Robert Michulec, Mirosław Zientarzewski

T-34
MYTHICAL WEAPON



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Photo credits sources:

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- Archiwum Towarzystwa Przyjaciół Fotografii (Society of Friends of Photography Archive), Cracow, Poland
- CAW — Centralne Archiwum Wojskowe (Military Central Archive), Warsaw, Poland
- contemporary press release
- Dmitri Karlenko
- D. Sieńkowski
- Sławomir Gonera
- Michał Szapowałow
- MWP — Muzeum Wojska Polskiego (Museum of the Polish Army), Warsaw, Poland
- PAP-CAF — Polska Agencja Prasowa — Centralne Archiwum Fotograficzne (Polish Press Agency — Central Photographic Archive), Warsaw, Poland
- Planeta pub.
- Paweł Kubiak
- Robert Bock
- Steven Zaloga
- Thomas Anderson
- T. Ogrodniczuk
- Victor Kulikov
- WAF — Wojskowa Agencja Fotograficzna (Military Photographic Agency), Warsaw, Poland
- WIH — Wojskowy Instytut Historyczny (Military Historical Institute), Warsaw, Poland

- Acknowledgements -

Leszek Erenfeicht	*translation of pt. 1*
J. J. Fedorowicz	*translation of pt. 2*
Witold Hazuka	*drawings*
Krzysztof Pałubicki	*drawings*
Jacek Jackiewicz	*drawings*
Arkadiusz Wróbel	*cover artwork and color plates*
Dariusz A. Lipiński	*3D drawings*
Katarzyna Kwiatkowska	*typesetting*

ISBN 0–9781091–0–4

© book by Robert Michulec
© translation by J. J. Fedorowicz, L. Erenfeicht
© drawings by W. Hazuka, J. Jackiewicz, K. Pałubicki

- ENGLISH VERSION OF "T–34 MYTHICAL WEAPON" published by -
AIRCONNECTION, 2355 DERRY RD. E UNIT # 7, MISSISSAUGA, ON, L5S 1V6 CANADA
Phone: 905 677-0016, Fax: 905 677-0582, www.airconnection.on.ca
in cooperation with Armagedon Books, armagedonbooks@poczta.onet.pl

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- Printed by -
Drukarnia POZKAL
ul. Cegielna 10–12
88-104 Inowrocław
tel. (+48-52) 354-27-00

PRINTED IN POLAND

FOREWORD

Paging through the books on World War 2 history, be it great volumes written by professional historians with renowned names, or somewhat smaller ones written by passionate amateurs, general or detailed — it is very hard to find a single bad word written about the T–34. Each and every author who found it necessary to at least list the tank in a footnote, had praised it. This opinion is so widely recognized that it seems to have become etched in stone and is therefore indisputable. That overwhelming praise is so imposing that the T–34 is deemed to be a well-known tank, reviewed so many times that it yields no secrets. No one has even tried to find the other side of it, or for that matter — even to check if there were any dark sides to this wonder of 20th Century warfare. Phrases such as "One of the best tanks of WW2" is what most authors are content with, and deem to be an objective truth.

However, the reality was quite far from that glamorous picture. The quality of a weapon system is judged not only by the design features, but also by the ability to use it, and by the quality of its manufacture. All of these are questions carefully avoided by the rank and file praise authors — and not without a reason. It is easier for mainstream historians to depict the colors flowing in the wind over the battlefields than to examine complicated and difficult matters of logistics and technology of warfare — all those minute details that shape the outcome of human conflict.

The T–34 was a badly designed tank, manufactured from inferior materials under terrible conditions. Its fighting and traction abilities were not as great as is generally written. It was highly vulnerable to mechanical malfunctions, and the way it was employed tactically was one big misunderstanding. It was possible only after the war to create the high quality T–34 that we now know. It was the post-war T–34 that served for so many years in the Warsaw Pact and Soviet satellites' armies and played roles in the movies, such as the Polish TV series "Four Tankers and a Dog". The series is very popular to this date, despite a distinct propaganda seasoning generously added to it. It was this projection of the 1950s-made T–34 perfection upon the WW2 version that built the myth of a perfect tank.

This book is intended to answer how and why that happened. By showing both the dark and bright sides of the tank against the background of wartime reality, I have tried to show the T–34 in a correct perspective, free from the propaganda myths.

This is a subject so huge, that I had to limit the scope somewhat to put it all into one book. I have defined my mission as describing the T–34 against the backdrop of the war and exploring the phenomenon of its myth. This book is only about the T–34 itself and matters that directed its fate. As a consequence, the history of the various prototypes was more or less only sketched, while the derivatives based on the T–34 chassis are totally absent. On the other hand, the development of the basic design was described in as detailed a way as possible, under the given circumstances.

The second part of the book is devoted to two separate considerations; the role of the T–34 in the Polish Army (this is really a brief sketch as a full description would require an extensive separate volume), as well as a technical examination of this tank and its production in Poland. Readers who are not very interested in these matters will undoubtedly concentrate on the tank's appraisal or the color section, which was created with the cooperation of Mirosław Zientarzewski, and the 3D drawings by Darek Lipiński.

You will also find the serial numbers of the T–34's which were used by the Polish Army from 1943 to 1951. The percentage of the tank serial numbers which were received during World War II and are presented in the book is 99.9%, while of those which were bought after the war is 100%. The situation regarding the tanks bought after 1950 is much more difficult as the pertinent documentation is still shielded by secrecy laws and their contents are not available for viewing. The same applies to the use of the tanks in actions as well as the various facets of production (such as technological concerns). This limitation has affected the scope of my work, and consequently the content of this book.

The book contains a number of sets of technical drawings. They present a number of hulls (the T–34–76 version from 1942 and the T–34–85 version from 1944) and turrets (their evolution from the end of 1940 to the beginning of 1945). This material will allow the reader, if he has the need for it, to complete almost every variation of the tank from the war period.

When it comes to technical drawings, I would like to make one simple point; at this time there are no good (correct) drawings of the T–34 available which show the individual series production tanks. Such plans are just starting to be assembled in Russia and will not be published in the near future. The vast majority of the published drawings contain errors as their authors have drawn them from other drawings, which in turn were partly created from instructions, that is, "paper materials". Meanwhile, the knowledge obtained during the examination of preserved specimens has shown irrefutably that each production run of the tank was uniquely different. It is a given that, with the exception of some

measurements crucial to the correct functioning of the tank (such as the width measured from the end of the axle of the left drive wheel to the end of the right wheel's axle), there are differences in the measurements of its many other parts. The differences in the length and width of armor plates and cast parts often reach to 2–3 cm and sometimes even up to 5 cm. There are known cases where turrets are mounted asymmetrically on hulls, being off center by several centimeters. Frontal hull plates have differing widths, and only the ends of the axles conform to the set standards, as they had to conform to the set measurements of the axle of the transmission gears. The drive wheels and the rest of the wheels had to be in a more or less straight line or the tracks would have been continually falling off.

The drawings included in this book have been assembled 90% from my own notes, which were made during extensive bivouacking at tank monuments and in museums. Their margin of error is relatively small, but, keeping it in mind, does exist. This is self-evident since some of the existing examples in Poland (as well as the rest of Eastern Europe) have been put together from several different versions of the tank and do not in themselves necessarily reflect a particular concrete T–34 series production vehicle.

The use of the photos, a part of the almost 1,000 which I have and managed to stuff into this book, has supplemented my notes. I hope that they help the reader to analyze the T–34 independently. The information which does not exist in Poland (here I refer only to the turrets with the L–11 gun and the hull from 1940) was augmented by Russian literature and manuals.

It is obvious that this book would never have been written without the support of many people. Here are some of them whom I'd like to thank for their contribution: the Kęszycki brothers, Jerzy Majszczyk, Capt. Tomasz Ogrodniczuk, Dimitry Karlenko, Victor Kulikov, Mirosław Zientarzewski, CWO–3 Henryk Zaśko and last, but not least, Steven Zaloga. I would especially like to thank Dr. Tomasz J. Kopański (and his family) for their wholehearted support, in both the material and spiritual meaning of the word.

OF MYTHS; GREEK AND SOVIET

I hope that no one will be surprised by my statement, that war gives rise to an avalanche of myths — people need them during peace, but this demand skyrockets in time of a war.

The most famous myth creators thus far were the ancient Greeks — a nation that greatly influenced history, a sort of ancient Nazis. They were not just a benign nation of pleasantly smiling shepherds — their national sport became spilling their neighbor's blood, and some of their ideas would be quite disturbing these days. We are quick to forgive them their tiny imperfections, although calculated in tens of thousands of innocent lives — because they have left behind a compelling drama, describing all the tragedies they wrought upon the ancient world. We even like them for the lively and colorful mythology they created for their entertainment — and propaganda — purposes.

It is the same with the Soviets. Although unable to equal the ancient Greek's mastery in that field, the Soviets have nevertheless influenced the world's public opinion strongly enough to create the greatest myth of our times — the history of the Great Patriotic War. Thanks to gifted ghost-writers, the Soviet Union abounds in stories as compelling as that of Thermopylae in ancient times — not overly truthful, but heroic and mythical. As a consequence, the history of the Great Patriotic War is more of a collection of myths, described upon bronze plaques bolted to heroes' statues than the factual history, like in most other wars in the past.

Soviet post-war activity in the "history" field yielded one more novelty — in the former USSR, statues commemorate not only the fallen heroes and victorious battles, but also the weapons they used! We can find there monuments erected to honor the ZIS–3 cannon, the Katyusha rocket launcher and the "Sturmovik" — the Ilyushin Il–2 ground attack plane. Can you think of anything more abnormal than a monument erected to commemorate a tool of massacre?

Any such monument, be it one to the axe or Katyusha, symbolizes the myth connected with it, not the effectiveness or excellence of the piece of hardware. The ZIS–3 is reputed to be the best cannon of WW2, the Katyusha — allegedly the first tactical rocket launcher, the "Sturmovik" — the one-of-a-kind, best-in-the-world plane of its type. Not one of these propaganda labels has even the remotest connection to reality, because each is a classic example of effective agitation, not weaponry. It is the agitation, a public relations exercise, which fosters and fixes the myths, eventually seeping into the works of historians. That is the propaganda that created the "truth" about the alleged superiority of the Russian and Soviet soldier and his hardware. It was not some devious invention of the Bolsheviks, though great Western commanders and scientists (not always those harnessed by the Soviets to plough the ground for their seeds) have been spontaneously spreading that poisonous pollen for years. One can hardly accuse Frederick the Great of bowing to Soviet propaganda, when he stated in the latter half of the 18th Century, that the Russian soldier is the best. In order to defeat him, you must kill him. Then bayonet him. And then shoot the bastard — and only then you can be sure of your victory. Well, although Old Fritz's *bon mot* cannot be taken as a yardstick of reality (not to mention logic), it was etched in the West-



A T–34 photographed during a training charge in March 1942. On the turret we can see the word "Lazo" (name of the Revolution hero). In front of it there is a unit tactical sign, enclosed in a rhombus: a "2" over "045", indicating the 116th Tank Brigade. Judging by the rear of the turret, this vehicle is from a series production from the end of 1941.

- V. Kulikov's collection -



The wreck of an early series T–34 tank with L–11 cannon destroyed by a Waffen-SS unit in summer, 1941. Many minor details of the vehicle are visible, but the turret is what really catches the attention as it has been torn from the turret ring. Usually the ring was ripped off together with the turret (a cast one in this case). Obviously, the joining of the two components was not very effective.

- Author's collection -

ern historians' minds for centuries, and was VERY often quoted as a bona fide assessment of the Russian (Soviet) armies and individual soldiers. Seldom did one of them take a break to think what that meant, and to realize that the creator of Prussia was just impressed with the primitivism and resigned doggedness of the Russian peasant — as well as in desperate need of an excuse for his numerous defeats.

Such misunderstandings accumulated through the years and, as a consequence, we have a myth, according to which all the armaments that Russia or the Soviet Union produced are deemed perfect. We admire their hardware because it is so utilitarian, has no frills and it is just what it is — a tool of war. It is hardly popular knowledge that Soviet weapons were often simple to the point of being primitive, were mostly made of inferior materials, were of inferior quality, and had worse performance and combat capabilities than their Western counterparts. Even today, many specialists still deem primitivism a virtue.

Amongst those mythical weapons, along the lines of the Pepesha submachine gun, came the T–34 — pride of the Soviet peoples, "The best tank of WW2", "Tank ahead of it's time", "Tank like no other", "Incomparable tank", etc., etc., to list just a handful of titles bestowed upon it by mostly Soviet apologists and then copied by their Western acolytes. Many Western experts also fell in love with the T–34 — oh well, it is said that love is blind. It was built as a brick, had good looks, and presented itself well in the propaganda movies — by far the only source available in the West, as the tank itself was not readily available for first-hand acquaintance. As a consequence, well into the 1990s, this vehicle was generally held in very high esteem. Many who have not had the opportunity to physically examine one, still regard it as a perfect tank and a tanker's dream come true. Oh well, nightmares are also dreams, aren't they? Those apologists cannot (or would not) see that the image they believe was created by the self-admiring Soviets and propped-up by the defeated Nazi generals, who spread hysterical opinions to justify their blunders.

As a consequence, there exist two T–34s: the one we know from literature and cinematography, and the other, the real one. The one in the books was the standard tank of the mighty Soviet armies, crushing the opposition at will. The real one was not so much a perfect tank, suffering many drawbacks in design, as well as in quality of manufacture at the hands of unqualified workers. This real T–34 was not a revolutionary design that left its German or American contemporary opponents far back in the beaten field. And certainly, it is not the T–34 we all know — a mixture of rare hard facts, abundant half-truths, misunderstandings, generalizations and blatant lies, as is always the case with myths — be they Greek or Soviet.



This T–34 armed with an L–11 gun burned out in a Russian village and served the Germans as a signpost. The tactical sign of the 12. Pz.Div., whose soldiers destroyed the tank, can be seen painted on the turret. The rear external fuel tank has a large hole in it. Even though the tank shows no signs of burning, and there is no rubber ash piled around the wheels, it is obvious that fire has consumed the vehicle some time in the recent past.

- Author's collection -

T–34 — THE ALIBI OF THE WEHRMACHT

To state with any authority whether the T–34 was a wonder or a myth, one has to study the history and technical performance of the tank. That is what the second part of this book is all about. However, to understand where the myth of the T–34 originated, we have to take a good look at the point in the past when the tank in question drove onto the pages of history. This would explain how many misunderstandings amassed in those days and how they were later etched into the imagination of millions.

This part of the story begins not in 1937, when the technical story of the T–34 began, but in late June or early July, 1941, when the tank was first reported in action. Every lead that matters in our story emerged from the uneasy alliance between Soviet Russia and Nazi Germany that began in August 1939. It was then that both sides — Nazis and the Soviets — made the ultimate decision to wage war on each other, and started preparations. To the possible (probable even) amazement of many, that story begins not in Kharkov or Moscow, but in… Germany. The cast of leading roles is mostly made up of generals from the highest echelons of power in Berlin. They pulled on the strings attached to all facets of the German military machine, including the tank industry and the Land Forces HQ (Oberkommando des Heeres, OKH).

The German Panzerwaffe was — without a reasonable doubt — the finest military land force that the world had seen prior to 1942. The other branches of the Land Forces (das Heer) — artillery, infantry, remnants of the cavalry — were by far overshadowed by it. They were not so much awed by the technological advancement of the Panzerwaffe, but more by the operational capabilities of that formation. Technically, it was at the same level with all of the German armed forces — an uneven level, hardly revolutionary in hardware and rather limited, if not downright constrained, in means. The first tank of the Panzerwaffe was hardly a fighting machine at

all, and the subsequent models were designed at the same time and according to the same designs. That is why the Pz.Kpfw. II thru IV are so much alike.

The Panzerwaffe's standard tanks, (called Panzers in the West), the Pz.Kpfw. III and IV, went into production in 1937, after some two years of designing and testing. Both were the product of early 1930s concepts that shaped their features and armament. At the time of their introduction they were modern, and the military was satisfied with their capabilities. Even if they were not, there was not enough money to buy more and better tanks, so they had to make do with what they got. In 1937 it was deemed more fitting to build as many tanks as possible to fill the "paper" divisions, than to dwell too much on their suitability for future warfare.

The first Pz.Kpfw. IIIs and IVs had only a 15 mm (.60) thick armor, protecting the crew merely against small armor-piercing bullets and artillery shell fragments. Even at the time of their introduction, they were not fit for combat with such paltry armor. In early 1938 the armor was doubled to 30 mm. That was still a provisional solution, as already in 1937 a decision had been made to develop a totally new medium tank, whose performance, armament, and armor protection would enable it to fight similar opponents at distances over 500 meters (550 yds.). If the Pz.Kpfw. IV was a 20-ton class tank, its successor was planned to be in the 30-ton class before the first lines were drawn on paper. It was to be armed with a 75 mm short-barreled gun, the same as Pz.Kpfw. IV, but the armor was to be 50 mm (1.97-in.) thick, and the suspension was patterned after the best rough-terrain vehicles of the German Army — the half-tracked tractors. These basic guidelines were constantly changing, and the project tended to grow. New technological gimmicks were introduced; new arms and equipment. The basic concept though was unchanged — a box-shaped hull with the specified suspension.

Several prototypes were built, but none became the new standard Panzer. This was not only because they were found wanting, but because during the four years of their development, the factories were working on the prototypes mostly at their leisure. Even the state was not in a hurry to get their new tanks, and the stipends were sparse. Also, the military did not press the designers too much, as Germany conquered one easy prey after another. Of course, there were serious technological problems to overcome, which also slowed the development down.

The fact remains, though, that up until the spring of 1941, the pace of new tank development was not breath-taking by any means. About that time, the 1937 idea of the 30-ton class died a sudden but natural death, only to be reincarnated several months later in a radically different guise, energetically sought after by both the military and state officials. What happened during these 6–7 months of 1941 that made such radical changes necessary, and in such a hurry? To answer these questions, let us go back several months.

As a consequence of the mutually profitable German-Soviet co-operation initiated in the summer of 1939 by the Ribbentrop-Molotov Pact, in late October and early November 1940, a team of Soviet munitions, military



This early series T–34 was blown off the road into the ditch by a near miss from an aerial bomb. There is no trace of a fire, but the rubber tires have burned out.

- Author's collection -



This T–34, armed with an F–34 gun, has been towed from the battlefield to a collecting point for captured equipment, summer 1941. The tank's appearance is typical of the early 1941 series T–34s. Note the extended fenders.

- Author's collection -

and intelligence specialists visited the Third Reich. The guests were offered unprecedented access to the German munitions industry and its latest developments. They had an opportunity to see with their own eyes, touch, and even buy the latest in German armaments technology. For the technologically backward Soviet state, it was a true God-sent gift from heaven (had they believed in its existence).

Of course, there were tank specialists[1] present amongst the 60-plus members of the Soviet delegation. Amongst them were B.M. Korobkov, Professor N.I. Gruzdiev (heading the tank chair in the Red Army's Motorization and Mechanization Academy), and A.S. Zavyalov (chief armor metallurgy expert from the Izhorsky Industrial Works). They were not only shown the latest tanks and their assembly plants, but were even presented with the complete technological documentation concerning the armored plates' production methods then employed by the leading German steel mills! They also bought two brand new examples of the latest version of the Pz.Kpfw. III — the Ausf. E[2].

The Soviet guests demanded to be shown the very latest in no uncertain terms, insistently and sometimes putting much stress upon their hosts' hospitality. They were so imposing during their visit to the Germans' most secret factories, designers' bureaus and proving grounds, that their German guides (designers, businessmen, military and of course — counter-intelligence officers) started to file official complaints. Many of these charged the Russians with plain industrial espionage and compared them to the proverbially nit-picking Post WWI Allied Disarmament Commission — to the latter's favor!

The tank delegation was as demanding — and for a good reason. Hitler himself promised to show them the latest in German armored technology. Instead, they were shown the Pz.Kpfw. IIIs and IVs. These clearly could not be the heaviest tanks of a state dreaming to be a world empire! The peskiness of the Soviet delegations gave their German hosts much to consider — the Soviets must have had larger and heavier tanks than the

[1] H. Guderian *Memoirs of a Soldier* (Polish edition, *Wspomnienia żołnierza*, Bellona 1991) states it was in the spring of 1941, but that is clearly a mistake. It might have been one of the previous visits, maybe in the spring of 1940, when the Soviet contract was being finalized.

[2] German technology was exchanged for Soviet raw materials, according to a contract signed on February 11, 1940. Soviet demands were vast and, surprisingly to the Germans, called mostly for military hardware, not industrial machinery as was previously (summer/fall of 1939) agreed to. These contracts were fulfilled starting in the spring of 1940, very reluctantly at first.

Panzerwaffe[3]. This was true, just as the Soviets were right about Germans hiding from them their secrets despite the alleged openness. They were not shown everything, that's true. The 30–ton class tanks remained hidden from them. The Soviets must have known about them from their intelligence sources.

German suspicions about the Soviet tanks rose slowly but steadily. It was not before early 1941 that they became aware of the true extent of Soviet development in that field. Why this knowledge came to the German generals, as well as rank and file soldiers, so late, is not obvious, but the source is known for sure. In November of 1940, after making a decision to invade the Soviet Union, Germany entered into military co-operation with Finland, a recent victim of Soviet invasion. The Finns did not have much in the way of natural resources to pay for the German arms, but they had something even more valuable than that — recent first-hand experience



Left: This T–34, armed with an L–11 gun, has been looted by "tourists" in one of the collection points for captured equipment, winter 1941/ 42.

- Author's collection -



This crew had no luck. Their early T–34 with the Panoramic Vision Periscope (Panoramniy Observationniy Pribor, POP) on top of the entry hatch, was probably ambushed by the Germans.

- ATPF -



An abandoned wreck of the first, before March 1941, series T–34. This photo shows all the identifying features of this version of the tank, often called the "Model 1940": the tracks, the driver's hatch, the L–11 cannon and the POP on the turret hatch (flat). Pay special attention to the turret front — the rounded "cheeks" are clearly different from the No.112 Factory's moulds, which were much flatter in this area.

- Author's collection -

of the combat capabilities of the Red Army, as well as accounts of encounters with the latest in Soviet military hardware. Amongst them were Soviet heavy tanks tested during their Winter War attempt to break through the Mannerheim Line on the Karelian Isthmus. The Soviets sent two SMK/T–100s (which the Finns even managed to photograph) and three KV–1 prototypes. The Finns reported not only their apparent size, but also their strong armor and potent armament. Gossip and hearsay about the new Soviet tanks were thus not only confirmed, but the reality proved to be even worse than expected. Now the peskiness of the Soviet guests was understood and the German specialists began to fear the image that started to emerge. The above would corroborate the period when the Germans became aware of the threat, stated as spring of 1941 in General Guderian's memoirs — even if the nature of the threat was falsely identified by the author.

Many Germans were convinced as early as the winter of 1941 that the encounter with a new Red Army tank was inevitable and imminent. General Fritz Halder noted in his War Diary that, on March 2, 1941, a Panzer-

[3] This story can be corroborated by a quote from Morozov's biography (V.D. Listrovoy and K.M. Slobodin *Konstruktor Morozov*, Politizdat, 1986, p.12): *"Specialists who examined the T–III came to conclusion that this is not the latest model, and that the Nazis are covering up to put our vigilance to sleep"*. Later, the authors concluded that the model the Nazis were covering up was the Pz.Kpfw. IV. This is rubbish, as this tank was not a secret at that time — even if the Germans did not highly publicize it prior to 1940. In his book *Protivoborstvo* (DOSAAF, 1989, p. 115), Ibragimov states that the Pz.Kpfw. IV was not hidden from the Soviet delegation, but they were simply not shown the tank. It is hard to establish which tank, if any, that was all about, and how the Pz.Kpfw. IV was presented to the Soviet delegation. The Germans claim that they did show the tank, just like everything else, except for the prototypes — and the Pz.Kpfw. IV was clearly not a prototype. According to Ibragimov (ibid), a German explained the lack of the Pz.Kpfw. IV by claiming that the tank was still on the drawing board, which is simply not true. Besides, if we are to accept the Soviet version, the Soviet delegation could not ask directly about the Pz.Kpfw. IV because in that way they would have revealed to the Germans that they knew about the tank from Soviet intelligence sources. The Soviets might have actually asked to see the most "modern tank", but the Pz.Kpfw. IV was not such a tank. The whole matter was probably based on a simple misunderstanding about what was what (to the unaccustomed eye the Pz.Kpfw. III and IV appear identical) or on a translation error (the Pz.Kpfw. IV Ausf.D was only just being started to be produced in October, which made presenting of the most modern model of Pz.Kpfw. IV impossible, and the Pz.Kpfw. III Ausf.F, produced since September, was indeed the most modern German tank at that time). The Soviet complaints of the Germans hiding the most modern hardware were dismissed by Goering, who said that only the prototypes were not shown. Clearly, the Pz.Kpfw. IV was not a prototype.



A very early T-34 abandoned at the streets of Lvov in June/July 1941. Note the details and spare clutches with gearbox stored on the engine cover.
- Author's collection -

waffe situation conference was held. Elaborating about the Soviet tanks, General Halder wrote that: "*They're probably mostly of inferior quality, but surprises are not to be excluded.*"[4] The question remained: what were the surprises? The leads were investigated shortly, and soon the truth was out; the Soviets really had modern heavy tanks. On March 30, 1941, during a staff conference in Berlin's Fuehrer's Chancellery[5], the generals related their unnerving discovery to Hitler. The Fuehrer spoke of Soviet armor respectfully, adding some details. According to his sources, the new Soviet heavy tank was 42–45 tons and had a long-barreled 100 mm gun. If that was the truth, his news would be alarming, indeed. If the planned 30-ton tank (weighing in at 32–35 tons) had a maximum of 80 mm (3.15-in.) frontal armor, then the Soviet 45-tonner could have a glacis of 120 mm (4.8-in.) thickness! And the 100 mm long-barreled gun? That would make defeating such a monster very hard — if at all feasible. All the Panzerwaffe was prepared to fight were medium tanks — and they had no viable opposition in that category. In France they had confronted Char B1s and Matilda IIs, whose frontal armor reached 60–80 mm (2.4–3.1 in.), making them the most potent armored fighting vehicles of the ETO. The Germans were not concerned because they already had a deadly effective "tank-killer" — their famous Acht-Komma-Acht, the 88 mm Flak 18/36 gun. As early as 1937, these were transferred from the anti-aircraft category to the dual-purpose, with their gunners being trained in anti-tank warfare. An effective armor-piercing projectile was developed, produced and issued. This was an admirable foresight on the part of the German artillerymen, given the thin armor of their own tanks of the era that 37 mm guns were more than enough to pierce. Thus, they were able to invade France with confidence. With the 88 mm guns, whose AP shot was able to punch through up to 100 mm (3.9-in.) of armor plate at 1,000 meters, riding shotgun to the Panzer chargers, nothing that the European opponents had in their inventories could be dangerous. A hypothetical medium tank of the 25 ton class with 55 to 90 mm (2.2–3.5-in.) — or 40–45 mm

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[4] F. Halder, *War Diaries*, Polish edition *Dzienniki wojenne* MON 1974, vol. 3, p.39.

[5] All Army Group and Army commanders were gathered there, as well as many staff officers from the OKH and OKW. Therefore, it can be assumed with a clear conscience that the Wehrmacht's entire high command was aware of the problem.

[6] H. Guderian *Memoirs of a Soldier* (Polish edition, *Wspomnienia żołnierza*, Bellona 1991) p.116.

(1.8-in.) set at an angle of 45–60° for that matter — was a fair prey for the mighty 88. A heavy tank was another pair of shoes altogether — a genuine challenge, both in design and in operational use. The Germans had enough experience in trying to master a heavy tank design to appreciate the fact of their opponent having developed such vehicles and using them in combat with apparent success, not to mention the awareness that would mean for anti-tank defenses.

Taking it all into consideration, the assorted German generals gathered at their Fuehrer's side should have been thrilled and shocked by what this fellow was prodding them to do — attack an opponent who had such powerful tanks. Nothing like that! Judging from Halder's notes, the news made no effect at all. General Fedor von Bock, present at the same conference, did not even take note of that intelligence report in his diary! Apparently he did not think it would be able to interfere with his plans for the upcoming operation. It looks like most of the generals were deeply asleep, or completely ignored their Fuehrer's revelations.

It is thus an established fact that three months before Operation Barbarossa began, the Germans knew — as opposed to "suspected" — that the confrontation with superior armored vehicles, more potent than anything they had, was inevitable. Then why were they so surprised by something they knew for sure? And more important for our story, why did the heavy tank threat evolve into a "T–34-phobia"? It looks as if the German generals played a major role, giving the T–34's designers and manufacturers a very effective complimentary PR job. General Guderian's memoirs, published as early as 1951, were also a key factor in the frenzy. He blamed the T–34, along with Hitler, for the defeat. His single word counted for more than a whole book written by anyone else. For the Germans, Heinz Guderian was THE tank expert. For the rank and file "Herr Schmidt" in the street, the opinion of this knowledgeable and influential Panzer leader, and front-line Panzer commander, was gospel.

To sum up the chapter about the Soviet armor experts' visit to Germany, which gave the Germans the first signal about what was brewing in the East, Guderian wrote: "*And which type of the modern tank that was, we learned when we first confronted the T–34 in July of 1941*"[6]. Well, it does not have to be that tank! Reading carefully Guderian's own later statements or other German staff documents, e.g. General Halder's war diaries, one can easily find leads to the contrary. Both Halder, and other generals, were being informed about mostly — if not only — the Soviet heavy tanks, hard to kill and majestic. It was these machines that put the fear of the Red Menace into the German generals, especially the KV–2, which was met with both fear and admiration by its would-be

An early T–34 in an embarrassing situation, whose effect can be seen by the expression on the mask of the Voroshilovets prime mover, July 1941. It appears that the T–34 was hit and then burned out while already "loaded" on the Voroshilovets.

- CAW -



opponents, for its sheer dimensions and potent armament — the 152 mm (6-in.) gun.

These chance encounters with the new Soviet tanks were copiously described in Halder's war diaries in the first days of the war. But again, only the heavy tanks are mentioned, which prompted many historians to assume that the Soviets had very few T–34s in the early stages of the Barbarossa campaign, and that these were largely dispersed. This was not the case. The KVs were just conspicuous, and for many reasons. First, this was a tank that had not been seen before in Europe, and everybody was just plain curious about it. Secondly, the KVs led the counterattacks, while the T–34s rode on the flanks, and often were abandoned by their crews for technical reasons. It is obvious, that the tank, even if modern and unknown, found in such circumstances, was much less interesting and awe-inspiring than the one you had to "kill, bayonet and then shoot" just in front of your trench.

Despite having knowledge about the Soviet heavy tanks as early as March 1941, Halder seems to be genuinely surprised by their appearance in the field. On June 24, he scribbled the hasty note: "*New enemy heavy tank!*"[7]. The most intriguing part seems to be that exclamation mark, further underscored by more notes written that day: "*New Russian heavy tanks appeared, with probably up to 80 mm guns, or even as much as 150 mm according to the Army Group North report, that seems incredible*"[8]. On June 25 Halder noted further information about German soldiers encountering a new tank, and that they were unable to name it other than "*a 52-ton tank with a 150 mm gun*" — obviously a KV–2. The "*75 mm armed tank with three machine guns*"[9] evoked as much interest. This was, of course, not the T–34, but the KV–1, because the former had only two machine guns.

It seems that among the many notes on Soviet tanks scribbled by Halder in these first hectic days of Barbarossa, there is not a single line about the T–34, as if only the behemoth KVs were of any interest to the military. According to the photographs though, T–34s were scattered around the Barbarossa battlefields in much greater numbers.

Having written about the Germans being surprised by the Red Army's tanks in July 1941, Guderian surely meant the KVs — even if he didn't know the name at that time. In the late 1940s, when he wrote his book, the memory of the KVs was long gone and the Soviet heavy tanks were IS–2s. The only 1941-era Soviet tanks still around were the T–34s that the Germans had fought all through the war. Although Guderian was a good tank operational commander, he might have not been in technical terms, as most of staff officers. He did not have to know the Soviet tanks intimately, because he did not fight them in any other way than by driving thumbtacks into a map. That may be the reason he pointed his accusing finger at the T–34s, and not KVs, or at least T–34s and KVs, as the nemesis of the Panzer soldiers. Since Guderian's first edition appeared in 1951 till the present day, anyone following his lead assumes it was the T–34 that defended Russia.

It would take more space in this book than is intended to list all of those who let themselves be misled by "Panzer Leader" Guderian. As an example of his influence, let us take a look at only two of the most renowned historians whose work brackets our field of interest.

Professor Hans Jacobsen, one of the most influential German historians in the late 1950s and early 1960s, who edited Halder's "War Diaries", put a footnote to the "surprise" entry. In this footnote he wrote that this was a T–34 — and then repeated it twice, in Volume 2 and 3 — misleading the less knowledgeable readers. These notes refer to the KV heavy tank, there is no doubt about it, and all of Halder's hints lead to that point. But not for Jacobsen, who doggedly labeled all tanks as T–34s, following the German Army veterans.

A similar situation occurs with Professor R. Stolfi, who recently stated in one of his works[10], striving to prove that the Germans were capable of winning the war with Russia in 1941, had they only pressed on regardless to Moscow, instead of changing direction towards Kiev. The T–34 is one of the pillars upon which he rests his theory. First, he gives a quite fair assessment of the real value of the tank, but then points out the fact that these were available in only limited numbers until early October, when they suddenly became an allegedly decisive factor in the defeat of the German "Operation Taifun" in the Battle for Moscow. Had the Germans made a dash for Moscow in August, before the T–34s became abundant, he says, they would very probably have captured the Soviet capital.

For us, the most important thing is that Stolfi evaluated the Battle of Mcensk as the turning point of the entire Soviet campaign and the description of the battle repeats almost word for word the account given by Guderian in his memoirs. Here we retrun to the officer who influenced the historiography of the era so much. His account of the Mcensk battle has had a surprisingly long life and hardly any historian, be it Western or Soviet, has been able to make do without Guderian's words about the battle. Let us take a look at what happened during these fateful, October 1941, days.

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[7] F. Halder, *War Diaries*, op. cit., p.34.

[8] Ibid. p.35. My emphasis. It is worth to emphasize that already in 1940 the Germans were using the self-propelled 150 mm sIG33 guns in combat — a fact that Halder appears to have no idea about.

[9] Ibid.

[10] R. Stolfi *Hitler's Panzers East* Alan Suton, 1992, pp. 164–165.



Gen. D.D. Lelushenko, commander of the 1st Guards Corps, which faced the 4. Pz.Div. at Mcensk and suffered heavy losses. Despite the laurels from historians, who credited him with "smashing" Guderian's troops, it is difficult to say anything good about his leadership during this battle.

- Planeta -



Gen. Heinz Guderian, commander of Pz.Gr. 2 (later 2. Pz.Ar.), whose memoirs became one of the pillars of the T–34's myth.

- CAW -

SOVIET REICHSWALD

Mcensk is a small town of almost no strategic value, to the northeast of Orel, across the Tula highway, a small riverine port on the Zusha River. That this township made history and is now the place of one of the most important battles of the Great Patriotic War, is thanks only to a string of coincidences — and Heinz Guderian. It was he who immortalized the name, by giving a description of the battle in which we can find the answers to all the nagging questions regarding the Soviet myth of the invincible T–34 and German "T–34-phobia". Without his assessment of the battle, the mere Stavka communiqué listing the hundreds of dead Germans and Soviet heroes whose memory lives forever, would not have influenced historians so much — there were hundreds of communiqués like that each day of the long four years of war.

On September 30, 1941, two days ahead of schedule, Guderian's Pz.Gr.2 moved to attack the lines of the Soviet 13th Army, unofficially starting "Operation Taifun". As usual, the Soviet defenses were broken without undue strain, and the behind-the-lines operations were conducted more or less as planned. In places, the deteriorating and erratic weather posed more serious opposition than the Red Army. Throughout the night of September 28/29, light rain fell, with showers all the next night. As the XXIV Pz.Kp. (Panzer Corps) moved on September 30, it was still raining, as on each previous day. Heavy, low clouds limited the visibility, and the roads, already poor before the rains set in, were getting worse by the minute.

Guderian's forces were spearheaded by the 4. Pz.Div.[11], then commanded by Gen. Frhr. von Langermann und Erlenkamp. The main force of that division was Pz.Brig.5 under Obstlt. Eberbach, initially numbering three battal-

[11] Most of the information about the actions of the 4. Panzer Division comes from D. von Saucken *4. Panzer-Division*, Bonn 1985 and J. Neumann *Die 4. Panzer-Division* — Bonn 1989. Additional material came from *Geschichte der 3. Panzer-Division Berlin-Brandenburg 1935–1945*, G.Richter Verlag 1967.



Col. M.Y. Katukov (standing on the right) with the crew of a KV–1 of his brigade. While this photo is captioned as taken in December 1941, a thin layer of snow and the soldiers' relatively light uniforms suggest an earlier date — maybe even October. It was then that the first snow fell in the area of Mcensk. The snow did not stay, which may be the reason for this particular winter painting. The way of camouflaging the tank clearly illustrates the tactics of the 4th Tank Brigade (later the 1st Guards Tank Brigade) during the battle.

- V. Kulikov's collection -

ions of the two regiments: the II./Pz.Rgt.6 (of 3. Pz.Div.) with the I./ and II./Pz.Rgt.35 (this regiment was commanded by Obstlt. Hochbaum). Both of Pz.Rgt.35's battalions, I./ under Maj. von Lauchert and II./ under Maj. Frhr. von Jungenfeld, numbered 110 tanks between them. These were mostly worn out, as the replacements from the Reich in September were few and far between. The 3. Pz.Div.'s Panzer Regiment was much better off, with 135 tanks, including 18 Pz.Kpfw. IVs. On October 1, when fresh tanks from the Reich crawled off the rail flatcars, the Regiment was augmented to 170 tanks. However, even that proved too little to influence the outcome of the Battle of Mcensk.

Racing toward Orel, the 4. Pz.Div. swept the highway clear of any Soviet opposition. Thanks to the initiative and decisiveness of the German soldiers, but in no small part due to the indolence of the Soviet command, Eberbach's men took one bridge after another before they could be blown up. Using a brief three day period of clear weather to the utmost, they made steady progress. Between 0635 hrs on September 30 and 1500 hrs on October 3, the Division covered as many as 240 km (150 miles) — a remarkable achievement for the era, and with only minimal casualties. And then, in the afternoon of October 3, when the Germans closed on Orel, for the first time they had to actually fight their way through the Soviet defenses.

Spearheading the Division was the so-called *Vorausabteilung Hochbaum*[12]. It consisted of highly maneuverable units — Pz.Rgt.35 tanks with the K.34, a motorcycle infantry battalion, supported by several motorized artillery guns.

The unit advanced towards Orel on a side road, over the bridge adjacent to the airfield, designated as the landing zone (LZ) for Lt.Col. S.M. Kovalev's 2nd Battalion of the 201st *Wozdushno-Diesantnaya Brigada im. S. M. Kirova* (S. M. Kirov 201st Airborne Brigade). The Brigade was an element of the 5th A/B Corps, thrown into the fray by the direct emergency order of the Stavka,

[12] Similar to "Advance Guard" in English.

the Soviet High Command. The paratroopers were better organized, less demoralized and higher motivated than the local troops, and they put up a staunch defense. Thrown into the middle of the ensuing hell, they had no option but to fight for their survival with what little ammunition (two fire units per capita) and heavy weapons they had.

Supported by tiny Orel garrison units that had not yet given in to the hysteria of defeat, they began by damaging (there was not enough explosives to blow it up completely) a road bridge on the main road towards the city. This cut off the left, slower, prong of the German attack. A few faster tanks of the Vorausabteilung with a handful of motorcyclists were to force their way into the city alone in a bloody and desperate battle against the fanatical, if lightly armed, Soviet paratroopers. The attackers used what little artillery they had to their full advantage and decimated the defenders, taking the airfield with several transport planes. The Germans losses were serious though: 58 casualties, including 16 KIA.

After nearly an hour of fighting at the outskirts of Orel, they eventually fended off the Soviets and pushed into the city itself. Two tanks of the 6./Pz.Rgt.35 under the company commander, Oblt. Wollschlager, had penetrated the defense and entered the city. The gap was exploited by the Brigade's Stabskompanie tanks, followed by several others. The Panzers drove quickly along the wide downtown lanes, heading for the railway station and the main bridge. As the tanks roared through the streets, the citizens who were peacefully returning to their homes by streetcars were watched with amazement by the German tankers. Some residents even waved and cheered, thinking they were a Red Army unit! The surprise was complete.

The lack of an organized defense and the lightning speed of their actions allowed the Germans to take over Orel without much trouble, with a mere handful of tanks. It was only after 1900 hrs that the motorcyclists of the K.34 and I./Inf.(mot.)Rgt.33 were able to catch up with the tanks. Chaotic warfare went on for most of the night, as there were too few Germans to control all of the big city. Instead, they held onto the key points, such as the railway station. Despite this, several tanks probed as far as 2 km east of the city and into its suburbs at 1700 hrs, immediately after entering Orel.

Throughout the night, Orel was occupied with more and more 4. Pz.Div. units. It took, however, well into the afternoon on October 4, to occupy a sizeable part of the city. It was the only division of the XXIV Corps to reach its scheduled objective on October 4 and 5. The other units, 3. Pz.Div. and the following 10. Inf.(mot.) Div., lagged behind in traffic jams on the crowded highway. Each of these divisions had their own goals; the 10. Inf.(mot.) Div. secured the rear left flank of the Corps,

Heroes of the Mcensk Battle



Portrait of Katukov as Marshal of the Soviet Union in the 1960s.

- CAW -



Obstlt. Eberbach (right), the commander of the 5. Pz.Brig. during the Battle of Mcensk, was wounded there when his Pz.Bef.Wg. III was hit by a T–34 shell. The photo shows him in the spring of 1944, visiting the 4. Pz.Div., with which he served at Mcensk.

- CAW -



This BM–13 (Katyusha) rocket launcher was captured by the Germans after they broke into Mcensk on October 10. This vehicle belonged to the 9th Guards Mortar Regiment, part of the 1st Guards Corps. Their novel armament played a minor role in the battle because only part of the unit was attached to the Corps.

- MWP -



A T–50 burns in the area of Mcensk in October 1941. This vehicle belonged to the 11th Tank Brigade, one of the few units to be issued these very rare tanks. Not many more than 50 were ever assembled.

- MWP -

sealing the Bryansk Pocket, while the 3. Pz.Div. was to exploit the successes of the 4. Pz.Div. on the right flank, at first by leaving the highway and advancing eastward across the fields. This plan did not work, either. The 4. Pz.Div. was the first to use the highway and its vehicles were able to gun along, not having to negotiate the rain-soaked terrain. Gen. Model's division had to leave the highway (or rather, to be more precise, the "highway") and encountered countless problems in the process. As of October 1, the HQ was bombarded with dispatches and reports about tank and truck columns stuck in the mud. As a consequence, the decision was made to return to the highway and advance along it, in the footsteps of the 4. Pz.Div. After the whole night of negotiating back what was covered during the day, in the morning of October 4 the division at last started its advance eastward, only to get stuck again, this time in traffic jams. The weather cleared a bit, and immediately Soviet aircraft appeared, bombing and strafing the crowded highway. On October 3, it was decided to leave the highway again and send battle groups probing along various routes, mostly to the northeast. One of these was still following the 4. Pz.Div. toward Orel.

All of these combined to seriously deplete the units closing in on the future battlefield around Mcensk. During the three of the four days that elapsed since the 4. Pz.Div. HQ's daring raid through the streets of Orel, German units poured into the city, rapidly extending the "feeding status" of the Division to the enormous number of 35,000[13]. However, the Division itself had no more than 10,000 troops. Of these, only some 6,000[14] men could be rated as first-line troops (infantry, anti-tank units, reconnaissance and pioneer companies).

It was not any better in the Panzer units. Langermann's Division was sent into combat with 204 tanks,

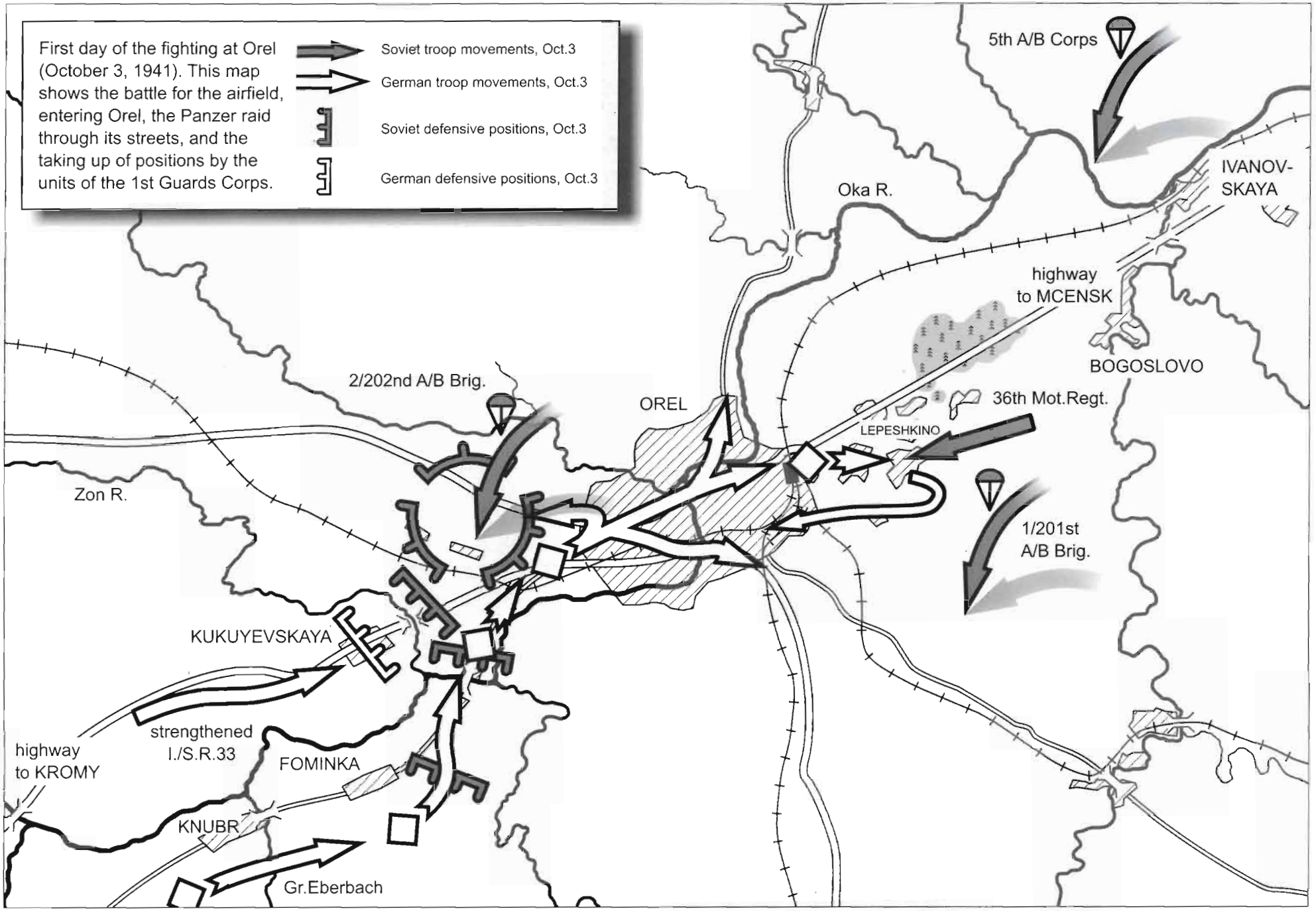
This T–34 was knocked out by the 4.Pz.Div. at Mcensk in October 1941. It appears that the crew tried to reverse from the battlefield but German artillery immobilized it. One of the tracks broke and the crew tried to repair it. If this was a tank from the 4th Tank Brigade, this photo would corroborate that STZ tanks prior to fall of 1941 were almost identical to those from the No.183 Factory. The changes at STZ were brought in during the fall, while the 4th Brigade was issued tanks from August's production.

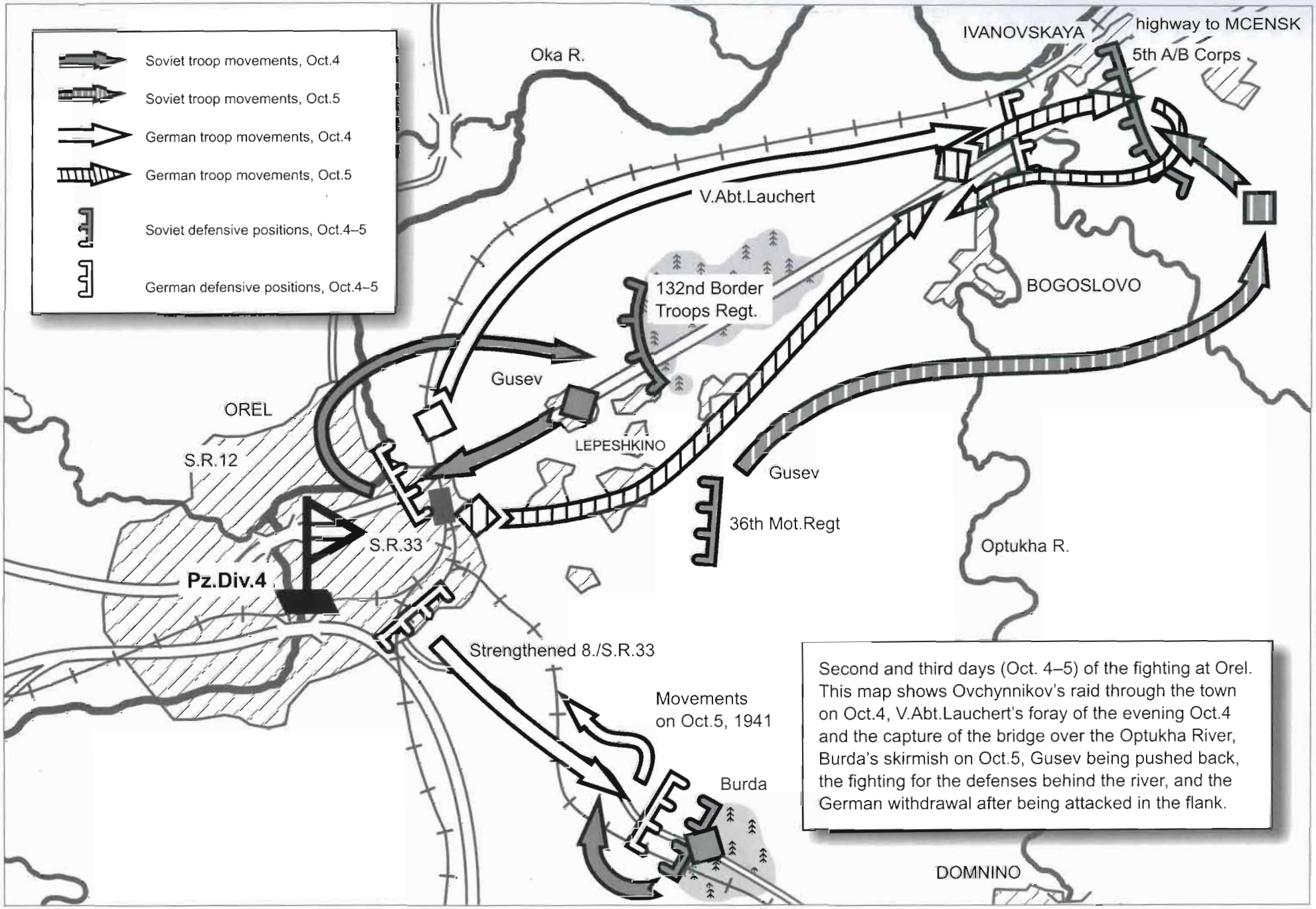
- MWP -



[13] According to the German military administration system, all forces supplied by the larger units were taken into its account of the "feeding status", including the Divisional HQ civilian auxiliaries, the POWs, the Hiwis etc. This even included the rear echelon, soldiers cut-off in traffic jams behind the lines, Corps units attached and 3. Pz.Div. units subordinated operationally to the 4. Pz.Div, etc.

[14] The 3. Pz.Div. numbered as many as 15,000 people in its "feeding status" on September 28, but amongst these were even the RAD battalion rebuilding roads, etc.


First day of the fighting at Orel (October 3, 1941). This map shows the battle for the airfield, entering Orel, the Panzer raid through its streets, and the taking up of positions by the units of the 1st Guards Corps.
Soviet troop movements, Oct.3
German troop movements, Oct.3
Soviet defensive positions, Oct.3
German defensive positions, Oct.3
5th A/B Corps
IVANOV-SKAYA
Oka R.
highway to MCENSK
BOGOSLOVO
2/202nd A/B Brig.
OREL
36th Mot.Regt.
LEPESHKINO
Zon R.
1/201st A/B Brig.
KUKUYEVSKAYA
strengthened I./S.R.33
highway to KROMY
FOMINKA
KNUBR
Gr.Eberbach



Second and third days (Oct. 4–5) of the fighting at Orel. This map shows Ovchynnikov's raid through the town on Oct.4, V.Abt.Lauchert's foray of the evening Oct.4 and the capture of the bridge over the Optukha River, Burda's skirmish on Oct.5, Gusev being pushed back, the fighting for the defenses behind the river, and the German withdrawal after being attacked in the flank.

unit	*commander*
5th Guards Rifles Division	Col. P.V. Mironov
6th Guards Rifles Division	Col. K.I. Petrov
41st Cavalry Division	?
4th Tank Brigade	Col. M.J. Katukov
11th Tank Brigade	Lt.Col. V.A. Bondarev
5th Airborne Corps	Col. S.S. Gurev
36th Motorized Infantry Regiment	Capt. T. Tanashchishin
132nd[16] Border Troops Regiment	Col. Piyashev
9th Guards Mortar Regiment (Katyushas)	Maj. Shamshin

of which 169 were in Pz.Rgt.35. Other than that, there were 35 armored cars, 43 armored personnel carriers, 183 half-tracked tractors, almost 3,000 cars and trucks, and over 1,500 motorcycles. Many of these were already lost by October. The most severe losses were in mechanical transport, prohibiting the Division from moving quickly. There were only 59 combat-effective tanks available on October 4, 1941 in Orel. The rest of the September 30 report showed that 110 tanks were lost along the way, either damaged (35) or destroyed (6).

The situation was therefore far from satisfactory. Within days, it was to deteriorate even further. On October 4, in the afternoon the bad weather struck again. The rains fell constantly and rose steadily in intensity. The 3. Pz.Div., trying to pursue its objectives to the left of the 4. Pz.Div., was stuck in the mud and sand again. On that day, the fuel column of the stuck division needed 6 hours to cover as little as 7 kilometers (4.4 miles)! The 4. Pz.Div.'s main forces were better off, because there were paved roads in the city — but its supply trains were lagging far behind, caught in the traffic jams on the highway.

Throughout October 4, the German forces did not undertake any aggressive moves. In addition to the unfavorable circumstances (lack of troops, supply problems), a H.Gr. Mitte (Army Group Center)'s directive ordered all units to stay on the left bank of the Oka river. The offensive towards Tula was not considered at all — that question was still being discussed at the OKH level.

The Germans limited their activities to sending out patrols and consolidating the eastern defense perimeter of Orel. This soon paid a dividend as, around 1400 hrs (German time), eight Soviet tanks entered the city from the east. A short while earlier, reconnaissance reported that the Tula road was not defended by the Red Army,[15] so the incursion was not thought to be of great importance — just one armored probe more or less. In recent days there were scores of such incidents, like on October 1 at Sevsk, where two attacks of three to six Soviet tanks, including heavies, were fought off with one heavy tank being immobilized.

This lack of concern was to cost the Germans dearly, though. These were not some local counterattacks, but the spearhead of the forces thrown into battle by the Stavka on September 30.

When the Germans struck on the last day of September, the Stavka was not sure what was brewing. The attacked sector of the front sent soothing, cheery reports up the chain of command, totally out-of-synch with reality — and then the communications suddenly broke down. After the basic facts were established according to the neighboring sectors' reports, the Kremlin re-evaluated the threat and decided to send the reserve units to plug the gap. These reserve units, hastily collected behind the front, were organized into the 1st Guards Corps and Gen. D.D. Lelushenko was appointed as commander. He had a sizeable force under his command; two infantry divisions, one cavalry division, two tank brigades, two airborne brigades with the A/B Corps HQ, and four independent regiments.

Several smaller units were incorporated into the Corps as well, including the Cadet Battalion of the Tula Officers' School, commanded by Maj. V. Pronyaev. Aside from the 5th and 41st Divisions, which were too far on the flanks of Mcensk, the rest were poised to attack the beleaguered 4. Pz.Div. Numerical superiority was certainly on the Soviet side. Each of the two infantry divisions fielded 10,000 troops, there were two tank brigades with another nearly 1,000 troops in their infantry battalions, two independent regiments with the Tula battalion, giving 2,000 more troops, and 5,000 more in the airborne corps: altogether 20,000 troops[17], with more than 15,000 in first-line units.

Manpower was not the only threat. The Corps had more than 100 tanks (excluding the light tanks and tankettes), including over 50 modern ones, and 18 Katyusha mobile rocket launchers. The Border Troops had anti-tank rifles, another novelty, and the infantry was well armed with F–22 76.2 mm long-barreled divisional cannon, very effective as an anti-tank weapon. After the Guards Corps moved, an anti-aircraft artillery bat-

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[15] On October 4 Halder noted, according to the reports he received, that *"Guderian reached beyond Orel to Mcensk, and is striking into a complete void"* (ibidem, p. 333). Hmmm, some void, indeed...

[16] According to other sources, it was the 34th Regiment, but that may be a mistake.

[17] It is possible that there were more of these, including some "indigenous" units.

talion with 85 mm M1939 guns was incorporated into the 4th Tank Brigade. This decision proved fateful at the decisive stage of the battle.

The hardware in many Soviet units was not only modern, but was also factory-fresh. The T–34s of the 4th Brigade were manufactured at the STZ in August, 1941. The trucks captured by the Germans had minimal mileage. The Corps had its own air force complement, comprising as many as four air regiments, with 80 airplanes between them. The Soviet Air Force was not the most precise in bombing, but its pilots' skills were enough to bomb and strafe the Orel – Mcensk highway that was densely jammed with German supplies and troops. In the kind of weather that developed after October 3, this was perfectly adequate.

Both Soviet tank brigades had a full complement of tanks, totaling 46 each according to the TO&A. Speaking of these tables, they were revised as of September, and the 4th Brigade, organized according to the previous one, had even more tanks — since the brigade comprised an armored regiment HQ, it had 49 tanks[18] instead of 46. The regiment under Maj. Yeremin comprised two tank battalions, whose strength was set according to the Brigade's HQ needs. The August guidelines called for the 1st Battalion to be the "medium" (with medium tanks), while the 2nd was to be the "light" one. The September revision called for two mixed battalions, but the brigade had these units organized in their own way. The 1st Battalion, commanded by Capt. Gusev, was the "armored fist" of the brigade, with only the most modern tanks — heavy (a KV company), medium (T–34 company) and light (T–60 company). The other (under Maj. A.A. Raftopullo) was charged with exploiting the successes of the "fist" and consisted mostly of BT–7 tanks. A total of four KVs and T–34s were also in the brigade and regimental HQs. Apparently, the battalions had a different number of tanks: the 1st seems to have had 25 tanks (7 KV–1s, 10 T–34s and 7 T–60s in three companies plus 1 in the HQ), while the 2nd numbered 20 tanks in two companies. Each battalion had two or three companies, with two or three platoons in each, and one tank at the HQ.

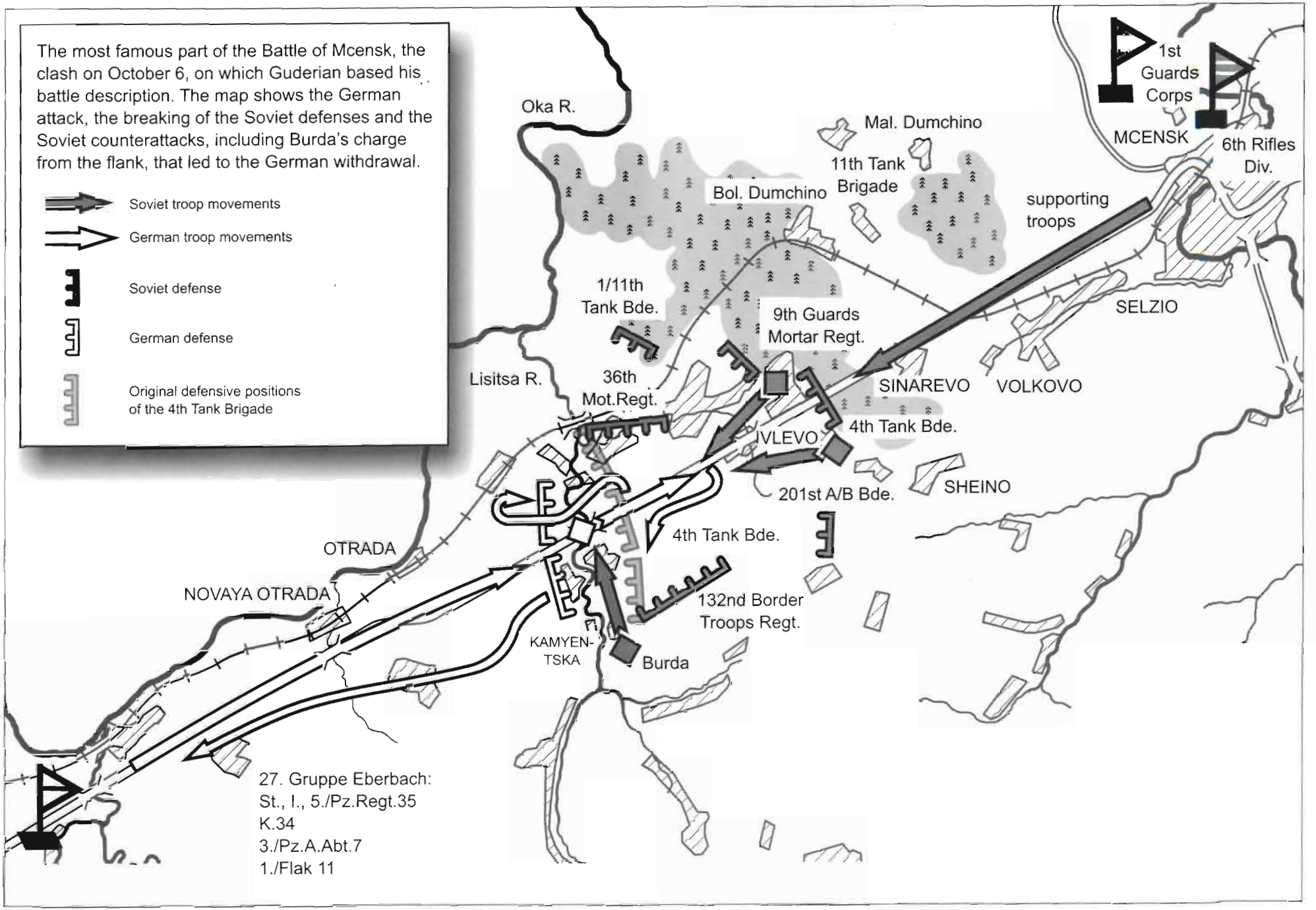
The 11th Brigade was organized similarly but, in addition to the KVs and T–34s, it also had the light T–50s. How many it had of the latter, and whether they were operating together or mixed with the older (BT–7s, most probably), is not known. Regardless, this data is enough to show that the Soviets had as many as 95 tanks at Mcensk, including at least 40 plus of the most modern models. But they were not only T–34s, to which the Western historiography parroting Guderian attributes the victory, but also — often not mentioned — heavy KV–1s. Contrary to the other authors, we will bear that in mind.

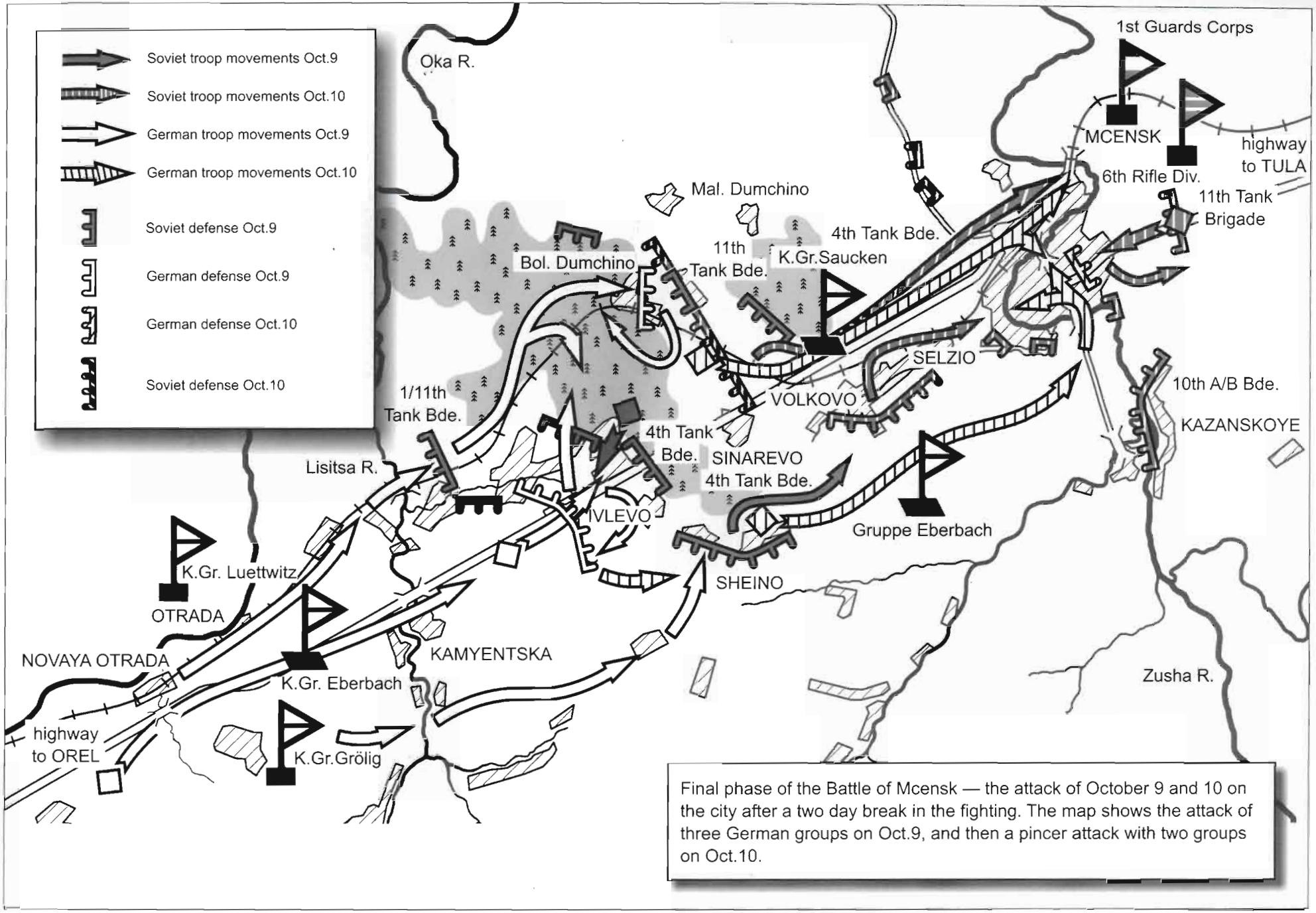
Summing up, the 4. Pz.Div. was significantly weaker than the 1st Guards Corps. And the difference was not merely several hundred soldiers — it was a quantum leap. With over 9,000 combat-effective first-line troops more than the Germans, the Soviet forces had a superiority of 2:1. It was much the same with the tanks: on the day the Battle of Mcensk began, the Soviets had a 1.6:1 numerical advantage in tanks. But it was not only in the numbers that the Soviets had superiority — the Red Army fielded heavy tanks there, while the Germans had not a single heavy tank at their disposal. They had only 10 Pz.Kpfw. IVs, hardly a match for the KV. In addition to these, they had several command tanks, and Pz.Kpfw. IIs, which were in fact suitable for reconnaissance duties only. On the other hand, all Soviet tanks, even the older light ones, were combat vehicles with serious anti-tank capabilities.

The Germans had more artillery barrels (both sides had rocket artillery at the time), but the Soviets had their own Corps' air force, and they were operating close to their supply depots in both Mcensk proper and Tula. This was to be one of the most decisive factors in the outcome of the Battle of Mcensk. It was the supply situation that in fact stopped the German offensive at Mcensk. The Germans had to struggle each day to supply their troops in "Operation Taifun", and the magnitude of the problems involved meant the momentum was lost with each consecutive day. All of the Pz.Kp. XXIV's supplies had to pass through one bottlenecked, narrow, bombed road, asphalted only from Orel to Krom in their direction, and then from Orel towards Mcensk, eastward. To supply the Corps using this road, a highway only in name, it had to be captured, held and then negotiated by the trucks. That, contrary to the hopes of the Germans, was not the easiest part of the task. If, before October 1, the 4. Pz.Div.'s main force was only partially affected, then after October 3 the situation proved nothing short of a fully-blown disaster.

Even before reaching Orel, tank units had drawn heavily on their own stashed stocks of gasoline that even the Divisional HQs did not know about. Between October 3 and 5, these stores were only sufficient to stave off the catastrophe until a little later. The offensive was halted so that the little stashed fuel proved to be enough for two to three days. But then the tanks ran out of ammunition and the weather became an issue. It was already raining between September 28 and October 1 when the skies cleared, but only for a day and a half. During that time of year it was still warm in the daytime, with a sub-

[18] According to M. Katukov, *Armored Spearhead*, Polish edition *Pancerny grot* MON 1976, p. 33, there were 49 vehicles, only to drop to 46 two pages further. However, I. Moschanskiy (*1941: Taktika tankovoy voiny*, OOOPKV 2001, p.24) corroborates 49 as the number. However, the three-tank difference, whether genuine or not, did not matter; either way, it was a fully equipped unit.


The most famous part of the Battle of Mcensk, the clash on October 6, on which Guderian based his battle description. The map shows the German attack, the breaking of the Soviet defenses and the Soviet counterattacks, including Burda's charge from the flank, that led to the German withdrawal.
Soviet troop movements
German troop movements
Soviet defense
German defense
Original defensive positions of the 4th Tank Brigade
Oka R.
Mal. Dumchino
11th Tank Brigade
Bol. Dumchino
1st Guards Corps
MCENSK
6th Rifles Div.
supporting troops
1/11th Tank Bde.
9th Guards Mortar Regt.
SELZIO
Lisitsa R.
36th Mot.Regt.
SINAREVO
VOLKOVO
4th Tank Bde.
IVLEVO
201st A/B Bde.
SHEINO
4th Tank Bde.
OTRADA
NOVAYA OTRADA
132nd Border Troops Regt.
KAMYEN-TSKA
Burda
27. Gruppe Eberbach:
St., I., 5./Pz.Regt.35
K.34
3./Pz.A.Abt.7
1./Flak 11



Final phase of the Battle of Mcensk — the attack of October 9 and 10 on the city after a two day break in the fighting. The map shows the attack of three German groups on Oct.9, and then a pincer attack with two groups on Oct.10.



This T–34 (F–34 gun) is still smouldering after being "cooked" by the Germans on the streets of a small Soviet town. Two crewmen were killed while bailing out, thanks to which the local population became richer by one pair of boots.

- Author's collection -



An immobilized T–34 (L–11 gun) abandoned by the crew at the Rozhany battlefield. The battle for Rozhany, in which the Soviet 6th Mechanized Corps participated, was fought two weeks after the start of the war. The Soviet soldiers, at least three, trying to shelter under the tank, were all killed. Soviet 45 mm anti-tank gun is visible in the foreground.

- CAW -

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[19] This tank did not belong to any tank brigade — it was probably a survivor from a destroyed unit.

[20] The Germans were using Berlin Summer Time, while Soviets were using Moscow Time.

[21] Contrary to appearances, the Soviet 8–10 kilometers (5–6 miles) and the German 2 kilometers (1.25 miles) may be referring to the same area, as the opposing sides could have been using different definitions of "the city of Orel". East of the city were small built-up areas, which could have been considered as Orel's suburbs or as its adjacent villages.

[22] The corps was armed with ten 45 mm antitank guns, approximately fifteen 82 mm mortars, and some 12.7 mm heavy machineguns.



Excessive speed or sharp breaking caused this T–34 to veer off the bridge and onto the stream bank. Many modern tanks were lost this way during the hot summer of 1941. Unlike the tank in the previous photo, this T–34 has only one external fuel tank left. The three missing tanks were probably taken by other crews. Initially, the Soviets fitted four fuel tanks on each vehicle and later eight.

- AFAAS -

stantial drop in temperature only after dark (the sun was then setting at 1630 hrs German time and rising at 0600 hrs). Then, on October 4, the weather changed — for the worse! The showers were ceaseless, often accompanied by gusting winds, driving the rain into the soldiers' faces. Dark clouds gathered over the German troops — in both senses of the phrase.

The first to confront the Germans were the paratroopers — both the remnants of the battalion beaten at the airfield, and fresh troops, airlifted to the LZs east of Orel and on the other side of the Oka River, at Ivanovskaya on the Optukha River. These troops were soon reinforced by the 36th Motorized Infantry Regiment, with 150 motorcycles and a single T–34[19] commanded by 2nd Lt. Novichkov. At roughly the same time, the Tula Officers' School battalion arrived in Mcensk in civilian buses.

The first to fire a shot at the 4. Pz.Div. were the motorcyclists. According to the Soviets, it was around noon on October 3. German sources are a little out-of-synch with this timing, but the difference is not sizeable enough to matter[20].

The 3rd Reconnaissance Group, accompanied by the lone T–34, reached the area 8–10 km northeast of Orel, and there encountered — and engaged — the Germans. During the brief encounter, Novichkov claimed two Panzers, then an APC and three motorcycles. According to the Soviet sources, the knocked-out Panzers were then towed back into the city. The 4. Pz.Div. chronicle corroborates that troops were dispatched 2 km[21] east of the city, and that two Panzers were indeed lost in combat on that day, but states that both were lost in skirmishes with the paratroopers. This might be a misunderstanding, though, as the paratroopers had no heavy weapons[22] enabling them to destroy these tanks. Perhaps these are in fact the two Panzers claimed by Novichkov, which would make them confirmed kills.

That night (October 3–4), the first railway transport with 4th Tank Brigade vehicles reached the Mcensk railway station, sent from Kubinka the night before. It carried the major part of the brigade's 1st Tank Battalion, with 16 modern tanks, along with a company of motorized infantry and the Brigade's HQ. A little earlier, the 132nd Border Troops Regiment arrived and immediately deployed towards the outskirts of Orel, taking positions in the forest northeast of the city and straddling both sides of the highway. Two of the 4th Tank Brigade's



The same tank photographed a short while earlier (?), summer of 1941. All features of the spring 1941 series vehicles can be seen on both photos: the early driver's hatch, two headlights, two tool boxes on the left fender and an additional small one at the back.

- Author's collection -

tank platoons were sent[23] even further: one was to reconnoiter the area east of Orel, the other southeast of the city. Three tanks were left in Mcensk. Both platoons were from 1st Lt. V. Rakov's medium tank company. The battalion's commander, Capt. Gusev, had overall command of the reconnaissance mission. He himself took over the nine tanks heading toward Orel, while the group of four tanks reconnoitering the area southeast of the city was placed under the command of 1 st. Lt. A. Burda. Each of the tanks carried some infantry, some of the 4th Brigade's own, partly from the Tula Officer's School (TOS), totaling 100–150 men. According to Lelushenko, they departed before dawn, while Katukov states that they departed at 1030 hrs.

After closing in on Orel, the Soviets found everything in perfect order. Capt. Gusev ordered Lt. Ovchynnikov's[24] platoon to enter the city proper. Gusev's outfit was spotted by a German fighter pilot patrolling over Orel. He dove toward the tanks several times, showing the approaching threat to the 4. Pz.Div. soldiers. Thanks to his efforts, the defenders were properly forewarned and had time to prepare a fitting reception for their guests...

Ovchynnikov's platoon was fired upon from short range, and the tanks were forced to withdraw after the German projectiles ignited the fuel drums carried externally on the tanks. The Soviet crews neglected to remove them before departure. One of the KV tanks was slightly damaged and had to withdraw further, towards Gusev's main forces. Ovchynnikov soon moved on again, this time supported by Rakov's platoon. Soon Gusev sent two more KVs into the city, remaining outside the perimeter with two more tanks (including a damaged KV) at the ready. A total of seven[25] Soviet tanks entered the city and fought there — according to Katukov — for as long as three hours.

Effective radio communication between the German units allowed them to organize and conduct a defense and then to counterattack. As a consequence, Soviet successes, if any, were limited. Their tales of the trucks and cannons crushed under the tracks are not worth much — as usual. They claimed that they destroyed as many as 19 tanks, 8 cannons and 100 trucks, while *"numerous German soldiers were trampled under the tracks"*[26]. In fact, only one Pz.Kpfw. IV of the 4./Pz.Rgt.35's commander was destroyed, while counterattacking. The whole

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[23] There is no agreement as to when Katukov appeared in Mcensk. He himself states that he had arrived during the night of October 3–4, and then personally ordered the reconnaissance units to advance towards Orel. Lelushenko, on the other hand, wrote that it was he who welcomed the first rail transport and ordered Burda and Gusev into action. According to him, Katukov arrived only with the second transport in the evening of October 4. In the author's opinion, Lelushenko's version is more believable, as Katukov frequently confuses the dates between October 2 and 4, and then writes that, after leaving Mcensk, he met the Orel Military District commander, who was entering the city. This is highly improbable, as Gen. A. Tyurin had to flee Orel in the evening of October 3 at the latest.

[24] Katukov (ibidem) states this was a platoon of medium tanks using T–34s. Actually, these were KV–1s because, according to reports, they had return rollers.

[25] The Germans counted eight tanks, mostly heavy ones. The additional one, a KV with damaged return rollers, was withdrawn. It is worthy to note that the Germans did not claim Ovchinnikov's tanks which they had set on fire.

[26] D. Lelushenko, *The Armored Trail*, Polish edition *Pancernym szlakiem* MON 1983, p. 60.

[27] At best these were the half-tracked prime movers that the usually Soviets identified as armored fighting vehicles. In the chronicle of the 4. Pz.Div., it is clearly stated that none of the reconnaissance units met any enemy forces. The loss entries in German records mention only losses in armored equipment and soldiers, not transport vehicles. It then appears that any victims of the Red Army's ambush, if any, must have been a supply column, or a similar group.

crew, including the company commander, was lost in the flaming tank. The number of destroyed cars and trucks is unknown, but safely can be struck down to a number 4–5 times less than claimed.

Four Soviet tanks were left in the streets of eastern Orel, hit by the 4./Pz.Rgt.35, anti-tank artillerymen with their 50 mm guns and two 88 mm dual-purpose guns. According to the German sources, two "52-tonners" were hit, which may be a mistake, as this is how the KV–2s were initially designated. The KV–1s, actually used, were the "44-tonner" tanks, but this was a common mistake in the 4. Pz.Div. documents — all heavy tanks are commonly known as the "52-ton" model. Comparing the Soviet and German sources, it is obvious that two KV–1s and two T–34s were lost — the latter seemingly so unimportant to the Germans that they did not even mention the name or tonnage category! Certainly they made much less of an impression on the Germans.

Even before the Soviet tanks began to roam through the city, the Germans started to send reconnaissance patrols 10–15 km deep in various directions. All of these parties returned unmolested, reporting no enemy troops. That would suggest at least that the reconnaissance was not a (typically German) thorough one. It seems that German patrols reconnoitering the Mcensk highway had not gone further than the Optukha River, and carefully avoided the woods infested with Border Troops.

According to the Soviet sources, Gusev's tankers had met one of these reconnaissance parties leaving the city and destroyed it. Three APCs[27] were reported to have been destroyed within 3 minutes, with the crew of the fourth (1 officer and 8 privates) taken prisoner. Combined with Burda's POWs taken a little while later, and the Border Troop's bag of the night, this made at least 20 4. Pz.Div. soldiers missing on that day — which is in stark contrast to the German personnel reports. Over the entire length of the week-long Battle of Mcensk, only one German soldier was reported missing and not accounted for! That would suggest either an en masse POW murder, or — also not so unusual — a doctoring of the engagement reports and the memoirs later on. Or both.

Paradoxically, it is the Soviet sources that tend to corroborate the "one soldier missing" German reports. According to the records, data on the 4. Pz.Div. location and intentions came from a single German human source (reported to be an officer captured with a map case). Lelushenko partly corroborates it too, quoting Marshal Shaposhnikov thanking his troops for "a prisoner" (singular) and "a map", not "prisoners" (plural).

The same situation exists concerning the number of the Panzers destroyed. Apart from the ones destroyed in

Another T–34 abandoned in a similar situation during the spring – summer of 1941, southern USSR. In this case, the driver was unable to avoid a large bomb crater. Differing from the tank shown in the two previous photos, this tank has the new type of cast turret introduced in late 1941. The hatch on the rear of the turret for dismounting the gun is secured with only four bolts instead of six. The cover for the engine compartment cooling slits is open.

- Author's collection -



Orel proper, Gusev was credited with 4 more from a column of 10 engaged during the night of October 4/5. Once again, there is no corroborating trace of such success in the German sources. In this case, though, it is almost certain that the skirmish in question was connected with a German action on October 4, which the Soviets might have just misdated.

After the German reconnaissance parties returned to Orel, the enemy's strength was underestimated and a decision was taken to make a dash for the bridge over the Optukha near Ivanovskaya. The bridge was needed for the 4. Pz.Div.'s further advance on Tula, and at 1500 hrs V.Abt.Lauchert was ordered to secure it. The Vorausabteilung, consisting of Panzers from the I./Pz.Rgt.35, augmented by 7./Sch.Rgt.12 and 5./AR103, departed after dark, widely circling the Verkhnaya Lushenka, where Gusev's tanks were holing up. Soviet fire on the column — if any — must have made an impression meager enough to skip over it in reports. At 1900 hrs, V.Abt.Lauchert, much alive and kicking despite Gusev's report, took the targeted bridge, unscathed and unopposed. This was done despite the Soviet force build-up on the other side of the river. Earlier, various detachments of the Soviet 36th Motorized Regiment, 132nd Border Troops Regiment, and paratroopers must have crossed the same bridge several times in both directions, while the 3rd Battalion of the 201st Airborne Brigade was digging in on the far bank of the river!

As Gusev faced the opposition, Burda waited, and he was soon to be rewarded for his patience. On October 5 the German divisional HQ ordered several combat reconnaissance missions. One of these was aimed at the village of Domnino, 12 km (7.5 miles) southeast of Orel.

On October 5, in the morning, the 8./Sch.Rgt.33 and two guns of the 1./Pz.Jg.Abt.49 moved on from Orel. The troops were traveling in a column of about 10 vehicles, with no tanks. Burda reported as much as a regiment (!)-strong infantry unit, with two APCs in front, then APCs intermittent with tanks, trailed by as many as three... heavy tanks! All in all, this group was reported to include as many as 15 tanks, numerous APCs and trucks.

Five kilometers (3 miles) south of Orel the column drove into Burda's ambush. It seems that the Soviets proved trigger-happy and did not wait long enough, thus giving the enemy warning and time to re-group and start shooting it out with the ambushers. The Germans proved much better at this type of fighting, used the terrain for cover, and even tried to outflank the Soviet ambush. Then they encountered Molchanov who, with his two tanks, precluded that attempt. The long skirmish ended with a German withdrawal, when they were attacked by a platoon commanded by 2nd Lt. A. Kukarin. The Soviet platoon quickly left its ambush position, and charged into the German rear. That attack decided the result of

This T–34 with the cast turret has been knocked out on the street of a Ukrainian town, summer of 1941. Note that the idler wheel on the left still has the rubber rim.

- Author's collection -



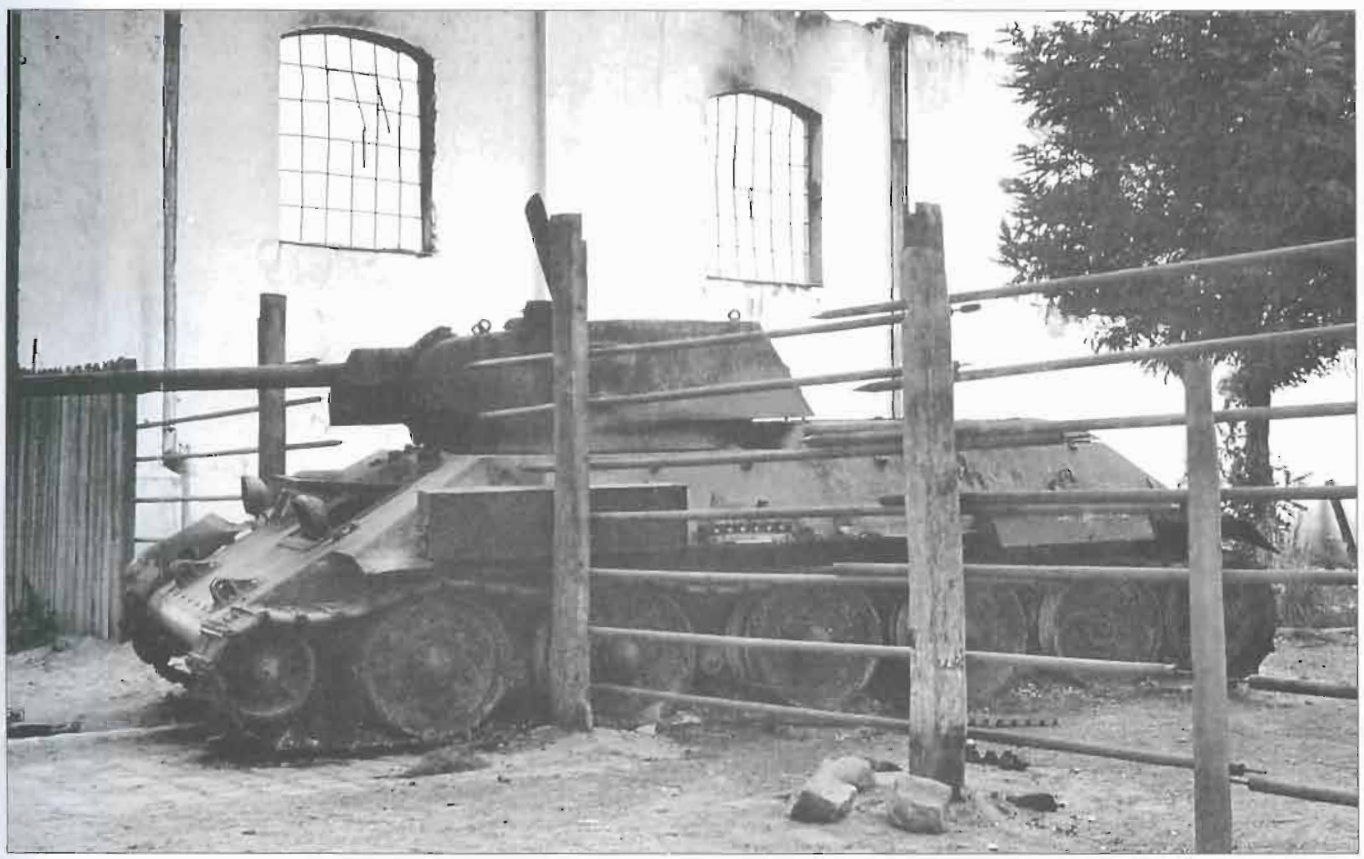


Above: A pair of T–34s abandoned in an improvised repair workshop, summer 1941. Details of the cast turret are clearly seen. This turret is shaped differently than the standard No.183 Factory's one. It is slimmer in the "cheeks", similar to the welded turrets. The turret entry hatch has a raised POP base, but the POP opening is already plugged. The glacis has the older style driver's hatch, a riveted front girder, two headlights. Note the large toolbox on the side mudguard — this is typical for the 1940–41 series tanks. All of the details point to vehicles manufactured in early spring. Also worthy of note is the clearly visible asymmetry of the turret.

- Author's collection -

Below: A T–34 of the same series destroyed by the Germans in the summer of 1941. The burned rubber tires made the burned out wrecks look like they were crouching.

- Author's collection -



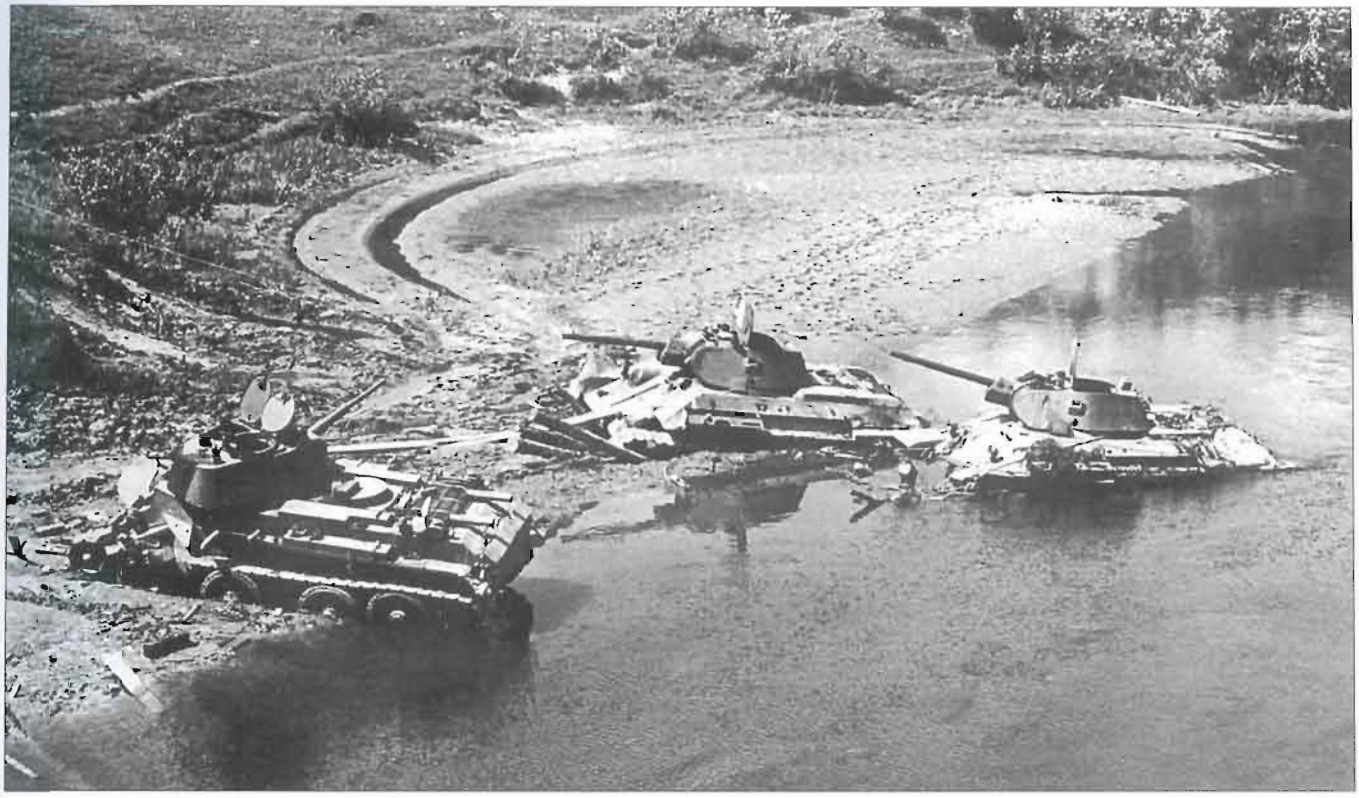
the engagement. The Germans, fearing certain annihilation, re-grouped and withdrew into Orel.

Later on nine Stukas reportedly appeared over Burda's forest and bombed it. However, the wooded patch was already empty, as Burda had also withdrawn after the Germans had left. After a long, circuitous march, he returned to his brigade during the night.[28] He reported there that his crews had destroyed ten enemy tanks, two anti-tank guns with their half-track tractors, five trucks and as many as 90 enemy troops. In fact, the German losses were negligible; only the two guns and trucks were corroborated, with no casualties.

Meanwhile, northeast of Orel, the 4. Pz.Div. was still following the Corps' HQ orders. Mcensk was the objective, planned to be captured before dark on the same day. However, the forces earmarked for the operation were too small. This is easy to understand when taking into consideration the fact that the Mcensk raid was considered more of a combat reconnaissance than an operational movement. The Germans had no idea of how deep the Soviet defenses along the highway were deployed, so they wanted to probe them and possibly improve their position before the main offensive in that direction. It was not the Corps' intention to engage in a major battle because; 1. no serious opposition was expected, 2. it would be contrary to the orders from H.Gr. Mitte and the OKH. According to its orders, the 4. Pz.Div. was to hold its ground and support the 3. Pz.Div. push northward, to seal the Bryansk Pocket. This was the most important task, as the Corps moved far ahead of the rest of the front. Pushing it further east without securing the supply route and any support was asking for trouble. All that the 4. Pz.Div. could do, was to wage a "private war" on a limited scale. That was why only V.Abt.Lauchert was pushed through Optukha on October 5. The 7./Sch.Rgt.33 was left at the bridge to hold it, while two 88 mm guns and a motorcycle battalion (K.34) replaced it in Lauchert's unit. At the same time, to contain Gusev and the paratroopers reported at dawn in the village of Lechkino (by Orel), the II./Pz.Rgt.35 was moved there. Its task was to engage the enemy, and thus secure the Vorausabteilung's right flank. These forces were to have fire support from all of the artillery available on the outskirts of Orel.

These moves show that the Germans felt very secure. They underestimated the enemy strength — more likely they had no idea whatsoever of what was brewing. Their reconnaissance, both ground and aerial, failed completely. The Soviets camouflaged their positions on the far side of the Optukha throughout the night. German scouts were unable to establish the strength or composition of the troops waiting on the highway — they did not even know where to begin their search for them. And that is where the Luftwaffe failed, grounded by the weather. The ferocious weather should have made the 4. Pz.Div. think twice before starting its planned operations, but it did not. On October 4, when orders were handed out, this factor was just ignored. The terrain, while beginning to deteriorate, was still firm, when on October 4 in the evening, showers began. On the morning of October 5, it was still raining lightly — but constantly. Then the cold wind started, chilling the German soldiers wrapped in their summer uniforms. Unpaved roads turned impassable to motorcycles. Supply columns were no longer







Three views of the same scene, showing the effect of an attempted crossing of the river Dvina in Lithuania, in the second part of July 1941. The first T–34 on the left has a white stripe painted on top, and on the rear of the turret. It is hard to tell who the author was, or what its purpose was. At the top left of the left photo, behind the bend of the river, can be seen a third T–34 sunk in the muddy sand bank. Taking into consideration the condition of the retreating Soviet units, it is highly probable that all of the T–34s were in usable condition for the Germans. But did they consider such a possibility?

- CAW -

able to move smoothly along the narrow mud covered and cratered Dmitriev-Kromy-Orel highway. The road was no longer as usable for the supply columns as it used to be. The road shoulders of the entire length of this stretch were long destroyed by the heavy traffic. It was becoming impossible to maneuver and pass along this vital link. Eventually, the road was permanently jammed, and the division's supplies were stuck in traffic stretching for many kilometers.

At 0830[29] on October 5, the Stukas bombed Lepochkino, and the II./Pz.Rgt.35 moved on sluggishly through

[28] Burda operated approximately 20 km (12.5 miles) from the HQ, and 4–7 km (2.5–4.5 miles) from Gusev. However, despite the fact that the T–34 and KV–1's radios had a range of 25 kilometers (16 miles) while stationary, he did not have radio contact with them. In the Soviet literature his silence is explained by his moving beyond radio range.

[29] According to the Soviet sources, the sky cleared up at 1000 hrs, which means that the attack started at 1030. This is confirmed exactly by what the Germans reported.

the muddy fields. So sluggishly, that it reached Ivanovskoye only at 1130 hrs. Whether that was only due to the mud, or because the Soviets delayed the march, is not known. Also, according to Soviet sources, Gusev had ordered his unit back to Ivanovskoye as early as midnight. Had he really ordered that, it would have been unfeasible, as at that time the village was in German hands. According to the German sources, on October 5 his tanks were still near Orel in the morning, slowly withdrawing while taking parting shots at the advancing Panzers.

After a short preparatory artillery barrage, Lauchert moved on at the same time as the II./Pz.Rgt.35. For the first two kilometers the going was smooth, but then abruptly he encountered a stiff Soviet defense. Initially, as many as 3,000 Soviet infantry opened up at what they reported were 40 Panzers. Then Soviet tanks appeared — (10 to 15 according to the Germans), followed by Il–2 "Sturmoviks". Lauchert's attack faltered and his offensive degenerated into a stationary firefight in the Soviet forward trenches. When late in the afternoon more Soviet tanks appeared from the right flank (most probably Gusev's withdrawing group), Lauchert decided to call it a day and ordered all troops to fall back to their original positions, sending his tanks and rocket artillery back to Orel.

The October 5 skirmish was a prolonged one, but bore little fruit for either side. Both opponents held their ground, with limited casualties, except for the 3rd Battalion, 201st A/B Brigade, which suffered heavily. According to Katukov, Lauchert had lost 18 tanks, 8 antitank guns and several hundred dead — which had little to do with reality.

It was after this engagement that the Germans finally realized that before they could move further eastward, they would have to clear the enemy from the highway to Mcensk. But by then it was too late. During the night of October 5/6, after the evening rain, snow had fallen and melted quickly. Then came an intense downpour, lasting late into the following morning. The roads turned into muddy ponds, the fields were seas of slime and on both sides of the front all movements and supplies had to stop. Only tanks and the most powerful tractors were able to move — not without difficulties, and not everywhere. The 3. Pz.Div.'s Pz.Rgt.6 got stuck for over 4 hours trying to negotiate the side roads leading to the Orel-Karachev highway, northeast of Orel.

After reports of Soviet activity, the Corps HQ moved several 3. Pz.Div. units to support the 4. Pz.Div. On October 5, the II./Pz.Rgt.6 was detached and subordinated to the 4. Pz.Div. the next day. On October 6 the entire Sch.(mot.).Rgt.394 was moved there, but was not able to help much. The regiment spent the whole day up to their armpits in mud, unable to move or even supply the soldiers. It took tanks to tow each truck still capable of moving over the dips and ruts.

All units arriving in the city, and especially the 3. Pz.Div., (forced to concentrate in the city after its failed attempt at by-passing it along the side roads to the north), had blocked Orel completely. Gen. Model's division also had only the most necessary supplies with it, leaving the entire logistics tail, more than 2,000 vehicles, far behind. As a consequence, there was a supply crisis in Orel. The 3. Pz.Div. had no fuel and the 4. Pz.Div. lacked ammunition. All tents, dry uniforms,



A similar scene, showing two T–34s after a collision on the battlefield, summer 1941. It appears that the vehicle on the left ran onto his friend, who had been immobilized by German troops earlier on. And that is where it came to a stop, although the dug in rear part of the tracks indicates that there was an attempt to free the tank. The visibility from the driver's position through the first type of driver's vision ports was not very good and probably caused such collisions. One shoudn't forget, however, conditions of battles of course — smoke, explosions, dust.

- T. Anderson's collection -



Left: An unusual scene, even when considering the driving abilities of the Soviets, showing most probably the aftermath of a hasty retreat of T–34s from the battlefield. The overturned tank and the one behind it on the left, have their turrets facing backwards.

- CAW -



A tank unit is preparing to move out. The front side of the turret (welded rolled plates) carries the unit's tactical symbol, while the rear part bears the slogan (*Za Rodinu* — For the Motherland). Such slogans were often repeated on the front girder of the hull.

- Robert Bock's collection -

etc., were left with the supply columns, as were all services (bakeries, butchers, laundries, even the field kitchens) and the most needed for mechanized troops: repair workshops. The supply crisis immobilized the two Panzer divisions for several days, making impossible all offensive moves for that period. Whatever the enemy might have done, would have been bad for the Corps during those days. If he resisted, the ammunition would be shortly used up. If he left his positions, the fuel would quickly be gone. The worst thing was the knowledge that nobody was able to do anything about it. Only the Pz.Ar.2's supply columns could have eased the situation, but to deliver their goods they needed the Bryansk – Orel highway to be taken and held.

Despite the desperate situation, on the evening of October 5, the HQ of the 4. Pz.Div. decided to try again. This time the task was given to Kampfgruppe Eberbach, assembled around his Pz.Brig.5, but with not much more force than Lauchert had. K.Gr.Eberbach consisted of Pz.Brig.5 HQ (with five tanks), I./ and 5./Pz.Rgt.35 (up to 35 tanks), the K.34, 3./Pz.A.Abt.7 (a handful of armored cars) and the 1./Flak.11 (four 88 mm dual purpose guns), with fire support from all available artillery in the area. It was foreseen that the battle group would be reinforced, but only after the 3. Pz.Div.'s main force took over control of Orel. Until then, no forces could be spared. It was also necessary to extend bridgeheads to the north and south of the city, and that is why the battle group did not have any infantry or panzers from the II./Pz.Rgt.6.

Around 0600 hrs on October 6, in hard rain, the combat group started to leave Orel for the battlefield. It was first to join the remnants of the V.Abt.Lauchert, and then start together towards Mcensk. It took Eberbach more than 2 hours to cover less than 10 kilometers (6.25 miles). Not until 0900 hrs was he able to start the artillery preparation and get the show on the road. As on the previous day, at first the going was easy. They slugged across the blown up bridge at Nowaya Otryada, then without a shot took another over the Lisitsa River. During all this time they operated within the range of Soviet artillery. The Soviets had all the time they needed to mine the area and blow up the bridges — and yet somehow they allowed the Germans to move as they liked, crossing the vital bridge and then spreading out into an attack formation almost on top of their positions!

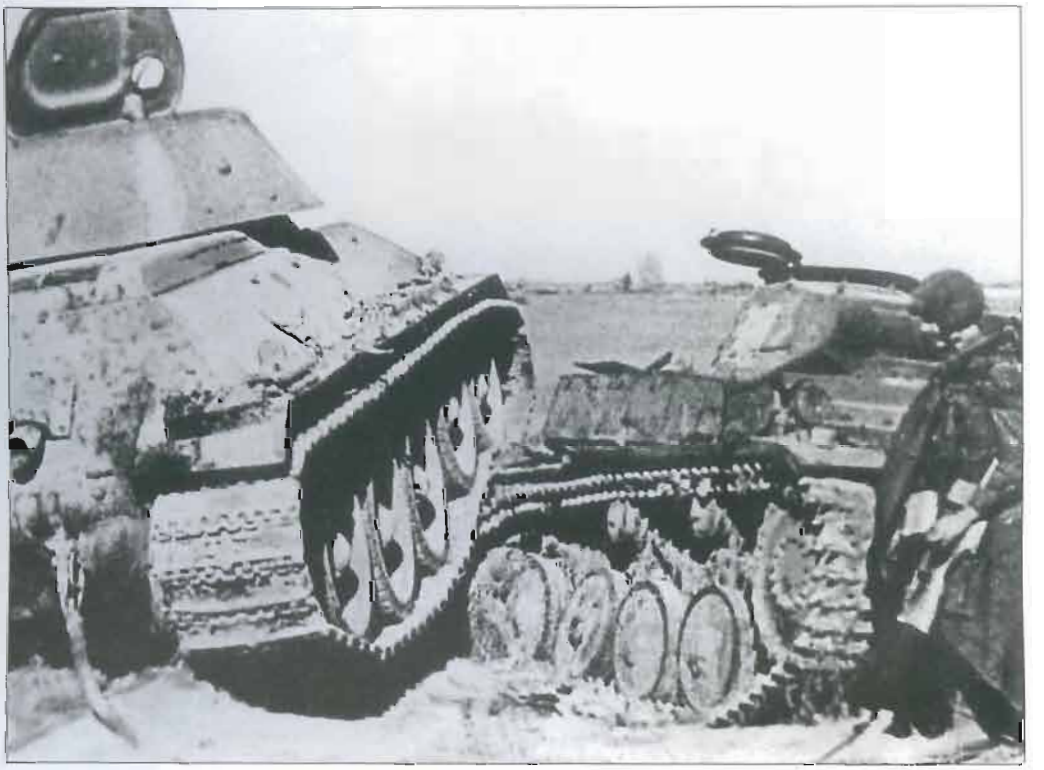
Behind Optukha, the terrain rose slowly up to the woods by a village called Perviy Voin, with slight hills along the way. The Soviet positions were placed amongst the huts, haystacks, small woods, and surrounded with villages on both sides and behind. Commanding the higher ground, the Soviets had a wonderful view of the German positions. The commanders had an unobstructed view and watched for over an hour as the enemy maneuvered, assumed an attack formation, then advanc-

ed and finally crushed the Soviet motorized infantry on the far side of the bridge. And yet they stood idly by, doing absolutely nothing! The infantry in question was Capt. D. Kochetkov's mechanized infantry battalion from the 4th Tank Brigade, holding positions astride the highway, on the raised ground behind the bridge. Seven light tanks, as well as anti-tank guns, supported them. The Germans later reported between four and seven of these — very likely that they mistook the dug-in BTs for some of that number.

A mixed medium and heavy tank company was placed some two kilometers behind the last infantry trenches, along the wood line. The same wood gave cover to the 4th Brigade's anti-aircraft battalion's 85 mm guns, whose unsung great hour was to come later on that fateful day. The reserve armored platoon was placed in another small forest, south of the village called Kaznusyevo. Several more tanks with infantry on board took positions to provide cover on the flanks. The 4th Tank Brigade was flanked by the Border Troops and motorcycle infantry regiments bloodied on the previous day. The 9th Guards Mortar Regiment (Katyusha rocket artillery) under Maj. Shamshin, freshly arrived in Mcensk, was placed behind the Brigade's positions. Deeper in the rear, reserve units were deployed: the 11th Tank Brigade and parts of the 6th Guards Rifle Divisionthat had just arrived by rail

Right: A Soviet tanker is examining what is probably his own handiwork — the ramming of a German Pz.Kpfw. II near Smolensk, September 1941. Obviously, the T–34 drove onto the Pz.Kpfw II. and became stuck on it. After the battle, attempts were made to pull it off (note the towing cables attached to the rear hooks), but they were unsuccessful.

- Planeta -



Below: A photo of the same scene from the other side. The Pz.Kpfw. II belonged to the 20. Pz.Div.

- WAF -









Three photos of a T–34 destroyed by German mountain troops on Poltava's main street in September 1941, which had earlier raided across half of the city. The driver crushed the anti-tank gun and then, traveling too fast, crashed the tank through the corner of the building. It was there that the Gebirgsjäger caught up to it and, thanks to them, their friends were able to take a souvenir photo with their victim. Their unit commander is standing on top of the engine deck.

- CAW -

transport to Mcensk. The defenses were very strong and deep, virtually impregnable in those circumstances.

After crossing the bridge, the Panzers began to roll toward the motorized battalion defenses, taken over by the K.34 motorcycle infantry closely following them. Despite the potent firepower all around the bridge, Kochetkov's battalion was virtually left to its own devices. Only when the Panzers finally broke through and started toward the tank-infested woods, did the guns start to roar. And then came one of the incidents that was so valuable to the later T–34 mythology. Suddenly, more than 1,000 meters from the line of trees, where the Soviets took positions, the lead German Panzer was knocked out with just one hit. Virtually all authors credit a T–34 with this hit, even when it is highly improbable. More — it just can not be true! There is not a single clue or even a hint pointing to a Soviet tank being the victor of that encounter, and yet everybody and his brother assumes it was one of the then advancing T–34s.

The problem is that the T–34 projectile was able to pierce as much as 61–63 mm of vertical armor steel at a distance of 1,000 m — which makes this shot only theoretically possible, but still a long way from being probable. One also has to remember that the 60 mm thick front armor of the Pz.Kpfw. III and IV was surface-hardened plate, unlike the armor test-fired on by the T–34. A one-shot kill at 1,000 meters plus was thus just physically impossible. And then there were the accuracy problems — it would be very difficult to hit a stationary target with the T–34 gun at that distance, even when firing from a stationary tank, much less from a moving tank at an enemy tank racing toward the woods over a bumpy meadow! Even the most experienced tank gunners were unable to hit anything at that distance with the F–34 cannon and its low-quality Soviet optics. The direct shot limit of the T–34 was somewhere around 800 meters, 200 meters short of that miraculous one-shot kill attributed to them.

The key to this enigma is the 85 mm M1939 anti-aircraft dual-purpose gun company deployed in the woods along with the T–34s and the KV–1s, something which has been ignored. No one wrote a word about what that battalion was doing previously, and hardly anyone mentions its existence. And that is why everyone attributes



The wreck of a T–34 with a cast turret, photographed by the Germans in late autumn1941. The ribs are clearly visible where the top and bottom parts of the turret meet. This is the earliest photo showing these on the "flat" T–34 turrets, on which they occurred very rarely. Unfortunately, the manufacturer of this type of turret is not known.

- *CAW* -

the success of October 6 to the T–34s (but curiously not to the KV–1s!). Only Katukov admits the artillery unit ever existed, but does not give many details. In his memoirs[30] he mentions "*an anti-aircraft company with 16 guns*", but only later on, in a collective work[31], he admits these were the 85 mm guns. And that was a gun perfectly able to destroy a Pz.Kpfw. III or IV at 1,000 meters.[32]

The M1939 anti-aircraft guns in this skirmish are also indirectly hinted at by Lelushenko. Describing the German attack after crossing the bridge, he mentions "*two Soviet artillery companies*"[33] starting a barrage directed at the advancing tanks. According to data available from elsewhere, one of these had to be Katukov's anti-aircraft company.

Covered by artillery firing from a wood south of Kaznusyevo, T–34s and KV–1s started to emerge from behind huts, bushes and haystacks, firing single shots from short firing stops, and continuously changing positions. A short while later the "Sturmoviks" appeared in the skies.

The Germans were confused. Within a mere ten minutes they lost five or six tanks, knocked out by the sudden Soviet counterattack. The situation was on the verge of critical. To stop the Soviet attack, both 88s were rolled to the highway and started to fire at the advancing tanks. This recklessness was soon punished severely. After the 88s hit just one of the fast maneuvering tanks, the Soviet

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[30] M. Katukov op. cit. p. 33

[31] This collective work is *Bitva za Moskvu*, Moskovskiy Rabochiy, 1985, where can be found Katukov's paper *I-ya gvardeyskaya tankovaya brigada*. The author refers to the 85 mm guns on p. 192.

[32] Describing in his memoirs the tactics of the counterattack from ambush, Katukov states that enemy tanks had to be allowed to close to within 200–300 m (220–330 yards). It is almost certain that he based this on his own brochure, which was written about the battle of Mcensk and published in 1942 (Katukov, op.cit., p. 26 and 28). The crew of a T–34 had a chance of destroying a Panzer even at longer ranges, but had to hit the turret where the armor was only 30 mm thick. The practical possibility of hitting the enemy tank's turret at that range was non-existent. The descriptions of this encounter, and the principles of armor engagements authored by Katukov, clearly indicate that the T–34s first left the hiding positions in order to close the range. Only then, after driving several hundred meters, did they halt and fire. Therefore, the Panzer could have only been hit by one of the 85 mm anti-aircraft guns.

[33] It is almost certain that it was Katukov's 85 mm anti-aircraft artillery company. The lack of any mention of the 1st Guards Tank Corps' independent artillery seems to corroborate other information suggesting that the Corps might not have had any field artillery!

battery from the woods opened up on them and both guns were quickly destroyed.

The reserve artillery was quickly sent over the bridge (the guns of 6./AR103 and the rocket launchers of the I./Nb.Wrf.Rgt.53) and started a barrage to cover the retreat of the I./Pz.Rgt.35. The Germans did not hesitate to call for their heaviest asset. The 100 mm K18 cannon of the 4./AR65 was towed almost to the battlefield itself and quickly knocked out several Soviet tanks. This was easier said than done — the rate of fire of the huge gun was low, and the aimers had much difficulty with keeping the T–34s and KV–1s, maneuvering quickly over bumpy terrain, in their cross-hairs. Nevertheless, even before the K18 opened up, the massed artillery barrage hindered the attack and one or two tanks were knocked out by the sheer bad luck of riding straight under a falling howitzer or heavy mortar projectile.

A dogged, even-sided battle ensued, after more Soviet artillery opened up from the Mcensk area. The 180th Divisional Anti-Tank Artillery Company arrived at the scene, then the 1st Battalion of the 401st Guards Rifles Regiment under Maj. A. Nabatov, and the Reconaissance Company, 6th Guards Rifles Division, followed by the 76.2 mm divisional cannon battery. As if these were not enough for the embattled German unit, an armored counterattack hit them from the south, on their right flank, threatening to cut off all the forces massed east of the Lisitsa River. Facing that, Eberbach ordered the artillery and the K.34 to withdraw over the bridge. At the far side of the river, only two 105 mm leFH18 crews of the 6./AR 103 were left to fend off the Soviet tanks. Their fire was accurate enough to force the advancing tank platoon to stop and even retreat. Around 1400 hrs the situation repeated itself, when the enemy decided to attack with four KV–1s under the covering fire of four other tanks. This time it was the 100 mm gun that thwarted the attempt, according to the German sources.

Despite the unfavorable conditions, the Panzers of the I./Pz.Rgt.35 still remained amongst the captured motorized infantry trenches, shooting it out with more than ten of the advancing 4th Tank Brigade T–34s and KV–1s. The breakthrough came before the sun set. Under a covering artillery barrage, 15 tanks[34] (according to the German sources) counterattacked frontally, soon to be supported by another ten on the right flank. And it was Lt. Burda's charge on the right flank that decided the outcome of the battle. The Germans gave in under this attack, but it was a pyrrhic victory for Burda who paid a heavy price for his success. When he broke through as far as the bridge, the German positions there held. The Panzers mixed in with T–34s, and the results of the point-blank fire were quick to see. Soviet sources remain silent about the exact numbers, but the two howitzer crews, ably supported by their colleagues from the other side of the river, and the 100 mm gun, claimed (and were credited with) three Soviet tanks. Another three were knocked out by the Panzers, and the remaining motorcycle troops destroyed one more. That would give seven out of ten tanks for just one German howitzer. The reckless bravado of Burda's company resulted in his tanks being nearly wiped out.

Almost at the same time that Burda retreated, another tank attack hit Pz.Rgt.35's first battalion. A chaotic shoot-out ensued, forcing the Germans to interrupt their ordered retreat to the other side of the river. After a long duel, the sole remaining 105 mm howitzer of 6./AR103 finally destroyed one more Soviet tank, forcing the others to flee. The retreat could start again.

During one of the limited counterattacks, the Soviets first fielded the BM–13 rocket launchers of the 9th Guards Mortar Regiment. According to Soviet sources, the rocket barrage had a devastating effect on the German forces and their morale. In reality, no German report even mentioned that ground-breaking event! The retreat was still going on in an orderly manner. By 1600 hrs, all German forces were withdrawn from the far side of the river and concentrated around the village of Novaya Otryada, where the defenses were prepared for an overnight stay.

After the sun set, both sides settled down to analyze the battle. The Soviets paid a stiff price for their limited success. A German body count listed as many as 160 Red Army soldiers dead, with a bag of 166 prisoners. Together with the wounded, that amounted to the wiping out of Capt. Kochetkov's battalion. Eleven enemy anti-tank guns were reported destroyed, along with 17 tanks, including as many as 8 heavies in that number. German casualty figures were much lower; ten tanks, including six write-offs, 4 guns destroyed, 10 KIA and 33 wounded. Interestingly, only 10 of the casualties were infantrymen (or rather motorcyclists) — the rest were all artillerymen or tankers.

The Soviets were much more generous in summing up German losses. According to their sources, they bagged as many as 43 German tanks (almost the entire strength that was present), 16 anti-tank guns, 6 trucks, and the body count was close to 500. The artillery barrage was credited with 14 of the German tanks, seven others were allegedly destroyed after hitting mines (number of mine reports filed by the Germans on that day — nil). The hero of the day was Lt. Kukarin, who bagged nine German tanks, including four hit from his immobilized KV–1.

Katukov estimated his losses at 6 tanks, with only two write-offs, and his motorized battalion "*suffered se-*

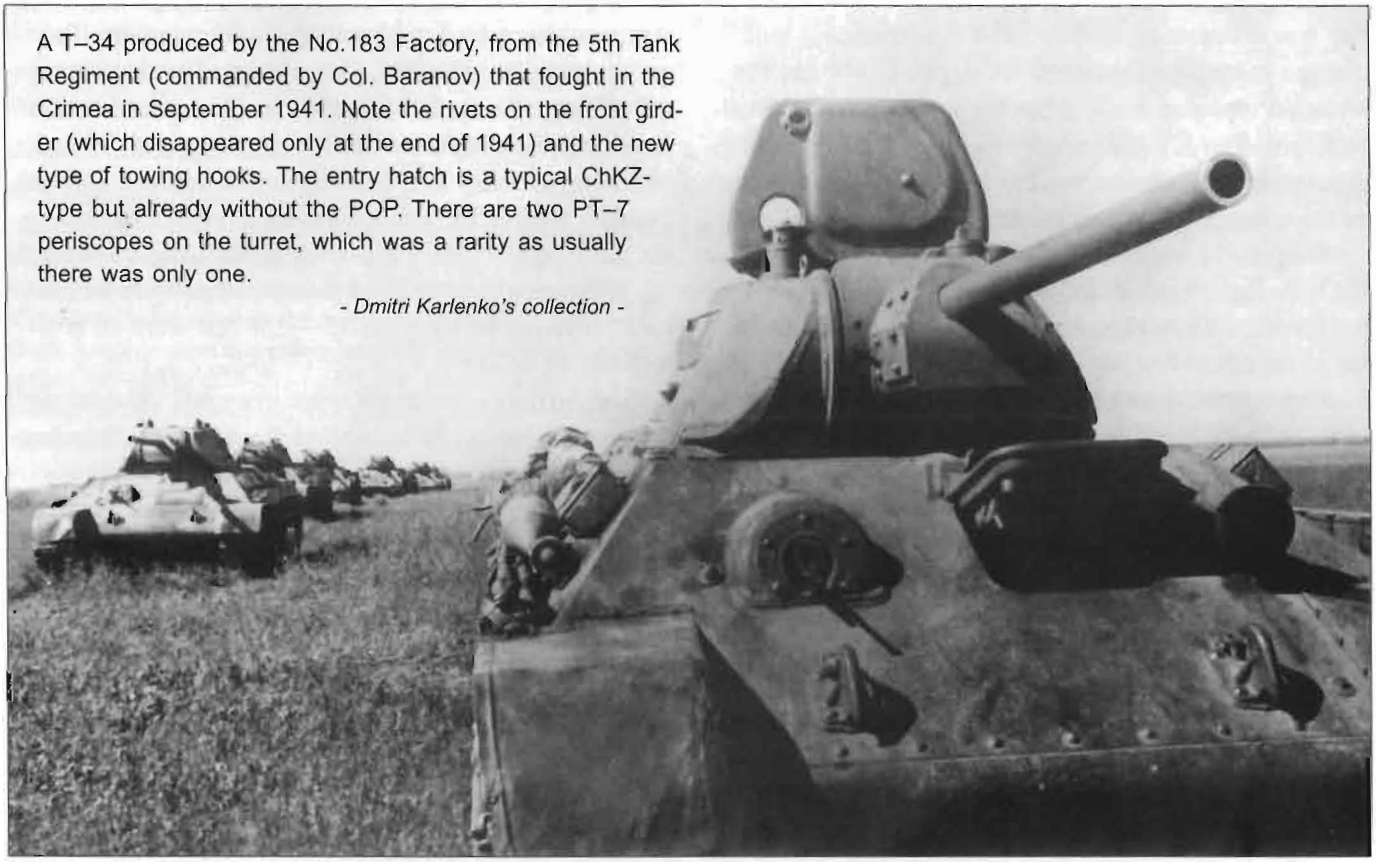
[34] According to the German sources, the Soviets also counterattacked with light tanks. It appears that infantry might have also taken part in the counterattacks.

rious casualties". Lelushenko is more truthful. According to his memoirs, the Soviets lost 12 tanks and up to two battalions of infantry. By that last figure the general summarized the losses of both Katukov's motorized battalion and other neighboring units — the Border Troops and the paratroopers who fought on the flanks of Katukov's positions. The dozen Soviet tanks were almost certainly the write-offs figure. Whether he counted the BTs dug-in at the motorized infantry positions or counted only the modern tanks advancing from the woods, remains an open question. Judging from the available sources, it is safe to assume that all of Burda's tanks were amongst that number (i.e. 7), with 4 BTs and 1 or 2 from the attacking platoons. That would amount to 12–13, or the number given by Lelushenko. If so, the Soviet versus German loss ratio in armor was 2:1, with almost 15:1 in human casualties!

October 6 was no doubt a day of heavy fighting. The battle itself lasted for more than seven hours non-stop, which must have exhausted the soldiers given the weather conditions. Soldiers on both sides were wet and mud-covered. Even if the German losses were not very high, it was a sobering and pitiful experience for most soldiers to lose 10 tanks during one day of fighting — more so, because it was the first such massive bloodletting they suffered since the beginning of the campaign. Despite this, the morale of the troops displayed during the battle was of the highest standard. During critical moments, which followed one another in rapid succession, they did not break ranks. All through the battle, German troops were disciplined and fought in a rational, orderly way. There were no panicky outbursts or massive fleeing that the Soviets reported.

It is hard to assess the Soviet operations of that day in one brief sentence. On the one hand, armored counterattacks were the proper tactic for the given conditions. On the other, however, Burda's charge, although successful in a limited way, was pointless and wasteful. The Russians were not able to organize a successful defense of the bridge, leaving the infantry to waste. They were then unable to mount a powerful enough counter-attack, despite having more means available than necessary. As a consequence, instead of smashing the weaker opponent, they only harassed him.

The miserable life for the German soldiers did not end when the guns fell silent. They had to return to their starting point on foot, as their trucks were unable to force their way through the seas of mud that used to be fields, and were barely able to negotiate the roads. Places to rest were few and far between, even after they got out of the range of Soviet artillery, which harassed them along their long march back. They had no dry clothing, and everything was wet and filthy after at least seven days since their last opportunity to change. The food was cold. Several days of non-stop rain rendered all firewood wet, and there was no dry place to even build a fire. As a consequence, the soldier's diet was hard tack and canned food which, coupled with lack of hygiene in the sea of mud, resulted in spreading gastronomical ailments, adding more misery to their life as infantrymen. Then came



A T–34 produced by the No.183 Factory, from the 5th Tank Regiment (commanded by Col. Baranov) that fought in the Crimea in September 1941. Note the rivets on the front girder (which disappeared only at the end of 1941) and the new type of towing hooks. The entry hatch is a typical ChKZ-type but already without the POP. There are two PT–7 periscopes on the turret, which was a rarity as usually there was only one.

- Dmitri Karlenko's collection -



Another souvenir photo from a country outing by soldiers from the rear services, winter 1941/42. This T–34 has a cast turret with two PT–7 sights. The old style driver's hatch, old type towing hooks and riveted front girder were all characteristic elements from the No.183 Factory.

- *ATPF* -

the night of October 6/7, with temperatures falling below freezing, and the first blizzard of the Soviet campaign. The morning of October 7 did not make much difference, except for a heavy wind-driven sleet.

The Soviets were better off. Their soldiers were as exhausted as the Germans, but were dug-in on a sheltered, wooded ridge, where fires could be started for warmth, cooking and clothes drying.

After re-grouping, at approximately 1000 hrs,[35] the Germans started a rather half-hearted attack, which soon faltered after encountering Soviet defenses. From left to right, they were facing various 4th Tank Brigade troops, elements of 201st Airborne Brigade troops, remnants of the 132nd Border Troops Regiment, and the tank battalion of the 11th Tank Brigade. As on the previous day, Soviet infantry gave way to the German attack and then a short but intensive battle ensued. The Soviets claimed a victory, with 39 Panzers destroyed and scores of Germans killed. Just a single paratrooper company with a little help from the 180th Anti-Tank Company (two 45 mm guns) was credited with as many as 15 Panzers! No German report of that day mentions a single tank lost, or even damaged. Likewise, the casualties can be counted on the proverbial five fingers. The weather was too awful to fight an intense skirmish, where more losses would be suffered by both sides. The lack of troops and a dedicated goal did not help either. The Germans were not fighting their way through Mcensk, but were merely trying to tie down the enemy and stop him from attacking elsewhere, where the defenses were even thinner. The higher command was still making up its mind whether to attack further east or call it a day and dig in for the winter. It was only on the morning of October 7, that von Bock's (H.Gr. Mitte commander) HQ first discussed the planned offensive towards Tula, to be undertaken within 2 or 3 days. This decision was made possible by the positive outcome of the efforts to close the Bryansk Pocket. After the encircled Soviets surrendered, the German troops tied down there could be used to renew the pursuit of the enemy withdrawing towards Moscow. Up to that point, the 4. Pz.Div. was still formally the "bodyguard" for the 3. Pz.Div., re-grouping around Orel, whose only contribution to the war effort was sending half-hearted reconnaissance missions probing in different directions.

The 4. Pz.Div. was kept in the dark as to the plans afoot for the next few days. There were no definitive

[35] According to the Soviets, this took place two hours later, at noon, when the skies cleared up. Soviet reports state that Germans were not pressed and synchronized their attacks with the changes in weather.

K.Gr. Luettwitz (north)	*K.Gr. Eberbach (center)*	*K.Gr. Grolig (south)*
Sch.Rgt.12	*Pz.Rgt.35*	Sch.Rgt.33
6./Pz.Rgt.35	*II./Pz.Rgt.6*	*3./Pz.Rgt.35*
2./Pz.Jg.Abt.49	II./Sch.Rgt.33	1./Pz.Jg.Abt.49
(5cm PAK 38)	II./AR103	(5cm PAK 38)
two 88 mm guns	3./Pi.Abt.79	Nebelwerfer battery
	1./Fla.Abt.11	armored cars unit
	four 5cm PAK 38	one 88 mm gun
	of the Pz.Jg.Abt.49	one 100 mm gun

orders, and the supply crisis was deepening by the hour. Fuel and ammunition stocks were depleted beyond emergency levels and the supply columns were still slow in approaching. The unit was paralyzed. The only solution was to withdraw all troops to Orel, giving them some rest. The easternmost defenses of the division were to reach as far as Novaya Otryada.

Throughout October 7 and 8, efforts were made to collect the widespread troops, but the effects were far from expected. The Division was in effect taking its days-off. Except for a brief encounter on October 7 at noon, not so much as an active defense was undertaken, not to mention any offensive movements. The 3. Pz.Div. HQ had taken over the northern part of the 4. Pz.Div.'s sector, on the far bank of the Oka, with the focal point of the fighting there being the village of Bolkhov. Model deployed there small mobile battle groups, centered around the Panzer battalions of his regiments. Their activity was limited by the terrain and supply situation. All of the supplies left in Orel were stuck there because of the fuel crisis. The whole of the 3. Pz.Div. around Orel was supplied by the divisional Panzer regiment's supply train — not much more than 20–30 trucks! The 10. Inf.(mot.).Div. was even worse off, literally wallowing in the quagmire near Dmitrovsk after being released from the Bryansk Pocket encirclement duty.

All through October 8 it rained, and the mud became diluted ever thinner. After the Corps-level staff meeting with Guderian, guidelines were set for the ordered attack further east. It was to start on October 9 at dawn, using all available fuel and ammunition stocks, delivered by whatever means available.

According to the orders, the 4. Pz.Div. HQ set out an operational order for an orderly, systematic advance. All of the available forces were divided into three groups, infantry (left flank), tanks (center) and still more infantry (right flank). The infantry on the flanks was to start the advance first, and after they gained any initial success, the Panzers of the 35th Regiment would attack along the highway. The plan shows that the Germans were trying to outflank the Soviet defenses, and then pour beyond in an all-out attack.

Other than the reserve II./Sch.Rgt.12, the groups consisted of the units listed above.

The Soviets had left their positions overnight as usual, and established the new defensive positions along the Ilkovo-Golovlevo-Sheino line. The center was held by the 4th Tank Brigade, with the Tula Officer's School Battalion and Border Troops units. 1/132nd Border Troops took a central position across the highway, between the villages of Golovlevo and Ivlevo. To the left of it, the Tula cadets dug in, and the 201st A/B Brigade took positions at Sheino, supported by a tank company and the 1st Battalion HQ from Katukov's brigade. The positions taken by the 401st Guards Rifle Regiment and the 10th A/B Brigade are unknown, but it appears that they were positioned somewhere between the Tula cadets and the 201st A/B Brigade. The 11th Tank Brigade was stationed north of the 4th Brigade, but only in part (the 1st Battalion was certainly there). The central position was inevitably the strongest, but encircling movements by the Germans were anticipated after they reconnoitered the left flank of the 1st Guards Corps, and so the 201st A/B was sent to Sheino to establish a strong defense there to stem their efforts. The right flank was much weaker, and that was where the Germans were able to advance farthest.

All through the night of October 8/9, sleet came down in curtains. The troops leaving Orel for their starting points were hardly able to force their way through the sea of mud. It was only at approximately 0700 hrs that both flanks were able to start their advance — on foot, as even the 4x4s were unable to negotiate the muddy fields. Despite the bad weather, at approximately 0800 hrs, Stukas bombed the positions abandoned by the enemy, giving the awaiting attack groups the green light to attack. At first, the going was smooth, with the troops merely advancing through the old battlefield without encountering resistance. The problems started when the Panzers closed within shooting range of Perviy Voin. The enemy opened up with heavy artillery, ably sighted in from the Soviet-infested ridge dominating the area. As a result, the central group was stopped as early as 1000 hrs. As the skies cleared up a little, the Soviet Air Force started to bomb the supply columns in the rear.

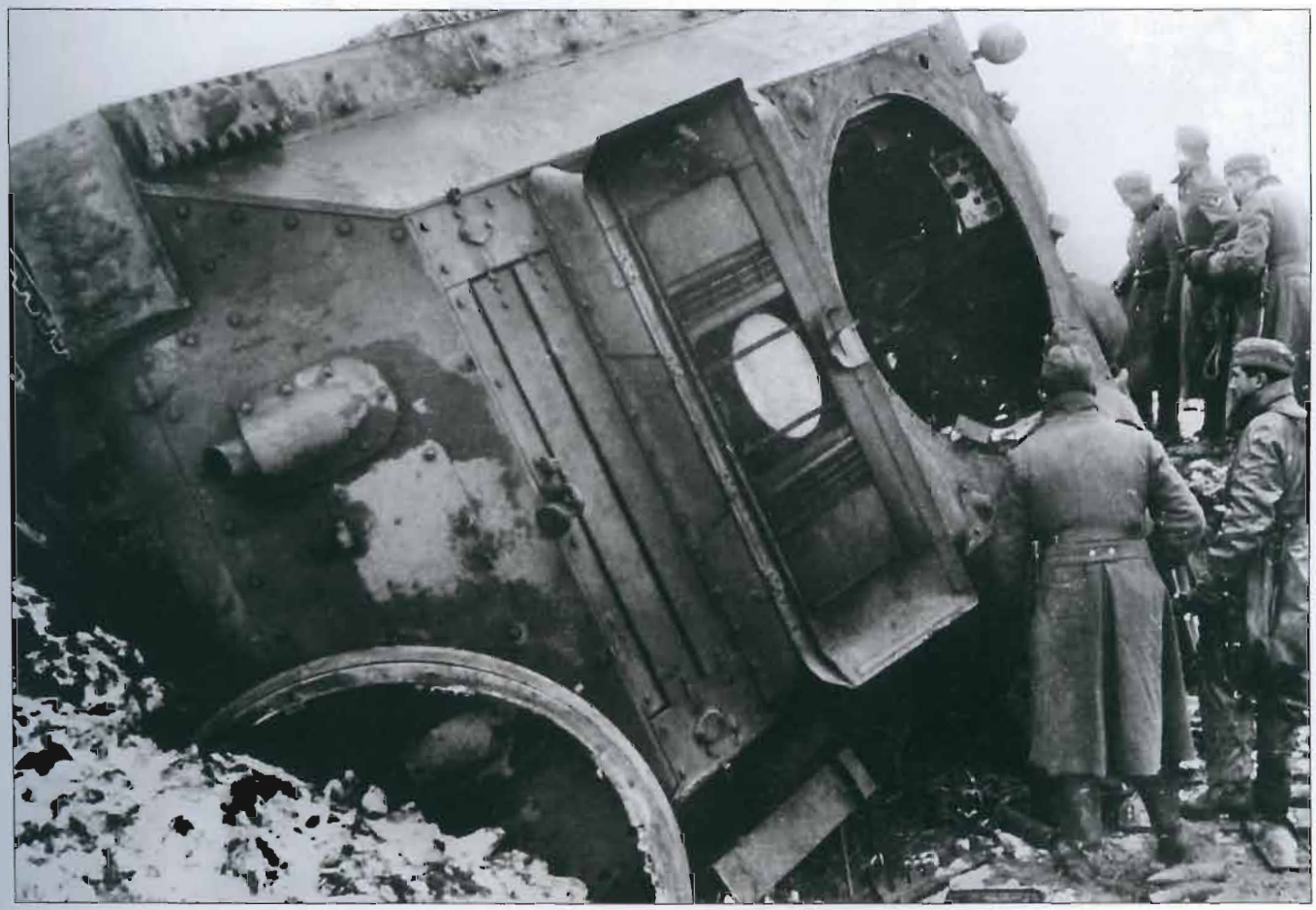
K.Gr.Luettwitz's point unit, the 6./Pz.Rgt.35, broke through the Soviet defenses, captured the railway bridge, and struck only as far as the woods north of Perviy Voin. After a short break, the Germans resumed their attack. By noon they had fought their way through the woods, to the rear of the Soviet positions at Maloye Dumchino. There, they were ambushed by camouflaged tanks of the 11th Tank Brigade. Their attempt at silencing the ambushing tanks failed — Soviet lookouts spotted the anti-tank gun of the Pz.Jg.Abt.49 being manhandled into firing position and it was destroyed. Despite that, the 4. Pz.Div. units infiltrated the line, pushing south-east to cut off the Soviet positions at Perviy Voin and join with Eberbach. Their advance was stopped around 1300 hrs at a railroad and highway crossing, some 5 kilometers from Mcensk. The Soviets held excellent positions there, checking all German attempts to break through with a platoon of T–34s under Lt. Kukarkin of the 4th Tank Brigade. His first shots from ambush credited him with destroying two Panzers and several APCs. Attempts at destroying them with the 88s were futile — there was no cover to conceal their approach and every move was greeted with a hail of heavy artillery fire. Both 88s were destroyed before they had an opportunity to take a shot at the Soviet tanks.

Shortly before sunset, reinforcements came — the II./Pz.Rgt.6 moved over from the central sector. Another attempt at breaking through the crossing and advancing further was again curbed, after six more T–34s (almost certainly of the 11th Tank Brigade) were encountered. Later on, attempts were made at infiltrating through the Soviet lines to join with Eberbach, using forest paths. Then, however, the evening darkness setting in forced them to stop.

Even in the center some successes came in the afternoon. According to the Germans, it was the massed artillery fire that enabled these. The Panzers then attacked into the smoke of the explosions and took the summit of the ridge north-east of the village named Voin in their report. However, almost certainly, it was Ivlevo. Then they advanced toward the plateau through the village of Sukharevo. There, the Panzers encountered heavy anti-tank fire from the front and had to stop. Stukas were called on for help, but they were needed elsewhere. Eberbach decided to wait for them and, meanwhile, push the II./Sch.Rgt.33 north of Golovlevo to join the northern group. Part of the battalion was able to circumvent the village, held by Soviet tanks, and even capture the woods north of Perviy Voin, entering Golovlevo, but that was that. Then the Soviets stiffened their resistance and the fighting degraded into positional warfare.

This T–34 wreck is without its turret and the torn out turret ring leans on the rear plate, November 1941. The tank's details are clearly visible, even the driver's instrument panel.

- Author's collection -



The hard-pushed Katukov decided to counterattack with his armor. Three tanks of the 1st Battalion appeared and, according to the Soviet sources, in a lightning raid set 11 German Panzers on fire. In reality, their victory total was only two Panzers, destroyed without casualties, as the prime movers with the 88 mm and the 100 mm had bogged down in the mud. With the Soviet tanks roaming behind his first line, Eberbach ordered his troops back to a ridge east of Perviy Voin. During that ordered withdrawal, another Panzer was lost to Soviet fire, but then the counterattacks were all beaten off. The 1st Company was left on the ridge to tie down the enemy, while the rest sheltered in Perviy Voin itself.

To the south, the infantry, led by the 3./Pz.Rgt.35, advanced as far as Sheino, where a prolonged firefight ensued with the Soviet defenses. At first the Germans succeeded in positioning anti-tank guns covertly enough to ambush A. Isachenko's T–34 — who was also waiting in ambush for the Panzers. The damaged T–34 was soon recovered by the Soviets. Lt. Lyenkov's platoon immediately counterattacked and pushed the Germans back further south, into Sheino proper, defended by a partly dug-in BT–7 company, the 1st Battalion's HQ, and the paratroopers. The Germans advanced slowly, gradually breaking through the enemy resistance. By 1600 hrs, four hours into the fight, the enemy was finally outflanked and forced to withdraw, and Sheino was taken.

As the sun set, the fight started to lose momentum — hampered even more by the ever denser snow. At 1730 hrs, the 4. Pz.Div. HQ decided to call it a day and ordered the troops to stop. Later into the night, at 2200 hrs, the 1st Guards Corps' HQ also decided to quit, and ordered its troops back to Mcensk.

It is hard to tell who won the battle that day. The Germans had gained some ground, but lost four Panzers and at least three anti-tank guns for the price of two T–34s damaged by the PAK 38 guns of Pz.Jg.Abt.49. Both T–34s were recovered, and thus not credited as destroyed. One of them was not even claimed as damaged by the Germans. Human casualties on the German side were negligible, which did not prevent the Soviets from boasting that they destroyed 33 Panzers and up to two battalions of infantry.

The conditions on the battlefield were still miserable. During the night of October 9/10, heavy snow had fallen, driven by the wind that chilled to the bone the continuously wet troops. It was cold. The 4. Pz.Div. HQ was still looking for the lost logistic trains that were stuck in a gigantic traffic jam west of Orel. Only one maintenance company and a field-butcher company had reached the city to date. The bakery was found as late as October 17, the other maintenance companies about that same date, i.e. — after the battle ended. The divisional luggage trains never reached Orel — they were attacked and destroyed by a group of stragglers breaking out of the Bryansk Pocket, some 200 kilometers (125 miles) behind the division!

The ammunition crisis deepened to the point where all the "iron" reserves were distributed among the troops and even the infantry started to count each cartridge and hand grenade. This was worse than the lack of cooked food suffered since October 6. Under the circumstances, the Pz.Kp.XXIV HQ ordered the 3. Pz.Div. to give their reserve stocks (63 tons) to von Langermann's division. The problem was that each ammunition case had to be somehow transferred over the sea of mud from Orel to the far bank of the Lisitsa, and then manhandled to the foremost troops. When weather permitted, Ju–52s dropped jerry-cans of fuel and bread sacks to the forward line positions.

Despite the circumstances, the 4. Pz.Div. was still ordered to advance and capture Mcensk. Seizing the opportunity to show itself off in the Sheino area, the 4. Pz.Div. HQ decided to explore it and concentrated all efforts there. Marching orders were received at midnight by K.Gr.Eberbach, which started south at daybreak, around 0500 hrs next morning, October 10. Their advanced troops arrived at Sheino, a distance of 5 km (3.1 miles) by 0700 hrs, after a bitter struggle against mud that only the tanks, powerful tractors and foot soldiers were able to negotiate. Everything else literally drowned in the mud. It took three hours more for the stragglers to come, and it was not before 1030 hrs that K.Gr.Eberbach's troops were able to start their attack.

Meanwhile, the reconnaissance missions reported enemy concentrations in the Volkovo-Selzio area, where the sole road out of Selzio led. At Selzio was the Mcensk highway bridge which was, according to German estimates, out of reach at that moment. It was thus decided to circumvent the enemy defenses with a wide arc movement, on foot and with tanks, to attack Mcensk from the south. There, at the outskirts of the town, was reported by aerial reconnaissance a pontoon bridge over the River Zusha able to carry German tanks.

Thirty tanks moved out of Sheino, carrying a company of infantry and a pioneer group. Mud permitting, the 88 and 100 mm guns were to follow the advancing troops. The rest of the infantry was to walk toward the objective in the tank tracks.

The awful weather and Soviet recklessness at last proved a German ally. At noon it was snowing hard, and the visibility fell below 200 meters. In this situation, the Soviets, without their outposts, radio communication, and reconnaissance, were deaf, dumb and blind.

After nearly an hour of slogging through 10 kilometers of muddy fields, the 6./Pz.Rgt.35 approached the pontoon bridge which the infantry managed to take swift-



T–34 with five fuel tanks on the side and steel road wheels, indicating it was produced in late 1941. Note that the snow camouflage was applied to the underside of the fuel tanks as well.

- *CAW* -

ly and silently. The pioneers removed the mines immediately, and at noon the first tanks clattered to the other side of the river. The surprise was complete, and the Panzers entered the town unopposed. Only in the center, by the market square, were the first Soviet soldiers encountered and shots rang out. The snow was still falling and in the confusion the Germans fired at anything moving — civilians and Soviet soldiers alike. Panic soon spread and a column of vehicles was captured abandoned in the street. There were guns, tanks, tractors, and a few BM–13 Katyusha rocket launchers for which Lelushenko was made responsible with his head, before being given a handful of them. At least that is what he says, and from his living to tell this story it is obvious that no one knew about the loss then. That must have been the case, since in 1941 no time was lost in liquidating Soviet commanders that failed in any way.

The Panzers then raced westward to capture the highway bridge over the Zusha River. They reached it at the precise moment when Soviet tanks, almost certainly T–34s of the 11th Tank Brigade, appeared on the same bridge, coming from the east. There was no time for consternation — the Soviets started firing and one of the first hits knocked out the leading Panzer. This was Eberbach's personal Pz.Bef.Wg. III, from the HQ, Pz.Brig.5, and the brigade commander was wounded. The Germans were quick to react as well and soon two T–34s were immobilized, one ablaze. However, the other six broke through and disappeared into the town.

Both sides consolidated their ground in various quarters of the town, and started evaluating the situation. It appeared that Pz.Rgt.35 was trapped in downtown Mcensk. The southern bridge was damaged, the western one was infested with enemy troops — these were Katukov's troops withdrawing under constant pressure. Most of the town was still defended by the 6th Guards Rifles Division. Should a retreat have had become necessary, the 30 crews of Eberbach's Panzers would have stood no chance.

Fortunately for the Germans, their guns soon arrived in the town. The most powerful of them, the 100 mm K18 cannon, was placed by the western bridge and the

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[36] As a comparison, on October 10 the Soviets did not hear the engines of the Panzers entering the center of Mcensk, and only then did the first fired shots clarify the situation.

[37] Katukov claims that, at that time, the bridge was under fire from several batteries of artillery (he is surely referring to the artillery situated south of Mcensk). He is wrong. The 4.Pz.Div's artillery started to shell the bridge in the late afternoon, about two hours before dusk. By then the situation was completely different.

[38] How this was possible after receiving two 100 mm hits on the turret must remain the veterans' secret.

88s were placed at the most important intersections in the center of town to thwart any Soviet attempt at an armored counterattack (Soviet tank engines were heard in the distance)[36].

At the news of "artillery" blocking the western bridge[37], Katukov threw into attack his last reserves, including three KV–1s. When the reserve unit approached the bridge, the leading tank under I.A. Lakomy was twice hit in the turret in rapid succession. The tank was soon ablaze, but Lakomy is said to have remained in the turret to fight it out with the "German batteries" to the bitter end[38]. The two other tanks were said to have seized the opportunity of that duel, crossed the bridge, and trampled the "enemy batteries" with their tracks. This cannot be true as there were no such batteries there! According to the Germans, the other "T–34", as they identified it, hit a mine. This clearly indicates that it had indeed broken through across the bridge, corroborating Katukov's writing, at least to a certain degree. The third tank broke through for certain.

At approximately 1330 hrs, German infantry of the I./Sch.(mot.).Rgt.33 and the anti-tank guns of the 1./Pz.Jg.Abt.49 entered the town from the south. Some time later, but not later than 1500 hrs, German artillery arrived at Mcensk. The batteries immediately laid down a barrage on the western approaches of the highway bridge, as well as across the highway to Tula — the two most likely spots where a counterattack could originate.

At last, the long-awaited Soviet attack came. Six tanks with infantry started from the eastern quarter toward the center of the town. The Germans were expecting a move like that and their 88s hit three of the tanks within minutes. Later on, a fourth one was hit by the anti-tank guns. After four out of the six tanks were lost, the Soviets fell back, and the first counterattack was over.

Accompanied by 3./Pz.Jg.Abt.49 at approximately 1700 hrs, K.34 entered the town on foot and dismounted due to the mud. Both units were thrown into the melee right from the start, helping to consolidate German positions in the northeastern part of Mcensk and capturing the highway bridge. Now it was not the 4. Pz.Div.'s troops who were in critical condition inside the town, but the 4th Tank Brigade and its subordinated units east of Mcensk. It was impossible for them to retain their positions, pressed hard by K.Gr.Saucken as they were. It was Katukov who had to flee the town, and his only way out was the railway bridge in the northern part of Mcensk.

II./Sch. (mot.) Rgt.33, which spearheaded K.Gr.Saucken, had left Golovlevo at approximately 0500 hrs on

This transitional T–34 model has an old entry hatch (POP base with no opening for it) and the old driver's hatch, but the road wheels, track links (550 mm) and towing hooks are new. This photo was taken in mid-December 1941 at the approaches to Moscow.

- CAW -



that day, but it took the battalion until 0930 hrs to reach the railway. Then it followed the tracks to the highway crossing which Sch. (mot.) Rgt.12 had captured at noon. Soon afterward the weather cleared, and the Soviet 11th Tank Brigade with infantry, still holding Bolshoye Dumchino, blocked the Germans' path.

At approximately the same time, Maloye Dumchino was occupied by the II./Pz.Rgt.6, which was stuck there, however, due to a lack of fuel. This gave Katukov at least three hours in which to organize his retreat.

Dusk set in before the trains pulled up but, despite the supply situation, the divisional HQ ordered a further advance. Saucken moved forward again at 1700 hrs. Sch.(mot.) Rgt.12, supported by 1./Pz.Rgt.35, went forward under the cover of an artillery barrage. The Germans moved slowly but steadily, meeting almost no resistance. Katukov had withdrawn already, leaving behind only two small rearguard units. At approximately 1900 hrs Saucken, at that time at the Mcensk city limits, was reinforced by the II./Pz.Rgt.6 which had chased after him all the way from Maloye Dumchino after fuel had finally arrived there. However, it was too late for the Panzers to have any influence on the tactical situation.

At 2000 hrs, the Soviets started to evacuate Mcensk across the railway bridge, planked over by the engineers to make it useable for the vehicles and infantry. This was done hastily and the planks, slippery from snow and ice, started to slip. Wheels were wedged into the slits, horses broke legs and the bridge started to jam up fast. The Germans finally discovered the Soviet evacuation attempt and started to shell the bridge, compounding the already chaotic situation. The German shelling intensified with Saucken's arrival. German troops were not deterred by the Soviet engineers' blowing up the downtown railway viaduct over the main highway at approximately 2230 hrs. An hour later, the I./Sch.(mot.)Rgt.12 was already fighting the rear guard of the evacuating Soviet brigade, inevitably closing in on the bridge.

Chaos reigned on the shelled bridge. The traffic was jamming up, planks were slipping, horses panicked and stampeded, others with broken legs had to be shot and thrown clear of the bridge. As the Germans closed in, machine guns joined the artillery and the amount of dead and wounded started to rise alarmingly. Bodies were strewn across the path of the retreating troops, and there was not always time to drag the still living aside or onto a vehicle. The horrible scenes which occurred on the bridge during that terrible night, as the temperature fell to –7° Centigrade, resulted in it being given the nickname of "Devil's Bridge".

The last to cross, in checker-board formation, were seven T–34s which fought off the Sch.(mot.)Rgt.12's infantry until 0130 hrs. Commanded by Burda, the tankers were assisted by paratroopers and an artillery battery. If we believe Burda's report, the fighting went well. Lt. D. Lavrinenko alone was credited with 6 German Panzers. Later on, during their last counterattack against the German-held railway station, the tankers had claimed the destruction of 10 Panzers, 6 anti-tank guns and up to a battalion of infantry! After the last tanks crossed, without much resistance from the Germans, the Soviets blew up the railway bridge.

At midnight Saucken's and Eberbach's soldiers met at the northern highway bridge in the center of Mcensk. But soon after the Germans shook hands, and the Soviets had blown up the railway bridge. At 0500 hrs, still in the darkness, the 1st Guards Corps began a major counter-offensive to retake Mcensk. The Germans, however, were prepared. Due to the frost, all engines were ordered to be warmed-up every hour or so and the tank crews had no chance to catch more than several winks of sleep that night.

At dawn, despite the Stukas and an artillery barrage, the Soviets were able to break into downtown Mcensk. This was mainly due to the 11th Tank Brigade's charge, spearheading the Corps with their heavy tanks at the point. Despite knocking out as many as eleven of the Soviet tanks in the streets of Mcensk on that fateful day, the Germans suffered setback after setback, with single Soviet tanks penetrating as far as the western bridge. Heavy fighting went on until dusk and finally the Soviets were pushed out of the central part of the town. All that was left was to mop them up in the villages west of Mcensk, as well as the eastern part of the town. This was gradually accomplished by the additional German forces arriving in Mcensk. The major part of this mopping-up was done the next day, so it can be safely assumed that the Battle of Mcensk was concluded on October 11.

Although the German division took the town, this did not mean that it could undertake further offensive actions. The reason for this did not lie in the losses that it had suffered but, rather, in the terrain conditions and the supplies, of which there were none. In the evening of October 11, Pz.Rgt. 35 still had 40 operational tanks but hardly any fuel to put in them. It was not until later in the evening, that the first supply convoy of Pz.Ar 2 arrived from Briansk with fuel. On October 13, 19.8 tons of precious ammunition finally arrived. Meanwhile, on October 11, the soldiers' rations were reduced. The lack of bread was especially felt. While canned items may have been plentiful, the field bakeries were sorely missed. For the Germans, the battle ended under the same conditions that it had started.

SUMMARY AND CONCLUSIONS

From 1 to 10 October, the losses of the 4.Pz.Div. were; 86 killed, 257 wounded and 1 missing. As a total then, from 30 September to 11 October the division lost well over 350 soldiers. This included at least 190 soldiers during the fighting for Mcensk from 4 to 10 October. During the period 30 September to 4 October, when the division pushed toward Orel, and then from 5 to 10 October, when the fighting between Orel and Mcensk took place, the losses were almost the same (a ratio of 40:50). Therefore, it is hard to see here any particularly strong resistance on the part of the 1 Guards Corps.

From 4 to 12 October, the division had at least 17 tanks destroyed (11) or damaged. The losses of the division's other equipment were significantly larger but remain unknown. But it is possible to estimate them as at least 50 vehicles destroyed, the same number as heavily damaged and 10 guns. The Soviets, of course, see them as completely different. According to them, the 4 Tank Brigade destroyed 133 tanks, 49 guns and 15 prime movers. The manpower losses of the 4.Pz.Div. would have been difficult for its leadership to count!

On the Soviet side, the losses, as usual, were frightening. A minimum of 500 Soviet soldiers were killed and a further 1,100 were taken prisoner. It appears that the number of wounded must have surpassed the total of killed and prisoners. The total losses of the 1st Guards Corps can therefore be estimated as at least 3,000 soldiers. In addition, over 30 tanks were destroyed from the two brigades, mostly KV–1s and T–34s, and the Germans managed to capture or destroy at least 21 guns, 1 armored car, 7 BM–13s and 33 cars (only captured ones).

When considering the losses, the Soviets lost the battle in every sense; in every category of weapons their losses were at least three times larger than those of the Germans.

Furthermore, the men of the Red Army could not hold their positions. They gave up all of their lines of defense and, in the end, the town. The commands of the Soviet units, Corps as well as the individual brigades, made so many mistakes that it would be difficult to list them all. Their actions were characterized by nonchalance and sloppiness. The overall difficult situation of the 4.Pz.Div., and the muddy season, which had just started in Russia, saved the Soviet Corps from a defeat. The mud, as well as orders from above, rather than just Soviet resistance, halted the 4.Pz.Div. It is a fact that on 5 and 6 October the Germans committed mistakes, but they could not have had an effect on their further actions. The failure to carry out the ordered assignments did not have any effect on the operational situation of the division or the entire corps. The failure to reach Mcensk resulted, first, from the orders which the division received, the situation in which the XXIX Pz.Kp. found itself, the breakdown of the logistics, the bogging down in the mud and, lastly, due to the resistance of the Soviets who, despite their numerical superiority, did not display any offensive intentions. The 4.Pz.Div. did not attack for 3 days (4, 7 and 8 of October) because of the resistance from the Soviets but, rather, because it was not in a position to take the field of battle. This was mainly because of the difficulties listed above, posed by nature, and not any extraordinary Soviet resistance.

It is obvious that the effect of the T–34's admired characteristics on the course of the battle and on the Soviet "success" at Mcensk was non-existent. This is evident because a tank's technical points cannot explain an operational failure in any way. A lost or won battle is a very complicated question, and trying to explain it by using technical data of one type of tank could simply turn out to be a manifestation of ignorance. If the technological advantage of any kind of armament was to play a significant role, it would have to be a crushing advantage. The T–34 did not offer such an advantage. Addi-



This T–34 from the STZ factory is typical from the period late 1941 / early 1942. All external equipment is deleted and the tank has steel road wheels, interlocking hull plates, the PT–7 periscope sight, a loader's vision port, and a simplified armored gun shield.

- Author's collection -

tionally, the T–34 was not the only type of the newest Red Army tank to make an appearance at Mcensk.

If we are to attach much weight to new tanks (but not only the T–34) at the Battle of Mcensk, it is better to point to factors related to their use rather than their construction. It was not the gun and the sloped armor that caused the biggest problems for the Germans, but rather the camouflaging of their positions, the attacks from ambushes and, above all, the three attacks on the flanks of the German units. It was these attacks that aborted the German actions on 5, 6 and 9 of October and forced them to retreat. It was not the construction of the T–34 that mattered, but rather their correct use in action. However, this was not enough. Despite having a numerical advantage, new equipment, and even strong air support, the Soviets simply could not destroy the combat units of the 4.Pz.Div. And yet, they had chances to do so, and not just once.

Guderian himself points to the importance of the new tactics for employing tanks in *"Panzer Leader"*, where he admits that this factor was one of the reasons for the 4.Pz.Div.'s lack of success. We read in his memoirs: "*Geyr's* (the commander of the XXIV Pz.Kp., author) *report did not sound very comforting about the effective-*



A ripped apart wreck of a T–34, destroyed by the Germans at the beginning of 1942. The missing hull wall makes it possible to see the vehicle's internal construction. It is interesting that, despite the strong internal explosion, the turret remained in place. This indicates that the quality of the welding of the hull was poor.

ness of the actions of the Russian tanks, and especially their changed tactics." Further: "*Russians... the tanks, and in a massed manner, they threw against our flanks. They have already managed to learn something*"[39]. It is true that, since the KV and T–34 were known already, the tactics of employing them became a new revelation. Nothing else, not even the "massed manner" of using tanks, was as important (see the example of Burda's charge on 6 October).

If the T–34 did not play a larger role in the Battle for Mcensk than earlier, then where did the German T–34-phobia come from? It appears that an explanation of this sickness is very simple.

As always, the greatest fear is caused by the unknown. At that time, the new 26, 44 and 52-ton tanks of the Red Army became that unknown specter. Graced only with that limited knowledge, and faced with three differently looking tanks, although similar to the uninitiated, the German soldier was always uncertain as to which tank he was facing. The Germans knew that the Soviets were using the "T" system, but the "special"vehicles were beyond their realm of knowledge. That is why they called the BT tanks "Christie", and why the KV was extremely rarely recognized correctly! Thus, very often the heavy tanks were identified as T–34s because that designation, especially with the passage of time, was the most popular. Exactly identifying the danger was less important than classifying it in the simplest manner. Tanks that had been designated in 1941 as heavy or modern, were later commonly identified by the Germans as T–34s. And that is where the "T–34–phobia" originated. Because Guderian played a key role in the process of creating this myth, here we must take another detailed look at his memoirs.

Speaking of the technical advantages of the RKKA's new tank, Guderian states: "*the 4.Pz.Div. was attacked south of Mcensk by Russian tanks and experienced some critical moments. For the first time, the superiority of the Russian T–34 tank made itself crystal clear. The division suffered heavy losses. The plan for a quick attack on Tula had to be temporarily set aside*"[40]. It is sad, but nothing in this quote agrees with the facts. This is because the 4.Pz.Div. was not attacked by Russian tanks, but rather endured several very limited counterattacks. Additionally, this was not south of Mcensk, but southwest of the town. This was not the first engagement during which the advantages of the modern tank became evident. The first clashes with this tank took place already in the period end of June/beginning of July 1941, and its technical superiority was already noted at the highest levels of command. Guderian also confabulates when he states that the division suffered heavy losses. On the other hand, his suggestion that the attack on Tula could not be continued because of the above-mentioned misunderstandings is absolute nonsense. As we are aware, the attack could not be continued because of orders from above and the lack of supplies (linked with the difficult weather conditions) rather than some tank. Guderian contradicts himself in a later part of his memoirs, where he describes the division's supply situation and the effect of weather on the end of its movement (although he is silent on the operational factors).

Examining *"Panzer Leader"* further, we read about the effect of the T–34 on the 4.Pz.Div.'s "pogrom": "*The Pz. IV tanks with their short-barrelled 75 mm guns could penetrate it* (T–34, author) *only from the rear, through the thinner armor, hitting the engine... The damaged Russian and German tanks were still on the battlefield. The Russian losses were significantly smaller than ours*". Continuing: "[In Mcensk] *the Russians threw into the fighting a substantial number of T–34 tanks, inflicting large losses in armored vehicles on the German forces. Until then we had a material advantage in tanks, now the Russians had it*"[41]. Here, too, Guderian is far from the truth. From available sources, it is obvious that, on 11 October, in Mcensk the Germans did not lose any tanks as total losses while claiming that they had immobilized 11 of the Red Army's modern tanks. This was an identical situation to the battle of 6 October, where Guderian had inspected the battlefield. During that clash the Germans lost 10 tanks (destroyed and damaged) and the Russians 12 (total losses). Where, then, are the Russians' substantially smaller losses?

Guderian is also wrong when it comes to examining the technological aspects, as the Germans did not have an advantage in tanks before the war or at the time of the Battle of Mcensk. If we were to accept that the Pz.Kpfw. IV or Pz.Kpfw III were better than all other tanks in Europe (debatable), this primacy was only true until the spring of 1941. At that time the Germans surely already knew that the Soviets had more powerful tanks than they did. The primacy was finally ended at the end of June 1941, when the T–34 and KV tanks appeared before the eyes of the German soldiers. Guderian confirms this, once more contradicting himself.

However, regarding these two quotations, most important is the fact that the general is discussing the possibilities of fighting against the T–34 with the Pz.Kpfw. IV. Guderian clearly states that the T–34 had one weak point — its rear. Here is where we get to the crux of the matter. The T–34 was armored equally at the rear and on the sides — 40 mm thick. The side armor was angled at 40 degrees at the side while at the rear it was angled

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[39] Guderian, op.cit., p. 187 (author's emphasis).
[40] Ibid. p. 188.
[41] Ibid. pp. 188 and 190.



Above: A T–34 from one of the four tank brigades of the 6th Army, which fought for Izyum, south of Kharkov, at the beginning of 1942. This tank most probably came from the No.183 Factory, which is indicated by the turret hatch and by the way the front girder is connected to the lower and upper glacis. This is a transitional variation T–34, still with the old driver's hatch but already with a new type of hull. The tracks are also transitional, designed to work with the steel road wheels. The tank is painted white and has a stripe for quick aerial identification painted on the turret roof. It also has writing on the turret; the right side has *"Za rodinu"* (For the Motherland), on the tube recuperator shield there is written *"Vpyeryod!"* (Forward!).

- CAW -

Below: A pair of T–34s manufactured by the No.112 Factory. The interlocked hull plates (front only), the headlights on the glacis, the two-piece recuperator shield, the one-piece turret rear and the new type of tracks all indicate a late 1941/early 1942 production model. The tank in the background, with steel road wheels, has the number "265" (undoubtedly painted in red) on the turret.

- CAW -



Another photo of the same tank as on p. 56 (top), on the left turret side it is written "Smert' Fashistam" (Death to Fascists). The slogans were painted in black or red (rather the latter), as was the stripe on the turret.

- V. Kulikov's collection -





With its engine smoking, this T–34 is making a quick escape in December 1941 on the outskirts of Moscow. The fact that the photo was taken by a German combat photographer makes it atypical. The crew's belongings, or perhaps the bodies of riding infantry, can be seen on the engine deck.

- CAW -

The same tanks as in the left photo, seen from the other side. Obviously, both have roadwheels with the internal amortization. The destroyed mud guards indicate that the tanks may have been destroyed by German infantry in close combat (there are no visible penetrations from anti-tank rounds, despite the fact that the Germans were to the right of the tanks, indicated by the turned turrets).

- M. Szapowałow's collection -





A T–34 with additional fuel tanks (the first infantryman is sitting on them) slowly climbs a steep slope in December 1941. The tank's front part has been painted with white camouflage paint, as were the top half of the side, the turret and the gun.

- WAF -



This collision was most probably the result of the Soviet unit being surprised during a road march at the beginning of 1942. Both tanks were probably hit in the hull side, where the T–34's armor was only 40 mm (1.57-in.) thick. They clearly display the winter camouflage used on T–34s only during the winter of 1941/42. It is widely assumed that this type of camouflage was characteristic of the 4th Tank Brigade, but in reality many units wore such "uniforms" since the tanks were painted in the factories. Noteworthy is the frontal part of the hull side, where the antenna pot opening was covered with a welded plate.

- CAW -

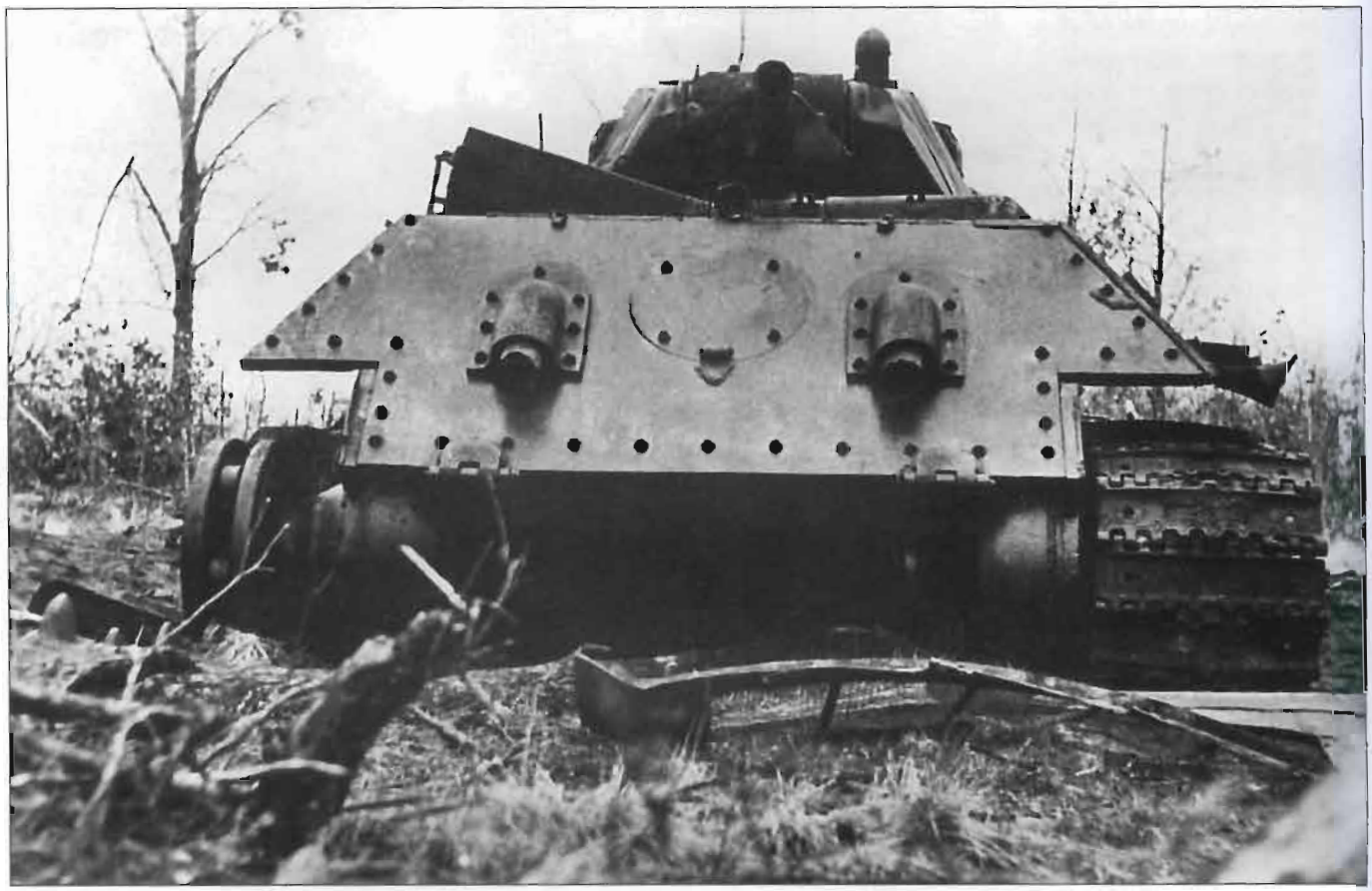
at 48 degrees. Effectively, this gave the rear armor an extra 6 mm of armor, making it stronger than the side armor. Only the hull side, 45 mm thick, was perpedicular.

What then is Guderian talking about? Obviously, the German general is not describing to the reader the advantages of the T–34, but rather... the KV! It was the heavy tank that had its weakest point at the rear. At the front and sides its armor ranged from 75–110 mm while at the back it had a 60 mm armor plate that was almost perpendicular. As we are aware of, Katukov's 4th Tank Brigade operating at Mcensk was armed with T–34 and KV–1 tanks. It is almost certain that the heavy tanks went into the attack first (according to the tactics used at that time), drawing the attention and fire of the Germans. If



A T–34 with the same type of camouflage. This vehicle already has the one-piece turret rear plate, the new driver's hatch, and applique armor on the front glacis. As the tank in the previous photo, this one also has the old tracks and rubber-tired road wheels, and the camouflage allegedly only applied at the No.183 Factory. This photo was taken south of Lake Ilmen in March 1942.

- CAW -



This T–34 was immobilized in the German trenches, probably in early spring of 1942. This tank already has the new type of rear hull assembly (both plates connected directly at an angle, without the rounding), but the old type of track. Note that the turret has applique armor, which suggests that the hull front also had it. The two wide hinges, the rear plate covering the edge of the lower, and the lack of interlocking welds in the rear indicate that this vehicle was manufactured at the No.112 Factory.

- CAW -

then Guderian was shown "new" Soviet tanks on the battlefield, they had to be T–34s and KV–1s[42]. Perhaps the KVs above all. This was not because they looked different or were better (after all, the front armor of both tanks was equally effective) but rather because they were better armored on the sides than the T–34, making combating them much harder. The side armor of the KV was so thick that the standard APDS Gr. 38 HL/B round for the 75 mm gun could not guarantee penetration at 800, 500 or 200 meters. This was not the case with the T–34 because its sides were protected by 45–53 mm of effective armor. There was not a huge problem for an APDS round to burn through such a thickness. It was only the HL/C rounds, which made it possible to burn through another 25 mm of steel, which negated the advantage of the KV's thick side armor.

Along with Guderian's visit to the battlefield at Mcensk, a veritable avalanche of events occurred. In a straight time line, they led to the birth of the T–34 myth. This is how Guderian related these events: "*In a report to the command of the army group referencing this, for us, new situation, I explained the factors on which the T–34 tank's superiority over our Pz. IV tank was based, and pointed out the resulting consequences for the future development of out tanks. The report ended with a plea to send to my sector of the front a commission, which would have been composed of representatives of the Wehrmacht, the Armaments Ministry, and tank designers and representatives of the tank producing factories... I also requested the immediate beginning of production of a heavy antitank gun capable of penetrating armor thick enough to destroy T–34 tanks. The commission arrived... on*

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[42] A reminder, the 4. Pz.Div. had already successfully engaged and destroyed T–34s and KV–1s before October 4.

[43] Guderian, op. cit., p. 187.

[44] According to other sources, this took place on October 20. In reality, this does not matter, as the committee was at the front for several days. It was composed of representatives of the Wa Pruef 6 (the OKH department dealing with armored development for the army) such as Obst. Fichtner, Mr. Kniekamp, and Maj. Ruden (an armor plate specialist), as well as Dr. Porsche and representatives of armament companies (MAN, Rheinmetall, Daimler-Benz, Krupp etc.).

[45] T. Jentz, *Germany's Panther Tank*, Schiffer 1995, pp. 14–15.

[46] Ibid. The emphasis is mine. Of course, the KV–1 was not faster than either of the Panzers. As to the ricocheting of the projectiles, it is not clear whether the General is referring to the KV–1 turret (to which he is continually referring) or the T–34 hull.

20 November"[43]. Guderian's report has never been found (assuming that it ever existed) but it is almost certain that it was a summary or a rewritten report from the commander of the 4. Pz.Div, General Langermann. According to the correct manner of sending reports, a divisional commander could not independently send a document to the Staff of an army group. Instead, the highest up he could direct it was to Guderian, and at that with the knowledge and approval of his direct superior, the commander of the XXIV.Pz.Kp. — General Geyer. Langermann prepared his report on 22 October and Guderian pushed it further some time later. As a result, the arrival of the commission already on 18 November[44] to listen to the complaints of the German front officers has to be judged as a very quick reaction.

Immediately after arriving at "the scene of the crime", the specialists were stuffed with a dose of Guderian's particular knowledge. Speaking to the guests, the general informed them, as he recalled in his memoirs, of the loss of superiority that the Panzers had had up to that time. He did not neglect to note that the German tanks performed badly *"in the bottomless mud encountered on the soft roads, as well as in the fields"*. That is why *"the possibility of driving* [the new tank, author] *cross-country and on bad roads in all seasons must become real"*.[45] Probably, only due to the haste, he did not demand that the new German tanks be made to fly.

Explaining the advantages of the enemy's tanks, Guderian stated forcefully; *"The armament of the Russian heavy tanks (44 and 52-ton)* [that is, the KV, author] *is made up of a 76.2 mm main gun, a machinegun at the front of the turret and one machinegun at the back of the turret* [once more, the KV, author]... *The hull armor is 80 mm thick... and the turret is 100 mm thick* [again the KV, author]. *The sloped armor causes the hits from the 88 mm Flak to ricochet* [the T–34?, author]"[46]. *"These tanks are faster than the German Pz.Kpfw. III and IV* [this means the T–34, author]". As we can see from the text, it is obvious that, while Guderian is talking about two different tanks, he does not understand this fact.



A burned out wreck of a T–34 with applique armor on the hull front, spring of 1942. The additional armor plate was designed to accommodate the towing hook (new type). Note the holes in the front fender — they are exit holes, suggesting that the armor piercing round was fired from behind and ricocheted along the hull side. Note also the late 1941 model track links.

- CAW -

The commander of the 4.Pz.Div., von Langermann, had a similar approach to this problem. Just like Guderian, he collected the information from his subordinates, that is, certainly from Eberbach and Lauchert. Both Germans, to a large degree, probably suggested to their commander solutions that, in their opinion, would have led to the neutralization of the Soviet advantage. It is worthwhile to become familiar with the most important parts of the report, as it gives much to think about. I have written all the underlined parts, and have also added commentary next to the various parts so that the absurdities, which occur in places, of the German report are more evident.

"During its battles, sometimes the 4.Pz.Div. clashed with Russian heavy tanks. Initially, they appeared in small numbers and could be driven off with concentrated artillery fire, or bypassed. In some especially favorable conditions, individual heavy tanks were destroyed by direct artillery hits."

After the capture of Orel, for the first time the Russians used their heavy tanks en masse. [It is certain that this is where Guderian got his impression about the mass use of heavy tanks at Mcensk]. *In several engagements there was heavy fighting between tanks* [exact translation; in fact, these were clashes involving platoons or companies of tanks] *because the Russian tanks no longer allowed artillery fire to chase them away.* [this statement by Langermann is not true]

For the first time during the campaign in the east... we experienced the absolute superiority of the Russian 26 and 52 ton tanks over our Pz.Kpfw.. III and IV. [another statement that Guderian poached for himself]

Russian tanks... opened fire on our Panzers from their 76.2 mm guns already from a distance of 1,000 meters, with an uncommon force of penetration and achieving a high level of accuracy. [Without a doubt, this refers to a Panzer destroyed on 6 October at a distance of 1,000 meters. Actually, that tank was destroyed by an 85 mm gun, and not by a gun from a T–34 or the KV. The Germans could not have known that]...

Beside the better armament and the stronger armor, the 26-ton Christie tank (T–34) is faster and more agile..." [The Germans did not have the opportunity to test the T–34, and so the question arises: How did Langermann know that the T–34 was faster than the Pz.Kpfw. III/IV?

One of the best-known photos of T–34s with applique armor, taken in the fall of 1942 during maneuvers on the Leningrad Front. These differently cut plates were manufactured by a repair shop, rather than the tank's manufacturer. This is an important photo, showing that at least some of the tanks also had applique armor on the lower glacis. Note the bundles of tree trunks carried by the tank in the background. They were used to free bogged down tanks or to help them in crossing difficult terrain.

- Auhor's collection -





This T–34 with applique armor was brewed-up by the Germans at Kharkov in May 1942. This is an exceptional photo because it shows the rear of the turret of this type of tank. It is can be assumed that the Soviets not only placed applique armor on the front and sides of the turret (as is commonly believed) but also on the rear. The No.112 Factory produced this tank.

- CAW -

As a general practice, the Soviets did on a regular basis what the Germans almost never did; they charged with their tanks. Once again, this was a matter of tactics rather than better technical performance. Simply, the Soviets took a completely different approach when operating with tanks in the field. For example, the Pz. III was at least as fast as the Russian tanks. But, in the conditions that existed in the fighting at Mcensk, the Germans did not even think of taking advantage of that factor, especially since their prevalent tactics did not allow for it. It appears that this part of Langermann's insight was invented as the T–34s often fought with the KV–1s, which could not keep up if the T–34s drove very fast.] *"Its wide tracks allow it to wade across fords that our panzers cannot cross. Their ground pressure factor is a bit better than ours...* [If the ground pressure factor was only a bit better, then this could not have been significant during the crossing of muddy or steep fords. If a crossing is difficult, then every tank will bog down in it, even one with a slightly better cross-country performance. The experiences at Mcensk, where the waterlogged and difficult terrain defeated the German tanks as much as the T–34, testify to this fact. The only difference was that the T–34 crews had it slightly easier.]

Combating Russian tanks with the 8.8 cm Flak or the 10 cm artillery gun cannot be a permanent solution. Compared to fast tanks, both guns are not mobile and, in most cases, are spotted, taken under fire and destroyed while still trying to take up a firing position. During just one panzer engagement between Orel and Mcensk, two 8.8 cm Flak guns and one 10 cm gun (these were all the heavy weapons that were used in the engagement) were shot up and crushed under tank tracks... [Here we are dealing with a typical style used by people to justify their own defeats. Langermann is simply lying. Both 88 mm guns were destroyed on 6 October (it is that engagement which he is referring to) because they were employed in a reckless manner, and not because they were used at all. Besides, the Germans used at least seven guns, not three. The artillery piece that was crushed was not an 88 or 100 mm gun (that was not even possible to do), but rather a 105 mm howitzer.]

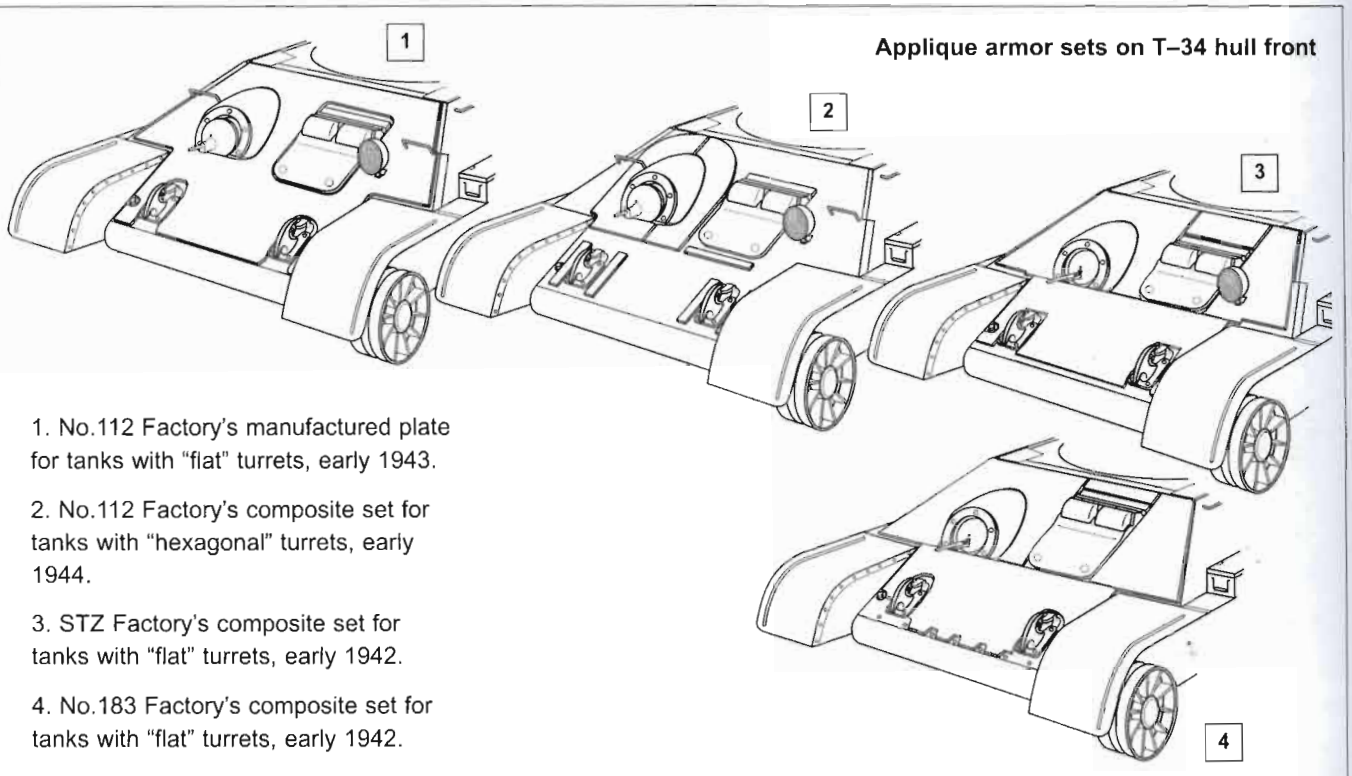
Based on the fact that all destroyed Christie tanks [meaning T–34] *were newer models, the conclusion can be made that the Russians, knowing their superiority, started the mass production of these heavy tanks...* [While obviously this is nonsense, it somehow correlates with Professor Stolfi's theory[47]. It is worthwhile to note the flexibility of the word "heavy"; previously it was applied only to the KV, now it also applies to the T–34.]"[48]

In a later part of the report, von Langermann proposed the start of production of the copied T–34 and 100 mm assault guns, the installation of F–34 and ZIS–5

[47] Just at that time, the T–34 production numbers were declining. Between July and September of 1941, the monthly production of the tank averaged 234 vehicles at the No.183 Factory and 137 at the STZ, giving a total monthly production of 371. In October, only a total of 185 tanks were assembled at both locations, and 260 in November (at the STZ and the No.112 Factory).

[48] T. Jentz *Panzertruppen* vol. I, Schiffer 1996, pp. 205 and 208.

Applique armor sets on T–34 hull front



1. No.112 Factory's manufactured plate for tanks with "flat" turrets, early 1943.

2. No.112 Factory's composite set for tanks with "hexagonal" turrets, early 1944.

3. STZ Factory's composite set for tanks with "flat" turrets, early 1942.

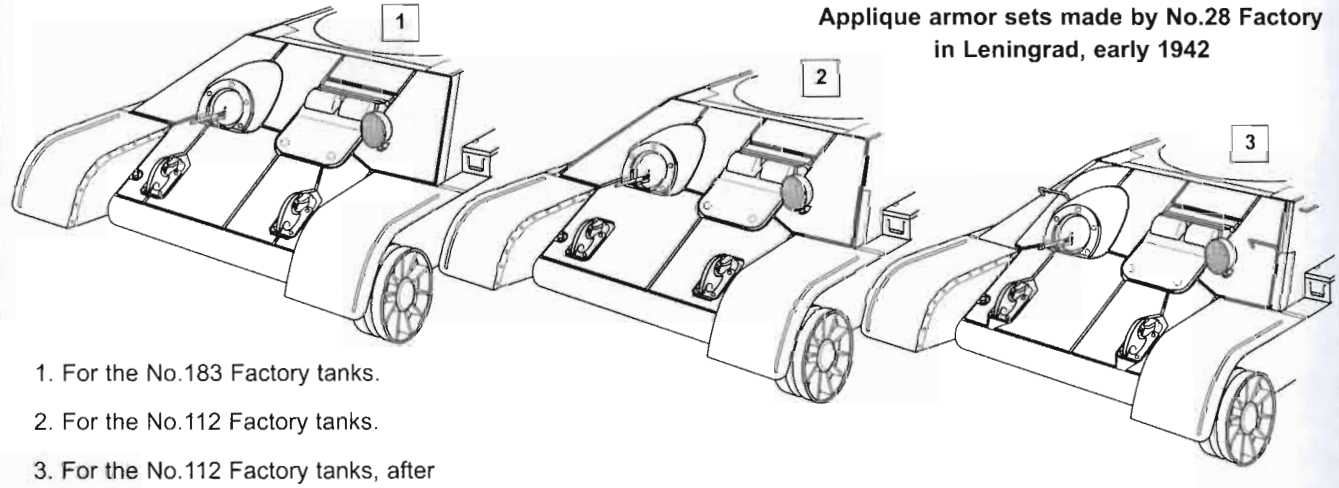
4. No.183 Factory's composite set for tanks with "flat" turrets, early 1942.

guns in the Pz.Kpfw. IV and the development of new ammunition[49]. Some of these proposals were reflected in Guderian's considerations, and later even became reality (copying the T–34). This, however, does not change the fact that in the middle of November 1941 they were already too late.

For example, already in August 1941, two 128 mm assault guns were built using the VK 30 prototype (the effect of meeting the KV at the end of June). At that time, a supply of the very good Pz.Gr. 40 ammunition was stored in the warehouses. At the same time, the German arms industry had already designed the 75 mm antitank PAK 40 gun with the long barrel, whose production had already started[50]. Already a year before Mcensk, it had been decided to install a similar gun in the assault guns. The tests of such an armed vehicle took place in March 1941 and Hitler had demanded the finalization of the work in the middle of September 1941. A long time before the Battle of Mcensk, the possibility of making the long barreled 75 mm gun standard in the 30-ton tanks was evaluated. Such a gun was built and, designated as KwK 40 (initially the KwK 44), its production started at the beginning of 1942.

But, by the fall of 1941 even that armament was already outdated! By that time, work was already very advanced on a completely new gun for the medium tank. It was to give the Germans an absolute advantage over guns from the years 1939 and 1940; that is the KwK 40, F–34 and M3. It was also a 75 mm gun, but it had the longer L/70 (initially L/75.5) barrel, and was later installed in the "Panther"[51]. Already during the period late 1940/early 1941, work was begun on the installation of the

Applique armor sets made by No.28 Factory in Leningrad, early 1942



1. For the No.183 Factory tanks.

2. For the No.112 Factory tanks.

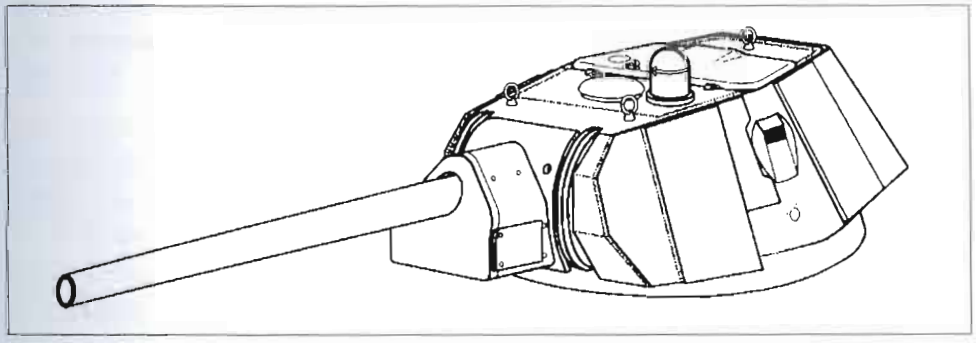
3. For the No.112 Factory tanks, after modernization in second half of 1942.

All tanks with "flat" turrets and rubber tired road wheels.



This T–34, manufactured by the No.183 Factory (S/N 210384) in October 1942, has probably the most unusual applique armor. There is no doubt that this masterpiece was created by one of the front line repair shops.

- Author's collection -



Drawing of the Leningrad No.28 Factory turret with applique armor. It can be assumed that the rear of the turret also has the applique armor — as can be seen in the photo on page 63. See also drawings on page 500.

88 mm Flak 36 gun in a completely new turret that was to be mounted on tanks developed from the 30-ton class.

A direct effect of the Battle of Mcensk was the sudden rebirth at the end of November of plans to build a medium tank (30-ton class) that could have replaced the already obsolete Pz.Kpfw. IV[52]. Work on such a tank, carried out in the years 1937–41, was set aside only a couple of months before the Battle of Mcensk, and

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[49] It is worthy to note that von Langermann does not use the designation KV–1 even once. He also refers to all Soviet tanks as heavy types, even though the weight classes are defined correctly.

[50] Contrary to the suggestion that this gun was the answer to the T–34 and KV–1 tanks, its development had already started in the autumn of 1939.

[51] Before the appearance of Jentz's Panther book, it was often assumed that work on the KwK 40 and the KwK 42 guns was started in November 1941. This is not true, as work had started only on the KwK 40.

[52] Work on the successor of the medium tank was carried on in two streams. As is well known, at the beginning of 1937 work had started on a successor to the Pz.Kpfw. IV (a 30 ton vehicle) and, from mid-1939, attempts were made to modernize it (a 20 ton vehicle). The result was a brief, but far-reaching modification of the basic Pz.Kpfw. IV (and Pz.Kpfw. III) tanks, with many of the changes becoming standard in the design bureaus. Some of these design changes were: a well-shaped hull rear, an original suspension, wider tracks and the 50 mm L/60 gun. With the exception of the gun, the same design features were incorporated into the vehicles of the 30-ton class. In terms of general design features, all subsequent projects were the same and that is why the original drawings of the Tiger and the future Panther did not significantly differ from each other in appearance.

a part of the drawings and designed prototypes were used to create the heavy "Tiger" tank. Its design was begun already on 28 May 1941, that is, a month before the beginning of Operation "Barbarossa". The decision to build a 45-ton tank was taken 2 days earlier at an informal meeting with Hitler at Bertechsgaden. During discussions, it was also ultimately decided that all redesigned or newly designed vehicles were to be armed with the long-barreled guns, allowing them to effectively engage the enemy's modern tanks at long ranges.

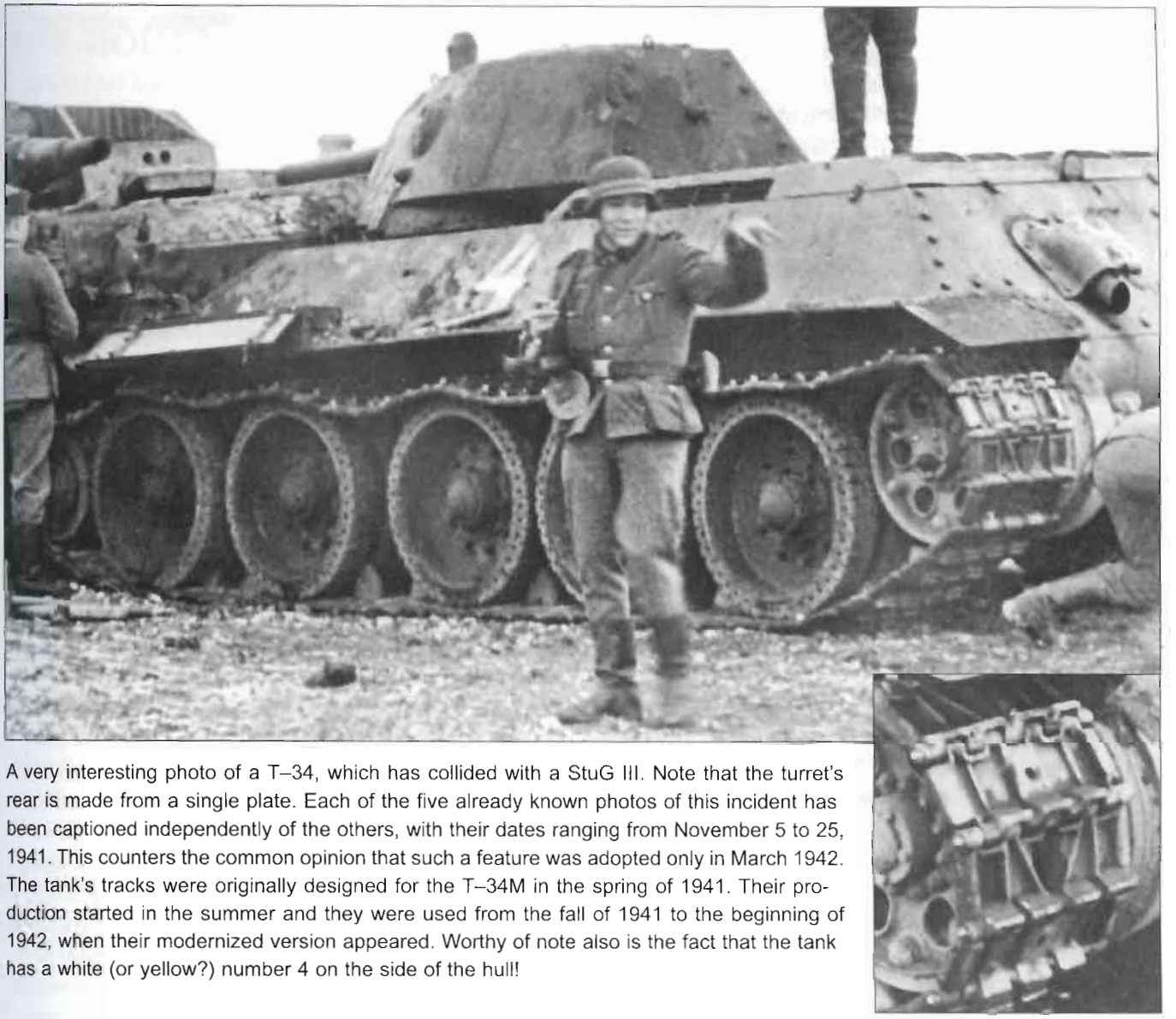
Undoubtedly, the deciding factors in this case were; information about Soviet heavy tanks that was received at the beginning of 1941, and the autonomous development of German tanks in the 30-ton class. It was for these reasons that the Germans considered the creation of a heavy tank, which they did not have, a priority, and not the medium tank, which they did possess. It is true that although the Pz.Kpfw. IV was already then considered as obsolete, it was still considered to be good enough so that it was not necessary to immediately spend money to build its replacement. It was only the general situation on the eastern front that forced the necessity to create a completely new medium tank, the successor of the Pz.Kpfw. IV. In this way, in a framework of a completely new program, the "Panther" was born. By no means was this a copy of the T–34, as the military demanded, or as some authors of armor literature claim. The "Panther" was just the German adaptation of the sloped armor on tanks, which the Germans (it is hard to believe) had not taken into account earlier![53] Despite the fact that since the end of June 1941 they had regularly faced it in combat, that experience did not have any effect on their concept of constructing the tank hulls. It was only the hysteria that took over in October that suddenly forced them to use armored plates angled at 40–55 degrees. As a consequence, the new way of shaping the front and sides of the hull made an appearance in Germany only at the end of October. It first appeared on the drawings of the Pz.Kpfw. V, then soon after (in February 1942) on the drawings of the Pz.Kpfw. VIB and, finally, on other fighting vehicles of the Panzerwaffe.

To partly vindicate Guderian or von Langermann, the originators of the Mcensk hysteria, it should be noted that the misunderstandings relating to combating enemy armor were committed *en masse* by the German officer cadre. As an example, the command of Pz.Rgt. 203 submitted a report in May 1942, from which it appeared that the Pz.Kpfw. IV could only defeat the T–34 from the side at a distance of up to 800 meters. But, this was only possible if the tank was hit on the hull side and not the angled areas or the superstructure. This is interesting because, as we know, the thickness of the hull and the superstructure side varied from 45 to 53 mm. The effect of the thickness differences could not have posed any problems for APDS rounds that were able to burn through 75–100 mm of armor angled at 30 degrees. It is then obvious that the T–34's whole side silhouette was possible to be penetrated, and even at slightly greater

A T–34 abandoned at the side of the road, where the Soviets fought during the winter and spring of 1942. This tank has a full set of the steel road wheels and the new type of tracks.

- CAW -





A very interesting photo of a T–34, which has collided with a StuG III. Note that the turret's rear is made from a single plate. Each of the five already known photos of this incident has been captioned independently of the others, with their dates ranging from November 5 to 25, 1941. This counters the common opinion that such a feature was adopted only in March 1942. The tank's tracks were originally designed for the T–34M in the spring of 1941. Their production started in the summer and they were used from the fall of 1941 to the beginning of 1942, when their modernized version appeared. Worthy of note also is the fact that the tank has a white (or yellow?) number 4 on the side of the hull!

distances, because an APDS round burns through armor in the same way, regardless of distance.

In the Pz.Rgt 203 report, as in Guderian's observations, the minor technical details were most important. Commenting on the possibilities of penetrating the T–34, it was noted that, to immobilize the tank, an attempt should be made to hit it between the 5th and 6th road wheels! How were the German gunners to do this if the T–34 only had 5 road wheels? But even more interesting is the answer to the question, why between the 5th and the 6th and not, for example, the 3rd and 4th? Because on the KV–1 with the *appliqué* armor, there was no such armor added between the 5th and 6th road wheels (which thickened the armor by 20–25 mm, making it 95–100 mm thick). This was done between all other road wheels. Once again, the German tankers confused the T–34 with the KV–1.

The miracle T–34 was regarded in a similar cartoon style by the department of fast troops at the OKH. At the same time (May 1942) it issued a document stating that the KwK 40 L/43 gun was worse than the F–34, but a little later stated that "*the T–34 could be penetrated at distances up to 1,000 meters with the 7.5 cm KwK 40 and the 7.5 cm Holgranate* [that is, the Gr.38 HL, author's note]"[54]. Ergo, our guns are worthless but even the KwK 37 is better than the Soviet tank gun.

However, a similar informational mess ruled on the other side. During tests carried out on the range in September 1941, a T–34 hull was fired upon and it was established that rounds from the Soviet 76.2 mm gun could not penetrate it from a distance of 50 meters. Three months later panic broke out in the USSR as a result of information that the Germans, using new armament, were able to penetrate the frontal hull armor of the T–34. It is possible that this was a result of experience against the Pz.Gr. 40 for the 50 mm gun, which actually had good results at short ranges (penetrating 130 mm of armor

[53] The gun, turret, suspension, engine, the hull's rear and the overall layout of the tank were original German ideas, designed earlier on.
[54] T. Jentz *Panzertruppen* vol. I, Schiffer, 1996 p. 231.

angled at 30 degrees at a distance of 100 meters) and which the Germans did not seem to value very much. According to reports made at the beginning of 1942 by German tankers, it was hard to penetrate with the 50 mm round even the side of the T–34 at a distance of 100 meters. On the other hand, during firing range tests, the Soviets established that the 50 mm rounds penetrated the T–34's side at a range of over... 2,000 meters! The Germans probably once more confused the T–34 with the KV–1, while the Soviet specialists were over-excited as the Pz.Gr. 40 could be fired only up to 1,500 meters.

From all information cited here, it is evident that the German officer corps simply failed to grasp the reality of the situation. It seems that all the most important steps in modernizing the equipment of the Panzerwaffe were taken without its participation. What is even worse, the gentlemen officers were not in any hurry to bother to personally inspect and classify the captured equipment. Hitler was much more active in this field as he understood tank warfare better than many of his generals. After all, he had been a private, and, in addition, he liked tanks. He was interested in them and knew much about them, which allowed him to see their future development with more accuracy than many of his subordinates.

For the soldiers, as always, it remained to suffer all discomforts, which at that time became harsher than usually. Von Langermann acknowledged this in his report when he stated that, as a result of the loss of advantage over the enemy's tanks, "*and especially due to the impression that the Russians are aware of their technical advantage*", the fighting spirit of the German tankers would weaken[55]. However, in October or November, no such thing occurred. German soldiers even endured the winter crisis of 1941/42. This was also the case in the spring and summer of 1942. In fact, it was the Russian crews that sometimes abandoned their wonderful T–34s, using technical malfunctions as an excuse.

Just as it was earlier, the deciding factor was the cooperation between the tanks, the air force, the infantry and the artillery, which functioned correctly in the panzer divisions. As long as this cooperation worked the Germans fought very well.

However, if the morale of the 4. Pz.Div.'s soldiers remained high (confirmed by, as an example, the Battle of Mcensk), at the same time there is no doubt that during the battle of Mcensk these soldiers were in a horrible state. According to Guderian, the commander of the 5 Pz.Brig., Oberstleutnant Eberbach, had a nervous breakdown and during his visit in Orel on 8 October was completely exhausted mentally. Suggestions that this was due to the appearance of the T–34 are completely false. The state of the troops had to be absolutely horrible, but this was mainly due to the weather, the division's supply situation and the general situation, rather than a particular tank.

When on 22 June the Germans invaded the USSR, for all of them, from general down to a private, there was only one goal; the capture of Moscow and the overthrow of the Bolshevik state. The goal had to be reached before the onset of winter, which was obvious to everyone. The example of Napoleon on the one hand, and the vast distances to be covered in Russia on the other, obviously dictated certain approaches to the problem. Of importance among the Germans was also the feeling of superiority over the Soviets that resulted in a specific attitude toward their enemy. The Germans were determined and full of initiative. Generally, they believed that the Red Army would not pose a problem and that they could accomplish that which Napoleon was not able to. Every battle in which they fought during the summer confirmed their beliefs. When on September 30 they set out toward Moscow, closed up two huge pockets and, as earlier, covered 200 – 250 kilometers of roads in two days, they still believed that only two weeks separated them from their desired goal. Meanwhile, already on October 4, they became stuck in a traffic jam without supplies, and then two days later (that is almost at the beginning of the fall season) snow started to fall and the temperature dropped to the freezing point. Suddenly, everything fell apart. Winter had arrived, and they were not in "their" Moscow. The clear, obvious goal melted like the fog under the sun. In its place appeared uncertainty. This was not at all a question of inadequate winter clothing, but rather the lack of a clearly defined goal. Not one officer could answer the question "what now?" Only one reality remained, that the race with time was lost. And that fact must have simply crushed every German.

When Guderian appeared at the headquarters of the 4 Pz.Div., he faced the worst possible situation; hungry, wet and frozen soldiers smeared with mud complained about the shortage of ammunition, the non-functional transport and, above all, the scarcity of everything. There was a lack of warm underwear, socks and boots, gloves and personal equipment that would have allowed each soldier to change into something dry. What was worse, there was no possibility of improving the bad situation. There was a general feeling of helplessness. In such conditions, the state of the troops had to change in a meaningful and expedient way. The indestructible optimism of the German soldiers was not crushed under the tracks of the T–34 at Mcensk but, rather, it drowned in the mud. In the same mud was born the myth of the T–34.

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[55] Ibid. p. 208.

THE ROOTS

The story of the T–34 is one of the longest in the history of the Soviet tank industry[56]. Although in the late 1920's and early 1930's decisions to purchase a tank or put it into production were sometimes taken at lightning speed, the process that led to the creation of what later became known as the T–34 took almost three years to complete. Initially, no one knew what that tank was supposed to be, not even what type of tank. All this uncertainty existed despite the fact that the decision-making process went on during a quiet, peaceful time and not in the midst of the fog of war, or under pressure.

Even this indecision tends to suggest that what later became famous as the T–34 was a special tank. It focused the efforts and strivings of many people — numbering in the dozens — who sacrificed their time to push through their particular ideas, and then refined the concept of the vehicle to a set standard that had to be reached.

It seems that no other armored fighting vehicle of the era got that much fine-tuning. The Pz.Kpfw. III and IV took the same time to appear but, for other reasons, their designers and manufacturers had to cope with a restrictive budget and a lack of industrial resources in the Third Reich. No such problems faced the creators of the T–34. Thanks to the introduction of Communist Economics 20 years earlier, money was never in short supply for armaments. Modern industrial and electrical works built by Americans provided manufacturing capabilities that were just short of miraculous. The only problem was the lack of any idea about what the new tank should be like. Designers, Party apparatchiks, the military, and what survived of the independent decision-makers could not reach a common goal for the Red Army's new tank. It took almost two years of constant arguing and infighting among the various lobbies to define the objective. Unfortunately, each faction was partly correct, and as a result an excellent tank was born, but with characteristics that were not very excellent.

The origins of the Soviet tank industry, which almost directly brought about the birth of the T–34, were not as illustrious as the picture that is painted of the Soviet armored forces in World War II. Soviet Russia, devastated by the ravages of the Civil War that followed the Bolshevik Revolution of 1917, and with a population decimated by years of mass-murder and hunger, was simply not able to produce professional cadres capable of righting so vast a country. As a result of the revolutionary chaos, the upper echelons of the Communist state were a dangerous mix of spirited but inept activists and a few true professionals, mostly lacking revolutionary fervor. The former wanted to create a Soviet State, but it was the latter who knew how to do it. It was not possible to unite the efforts of both groups. The industry developed by the few competent industrialists, under the close scrutiny of the trusted Party hardliners, had to overcome one hurdle after another because it was impossible for the State to flexibly intervene in everything that took place in such a big country. Even when one lobby or another succeeded in bringing State intervention somewhere where it was really able to do some good, it could only improve the situation for a short period of time. Moreover, such interventions, often really



A prototype of the A–34 during the winter 1939/40 trials at the NIIBT in Kubinka. Note the target searchlight prominently visible over the barrel, which then was standard equipment on Soviet tanks. War experiences proved the searchlight to be useless, as it was too easy to destroy. It was never mounted on the series-produced T–34s.

- V. Kulikov's collection -

[56] Tank production was a responsibility of the *Narkomat Mashinostroyeniya* (National Commissariat for Machine Building Industry, called also the Intermediate Industry) but, on September 11 1941, the armor industry was detached from it and established as an independent Industry.



These two photos show the production process of the armored plate.

Here a rough casting after being extracted from the mould.

- *Planeta* -

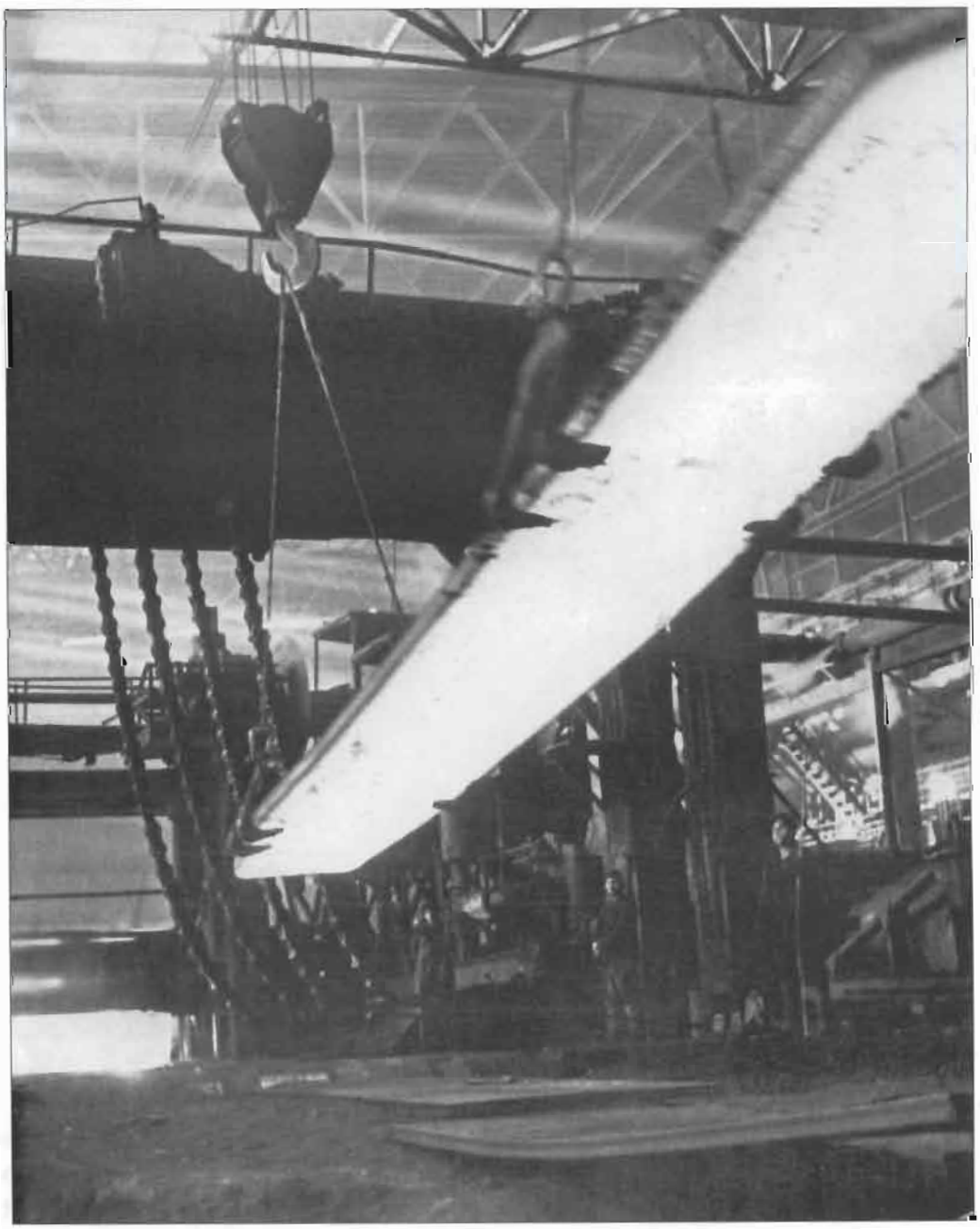
necessary, usually generated problems among those responsible for the varied functions of the factories, kolkhozes and villages.

The lower the decision-making process reached, the more difficult the situation became. Occasionally, the Kremlin was able to ascend above the ideology and arrive at some decision based on effectiveness rather than revolutionary fervor. Below that level, however, the authorities were stiff and dogmatic, taking the ideological exhortations from the capitol at their face value, and sometimes literally. Mostly because of that, in the early 1930s, there were still colossal problems in finding competent and trusted managerial and production cadres. This was most painful for the designers' bureaus, because no amount of true Communist fervor could replace knowledge and experience. As a result, the designers' bureaus simply lingered on, mostly unable to come up with anything original. They lacked highly educated engineers, technicians, chemical engineers, and electricians. The USSR generally lacked educated, competent people with initiative. Only enthusiasts in the various fields of knowledge, political idealists and, as in every country, career opportunists, remained on the field of battle for "a brighter future of the working class".

These problems were compounded, bringing about a failure in creating the armored forces for the RKKA (*Robochye-Krestyanskaya Krasnaya Armya*, Workers' and Peasants' Red Army). Before the Great Patriotic War some of those problems were eventually solved, and in some areas veritable successes were achieved, but the overall status of the ABTV (*Avto-Bronetankovye Voyska*, Armored and Motorized Forces) was still far from satisfactory. Poor leadership, a lack of efficient tactics, dysfunctional structures, and a lack of logistic support

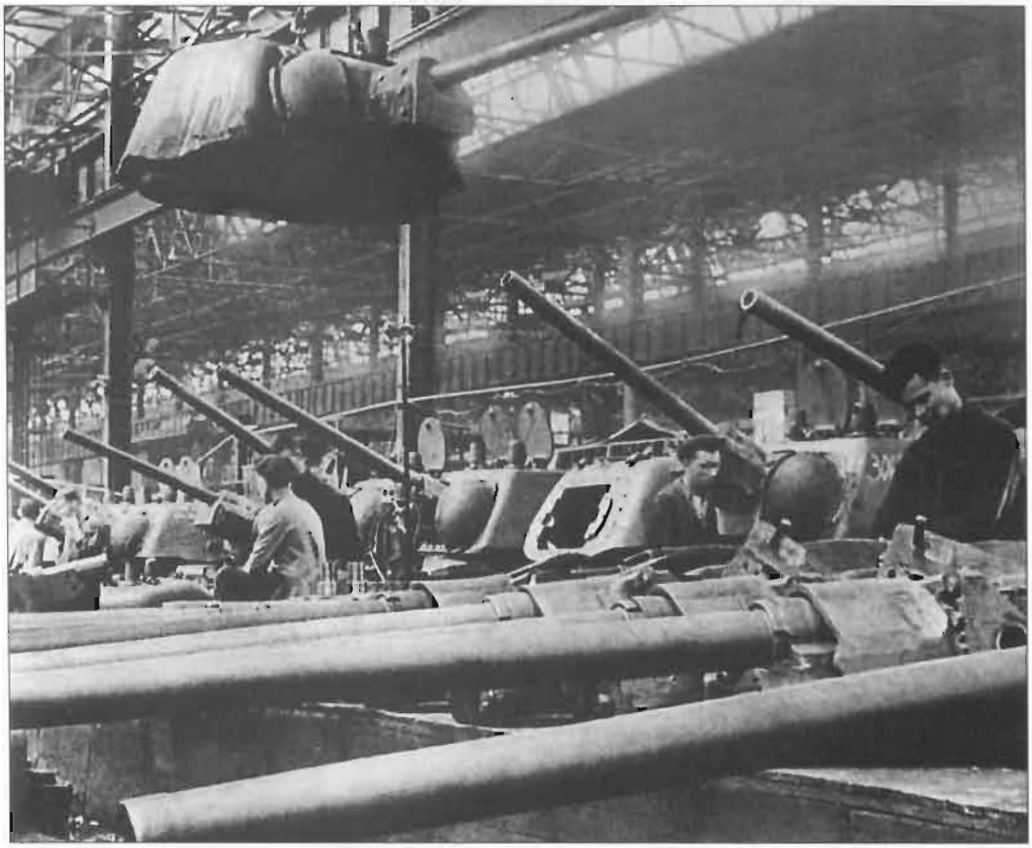
on one side, met with numerous design failures, poor workmanship, and inferior production quality on the other, resulting in the hampering of the efficiency of the ABTV. Even in the mid–1930s the steel mills were still unable to deliver good quality weapons-grade steel. At the Komintern Kharkov Steam Locomotive Factory (KhPZ, or *Kharkovsky Parovozniy Zavod im. Kominterna*), a facility crucial to our story, tank designing started as early as 1928, but all previous KhPZ entries had failed. Their first prototype, the T–24, refused to move forward and, what was even more humiliating, the factory staff did not know how to force the stubborn tank to change its devious ways. It was only after the sixth gear was eliminated that the T–24 began to move in the right direction.

Faced with the paralyzing helplessness of its cadres, the country's leadership decided to purchase abroad a tank for the ABTV. Thanks to that bold decision, the KhPZ started to manufacture the BT–2 wheel-and-track tank, a direct copy of the American Christie tank. The Christie was not bad as a fighting vehicle design but, owing to the inferior quality of Soviet materials, the BT–2 spent more time in the garage than in the field. Even as late as 1933, by the time the modified BT–5 was introduced (the first BT–2s were made in the fall of 1931), many sub-assemblies wore out or broke all too quickly. Due to the low quality of the steel delivered by the Kramator Metalurgical Works, the gearboxes and chassis were amongst the most failure-prone assemblies, but the tracks and armor plates delivered by the Mariupol Steel Mill were not much better. The "Liberty" motor, copied in the USSR without license as the M5, is a chapter on its own when it comes to failures and parts breakage. Lastly, the producer of the tanks, the KhPZ, could not maintain a high level of workmanship. In the first half of 1933 an average of 6% of the delivered vehicles



Transfer of a roughly shaped and rolled plate from which, after hardening, a hull side will be manufactured.

- *Planeta* -



A turret assembly hall at the UTMZ factory, in the Urals, 1943. F–34 cannons can be seen in the foreground. To be more correct, these are the F–34Ms because in 1942 their design was simplified and, at the same time, many of the elements were produced from materials of lower quality. In the background can be seen rows of cast (softedge type) and stamped turrets, some with their gun installed, others awaiting one.

- *Planeta* -



Hull details are being arc-welded.

- *Planeta* -

were rejected by the ABVT for quality reasons. The rejection rate climbed to 10% in the third quarter of the year (August through October), but the last two months were truly disastrous, with every third tank returned to the factory for repairs just after it passed the gates (!). Such was the price of adhering to the economical plan, set up without taking reality into consideration. Despite these difficulties, the tank was kept in production, with further improved models coming forth. The quality gradually rose, as the factory gathered the necessary knowledge and experience.

During the 1930s, the BT tank was one of the two basic tank designs of the Red Army. Built for the RKKA's fast troops, the cavalry and the so-called mechanized troops, it was meant to carry out deep raids behind the enemy lines. The basic advantages of the BT (*Bystrokhodniy Tank*, Fast Tank) for such employment scheme were its high speed and large diameter road wheels.

They enabled it to be used on roads as a heavy wheeled armored car after the tracks were removed. On wheels, operating on a paved road, the BT tanks were capable of achieving a top speed of 60 km/h (37.5 mph). It was a very attractive idea, making the BT a very efficient war machine, at least in theory. The military, fascinated by visions of hordes of BTs charging toward the enemy's cities, somehow forgot that, in order for the BT armored units to cover large distances while fighting the enemy, they would need the means to re-supply themselves and make repairs to their vehicles behind enemy lines. Without the possibility of meeting these two necessities, each unit was for one-time use, becoming worn out very quickly. All the more so as the main roads, the best ones especially, were always the most ardently fought over since they were the most useful for the movement of the main forces of various armies. How then, in practice, was a horde of BT tanks to break through numerous obsta-



Final assembly hall for the T–34, where the finishing elements were bolted on. Note the military personnel accepting the complete tanks.

- Planeta -



Individuals with the largest input in the creation of the T–34

M.I. Koshkin, chief of the designing group of the No.183 Factory in Kharkov, which created the original T–34.

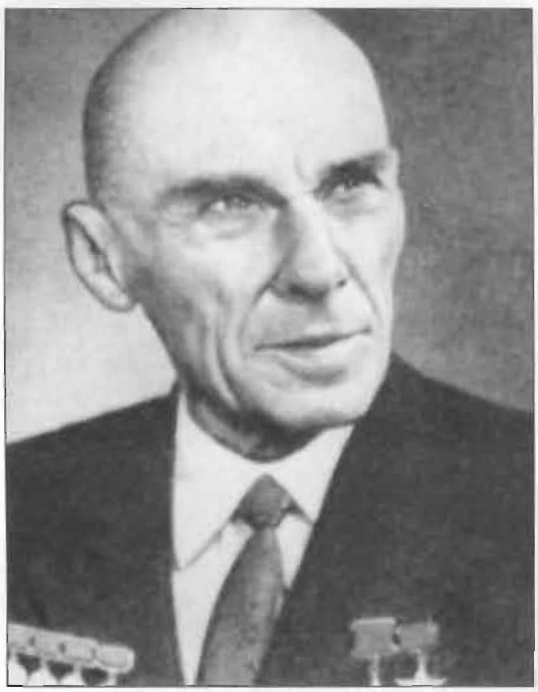
- Planeta -

their technical doctrine and adapting it to their concept of using cavalry. This had a significant influence on the thinking process of many people at the beginning of the second half of the 30s, when considerations began on the successor to the BT.

The Soviets organized their troops and envisaged the future conflict along the lines of the "deep penetration" concept, which in practice meant a gigantic, unlimited raid deep behind the enemy's lines. To carry this out, suitable equipment, able to keep up and cooperate with

Right: A.A. Morozov, he succeeded Koshkin after his untimely death and modernized the T–34.

- Planeta -



cles in the form of enemy units who were dug-in defensively across the roads in depth of between ten and twenty kilometers?

The Red Army's strong fondness of the wheel-and-track vehicles was not without reason. It appears that during most of the 1930s, Soviet military specialists observed closely the experiences and experiments of the British armored force, the only one of any significance in Europe until the beginning of the 1930s[57], accepting

[57] Although the French tank force was the largest in the world, for many reasons it was not really a formidable armed force. Despite its large tank production and a few interesting design features, the French army had nothing revelational to offer in terms of operations by armored forces. In England, the situation was completely opposite and, no matter how you look at it, it was there that sprung the theoretical basis for the coming mechanized war.



Right: The "Napoleon" of Soviet artillery, V.G. Grabin, whose design bureau created the F–34 gun. He only polished the later work on the S–53 gun for the T–34–85.

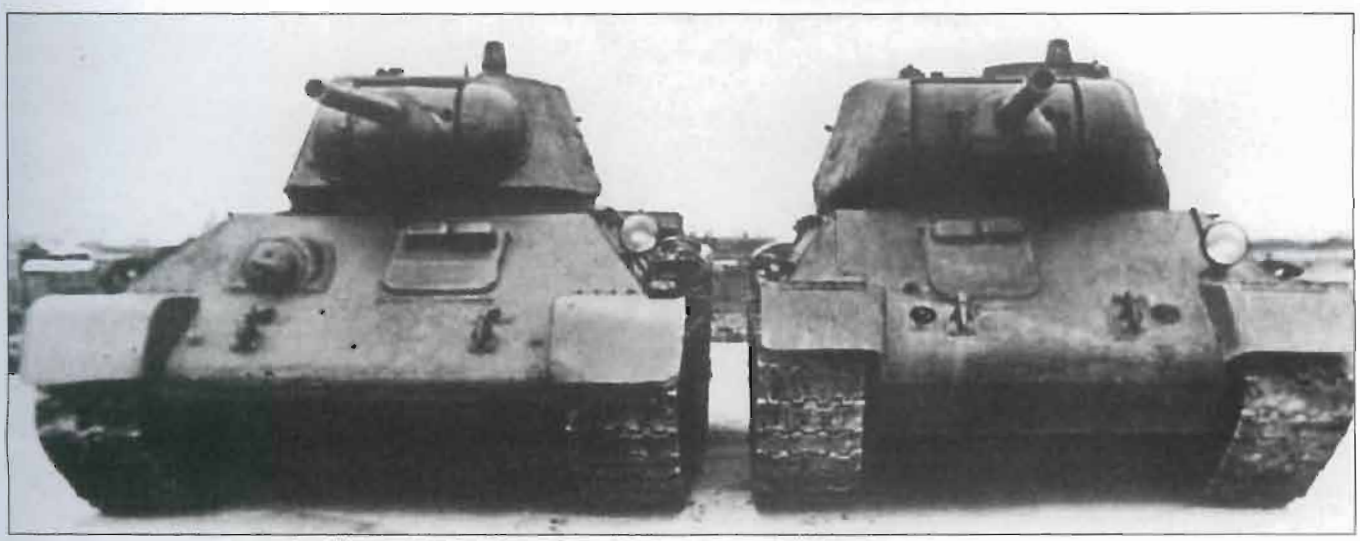
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A T–34 "Model 1941". This tank is a spring series-production of the No.183 Factory, but with later type of track links (550 mm). It has two PT–7 periscope sights, a radio and four external fuel tanks. It has a riveted hull, towing hooks, two headlights, the tall toolbox and the old style driver's hatch. The F–34 gun has been installed in a cast turret.

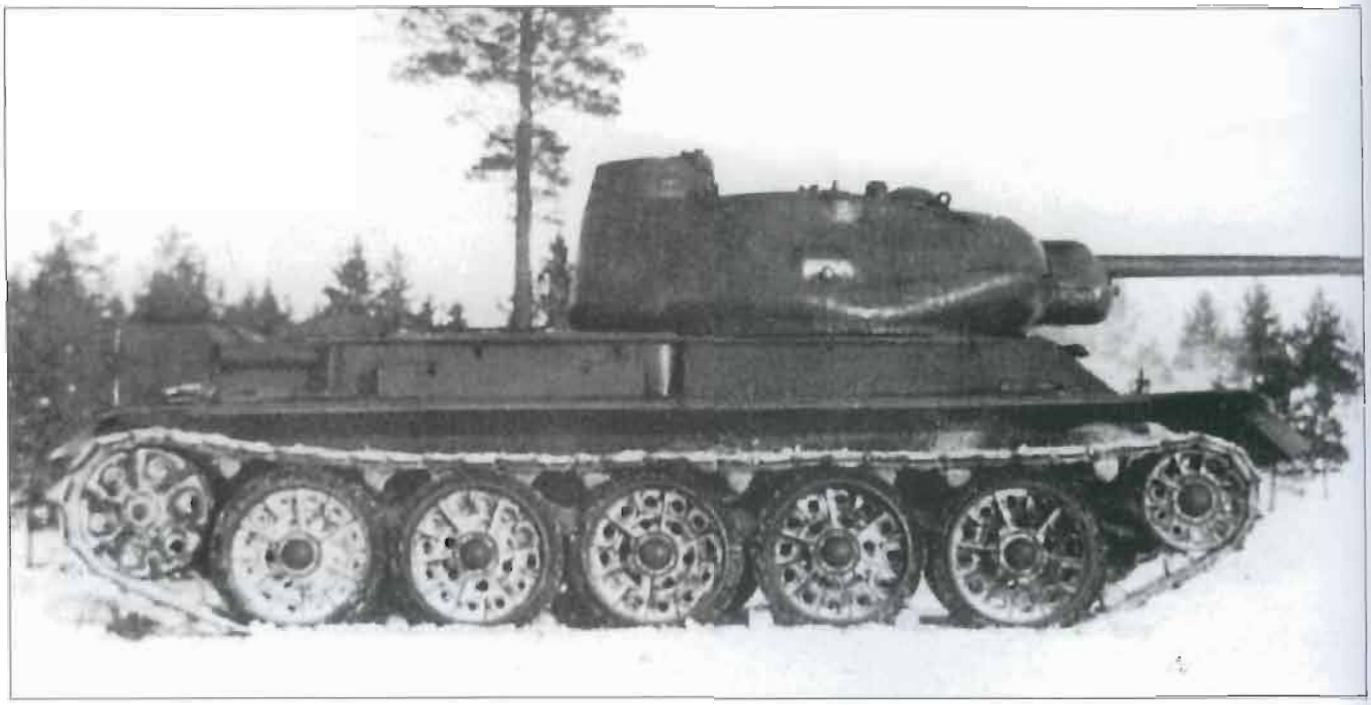


The T–34M tank, the successor of the not-so-successful T–34. Despite great haste, it was not possible to bring it into production before the war. This tank was clearly better than the T–34 and, to be honest, had little in common with it.



The T–43 prototype (on the right) stands next to the T–34, making it easy to see the difference in their appearances. The T–43 was to be a better-armored version of the T–34, having a 1,600 mm diameter turret ring. Despite good negotiations and a truly successful design, the tank did not enter the RKKA's weapon inventory because the USSR's authorities had other priorities.

- V. Kulikov's collection -



Above: In this photo, the T–43's side view clearly shows the change in its length (note the lack of gaps between the road wheels) when compared with the T–34. Note the new type of road wheels — similar were later introduced in series vehicles.

- V. Kulikov's collection -

Below: A T–34, which was knocked-out near Kharkov in May 1942, serves as an exhibit for German soldiers. They seem to be enjoying their field lesson on enemy equipment. This is an old vehicle, produced in the summer/fall of 1941 at the No.183 Factory (riveted hull, old driver's hatch and two PT–7 sights). Note the atypical external fuel tank brackets at the side. On the turret side can be seen the word "Chapaev" (the name of a famous Russian Civil War revolutionary hero).

- CAW -





Above: Wrecks of T–34s (and a single KV–1 in the background) after a Soviet counterattack in a forest in 1942. The tank in the foreground is a product of the No.112 Factory, manufactured not earlier than spring 1942. This is confirmed by the lack of the gun-dismounting hatch at the rear of the turret. The new type tracks, which quickly became standard, are clearly visible.

- CAW -



- Author's collection -

Right: The outing of some rear-echelon soldiers has ended happily and it is now possible to send home a souvenir from a successful campaign. This T–34 was produced in the late fall of 1941. The driver's hatch is still the old design, and the turret hatch still has the prominent Pop mount, but already without the mounting opening. The tracks are typical for 1942. Note the welding seam on the bottom of the gun barrel recuperator sleeve — the deep shadow indicates that this seam is not smooth. The turret's cheeks are a little more rounded, differentiating it from the original Sormovo turrets.

cavalry units, was needed. In the USSR these cavalry units, like one hundred years before, were largely self-sufficient, living in the saddle and feeding off the land. As a result, Soviet cavalry was very mobile and in favorable circumstances could strike effectively as a large combat force. This proved true even in the machine-gun era, as the Polish-Bolshevik War of 1920 demonstrated.

According to the 1930s Soviet war doctrine, the cavalry operated in combined Horse and Mechanized Groups (HMG), consisting of a cavalry corps supported by a mechanized regiment (or even several of them). Such formations had only token, if any, logistical support — the cavalry way. The mechanized regiment was such in name only. In fact it was an almost pure tank regiment, with mostly BT tanks. In the opinion of the Soviets, nothing else was needed. The mechanized cavalry's mission was to enter the gap in the enemy line and to cover the largest possible distance at the fastest pace, creating maximum disorganization of the enemy forces. Everything that may have hindered this mission, trains and tank supply columns included, was redundant. Simply, the HMG was to press forward as long as it still had functioning tanks and live horses. Everything else was to be left behind. The Soviets could afford to think this way because the HMG's mission was not to achieve a planned tactical objective. Its mission was to spread chaos and panic by disorganizing the enemy's rear — even if that meant the destruction of the HMG. If that happened, the next HMG would follow and press on. The mission, no matter what the losses, had to succeed.

This was a doctrine quite different from that of the Western European countries. In the West, the goal was a classic encirclement of the enemy's forces and their destruction, through carefully planned and organized operations. The operations were carried out by closely cooperating units and care was taken to keep down the casualties. If one wanted to stress the differences between the two concepts, it may be said that the Soviet HMG was similar to the Mongolian cavalry or Russian Cossacks, who achieved their successes by dispersing and disorganizing the enemy, while the West European armored (or mechanized) divisions were similar to medieval knights, who trampled their enemies into the ground with their close formation charges.

These doctrinal discrepancies imposed certain technological solutions. Therefore, tanks co-operating with

A T–34, either from the No.112 Factory or from the STZ (the interlocking hull plates and headlights on the glacis were common for both, but the lack of the loader's episcope would suggest that it came from No.112) with a cast turret and most probably without the rear hatch. The complete absence of additional equipment on the hull side suggests that it is a late spring/early summer 1942 production. According to the Germans, the photo was taken on June 20 1942.

- CAW -





Two T–34s produced by the No.112 Factory bogged down in soft ground (supposedly, this was impossible!) during the May 1942 battles around Kharkov. It is clear that the crews of both vehicles tried to free themselves from the morass but, after fighting against the Germans coming from the right, they abandoned the tanks and departed for parts unknown. On the turret side of the first tank is visible the unit's tactical symbol, the number "8" inside a triangle.

- CAW -



Victim of a German gun on the central front, summer 1942, photographed from a German half-track (note the characteristic armored shield for the forward MG 34). Note the wooden beams transported on the side of the hull to extricate bogged down tanks. There is a clear penetration on the side of the turret.

- CAW -



A T–34 commander reports during tank maneuvers on the Southern Front in April 1942. The tank has the numbers "32–32" painted on the turret side, indicating the 32nd tank of the 84th Tank Brigade, which fought for Kharkov in May 1942.

- Dmitri Karlenko's collection -

the Red Army's cavalry had to be very fast, as a galloping and cantering horse can move at close to 50 km/h over a distance of several kilometers, and then trot at a good tempo for some time. Since the cavalry was very maneuverable and could operate in rough terrain even when concentrated, its accompanying tanks had to keep pace with it. Because the infantry did not require such performance from tanks that worked with it, the fact that the speed of the T–26 was only half of that of the BT, and that its range was only 130 km on road as opposed to the BT's range of 220 km, did not bother anyone.

Soviet cavalrymen then were of the opinion that such a good performance, necessary for the cavalry, was due to the combined use of wheels and tracks. They believed that this factor increased the survival rate of the tanks, in case of elimination of rear area services, over those that only had tracks. The cavalry men tried to force the wheel-and-track concept onto other vehicles to be able to realize the fundamental doctrine of the "deep penetration". As a consequence, when the successor of the BT was discussed, it was taken for granted that it would be a light wheel-and-track vehicle, the equivalent of the

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[58] According to the fashionable thesis in military history, the BT, and generally the wheel-and-tracks tank, reputed to be a particularly "aggressive" kind of hardware, was built exclusively by the Soviets with an eye toward invading Western Europe, where paved roads were in abundance. This thesis was first encountered in the book *Ice Breaker*, written by V. B. Riezun (who writes under the pseudonym of Victor Suvorov), and is occasionally encountered in the literature. This thesis, however, is so absurd that it is difficult to comment on its merits in a logical manner. At this point, it is sufficient to emphasize that the tank is considered to be an offensive (aggressive) weapon, the wheel-and-track suspension just being a phase in its development, and not a military doctrine of a country. If we accepted Riezun's thesis, many strange questions would arise. For example, having started to develop the 10TP wheel-and-track tank, based on the Christie and BT tanks, was Poland becoming an especially aggressive country? Was it readying to invade not only East Prussia (where only a few roads cut across difficult forested terrain) but also all of the Third Reich and Czechoslovakia? The Soviets began to modify the BT that would have allowed it to drive cross-country on wheels, which ended in success (BT–IS). The following question then arises; what did that modification mean in the political context? By 1941, over 10,000 T–26s and over 8,000 BTs were built in the USSR. Does this mean that the USSR had a mixture of aggressive and peaceful intentions, but leaned toward peace due to the fact that it had more T–26s? As an aside to this question, an interesting item that reflects on the pre-war preparations of the USSR's leadership is a speech by V.A. Malyshev, the *Narkom* for Intermediate Industry. On May 22, 1941, he said at the No.183 Factory: *"In case of war, we will not only defend ourselves. If the need arises, we will attack. That is why we need more offensive fighting vehicles for the Red Army..."* (a collective work, *T–34: Put k pobyede*, Politizdat Ukrainy 1989, p. 7 — author's emphasis).



The wreck of a T–34 destroyed during spring/summer 1942, in the Ukraine. The internal construction of the turret's rear, to which (from November 1941) an external armor plate was fastened, can be seen clearly. Note the hit on the gun barrel. The close-up shows an early type of road wheel hub; the later ones were slightly different.

- *CAW* -

British cruiser tanks and the cavalry tank in the USSR, capable of executing operations practiced for years on the proving grounds[58].

According to the military, this tank was not to be another "land battleship", as such a variant was already being designed by another tank factory, in accordance with a decision to modernize the entire tank inventory. This opinion clearly designated the BT's place in the ranks of the armored vehicles. Some of the specialist groups, such as the designers, disagreed with that opinion and had a differing vision of the future of armor equipment.

Closely following the development of European tanks, the designers came to the conclusion that by the mid-1930s the end had come for the small and large tanks, whose only actual mission was to fight against enemy soldiers. Their thin armor was to protect them from the infantry's small caliber anti-tank weapons. In the future that armor would not be sufficient and would have to be replaced by thick armor plates. Guns of continually increasing caliber would have to be mounted on vehicles, which would have to learn to fight against other tanks and take on enemy emplacements. Machineguns and ridiculously small guns for combating infantry were no longer adequate.

Many conflicts of this type raged during the era of evolution in the classification of tanks and their combat role in the USSR. Along with the cavalry, beginning its slow march toward the scrap heap, the era of the cavalry tank had to end, just as the era of the multi-turreted cruiser tanks and the infantry tanks was ending. In their place were to appear light, medium and heavy tanks. All three types were to operate within one unit, but were to carry out different types of missions. The T–34's birth was a result of the clash between differing opinions in the world of armor.

CIRCUMSTANCES AND THE FIRST CUT

The concept of the new tank was born simultaneously in Moscow and Kharkov, both at the staff level of ABTV and VAMM (*Voennaya Akademiya Mekhanizatsyi i Motorizatsyi*, Mechanization and Motorization Military Academy), and at the KhPZ, which, with time, terminated its tractor production, switching entirely to tanks. (NB, contrary to its cover name, the KhPZ had not produced a single steam locomotive since the 1917 revolution. With the armament program gaining momentum, it was eventually renamed as the *Komintern* No.183 Kharkov Tank Factory). There were two construction bureaus, or KBs (from *Konstruktorskoye Byuro* — construction bureau), at the Kharkov factory. One was called the KB–190 and worked mostly on the BT series tanks. The other, called the KB–35, worked on the T–35 and was known for its notorious attempts to modernize that heavy tank.

In early 1937, on the eve of the decision regarding the BT's successor, Kharkov was already (in addition to Leningrad) one of the main centers of the Soviet tank industry. Its cadre had had the chance to accumulate ex-



What a surprise! There was a slight drop in elevation behind the escarpment! In this photo from the summer of 1942 we see an older T–34 with the old type driver's hatch, old tracks and the plugged right PT–4–7 socket. The number "412" is painted on the rear side of the turret. The turret ring shows numerous casting ribs.

- *CAW* -





These two T–34s, in a similar predicament and photographed in summer 1942, were both manufactured by the No.112 Factory. The tank above was assembled in early 1942, and the one shown below was assembled during summer/fall of the same year. Both tanks have the same cast turret and a full set of rubber-rimmed road wheels but the appearance of their hulls is slightly different. The earlier tank has external fuel tanks brackets, while the later one has handrails and a storage box.

- *CAW* -

perience, and its overall performance level rose thanks to skillful personnel management. This does not mean, however, that the factory had become independent or that the State authorities trusted it, permitting independent activity. Rather, the opposite happened. Just like in the beginning, when the government had forbidden even the slightest change in the original design of the BT tank during its initial production stage, the *vyerkhushka* (top brass) did not trust the Kharkov designers and engineers. The authorities simply felt bound to interfere in the operations of the factory, which resulted, in mid-1937, in an invasion of the No.183 Factory by Moscow specialists.

Meanwhile, in early 1937, the first guidelines were set forth as to the successor of the BT tank. Theoretically, all was ready to start the design work, and only the "go ahead" from the *vyerkhushka* was needed. It is widely assumed that the guidelines were based on combat experience from the Spanish Civil War, during which the Soviet tanks had shown some alarming deficiencies. As with many historical assumptions bordering on certainty, this one is also false. It must be remembered that



A No.112 Factory T–34 from the late summer 1942 production (photo was taken around August 20 1942). The handrails and accessory box typical of that factory are clearly visible on the hull. The turret hatch has a lateral convex center, typical of the No.112 Factory from the very beginning of the T–34 production there.

- CAW -

these guidelines were set forth in mid-1937, likely after several months of discussions and wrangling amongst various factions taking part in the process. However, the war in Spain started in the fall of 1936, and until the summer of 1937 the Soviets did not have any worthy opponents in the areas of aircraft or armor.

That the Spanish experiences played a secondary role is supported by two points; 1 — during the setting out of the new tank's specifications, it was decided to give it armor thick enough to protect the crew from fire by rounds of 12.7 mm. But in Spain, Russian armor faced some German 37 mm anti-tank PAK 35/36s and the 88 mm Flak 18s, as well as the 40 mm Swedish Bofors anti-aircraft dual-purpose gun, which was the main anti-tank weapon of Franco's troops. 2 — the planned tank was to be a wheel-and-tracks vehicle, a type that could not have shown its merits in Spain, a country generally without good roads. Even the T–26 tanks had problems with operating in the Spanish terrain.

It is much more probable that the decision-makers' inspiration for issuing the guidelines leading toward the new BT tank ran along two parallel lines. The theoreticians, taking into account the state of the ABTV, wanted to modernize the existing tank, while the pragmatists, taking into consideration the Spanish experiences, wanted to create a new one. As a consequence, a new BT was demanded, but with the passing of time and an accumulation of lessons from Spain, a new tank with thicker armor protection began to be created.

It can be assumed that the higher brass of the RKKA was heard first, and only at some later stage the combat veterans' voices were heard. As this second wave of guidelines was issued, it was widely assumed that it was as a result of the Spanish lessons that the T–34 tank was created — which again is not true. It must be borne in mind that successors were then ordered built not only to the BT, but also to the entire tank inventory of the ABTV. At the same time, in the spring and summer of 1937, a replacement for the T–26 (called the T–46) was ordered designed and a decision was made to abandon the planned T–29 tank, a wheel-and-track replacement for the multi-turreted medium T–28. Both of these were replaced in 1939 by entirely new vehicles, the T–46–5 and the A–20. The former was a strongly armored medium tank (not an infantry tank, like the T–26), and the latter was a standard medium tank, and not a cavalry one, like the BT. A little later, after the multi-turreted land cruiser concept was abandoned, both evolved even further, eventually becoming the heavy KV and the medium T–34 tanks respectively. The BT's place was later taken by the entirely new T–50 light tank, theoretically a direct descendant of the T–38 light amphibious tank.



These three T–34s, knocked out in summer 1942 on the steppe before Stalingrad, are being examined by German soldiers, who are checking for any survivors in the tanks. The vehicle in the foreground is a product of the No.112 Factory.

- *CAW* -

The creation of a new tank was not the result of a sudden turn of developments, but rather simply a product of long-term evolution. In 1936 the BT was an obsolete design, not fit to stand up to modern combat requirements. Let us remember that the BT–7 was basically a design dating from 1931, based on even earlier projects. More so, the BT was highly unreliable and did not yield much in the way of modernization potential. It was natural then, that a new, better and more modern tank, was called for. Such a design was in fact proposed in the latter half of 1936, when no one dreamed that the Spanish War would evolve into a full-blown conflict. This was the BT–IS, built on the initiative of Stalin and Comrade Tsiganov. Because Tsiganov's work on the BT tank involved a conflict that dominated the early history of the T–34, it is important to learn a bit about him to understand the basic facts. This is especially so since all later actions leading to the creation of the T–34 revolved around this conflict. It is quite possible that, without this conflict, the T–34 would not have come into existence in the form that we know it.

The conflict, of which we speak here, originally only concerned the actions of one man, Tsiganov. N.F. Tsiganov was a typical Soviet (self-educated technical mind) that the history of the USSR is abundant with.

This trio of destroyed T–34s, produced by the STZ, was abandoned in July 1942 on one of the streets exiting Voronezh. Six more T–34s and three T–60s of the same unit can be seen in the following photos (pp. 86–89).

- *CAW* -





A series of photos depicts the massacre of one of the Soviet tank brigades in the streets of Voronezh in early July 1942. All the T–34s are the product of the STZ factory, assembled there shortly before this incident. The tanks have two types of turrets: the cast and the welded. The former has no gun-dismounting hatch on the rear of the turret while the latter has a single-plate turret rear.

- CAW -





Two more photos of tanks from the unit that was beaten in Voronezh at the beginning of July. Both T–34s are of the same type as shown in the following photos.

Above: Vehicles (2 T–34s and a T–60 in front of them) knocked out in the same street, but some 60 meters in front of the main body.

- CAW -

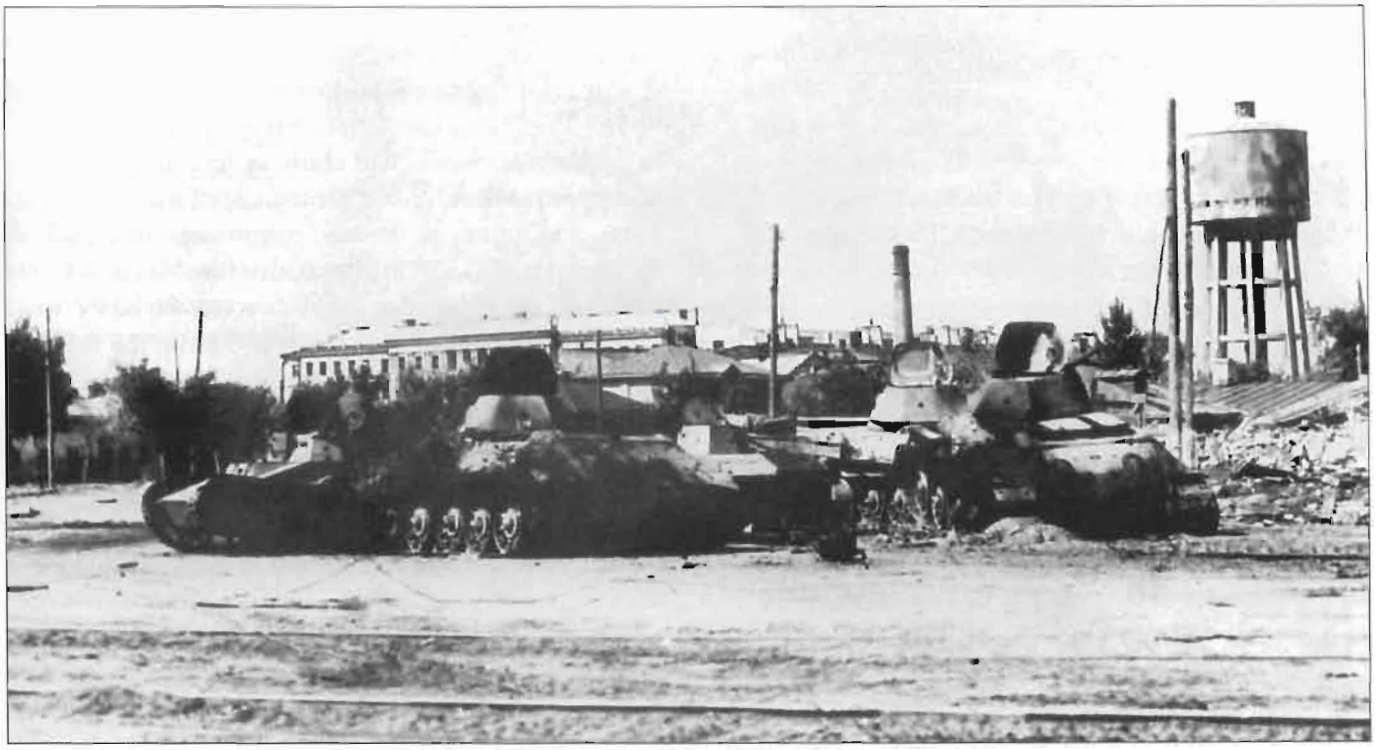
Below: The last tank was blown up by the Germans because, probably, it was not possible to move it. The engineers did such a good job that a couple of nearby buildings also got demolished.

- Author's collection -





All vehicles have the rounded hull rear, which was a standard at the STZ despite the introduction of the newer designs at No.183 and No.112 factories approximately half a year earlier. In the first photo, the vehicle on the left has a cutout for the rear light while the one on the right does not. This was probably the effect of cost-cutting measures instituted in the spring of 1942. The T–34 on the left has a triangular tactical sign on the turret.



This talented amateur-designer would shame the professionals with his technical initiatives. In the normal world, his discoveries would not have had significant importance. However, in the USSR at this time, where the engineer cadre was only marginally more knowledgeable than the enthusiasts, Tsiganov could indeed pose an authentic challenge to the professionals of the KB.

Tsiganov appeared in the history of ABTV virtually from nowhere in May 1934, when the commander of the Ukrainian Military District, General I.E. Yakir, a close friend of National Defense Commissar Kliment Y. Voroshilov, undertook to improve the BT–2 tank suspension along the guidelines set by J.W. Stalin himself. At a May Day parade that year, Stalin, upon hearing about the problems with the BT–2 suspension, not only ordered it improved, but also set up general lines upon which the modification should be executed. Due to a lack of confidence in the competence of factory designers, Voroshilov suggested the realization of this idea to the Kharkov military.

Yakir quickly took up this challenge and created a "tank design" group. It was Tsiganov, a platoon com-

The same scene, photographed several days later, after the T–60s were towed away. On closer examination of the tank on the left, it appears that it has somewhat an unusual cast turret, which slightly differs in the front from the norm (note the same details in the left photo).

- Author's collection -



mander in the 4th Tank Regiment with several BT improvement and modification drafts to his credit, that was put in charge of the project.

When his "designer collective" gathered, Tsiganov had under him a dozen people with either some technical education or experience in the practicalities of the BT tank's design and maintenance. This team made itself at home in a hut at the No.48 Tank Repair Facility in Kharkov and, after four months of work, the initial stage of the project was completed. The group had put together a set of drawings and models of two systems of traction; wheeled and tracked. The new, wheeled undercarriage had as many as three pairs of powered wheels instead of the original single pair. The turning radius was reduced from 5.5 m (18 ft) to a mere 2.5–3 m (8–10 ft) and, after the removal of the first pair of wheels, even to 1.5–2 meters (5–6.5 ft)! The wheeled tank was said to be able to cross soft terrain, and climb a previously unheard of 25 degree slope, which was impossible for a series produced BT. Additionally, when the track links designed by Tsiganov were used, the tank was to reach a speed of up to 105 km/h (65 mph)!

Informed of these results, in April 1935 Voroshilov ordered two series of three tanks each built. In actuality, only one prototype was eventually built. It was called the BT–IS, the last two letters representing Joseph Stalin's initials. This tank was ready in June 1935 and tested until November, proving true most of the designer's claims, and surpassing the road performance of the BT–2. Voroshilov and G.K. Ordzhonikidze (the National Commissar for the Heavy Industry) directed the KhPZ to cooperate with Tsiganov's group and bring the BT–IS onto the BT assembly lines. The leadership of the KhPZ and the KB did not comply with this directive.

Tsiganov did not give up and, still in 1935, proposed the next far-reaching modernization, based on another modification of the tank's suspension. He designed a clever clutch and gear reduction system, capable of synchronizing the wheel and track propulsion. As a result, when a tank lost a track it was able to continue to drive on the wheels on that side and the remaining track on the other side. Thanks to the ability to provide power to each of the three pairs of rear wheels, the tank could still drive while some of its individual wheels were da-

This STZ-made T–34 was abandoned in a crater at the outskirts of Stalingrad in early July 1942. Barely visible on the rear hull plate is the interlocking construction. There is no such interlocking on the hull by the turret, which, together with a bare hull side and the lack of the position light cutout, signifies that this tank was produced during spring/summer 1942. Note that the interior of the turret hatch is white — an exception at that time. The gun breech is not painted so.

- CAW -





T–34s at the STZ Factory are being prepared for shipping to the front in early spring 1942. The rear plate of the tank in the foreground features bolts with conical heads, while the one behind has interlocking plates. Note that the tanks have turrets from the No.183 Factory, supplied already finished to the STZ.

- Robert Bock's collection -

maged. With these modifications, the BT was able to become a truly functional and excellent tank.

The work on the new BT–IS was started in the beginning of 1936 and was completed successfully in the middle of that year. Later, an experimental batch of 10 vehicles was completed, several of which were thoroughly tested. Further modernization of the tank was started in May and was finished just before the beginning of July 1937. The military then showed up in the factory, wanting to guarantee that it had some influence on the course of events. The objectives of the "invasion force" were to join the modernization process of the BT–IS, which was to eliminate the shortcomings that became apparent during testing, and to supervise the work related to bringing the tank into production. Among the "invaders", one of the most influential was A.Y. Dik, who had a decisive role in the modernization of Tsiganov's BT and later in the conceptualization of the T–34.

The testing of the BT–IS revealed its merits and the military began to demand the production of the modified tank. Then, in the spring of 1937, the ever-growing problems started. The No.183 Factory flatly refused to produce the BT–IS and no exhortations were able to make the leadership change their minds. How difficult it was for the plant and the military to come to an agreement can be assessed by the fact that, after the truly re-



This STZ-produced T–34 was abandoned in a ditch sometime during spring/summer 1942. This tank is a rarity due to its markings and production details. The glacis has additional frontal armor, which, on STZ tanks, occurred very rarely (at least, by photographic evidence). The hull side is interlocked with the fighting compartment roof plate (near the turret ring). The turret has the PT–7 in the left socket, with the STZ's exclusively designed loader's episcope in the right one.

- S. Zaloga's collection -

markable successes of the BT–IS tests in 1937, the military demanded (repeatedly) to send the KhPZ designers to their proving ground. There they could see the conditions and tasks for which the tanks should be designed and manufactured. There they could also accumulate practical knowledge about the performance of the tanks they had designed.

However, nothing seemed to help. Dik's efforts at the factory did not bring any practical efforts as they were sabotaged by Koshkin (who then rose to be the KB Plant's head) and his designers, and probably by the management. Dik was finally able to make the ten prototypes of Tsiganov's tank, but it was an uphill struggle and took a lot of time. As a result, the modernized BT–IS with sloped armor was built only in late 1937.

About that time, Tsiganov also became *persona non grata* at the No.48 Tank Repair Unit for whom the inventor was working. The military tried to establish a tank production facility there, and create some competition, in an attempt to overcome the stubborn resistance of the No.183 Factory. The Repair Unit leadership, closely related to the No.183 Plant, was opposed to these plans and, as Yakir fell into disfavor in Moscow, his chief protegee fell with him. Tsiganov's work was almost entirely blocked. Only his appeal to Stalin himself allowed him to carry on further work that, however, as history was to show, had marginal value.

In the fall of 1937, Tsiganov sent directly to Stalin a primitive, complaining letter that came close to being a dangerous denunciation. As a consequence, help came from Moscow and he and his staff were transferred to the No.12 Tank and Automotive Repair Unit in Kharkov, where in short time he was able to assemble two of the new version BTs, characterized by the sloped armor. In this way the BT–SV originated, and was tested during the winter of 1937/38. The resulting hull configuration was deemed overly complicated, and the construction of the hull, with the armor plates bolted to the inner frame, was found obsolete. The BT–SV was found to be impractical, effectively spelling doom for the gifted amateur. At that time, the modernized BT–IS (with the sloped-armor) still had some hope. This hope started to fade in the fall of 1937 when the No.183 Factory finally succeeded in its efforts. Moscow decided to begin the process of designing an entirely new tank. Dik, who had up to that time supported Tsiganov, played a major role in this decision.

This breakthrough came about in a relatively easy manner. The military, unable to bring the tank makers under their heel, complained to Moscow that they wanted a new tank (by which they meant the Tsiganov BT–IS),



These STZ-made T–34s were knocked out at Stalingrad during the period summer/fall 1942. The top photo shows a patch welded over a penetration hole in the top part of the turret rear. In both photos, the one-piece recuperator shield can be seen clearly (neither bent nor welded as at other factories). Both also have the STZ loader's episcope.

- CAW -





These STZ-made T–34s were abandoned by the Soviets in the Don bend, at Kalach sometime in late July/early August 1942. At that time the Soviets led at Stalingrad a massed counterattack that ended in a fiasco. The tanks have no fixtures on the hull sides, indicating that they were produced in the summer of 1942.

- CAW -

Above: Close up of an STZ-made T–34, which was abandoned in a forest somewhere near Rzhev during the summer of 1942. The series of photos, from which this one was taken, proves that the Soviets attempted to break through a forest clearing with a sizeable tank column, but were completely smashed by the Luftwaffe. On the turret can be seen a part of the tactical sign — the number "14" in a triangle with rounded corners. The same insignia was painted on the rear of the turret.

- CAW -



Right: The hulls of T–34s destroyed in battle with the Germans were loaded on rail cars by the Soviets and transported to Stalingrad, where they were utilized in the production of new vehicles. This transport did not reach its destination because it was intercepted by the Germans in August.

- CAW -



A T–34 immobilized by German artillery is being examined in the fall of 1942. This vehicle is an old model, with a late 1941/ early 1942 hull.

- CAW -

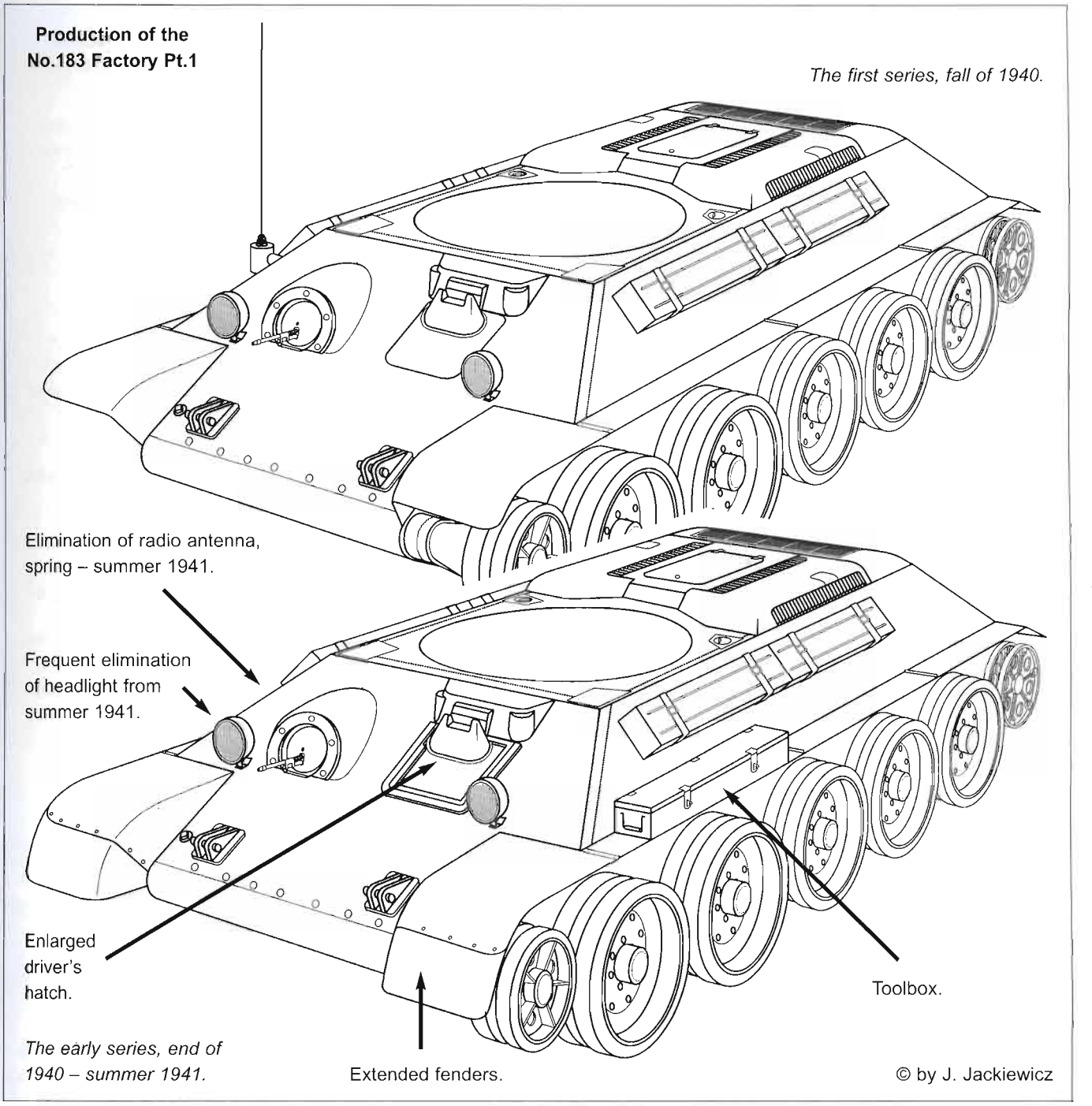
but that the Kharkov Plant was impeding the progress and thus threatening national security. Paradoxically, this move was a serious mistake because the military did not mention which particular tank they were after. This played entirely into the hands of the factory: they wanted a new tank? KB–190 was already working on a new tank. The Plant just did not want to have anything to do with Tsiganov's modification. Then they were ordered by Moscow to give the military an entirely new tank — and that's precisely what they were going to do.

The elite of the No.183 Factory was constituted of a mere handful of people. Undoubtedly, the most important of them was M.I. Koshkin, who, until 1937, worked as a designer at the Leningrad Tank Factory. There, he designed a thickly-armored infantry tank (the factory's specialty), the T–46–5, for which he was awarded the Red Banner Order and promoted as the head designer of KB–190 in Kharkov. From his collaborators' recollections, we know that he was a good organizer and worked in a flexible manner with his subordinates. What was even more important, he was courageous and resolute. This is borne out by an incident while he was still in Leningrad. In May 1936, the NKVD (*Narodniy Komisariat Vnutryennikh Dyel*, National Commissariat for Internal Affairs) arrested a man named S.A. Ginzburg, charging him with sabotage while designing the failed T–11 prototype tank. Koshkin turned himself in to the investigators, testifying that it was he who was responsible for the costly fiasco, and not Ginzburg. Shortly after the investigation, Ginzburg was released and returned to work.

That was not the only conflict in which Koshkin was involved. At the beginning of 1939, when the A–34 project was on the verge of rejection, Koshkin was again charged with sabotage; this time by the military, who could not stand his resolute manner. In their estimate, such behavior bordered on arrogance. Getting rid of Koshkin proved to be quite difficult, as the designer had a strong character, and had been an active Communist since 1919.

M.I. Koshkin reported to his new job in January 1937 and immediately started to familiarize himself with the factory and its managerial organization. The director of the factory was L.S. Vladimirov, who had replaced N.M. Toskin in 1933, when the latter was unable to cope with production of the BT–2. I.P. Bondarenko was the chief engineer, and S.A. Skachov was the factory's Party chief at the plant (and in the conditions at that time, only second to God).

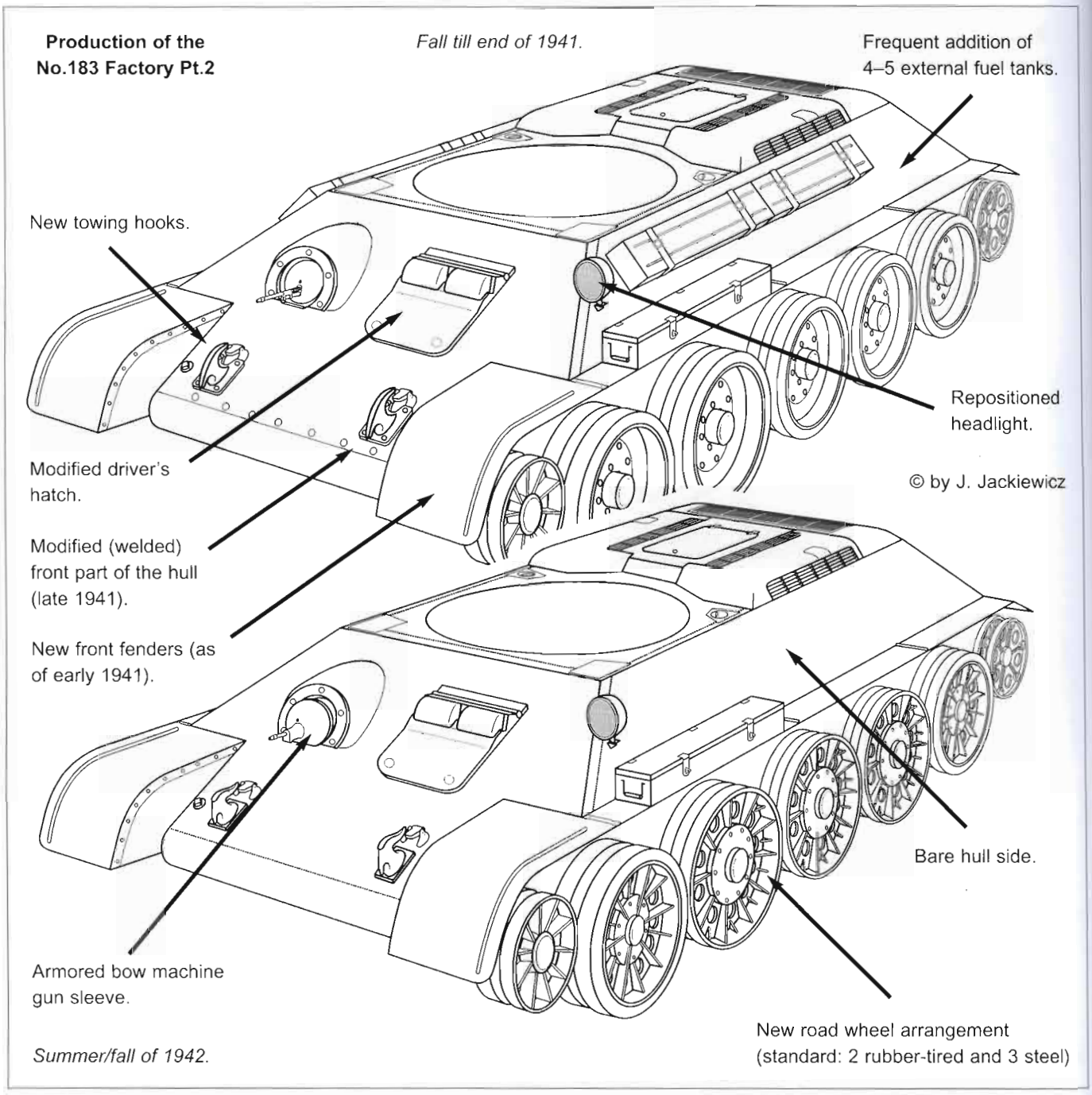
Production of the No.183 Factory Pt.1



In early August of 1937, at the latest, the ABTV headquarters demanded a new fast tank for the Red Army's fast troops. After the problem was discussed during an August 15, 1937 meeting, Resolution No.94 was issued. The resolution called for design work on a new tank to be started. It stipulated that the tank should be protected with a 20–25 mm (.80–1 in.) thick armor, armed with a 45 to 76 mm caliber gun, and powered by a Diesel engine capable of 400 metric HP (295 kW). Some of the stipulated characteristics were conspicuously similar to those of Tsiganov's, especially those concerning the traction. The new tank was to have a wheel-and-track suspension, identical to that which the modified BT–IS had. Many other elements were borrowed from the BT, including the overall construction of the turret and the transmission. The prototype of the new tank was to be ready in 1938, with series production starting a year later.

The order for the new tank was on director Vladimirov's desk in August 1937. That same month, on that same desk, landed an even more menacing document — the All-Russian Communist Party Central Committee (that is, Stalin) decided to totally re-organize the designer cadres of the Kharkov plant. The second document was to prove a milestone in the history of the future T–34, setting in motion the first actions that directly led to the beginning of the work on the tank.

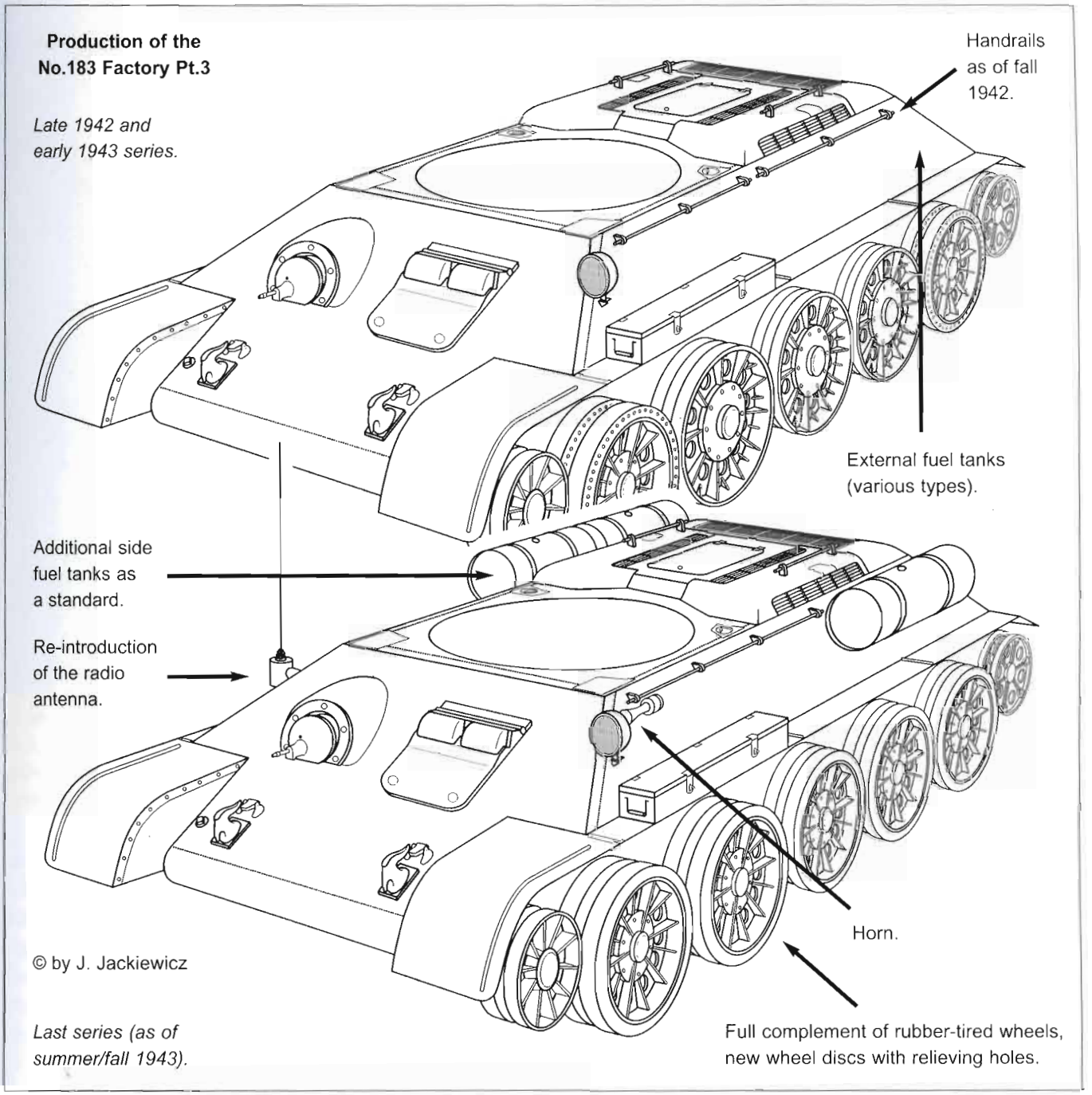
The ABTV leadership, disgusted with the past experiences in the lack of cooperation from the No.183 Factory, decided to take the supervision of the work into



their own hands. The Party helped it. The Central Committee demanded that Dik be appointed as a co-director, on the ABTV's behalf, of the new KB set up in the No.183 Factory, specifically to design the new tank. From the Factory's side, the chief engineer, I.P. Bondarenko, was also to be a co-director of this OKB[59], later to become known as KB–24. He was ordered to create the new KB from scratch, no later than October, and to staff it mostly with Moscow's VAMM graduates ("invaders from Moscow"), where Dik also graduated. They were to be joined by No.183 Factory's eight best designers. Y.A. Kulchytskiy, "parachuted" in from Moscow, was appointed the ABTV's chief consultant for the OKB. His mission was to watch the factory workers, ensuring that they followed the military guidelines. All design facets, worked out by Dik and realized by the OKB staff, were to be approved by Kulchytskiy. Eventually, the new KB–24 was staffed with 46 "Muscovites" and 21 Kharkov designers. From the beginning, they all had an enormous administrative workload.

Eventually, Koshkin became the chief designer of KB–24. He appointed A.A. Morozov, the KB–190 Transmission Branch's head whose main accomplishment up to that time had been the modification of the BT–7's transmission, as his deputy. The other KB–24 branches were headed by; M.N. Tarshinov was responsible for the hull, A.A. Maloshtanov was for the turret, Y.I. Baran

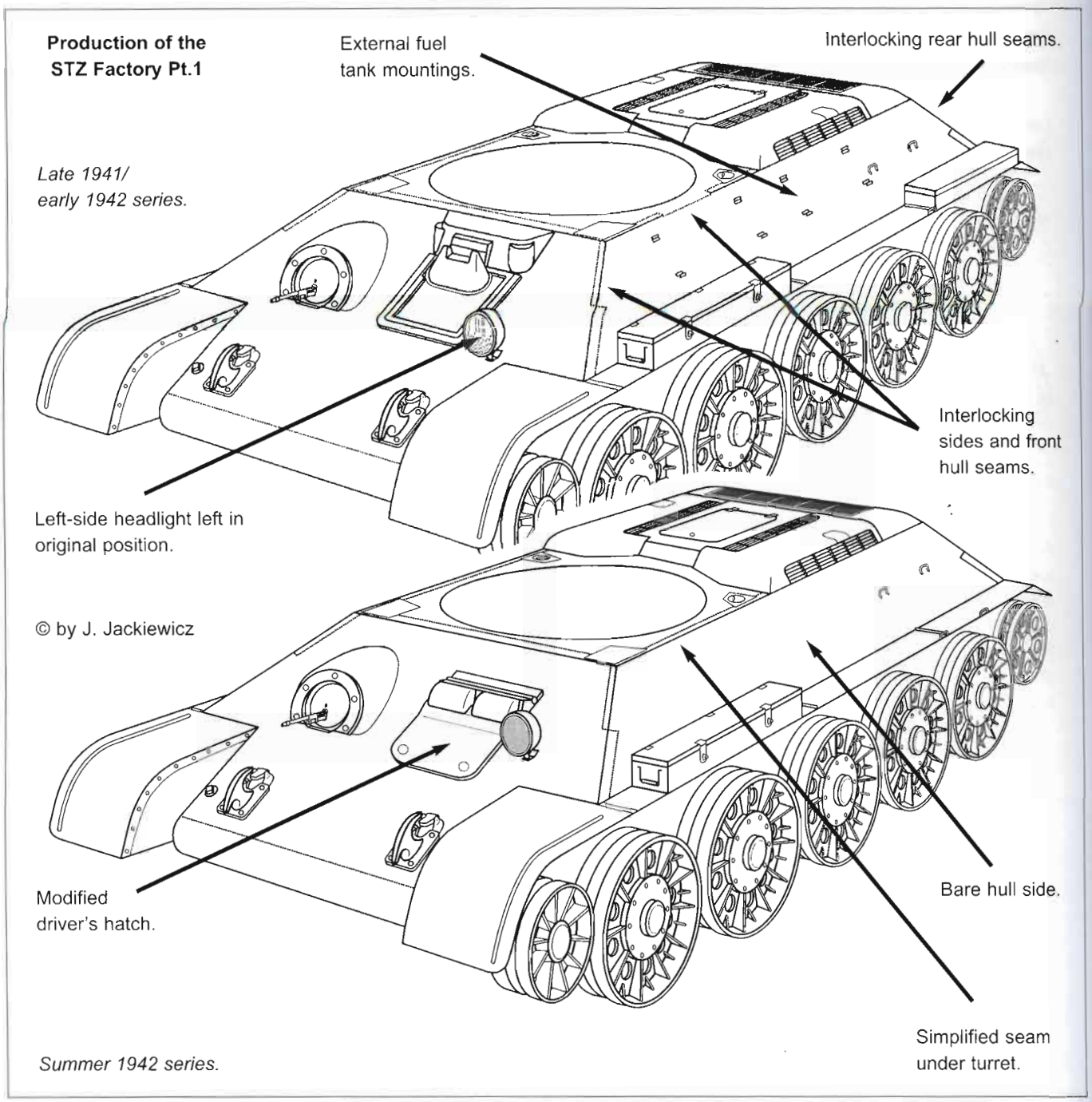
[59] Unfortunately, in case of the No.183 Factory, in1937 there is no agreement regarding the meaning of the "O". It could stand for either *Opytnoye KB* (Experimental Construction Bureau) or *Otdyelnye KB* (Independent Construction Bureau).



for the transmission, P.P. Vasilyev for the steering gear, V.G. Matyukhin for the suspension, and N.A. Nalyutovskiy for the armament. They were all the best specialists the factory had, and were handpicked by Koshkin. During the latter part of the T–34's initial design work, when preparations were being made for the mass-production of the new tank, the Kharkov Factory's production technology team, especially Patinov, Myelnikov, Chinov, Sokolyanskiy and Pomyerantsev, played an important role. They were ably supported by a small group of specialists who arrived from Moscow in the summer of 1937.

What the technologists were able to contribute to the T–34's production was chiefly the maximum streamlining of the assembly procedure for a rather complicated tank, resulting in a shortened process and an increased production. The technologists' supervision of the T–34 production proved crucial, as the tank was to be manufactured with state-of-the-art techniques not yet fully mastered. The tank hull's thick, sloped armor plates had to be arc welded precisely. Earlier, tank hulls were all made out of thin plates riveted onto the frame. The 10–20 mm thick armor plates were not only easier to handle, but the boxy hulls made from them were much easier to assemble.

It is hard to say anything concrete about the abilities and knowledge of the people involved in the process. It is only known that the work and co-operation between the designers, management, Party organization, authorities and the military was difficult, badly organized, and conflicts were abundant. Morozov, remembering his colleagues and the whole "decision making collective" of the Komintern works, never mentioned their knowledge



and professional successes. In his opinion, it was *"enthusiasm, diligence and patriotism"* that created the T–34 — not knowledge and skill. The T–34 was not a *"feat of superhuman genius"*, but merely a simple fighting machine, created by the sweat of the workers of the No.183 Factory[60]. There must be some truth to it, as the T–34's turret could hardly be used as an example of competence. In this case, what is really strange is the fact that Maloshtanov, its designer, was a skilled and knowledgeable designer, with years of experience in working on the BT tank turret. Maloshtanov stated that he designed the T–34 turret to the best of his abilities and was closely supervised by Koshkin himself, who was pleased with his work. It is now very hard to judge whether the abnormal T–34 turret was an effect of simple thoughtlessness, or the designers' arrogance, bending the needs of reality to conform to the ambitions of the tank's creators.

In October of 1937, when KB–24 slowly started to work, the ABTV issued a final statement as to the requirements for the new tank. In mid-October a TTT (*Taktichno-Tekhnicheskiye Tryebovanya*, Tactical and Technical Requirements) document was sent to the No.183 Factory, undersigned by Y.L. Skvirskiy, head of the ABTV HQ's 2nd Department (Supplies). It was the final, official document, meant to be the basis for the future tank.

The October TTT, imposed on KB–24 by the authorities, mostly re-affirmed what the designers already heard in mid-August. The only addition was the requirement that the sloping form of armor be used — doubtless the

[60] *T–34: Put k pobyede*, op. cit., p. 14.



A perfect example of a T–34 with a history: it has an old (late 1941/early 1942 at the latest) turret which has modified handrails in summer/fall of 1942 (welded on handrails in a style typical of the No.112 Factory), and a hull produced by the STZ during the period fall 1941/ summer 1942 (rounded rear and rear interlocking plates). It also has a complete set of steel road wheels, mostly characteristic of the STZ.

- CAW -

result of the oblique armor-plated Tsiganov BT–IS field trials, held in July 1937. These trials used the first form of sloping armor, the optimal one, while the radically sloped armor of the later BT–SV tank, designed to hijack the October TTT, proved a dead end. Even with that, it is widely assumed that it was the BT–SV armor that inspired the T–34's armor design.

The start of the design work on the new tank did not signify the end of the arguments regarding its final look. In a series of notorious meetings, various conflicting positions taken by the military, the designers, the authorities and even the Party, collided. There is no doubt that the sharpest fight was between the military and the factory. The first were represented by the ABTV Command and the National Defense Commissariat, sometimes even by Defense Commissar Voroshilov himself, sometimes by the ABTV Commander, I.A. Khalyepskiy; the second by the designers or the factory directors. Aside from the personal animosities and ambitions, that is, strictly questions of prestige, many misunderstandings originated from the inability to communicate, and even from the ignorance of some of the participants. After all, what could a Bolshevik activist contribute to the design of a tank, and what could a staff general know about the advantages of a tracked-only suspension?

The real problem was that the military simply wanted a new BT, while the designers (Koshkin, as well as Dik, the fresh convert to the "entirely new tank" idea) wanted a new tank able to cope with future threats. To make this possible, the tank had to have track-only traction and armor capable of withstanding hits from a 37 mm antitank round. Obviously, this directly contradicted the military's expectations. This was not a battle between professional groups who debated the merits of various designs, but rather one between the interests of the factory and those of the military, with the designers trying to place themselves in the middle.

The memoirs of many of the participants testify that the conflict was hard and intensive. It is obvious from them (what a surprise!) that in the end all of them found themselves on the same, and correct, side. For example, Morozov recalls that the KB had to collectively fight for the acceptance of their concept of a thick-skinned, track-only diesel-powered tank. But then he says that the Party collective, ably led by A.A. Yepishev, had to fight a bitter fight against the military to force them into accepting diesel propulsion for the future T–34. That's interesting enough, since diesel propulsion and stronger armor protection were part of both the August oral and October written TTT specifications!



Another bad example of tanks operating in wooded terrain, spring 1943. In this case, we see a tank produced by the No.183 Factory, to which testify the handrails, the wavy exhaust shrouds (a result of one of the "183"'s subcontractor's attempts to alter the shroud's design), the lack of one bolt on the rear plate and the angular (instead of rounded) side differential gear covers. On the rear of the "flat" turret (not produced since summer 1942), can be seen the number "77".

- *CAW* -

Despite the personality clashes, it seems obvious that in fact the only real bone of contention between the military and the designers was the tank's suspension. Dik took the side of the designers again and worked out a ten road-wheel chassis, clearly designed with an aim towards better ground-pressure distribution for the heavier tank. In the aftermath of the suspension battle, only the matter of the vehicle's armor protection remained. The military were ready to agree to a slightly thinner armor because they wanted to keep the wheels, but the designers, from the beginning, foresaw the necessity of the thickest possible armor.

The V–2 diesel engine, created together with the new tank, could not be a source of conflict. If we are to believe Yepishev that it was really necessary to fight with the military over it, it must have been over more pragmatic aspects of the development. Rather than over the use of a diesel motor, the arguments must have concerned an alternative motor for the new tank, in case the V–2 was not ready in time. This possibility was not excluded, despite what we may think based on our current perspective. The motor was not a guaranteed success at that time. In fact, the first attempt to put the V–2 into the BT–7 tank was unsuccessful.

Regardless of who was on which side, the fight ended with the elimination of some of the players. It appears that comrade Yepishev's intervention, as an aftermath of the escalation of a further conflict in the fall and winter of 1938, with the comrades of the Central Committee of the Party may have bore fruit. In a critical situation, the design cadre of the No.183 Factory received support from Stalin himself. This intervention almost

surely brought about the replacement of a part of the factory's cadre. In October 1938, the Central Committee (Stalin included in its membership) decided to change the leadership of the factory. L.S. Vladimirov, the factory's director since 1933, was replaced by an experienced worker in the armor industry, Y.Y. Maksaryov, who had worked in Leningrad up to that time. In 1938, the factory's chief engineer, I.P. Bondarienko, also lost his job and was replaced by S.N. Machonin, who took over the supervision of development of the T–34. As for Bondarienko, he was "unjustly repressed", that is shot! It is obvious that the conflicts in those times concerning the T–34 meant fighting for the tank's technical characteristics, and sometimes for one's own life.

The initial work on the new tank was not going very well, perhaps due to the atmosphere of the conflict which accompanied its beginning. M.N. Koshkin's team was unable to produce the initial design on time and the reason for this is a mystery, as it was known more or less how the tank was to look. The tank's basic criteria were defined sufficiently clearly by Dik, and it is he who probably should be recognized as the father of the T–34. It was Dik who proposed the layout of the tank, including the design of the armored hull and the transmission. He also adapted and developed the suspension from the BT–IS.

The drawings and model of the tank, known as the BT–20, were finally presented in the middle of March 1938, and approved by the ABTV Command on March 25. The accepted vehicle was undoubtedly a compromise. Generally, it reflected the point of view of the military and the Kharkov designers, with the latter surely incorporating some of the solutions very reluctantly. Mainly, this concerned the suspension (the original design by Dik carried 5 pairs of road wheels but the BT–20 had only 4 pairs) and the thin, according to KB–24, armor. There was agreement regarding three matters; the sloped armor, the diesel engine, which was continually taking on more of a shape, and the turret design with the armament.

Another example of Soviet armored tactics in forests. A pair of T–34s of the No.112 Factory's manufacture, abandoned in a forest clearing after an attempt to attack German infantry positions. Despite the fact that such tactics did not make any sense, the Soviets used them often, usually suffering terrible losses. Although this photo was taken in winter 1942/43, the tank still has the 1941 pattern tracks.

- CAW -





A column of T–34s is moving toward the front at the beginning of 1943. The leading tank is a product of the No.112 Factory and has a relatively rare configuration, with a cylindrical external fuel tank at the side. At that time the rear external fuel tanks were standard for the Gorki plant. In the background tanks with new type of turret can be seen.

- Author's collection -

This burned out wreck of a T–34 produced at the No.112 Factory was photographed in early spring of 1943. Note that, despite the late date, the tank still has a complete set of rubber-tired road wheels. Contrary to the STZ, where the steel wheels were standard, the Krasnoye Sormovo vehicles were almost exclusively fitted with these. Note the remnants of the snow camouflage and a tactical sign consisting of a number inside the triangle.

- CAW -



That such points existed at all opened some eyes in Moscow and gave a promise of a brighter future. Some even went to the other extreme and proposed to abandon the construction of 2 or 3 different tanks and, instead, build just one model, the BT–20. It would be manufactured in two variants, the wheel-and-track, and the tracked only.

The Defense Committee meeting at the Kremlin on May 4, 1938 was to decide what to do next. The meeting, chaired by V.I. Molotov, was to investigate the state of affairs vis-à-vis the new Red Army tanks, including the BT–20. During the reviewing of the initial design, a sharp discussion ensued, as some of the participants believed themselves to be competent in military affairs. Among them were: Voroshilov, the *Narkom* (*Narodniy Commissar*, People's Commissar) of Defense (an absolute ignoramus), D.G. Pavlov, the new chief of the Red



- S. Zaloga's collection -

Two wrecks of T–34s produced by the No.112 Factory. The tanks were destroyed during the Battle for the Kursk Salient in July 1943.

The tank in the right photo has some writing and a tactical sign on the turret, both of which are — unfortunately — illegible. Note that the transmission inspection hatch lacks the standard retaining bolts. This vehicle has no external fuel tanks while the one in the bottom photo is similar, but has the rear external fuel tanks.



- CAW -



This photo of a pair of burned-out No.112 Factory-produced T–34s, with tactical codes on their turrets, was taken at Belgorod in mid-August, 1943. The tank on the right has the tactical number painted on a dark rectangle (a standard sign with the number "15" or "16" above and a "22" below the divider). A most unusual impression is made by the vision port, which is visible on the side of the turret. It would be an impossible task to find such a device on any other T–34! These tanks, as well as others from that factory photographed in the Kursk area, have a complete set of the rubber-tired old model road wheels, then already a standard at Krasnoye Sormovo.

- CAW -



This No.112 Factory-produced T–34 fell into a water-filled bomb crater during one of the repeated Soviet charges during the fighting in the Kursk Salient area in the summer of 1943.

- *CAW* -

Army's ABTV Department (whose knowledge came from personal experiences), veterans of the Spanish War (veterans, as veterans go...), a delegation from the No.183 Factory, headed by Koshkin and Morozov (who were experts, without doubt) and Stalin (a tank aficionado and self-styled expert).

The main part of the argument concerned the suspension. The meeting's participants disputed whether the wheel-and-track chassis had any future left, and, if not, how to handle that hot potato. No agreement was reached during the discussion, but certain changes became apparent in the approach to the problem. This was shortly confirmed by an order from Moscow to build not two prototypes of the BT–20, but rather two versions of it. On May 13, 1938 the ABTV sent the No.183 Factory a somewhat revised TTT in which some of the past requirements were confirmed while others were changed.

According to the new TTT, the glacis plate was to be 20–30 mm thick and sloped at an angle of 30–53°. It was accepted to increase the weight of the tank to 16.5 tons, which resulted in its reclassification to a medium category (at that time tanks weighing between 16 and 35 tons were considered "mediums"), and it was also demanded that its maximum speed be raised from 50 to 63 km/h (from 31 to 39 mph). The KB–24 designers accepted these requirements as fully achievable. Using the fought-for changes, they slightly redesigned the existing concept of the BT–20, not according to the stated requirements, but rather to ones matching their own. As a result, the newly-born A–20's weight "unexpectedly" grew to 18 tons and evidently needed further evolution toward a vehicle with greater dimensions. Consequently, using such a vehicle as a base, work was started in May 1938 to simultaneously develop 2 versions of the tank; the A–20, which was a result of some minor corrections carried out on the BT–20, and the A–20G (*Gusyenichnyi*, tracked), an internal initiative of the KB–24, which was pushed through at the May meeting. After the A–20G was honed, and all the improvements deemed necessary by the KB–24 were introduced in it, the tank was found to be so different from the initial criteria of the A–20G that it was renamed as the A–32. This happened most probably at the beginning of February, and perhaps even already in January 1939.

A complete set of drawings and a mock-up of the A–20 were ready at the beginning of September 1938. At that time, Skvirskiy was able to see the result of the required improvements. Despite the fact that the military

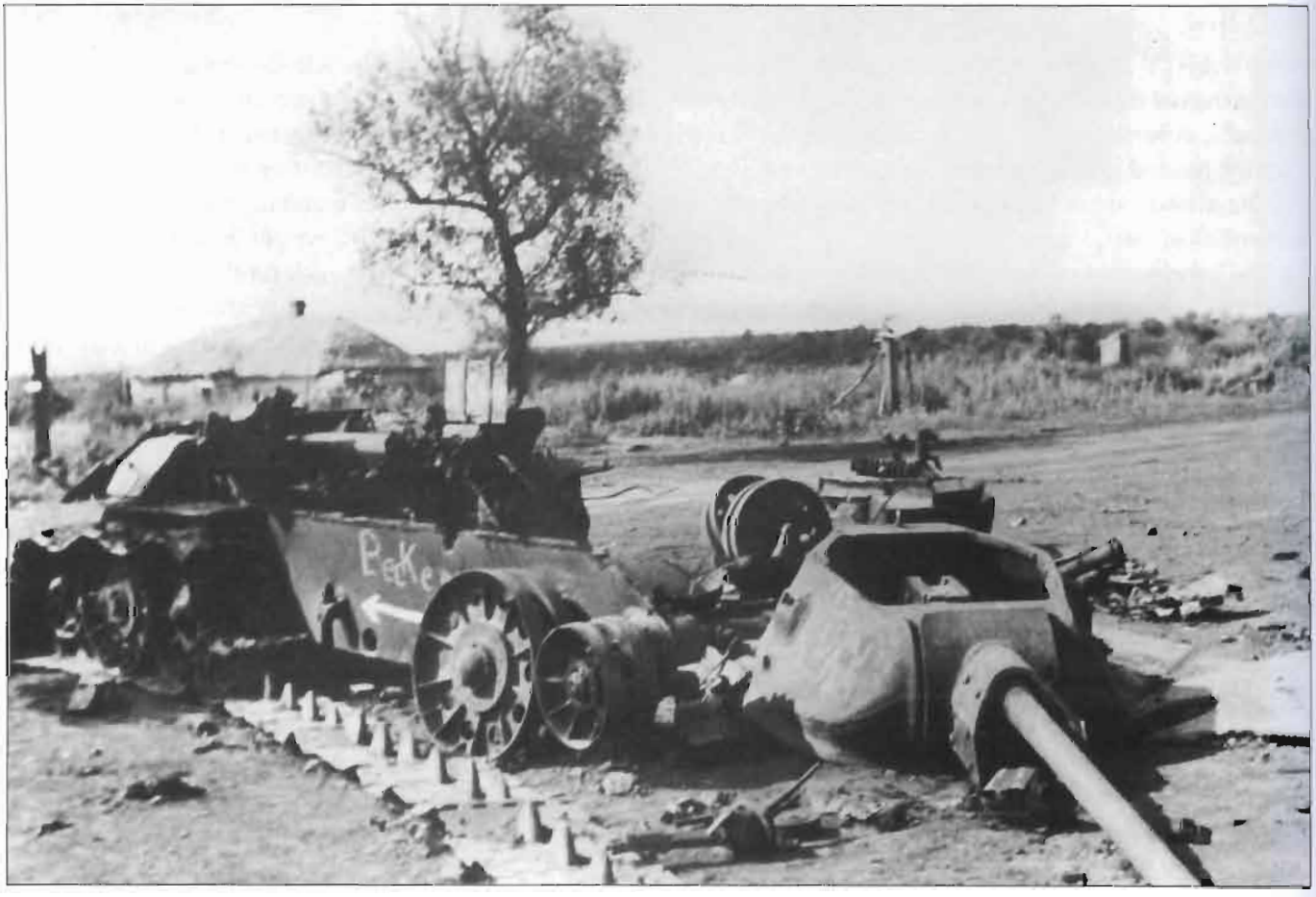


Left: This flaming wreck of a "Sormovo" T–34 was effectively photographed. The German photographer wanted to save himself work, and had the old wreck set on fire again, which resulted in this dramatic shot. Looking inside through the driver's hatch, we can see that the inside is completely empty and a small fire burns in the place where the engine should be. Note also the deflecting strips welded in front of the turret. This was a calling card of the No.112 Factory, introduced in early 1942.

- CAW -

Below: A ripped apart wreck of a T–34 with cast turret, August 1943. A part of the tactical sign "2–3" is still visible on the turret side.

- CAW -





Tank commanders are discussing the coming action on the Bryansk Front in September 1943. In the background are their T–34s, which were produced at the No.112 Factory.

- V. Kulikov's collection

did not want the A–20G, as a force of habit they distrusted the designers and preferred the track-and-wheel tanks, the work on it was also carried on. In October, drawings and mock-ups of both variants of the A–20 were presented to the authorities. The Main War Council deliberated on the projects on December 9 and 10 1938, arriving at a final decision regarding their future. Despite a lack of unanimity, it was decided not to change the former directives. The KB–24 was given the go-ahead to develop both prototypes, with the A–20 being given a higher priority than the A–20G. That is why, by mid-January 1939, the interim drawings of the A–20 hull and turret with a 45 mm gun were completed first, and only then was work started on the A–20G turret with the 76.2 mm gun[61].

To simplify the situation, another revolution took place in the No.183 Factory. At the request of the management, all existing design bureaus and all production subsidiaries were amalgamated. This resulted in the creation of Department 520, which incorporated the former KB–190, KB–35 and KB–24. It was only this maneuver that permitted the factory's management to gather several hundred competent people and to complete the production drawings for both prototypes. Koshkin, the chief designer of Department 520, was in charge of all work, and his main subordinates were: A.A. Morozov (administrative manager of Department 520 and deputy chief designer), N.A. Kucherenko (assistant deputy chief designer), A.V. Kolyesnikov and V.M. Doroshyenko (deputies for assigned projects). In practice, Koshkin mainly acted as a representative of the project, battling in favor of the more powerful version of the tank, while Morozov, almost exclusively, supervised the development of the design.

At the Defense Committee meeting of February 27 1939, drawings and mock-ups of both tanks were reviewed; the A–20 and A–32. A majority of the participants opted for the A–20, including the Deputy *Narkom* of Defense, General Kulikov, who represented Voroshilov's position. In this way the scales tipped in the favor of the military. Then M.I. Koshkin spoke decisively, demanding a decision to complete both projects and build both prototypes. Stalin, who as usual was more far-sighted than his generals, saw the merits of the A–32 and supported Koshkin. Thanks to Stalin's opinion, offered in opposition to the military collective, it was possible to build a prototype of the A–32 and then begin the production of the T–34 in 1940.

Thanks to Stalin's position, on that same day the Defense Committee issued Resolution No.45, which gave the go-ahead to build both prototypes according to the presented plans and mock-ups. In the opinion of the cadre of No.183 Factory, Iosif Vissaryonovich's decision meant success for their project. The management was sure of the superiority of its tank (A–32). However, the proving grounds were to provide the final positive decision; without it Stalin would have had to bow to the wishes of the military.

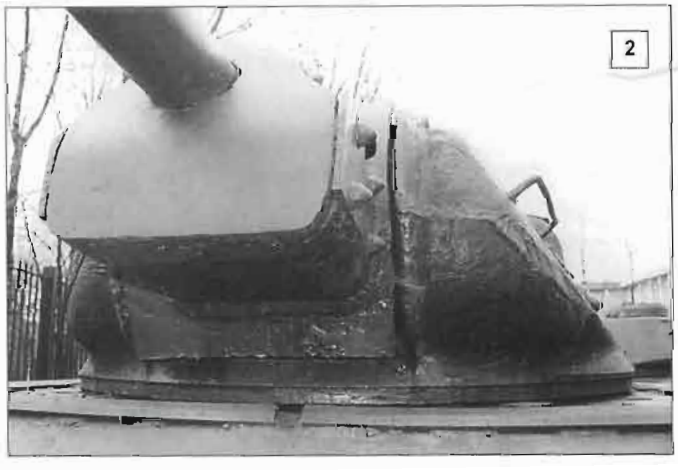
[61] Just as later on, when the usefulness of the long-barreled 76.2 mm gun compared to the standard F–34 was discussed, in this case also it was a matter of specialization of the guns and their usefulness in combat. According to the preserved data, it appears that the A–20 tank with the 45 mm gun was meant to battle the enemy's tanks, while the A–20G tank with the 76.2 mm gun was to support the A–20 tanks and the infantry. This dual role would have been made easier by its thicker armor and by, above all, the 76.2 mm gun, which was capable of destroying field fortifications (the 45 mm gun was definitely too weak for such a role).



Lt. M. Lyevshukov, of a unit taking part in the fighting against Finland in June 1944 (probably the 24th Tank Regt.), is preparing ammunition for loading into his old-type, No.112 Factory-made T–34.

- V. Kulikov's collection -

Right: A "Sormovo" cast turret with a "Barrikady" factory tube recuperator sleeve.



Above: A cast "Sormovo" turret.

Right: A welded turret from the No.183 Factory. Both castings from the No.112 Factory are almost identical, except for the small changes in the mould seams. It is worthwhile to compare the way the two turret types are connected to the turret ring.

On May 26 1939, the A–20 prototype was ready (minus the armament) and in early June it was sent for the factory proving ground trials. Upon their conclusion on July 15 1939, the A–20 was sent to the state trials. The A–20 proved to be a successful design, and on several occasions reached a speed of 85 km/h (53 mph) on wheels. The A–32 was close on its heels however, leaving the factory 10 days after its competitor. Its factory trials began in mid-June, and were followed by the state trials, which commenced on July 17. After the latter tests concluded on August 23 1939, the tracked A–32 proved to be only marginally slower than the A–20 on wheels! Despite being heavier, the A–32 was repeatedly able to achieve a speed of 70 km/h (44 mph), and appeared to the observers to be a dynamic machine. As a consequence, it was decided to sacrifice some of the speed and, at its cost, increase the thickness of the armor by 10 mm. This resulted in the weight increasing to 19.6 tons. The KB–24 cadre took advantage of this decision and, at the end of July, increased the weight of a second A–32 prototype, armed with a 45 mm gun, to... 24 tons. This combination simulated a tank armed with a 76 mm cannon and with a frontal armor of 45 mm (and people say that initiative is punished in the Soviet Union!). The tank was immediately sent for trials, which ended in late August, at the same time when the trials of the A–20 and first prototype of A–32 were concluding. On September 5, after an inspection and completion of repairs, the vehicles were sent for endurance tests at the NIIBT (*Nauch-*





A welded turret from the No.183 Factory's 1941 production (compare to photo no. 3 on the facing page).



A cast turret from the No.112 Factory's late 1942/early 1943 production. Note the ribs on the turret ring, left there by the mould segments. The turret serial number is 823 (compare to photo no. 2 on the facing page).



A cast turret from the No.112 Factory with the "Barrikady" tube recuperator sleeve, often used by the STZ. The turret number (5818) is on the other side. Comparing with the turret above, there are slight differences in the mould segments seams (compare to photo no. 1 on the facing page).



no-Isslyedovatelskiy Institut Bronyetekhniki — Armored Troops Research and Development Institution) at Kubinka.

Not much is known about the later history of the various prototypes. It is only known that the A–20 was used in combat in the period of summer/fall 1941. It was damaged during battle and was then repaired at the PTRB–25 (*Podvizhnaya Tankovo-Remontnaya Baza*, Mobile Tank Repair Unit). It is probable that other prototypes also had the opportunity to prove themselves in combat.

Meanwhile, concurrent to the end of the August trials, a small problem occurred. The testing committee chairman, V.N. Chernyaev, was either easily influenced or incompetent and signed a report to the effect that both tanks (A–20 and A–32) proved to be equally good. Consequently, this made it impossible to reach a final decision regarding the further fate of both vehicles. Taking advantage of a review of tank prototypes, the representatives of No.183 Factory decided to put on in Kubinka an effective demonstration for the generals. During this show, the A–32's unquestioned superiority became obvious. It was then ultimately proven that a fully-tracked tank can be as dynamic as a wheel-and-track one, and even more so when operating cross-country. This opened the door for Maksaryov, allowing him to demand more forcibly the production of the heavier A–32 (still not



A cast turret from the No.112 Factory.



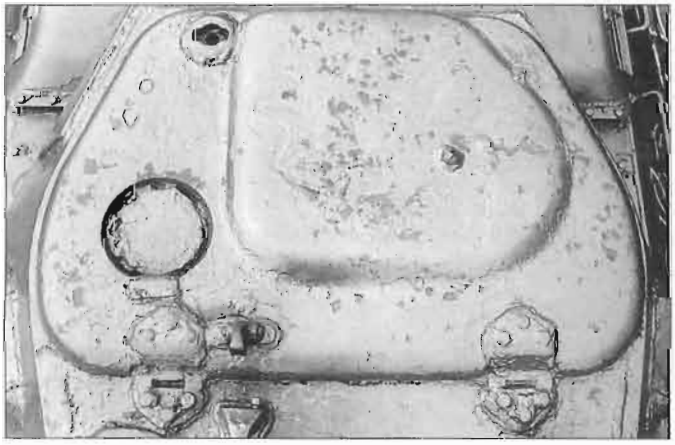
A welded turret from the No.183 Factory. The two differ from each other not only in the turret body (the cast turret no longer has the gun dismounting hatch, has a different entry hatch and the 1942 periscope sight cover), but also in the positioning of the fan, and the square eyelets for lifting the turret.

completed). After further discussion, in the end the Defense *Narkomat* accepted this idea and, on September 15, it suggested to the leadership of the government to agree to the production of 10 test A–32s with the 45 mm frontal armor by December 1, 1940. The government did not agree with that recommendation and, in accordance with its operating principles, ordered the factory to prepare the appropriate documentation and to submit it for a review in December 1939. Despite this setback, ultimately it was possible to pave the way to redesign the A–32 into an even more powerful vehicle, which was designated as the A–34.

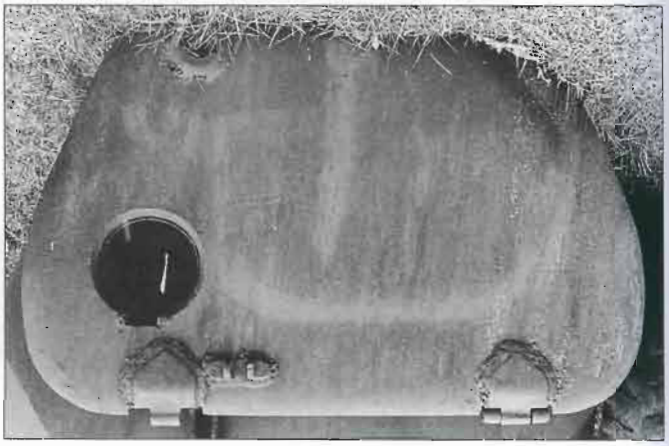
At the No.183 Factory, feverish work began to complete the factory drawings of the new version. The production drawings also had to be completed and most likely the factory technologists were employed for that as early as the beginning of 1939. Their task was to point out the areas where the design had to be changed to facilitate the production of the tank. First the initial design blueprints were drawn, and then they were redrawn according to the suggestions from the technologists. Later the technologists' input was incorporated into the designing stage, but this did not change much. The amount of work was enormous because it was not

Two entry hatches for the "flat" turret made by the No.183 Factory.

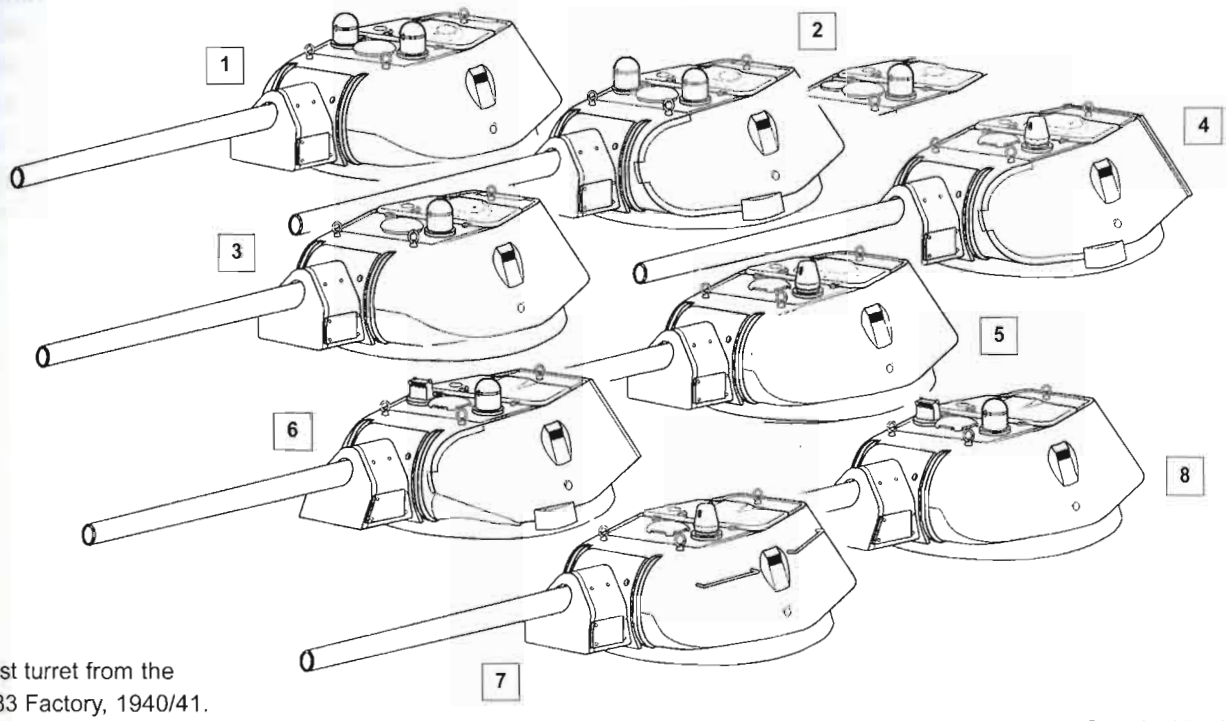
Earlier version with riveted hinges and a hole in the top of the raised part.



Later model with welded hinges and no opening.



Flat turret evolution.



1. Cast turret from the No.183 Factory, 1940/41.

2. Welded turret from the No.183 Factory, 1940/41, next to it, a roof from summer 1941.

3. Cast turret from the No.183 Factory, late 1941.

4. Welded turret from the No.183 Factory, with removable rear plate, from end of 1941.

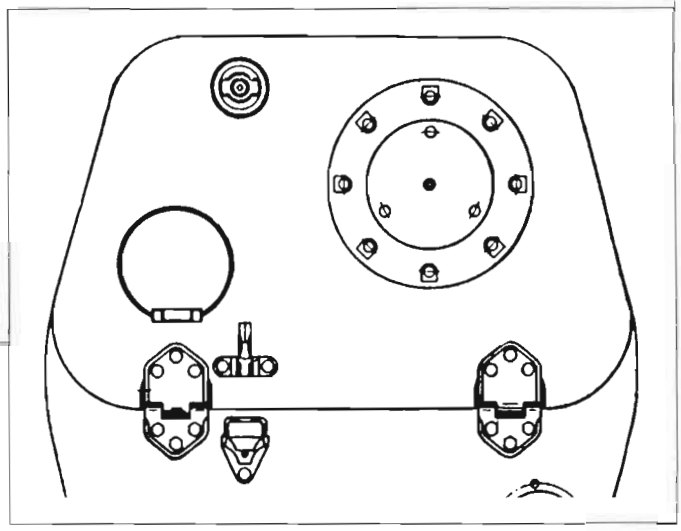
5. Cast turret from the No.112 Factory, no rear hatch, 1942.

6. Welded turret from the STZ Factory, 1942.

7. Cast turret from the No.112 Factory, 1942/43.

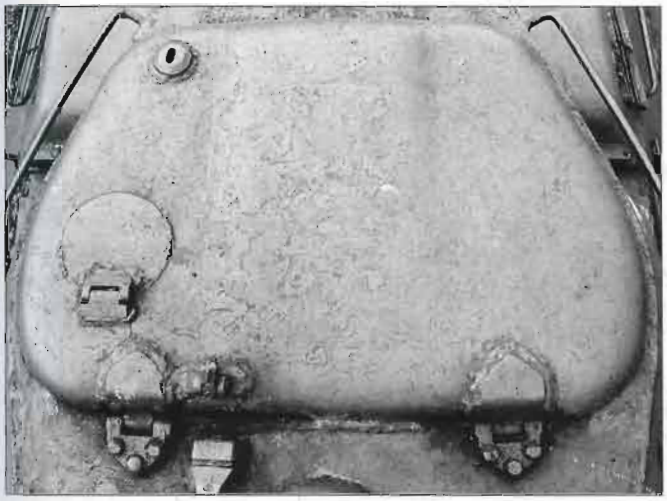
8. Cast turret for the STZ Factory, 1942.

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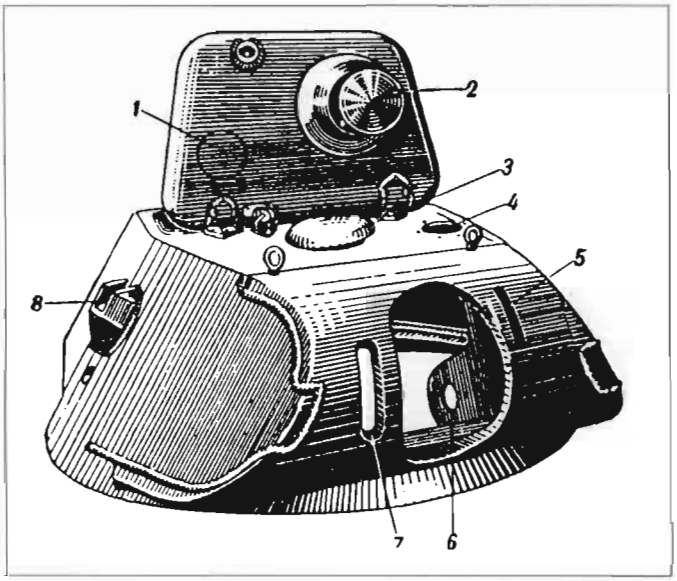


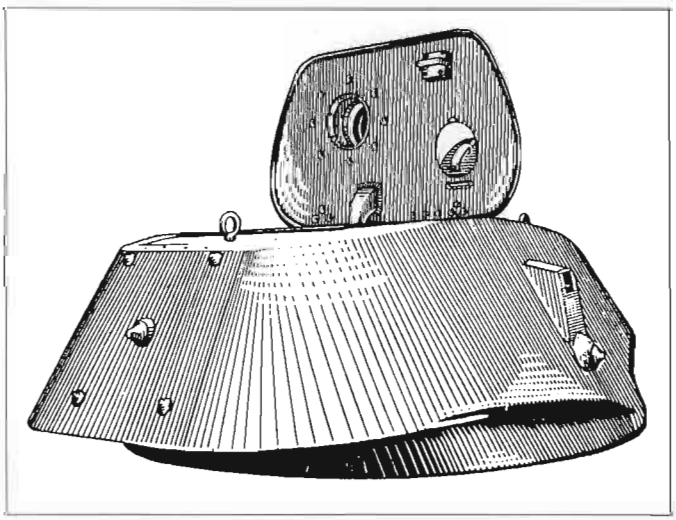
Drawing of a T–34 "M1940" No.183 Factory turret hatch with a POP bolted with 8 screws to the flat hatch cover. Later on the screws were deleted, and the raised POP mount appeared, as shown on p. 112.

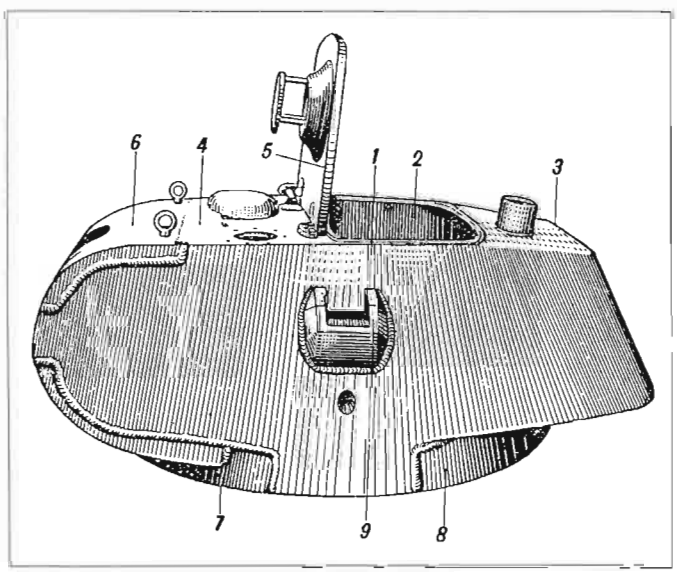
Two later-type turret hatches, of the No.112 Factory, and probably also from the STZ. The raised part of the hatch on the right has an unusual shape, narrowing in the middle.











The earliest turret (welded), still with L–11 cannon mount, but already with a modified POP mounting (no external screws) — as shown in the earliest T–34 manual. Note the antenna pot on the top rear of the turret shown in the bottom drawing — this was placed there only in the earliest series of the T–34 "Model 1940".

possible to include all of the designers' ideas. During all of 1940, the drawings were ceaselessly updated and upgraded. In fact, this process only ended at the end of that year, after the production of the T–34 had already started. Not until the beginning of 1941 was a complete set of new plans created. A special committee, headed by G.Y. Kobzan, was needed to keep tabs on current changes.

After reviewing the A–34 drawings, the Defense Committee made a final decision on 19 December 1939 in Resolution No.443, ordering two prototypes, which were already referred to as the T–34 (Tank Model 34). The same resolution tentatively accepted the tank into the inventory of the Red Army. With that document, the No.183 Factory was able to start preparations for mass-production. The factory was prepared for this and had started work on realizing these plans. Thanks to this work, the first prototype was finished on January 16 1940, and the second one, with a slightly revised driver's hatch cover, at the beginning of February. Both vehicles were labors of love. All openings and details were precisely machined almost to the millimeter and some surfaces were even mirror-polished. The tanks contained many imported high quality components, since it was not possible to reach such a level in the USSR.

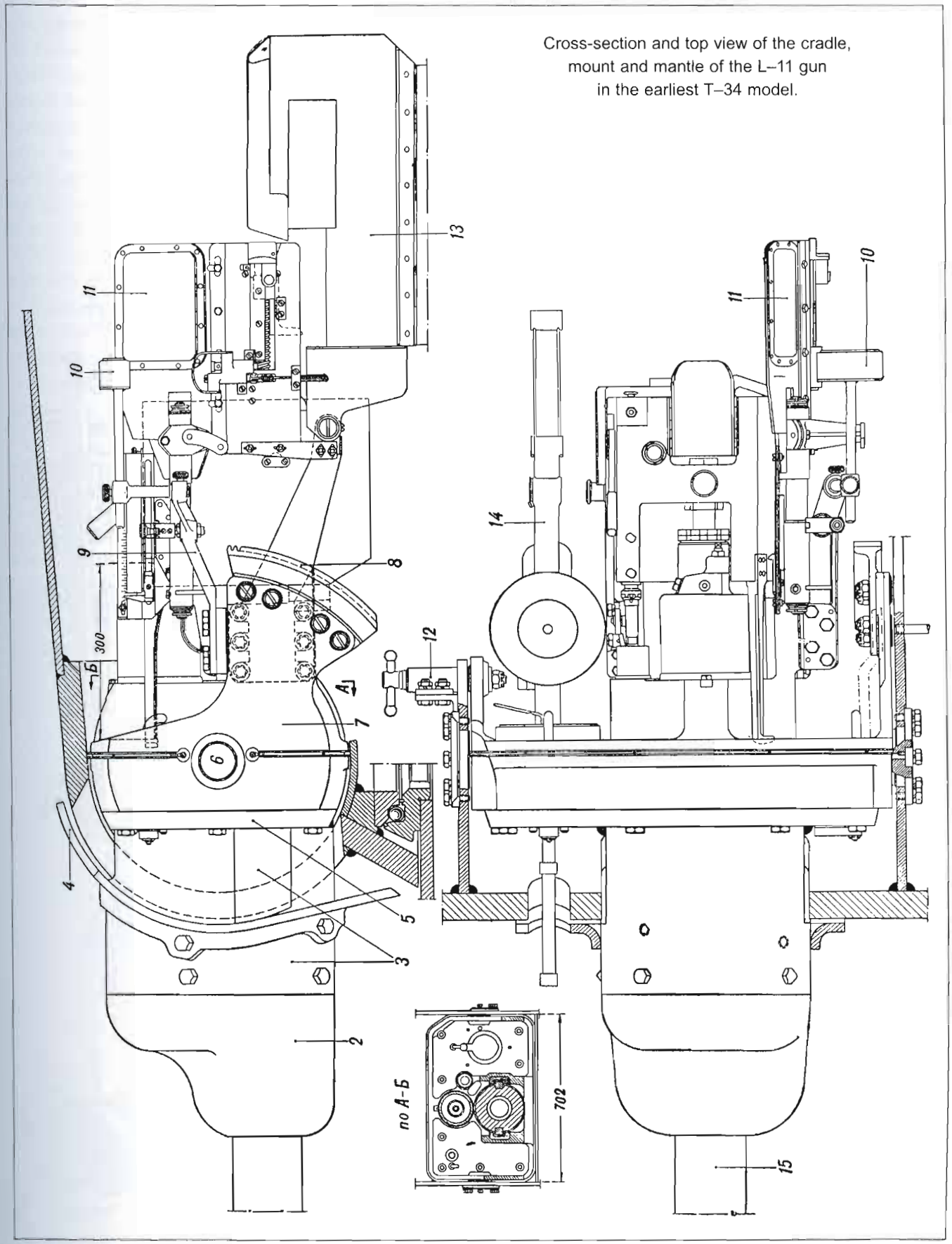
Each of the tanks was armed with a 76.2 mm gun, could reach a speed of 54 km/h (34 mph) and weighed 25.6 tons. Both were immediately sent for trials. The factory and initial state trials in Kharkov were completed on March 3 1940. During the trials a number of the tank's drawbacks were discovered; it was cramped inside, the fields of vision were very restricted, and the engine was still prone to failure. The first prototype's V–2 engine failed and had to be replaced after only 25 hours of operation. On the other hand, the tank had excellent driving capabilities and operated in the kind of terrain that the BT tank could not cross at all.

After the initial phase of the testing was done, the vehicles were overhauled and repaired so that during the night of March 5/6, 1940, they were able to leave the factory and, according to Kharkov traditions, complete a march (as a part of the national trials) to Moscow of over 1,000 kilometers.

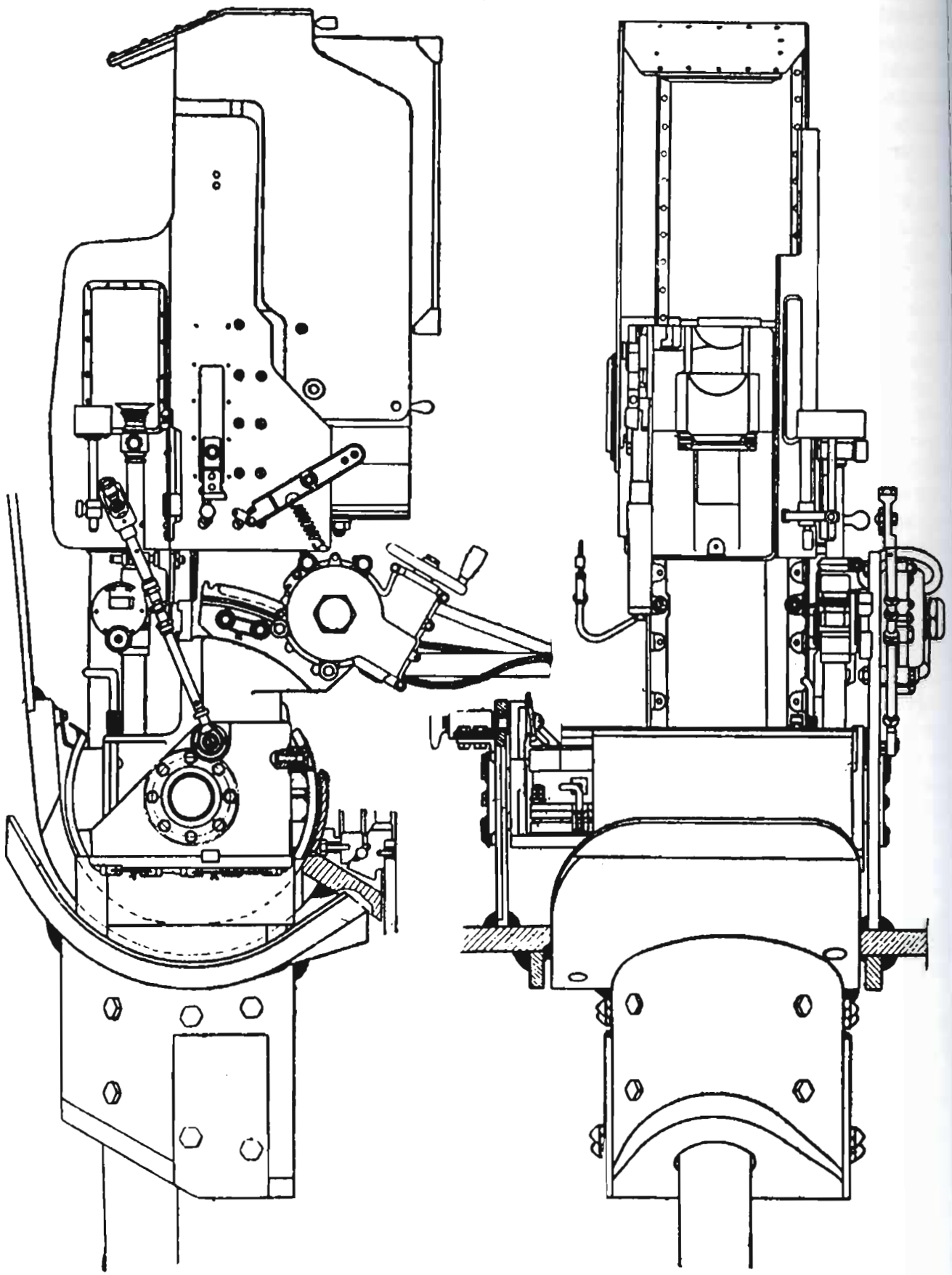
The journey proved extremely difficult. The winter of 1940 was severe, and the two tanks had to plough their way over roads covered with a layer of snow several meters deep. Their only navigational aids were their compasses and the tops of the electrical line poles lining the roads. To maintain secrecy, it was forbidden to use the main roads, and rivers were to be crossed on the ice, preferably at night.

Both tanks were crewed by the No.183 Factory's best cadre, coming mainly from the design bureau. The drivers of one of the tanks, in which Mikhail I. Koshkin rode, were Izaak G. Bityenskiy and Nicolai F. Nosik (the lat-

ter was a metal fitter, a mechanic-driver and a test driver) and the supervisor was engineer Ilya I. Gololobov. In the other vehicle was present a certain representative of the ABTV delegate, who, while driving the tank, damaged the main clutch. The tank had to sit in the open until repaired by the crew (beside the two tanks, two tractors were a part of the column, one carrying spare parts, and the other serving as a mobile home). Only one tank continued the voyage. Its crew was greeted in Syerpukhovo by the Deputy Narkom for Intermediate

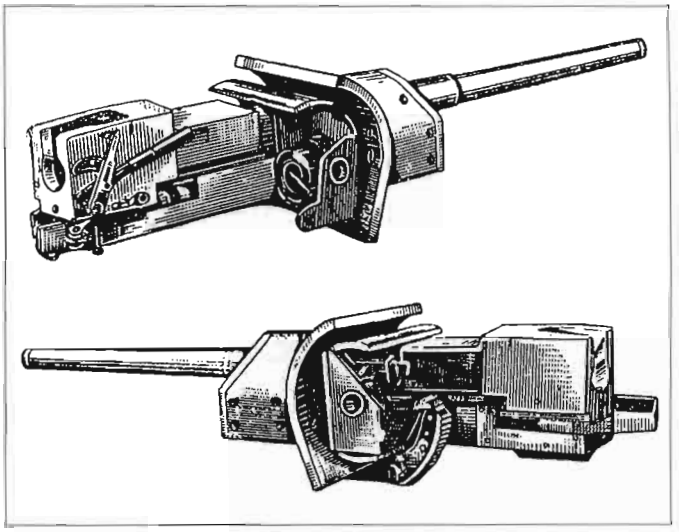


Cross-section and top view of the cradle, mount and mantle of the L–11 gun in the earliest T–34 model.



Cross-section and top view of the cradle, mount and mantle of the F–34 gun.

Rough left and right views of the F–34M gun after its modification in 1942.



Industry, A.A. Gorigelyad, who took advantage of the occasion and joined the group.

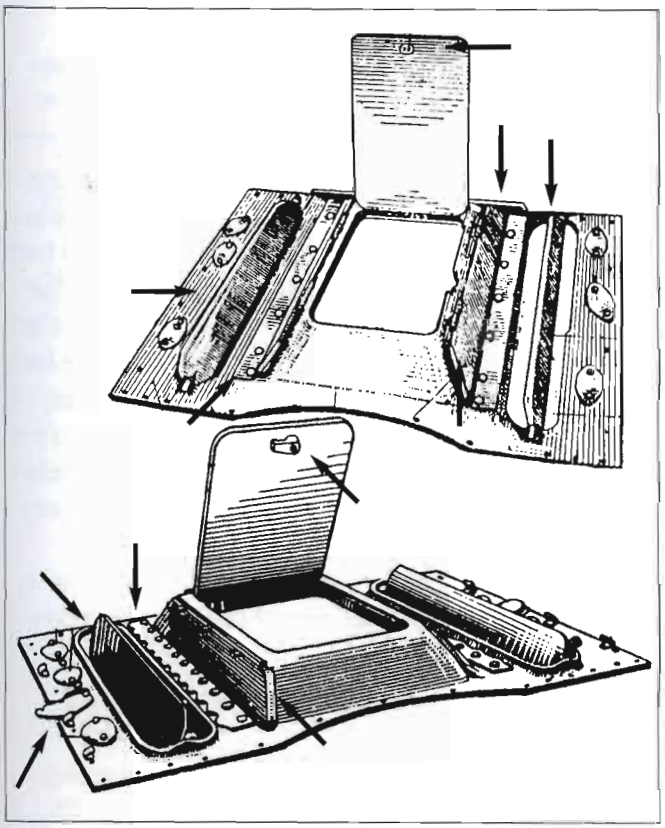
Within 10 days, both tanks finally arrived in Moscow, where they were overhauled at a repair shop of the No.37 Factory. It was there that a flood of Moscow officials from various institutions, drawn by curiosity, examined the tanks that they heard so much about[62]. Eventually, during the night of March 16/17, the tanks moved out in the direction of the Kremlin, where they were to be paraded before the Standard Bearer of Peace and the Teacher of the Nation, Comrade Stalin. The tanks entered after being searched several times by the NKVD, and with soldiers from this organization sitting right next to the two drivers; Nosik and V. Dyukanov.

Stalin, accompanied by the Politburo members, inspected the tanks and, after a brief and effective demonstration, showed his approval in an official document dated March 17, 1940. Immediately after, the tanks were sent to the Kubinka NIIBT proving grounds, where they were put through intensive military trials. These included checking the engine compartment's resistance to fire and the hull and turret's resistance to enemy gunfire. The second prototype of the T–34 was chosen for this, surviving 4 hits fired from a British 37 mm anti-tank gun and a Soviet 45 mm one from a distance of 100 meters. Not one of the rounds was able to pierce the armor or cause heavy damage. The gunners were only able to block the turret traverse with one of the 45 mm shells, which slightly damaged some of the turret equipment.

Later, in June 1940, the tank was sent to the Karelian Isthmus to conduct some demonstration trials, where Nosik performed some tricks. One of them was the crossing of an anti-tank ditch by driving the T–34 across the tops of the implanted steel stakes.

"One of them [obstacles, author] *was a ditch eight meters wide and two meters deep, with steel poles implanted into the bottom. While studying the obstacle and the approach to it, I noticed that the poles were placed in a checkerboard pattern. I built up the tank's speed and drove over the tops of the poles, with the tank jumping to the opposite side of the ditch. The wide tracks of our tank allowed me to perform a maneuver that no other light or heavy tank participating in those trials was able to duplicate".* But this was not the end of the show. *"For dessert, the state committee representative, who headed the trials, proposed... the crossing of an obstacle which was 'unsurpassable to the tank'; a wide belt of the forest ground with trees cut down so that only approximately one meter (3 ft) high stumps were left, and behind them a ditch six meters wide with wooden cuttings hedging the bottom...There were no takers...*

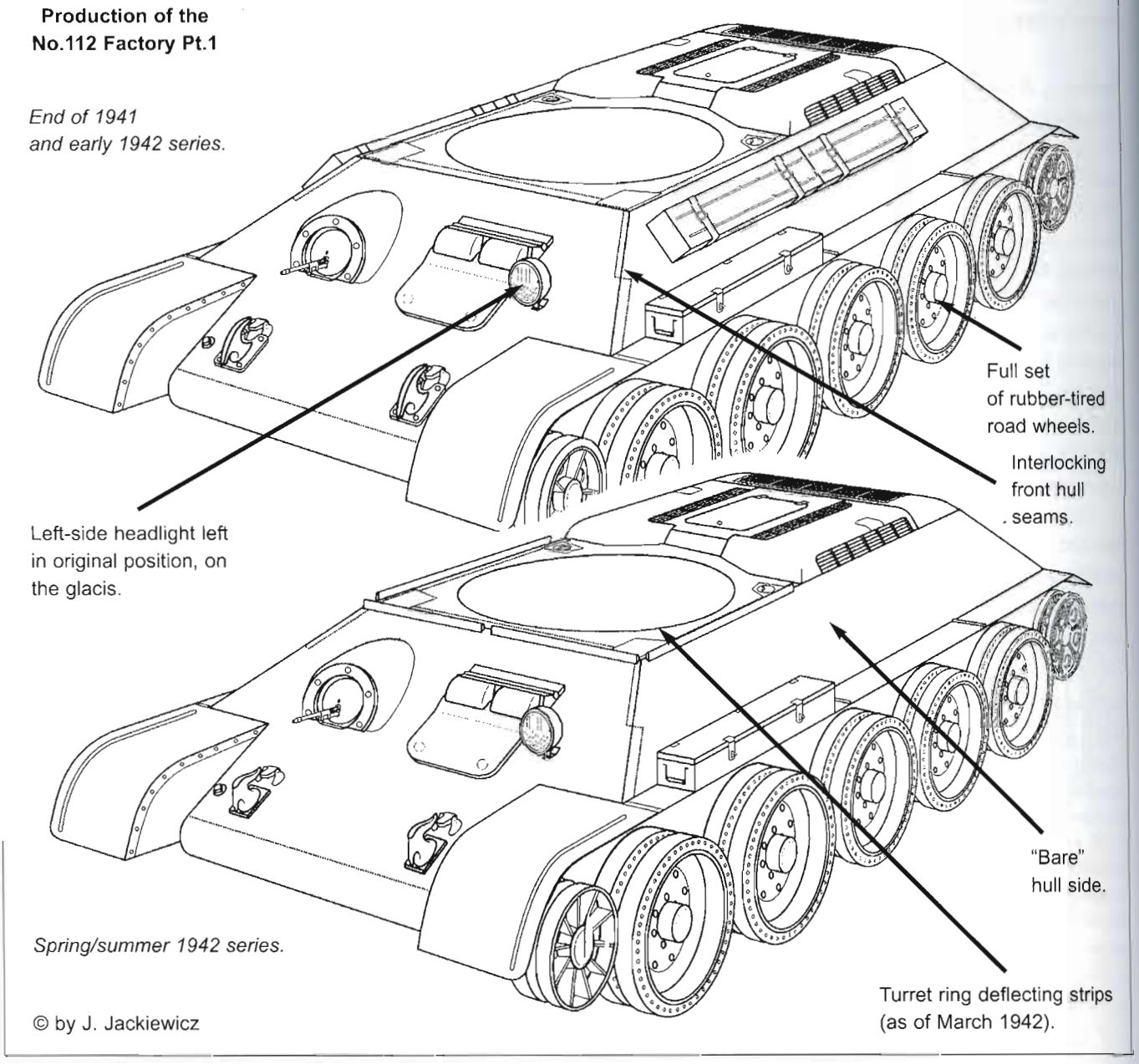
[62] It is worthwhile to underline the state of isolation in which the USSR had put itself at that time. Despite the presence of diplomatic personnel from many countries that worked in their embassies in Moscow, up until the summer of 1941 none of them knew about the T–34, although hundreds of people knew about the tank. This was remarkable because it is not easy to keep a secret in the diplomatic world, especially when the tank is zipping around on the streets in the center of Moscow.



V–2 engine covers.

Top: A simplified version, installed in and after 1942.

Bottom: The original 1940 version (arrows point to the main differences).



and so I volunteered. Building up the tank's speed, I directed it with all force at the tree stumps, some reaching a height of one and a half meters, which were in the way. With tremendous momentum, the tank uprooted the stumps and pushed them towards the ditch. The stumps fell into the ditch ahead of the tank and the vehicle drove over them and everything else. The tank reached the other side of the ditch and climbed out... The 'thirty-four's' triumph shook all of those present."[63]

The March stay in Moscow resulted in a preliminary decision by the middle level authorities on March 31 to begin the mass-production of the T–34. Perhaps this premature decision was inspired by Marshal Voroshilov's statement to the VKP(b) Central Committee meeting held on November 3, 1939. Comrade Marshal emphasized that a tank without its equal in the world had been created (this was known already then!). However, the fact was that the tank, at that stage of development, when the Party wise ordered it produced, would not have been considered for introduction into the inventory of any of the Western armies. The Soviets themselves had, to put it mildly, mixed feelings about the T–34. This especially applied to the military representatives, not the party ones such as Voroshilov.

This time they were right and stood united. What is most important, they were right. The tank at that time

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[63] *T–34: Put k pobyede*, op. cit., pp. 31–32.

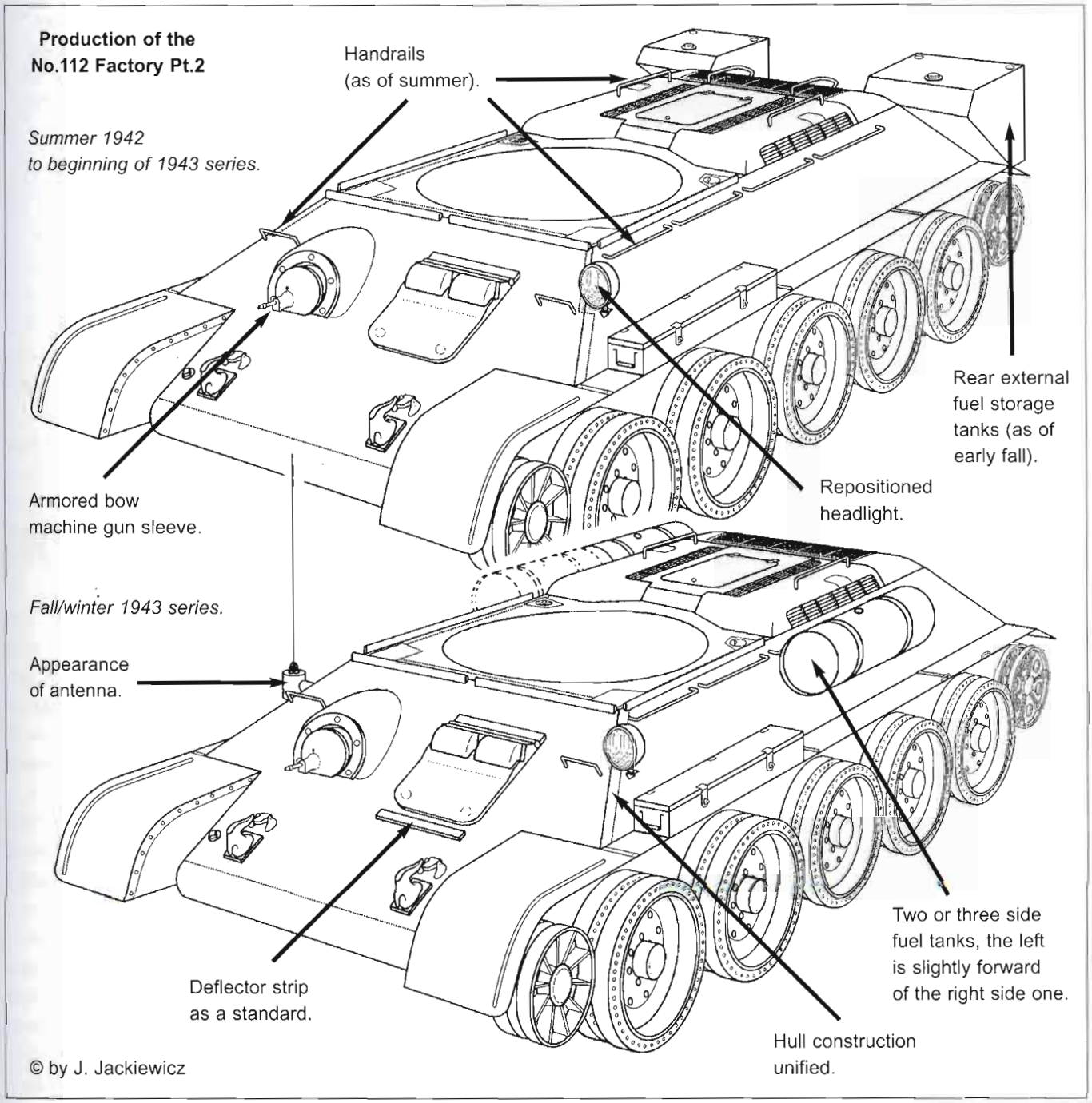
[64] As an example, the military protested against the practice of installing imported components in the engines and clutches of the prototypes. As a result, the prototypes performed splendidly, whereas the series-produced tanks broke down soon after leaving the factory.

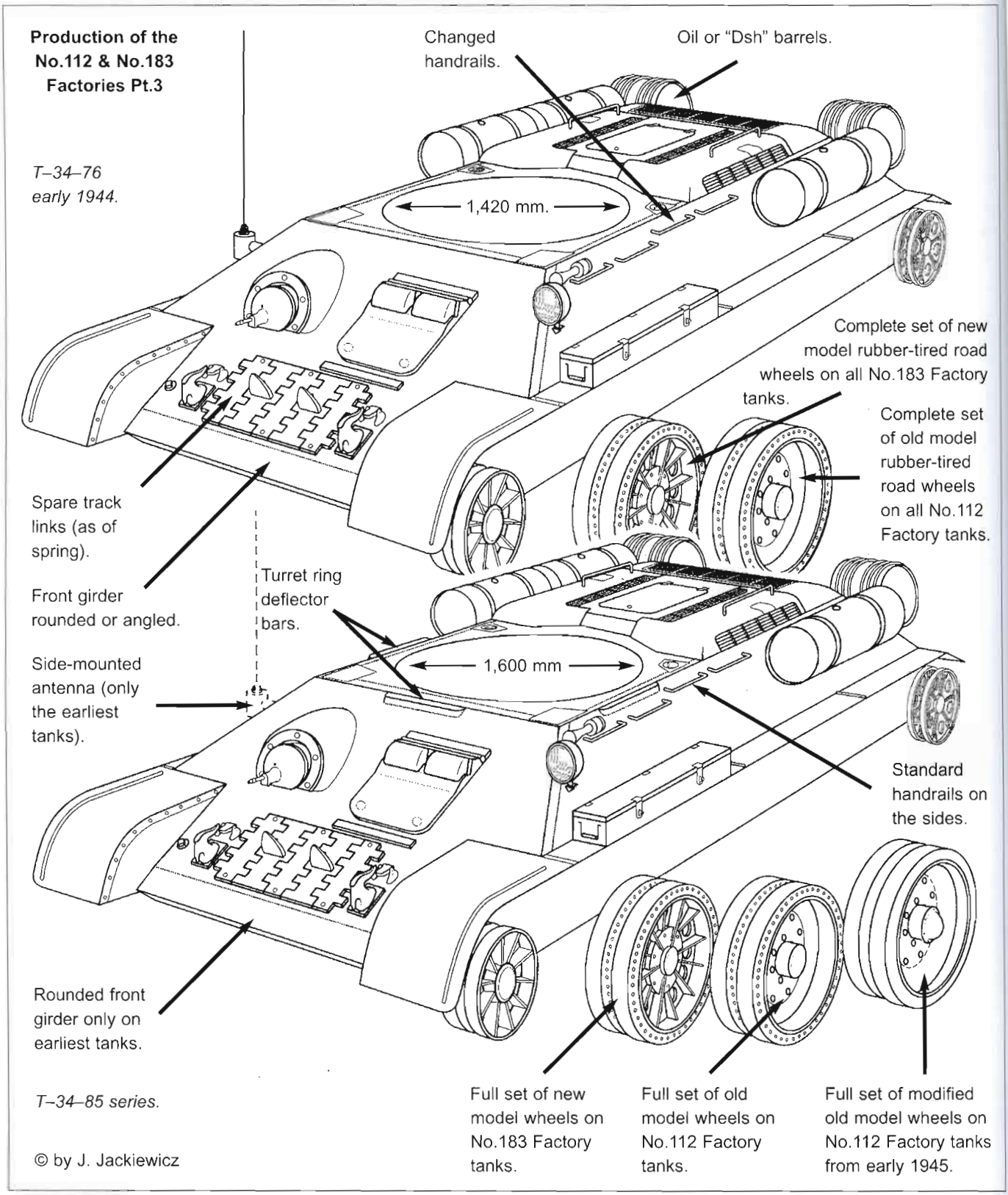
had many bugs; weak and nonfunctioning component parts of the transmission (clutches, gearbox etc.)[64], and an abysmal turret in which was mounted an equally abysmal L–11 gun. There was no doubt that the tank needed an immediate modernization, which, among others, demanded General D.G. Pavlov (at that time still the chief of the ABTW, but who was to be promoted shortly to commander of the Western Military District and be replaced by Y.N. Fedorenko). Pavlov feared the introduction of such a "farcical" tank into the armor forces of the Red Army.

The discussions regarding the further fate of the T–34 continued for two months. Finally, on June 7 1940, the SNK (*Soviet Narodnikh Commissarov*, Council of People Commissars — or the Soviet government) issued order No.976–368, authorizing the No.183 Factory to start mass-producing the T–34. The deciding factor was the necessity to upgrade the Soviet tank inventory, with an eye to modernizing the T–34 soon after starting its mass-production. All in all, this was a wise move, logical and rational. It was better to accumulate experience during the production of the tank, than to do nothing at all.

At the same time, on June 5, the SNK ordered the production of the V–2 motor to begin at the No.75 Factory. At that time, the decision was a risky move. But, just like with the T–34, the work on the diesel engine had gone so far that there was no going back, especially since the Soviets had no alternative engine to choose from.

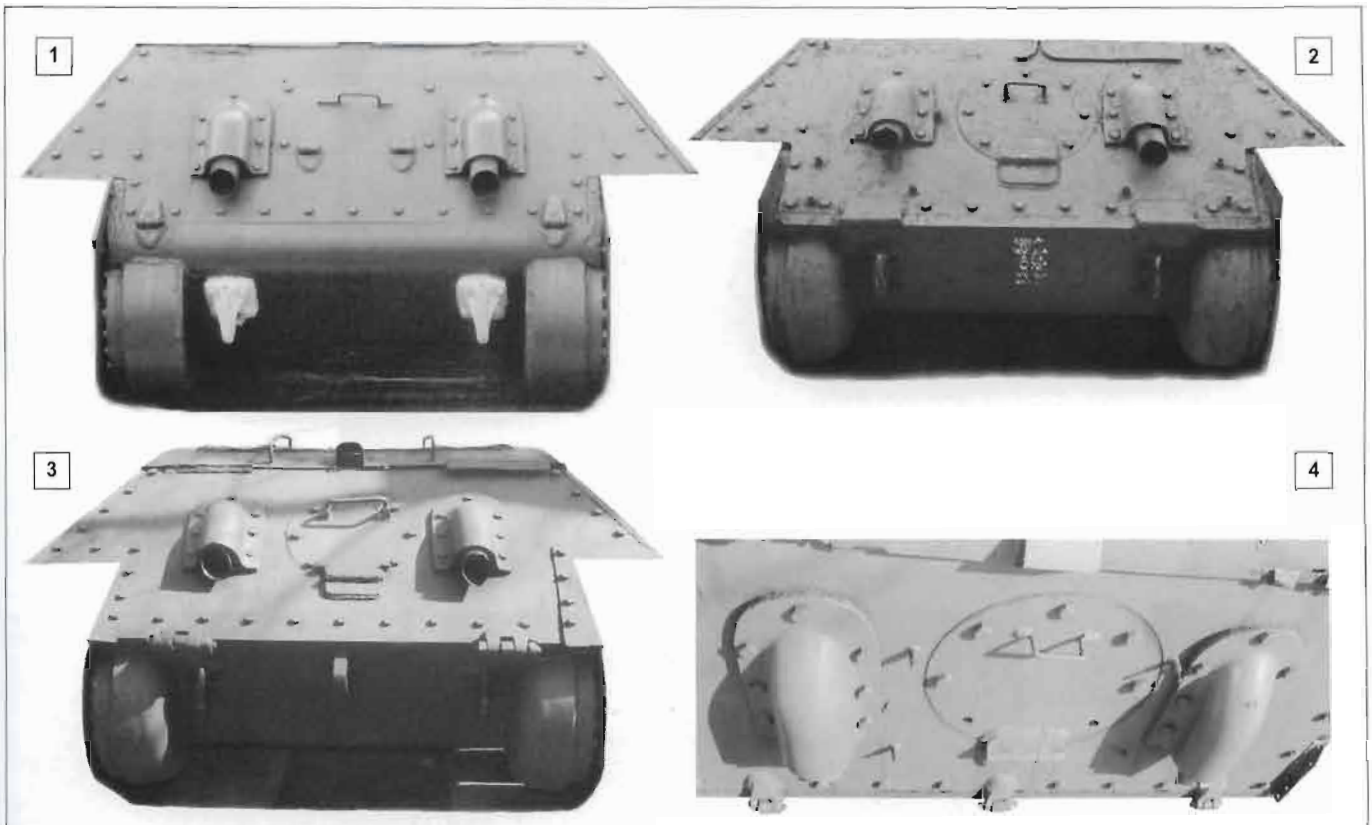
Work on the tank's engine at the KhDZ (*Kharkovskiy Dizelniy Zavod*, Kharkov Diesel Engines Plant), which had the most experience in the production of this type of engine (German-licensed), began already in 1931 and





lasted until 1939[65]. It was initiated by a group of young engineers employed there just after their graduation. Their goal was not the adaptation of the existing commercial applications, but rather a design of a completely new engine with smaller dimensions. The group's chief was K.F. Chelpan. He was assisted by Y.Y. Vikhman and I.S. Byer. One of the leading designers was I.Y. Trashutin. Vikhman later worked out the guidelines for the main diesel engine design, while Trashutin eventually rose to head the KhDZ's (later No.75 Factory's) KB in late 1930s. The entire project was supported by

[65] It is hard to establish to what degree the later V–2 was an authentically original Soviet design. As an example, the fuel pumps, used during the development of the diesel engine, were actually designed by Bosch. However, because the Germans ended the economic cooperation with the USSR in 1934, their deliveries of this component ended also. The Soviets copied the fuel pump and started to manufacture it as their own.



1. No.183 Factory, 1941 series: welded sprocket guards.

2. No.174 Factory, 1942–44 and T–34–85: two wide hinges.

3. No.112 Factory, 1942/43: two wide hinges, rear plate on top of the sides.

4. No.183 Factory, 1942/43: missing middle screw in top seams, three hinges.

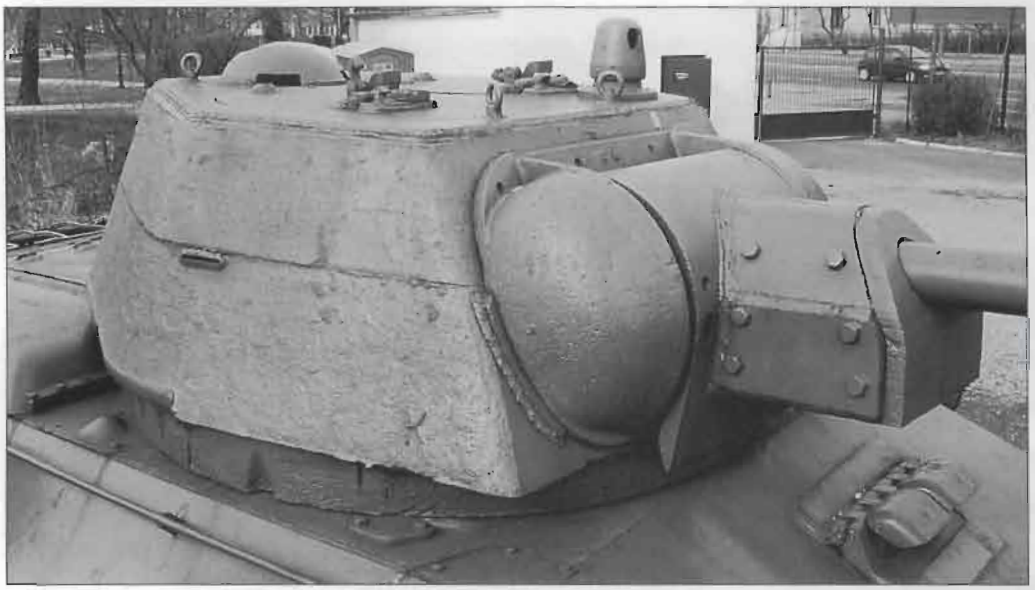
G.K. Ordzhonikidze, the *Narkom* of Heavy Industry. Later he started to pilot the work, whipping the whole team to achieve quicker results.

After long-lasting work on available engines and the adaptations of various solutions, in early 1932 the team knew how to design the engine. The assembly of the first BD–2 (*Bystrokhodniy Dizel*, High-Speed Diesel) engine was begun and it was ready for testing on May 1 1933. The engine was a failure but held some hope for the future. One of the prototypes was installed in a BT–5 tank in October 1933 and the practical testing was done in November. Several more BTs had the BD–2 installed, and were ready for testing by the fall of 1934. By the summer of 1937 each of these had worked a mere... 70–80 hours each. To conclude that this stage of development ended unsuccessfully would be rather accurate.

However, there could not have been another result. The department was badly prepared for the work and the cadre could not cope with the organization of its work. The poorly lit rooms were dirty and disorganized, and as a result the engines produced there had no possibility of working properly for an extended period of time. There was a lack of specialized tools and machines, which had to be imported from abroad as new problems, and the need to solve them, materialized.

In April 1937, along with the leadership's leaning toward a decision to build new tanks with the diesel engine, a new wave of „invaders from Moscow" dropped onto the KhDZ. Among them were such renowned engine specialists as T.P. Chupakhin and M.P. Poddubniy. Their mission was to ensure that the work was completed successfully. The invaders had to involve themselves in all phases of the work, starting with the basics. This included the verification of the metals used in the production of the crankcase, the redesigning of many of the details and, above all, a rationalization of the work process. It was then that the concept of using a light alloy to produce the crankcase originated. This shortened the service life of the engine but, simultaneously, also reduced its production costs and weight.

As a result of interference from the "Moscow invaders," by the summer of 1938, in a series of trials, a BT tank with an installed, well-working BD–2 engine outperformed a BT powered by a gasoline engine, and raised the interest of the testing commission. The redesigning of the engine and the elimination of some fundamental weaknesses were significant enough reasons for renaming it as the V–2 and beginning the last phase of work leading to its mass-production. In the spring of 1939, a first series of six were sent for state trials. On the average, each of these performed 250 hours of work and the test was deemed successful. However, the first series-produced V–2s were not as productive, and achieving a service life of 100 hours could be considered a suc-



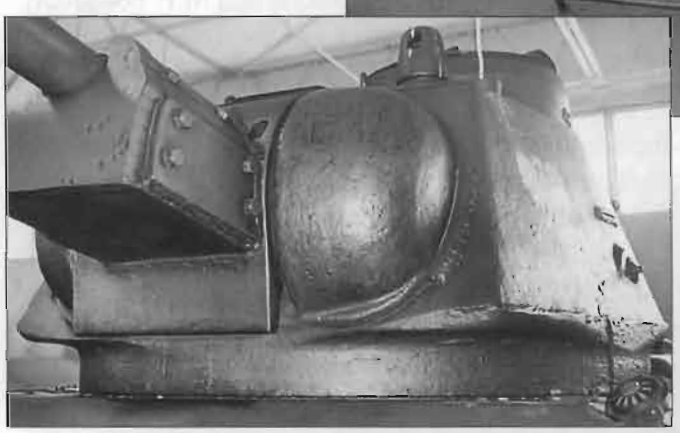
Two main variations of the hexagonal turret.

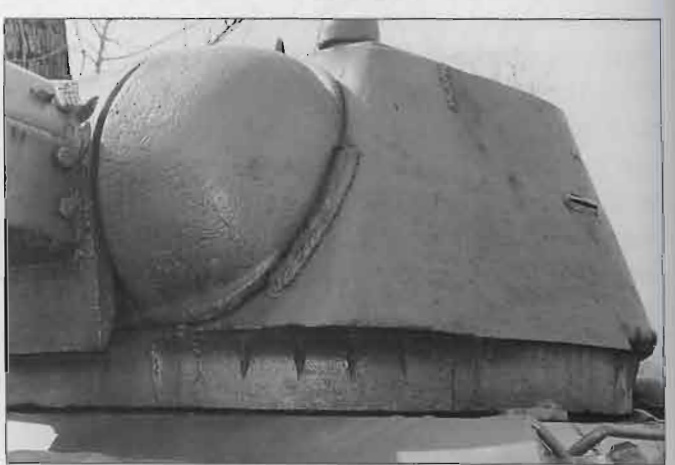
Left: the cast hardedge turret from fall 1942 (the casting mould was composed of nine parts, of which seven formed the turret ring!). ATTENTION: the line seen at the side of the turret is absent on its other side!

Below: Softedge turret (with only a 2-part mould) made in early 1943. Note ribs in the center part of the turret ring.



Below: The softedge turret with the commander's cupola and differently shaped front part under the gun mount. This turret's mould was made up of five parts, four of which formed the turret ring. The side plug on the turret indicates that it was produced in 1943.



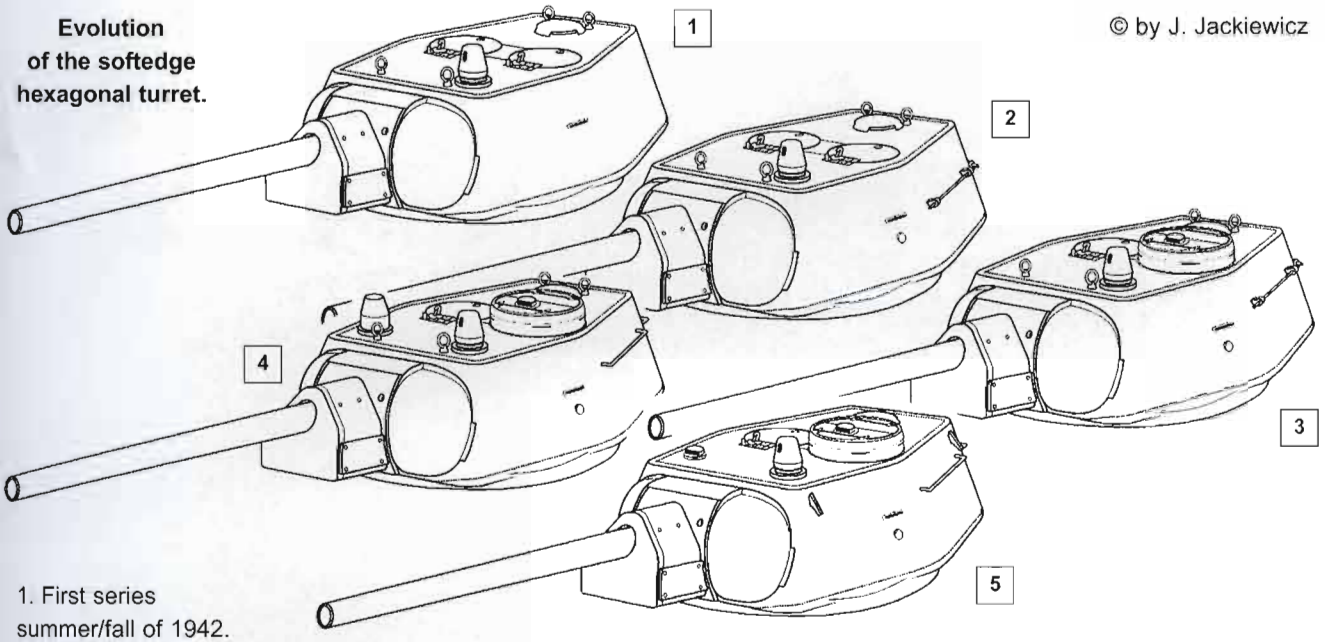




Above: The hardedge turret. Note the ribs, the sharp edges and the prominent fault where the mould parts are connecting.

Left: The softedge turret. Note two ribs under the mantle: these were exceptionally rare on this type of turret.

Evolution of the softedge hexagonal turret.



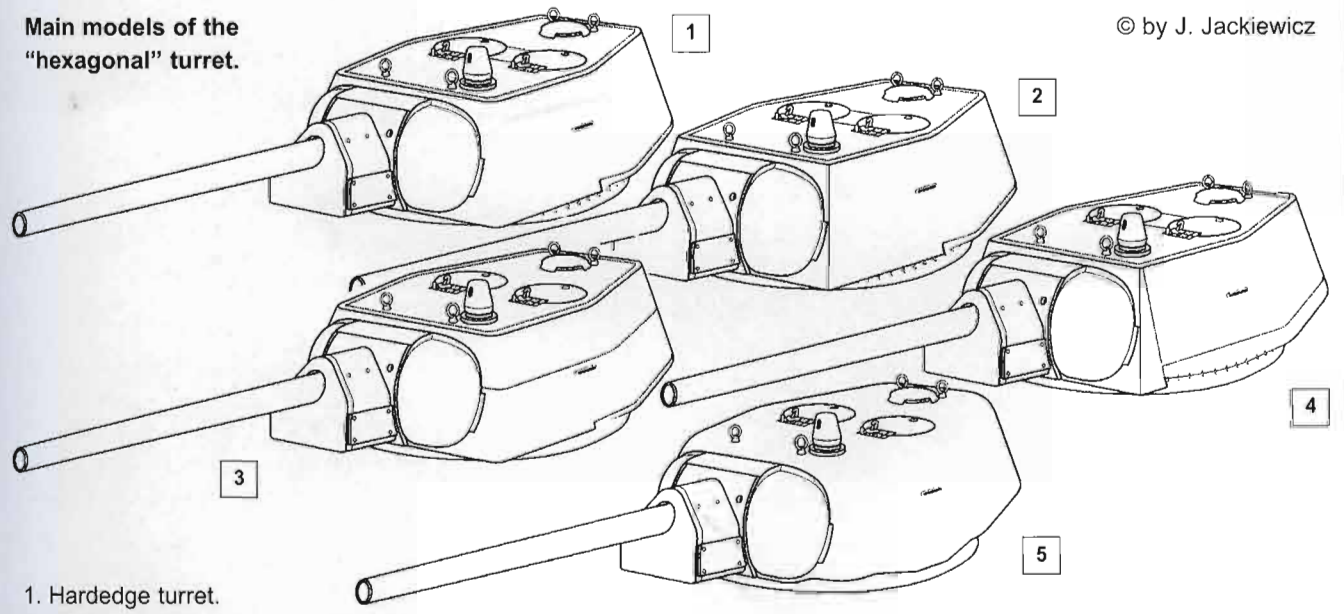
© by J. Jackiewicz

1. First series summer/fall of 1942.
2. 1942/43 series (handrails and side port).
3. Summer 1943 series (commander's cupola).
4. Late 1943 series (PT–4–7 and PT–K).
5. Early 1944 series (MK–4, PT–K, lifting lugs).

cess. It was not until the spring of 1941 that the factory was able to guarantee a service life of 150 hours. It is not known whether the engines had really lasted that long; perhaps the first batches manufactured during peacetime did. Later, however, this standard was not reached, and not until after 1943 was the 100-hour service life bettered. It is possible that the guaranteed 150-hour service life was achieved after the war.

Along with the successes of the T–34 and the Leningrad heavy tanks, it was becoming ever clearer that the V–2 diesel would be the standard motor for the new Red Army tanks. Consequently, a decision was made to separate the expanded KhDZ, then led by S.N. Makhonin, from the No.183 Factory, and operate it as a separate factory, called the No.75 Kharkov Diesel Engine Factory. At first, it was headed by A.Y. Bruskin, and then by D.Y. Kochetkov. Its chief engineer was Y.I. Neviyazhskiy, T.P. Chupakhin was the chief designer, his deputy was M.P. Poddubniy, and I.Y. Trashutin became the KB head. Not many from the original "bunch" were left. Some were eliminated in the purges, while others were fired due to their incompetence.

Main models of the "hexagonal" turret.



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1. Hardedge turret.
2. Hardedge turret, with sharp edges.
3. Three-part turret, "up-and-down".
4. Three part turret, "front-and-rear".
5. "Pressed" turret.



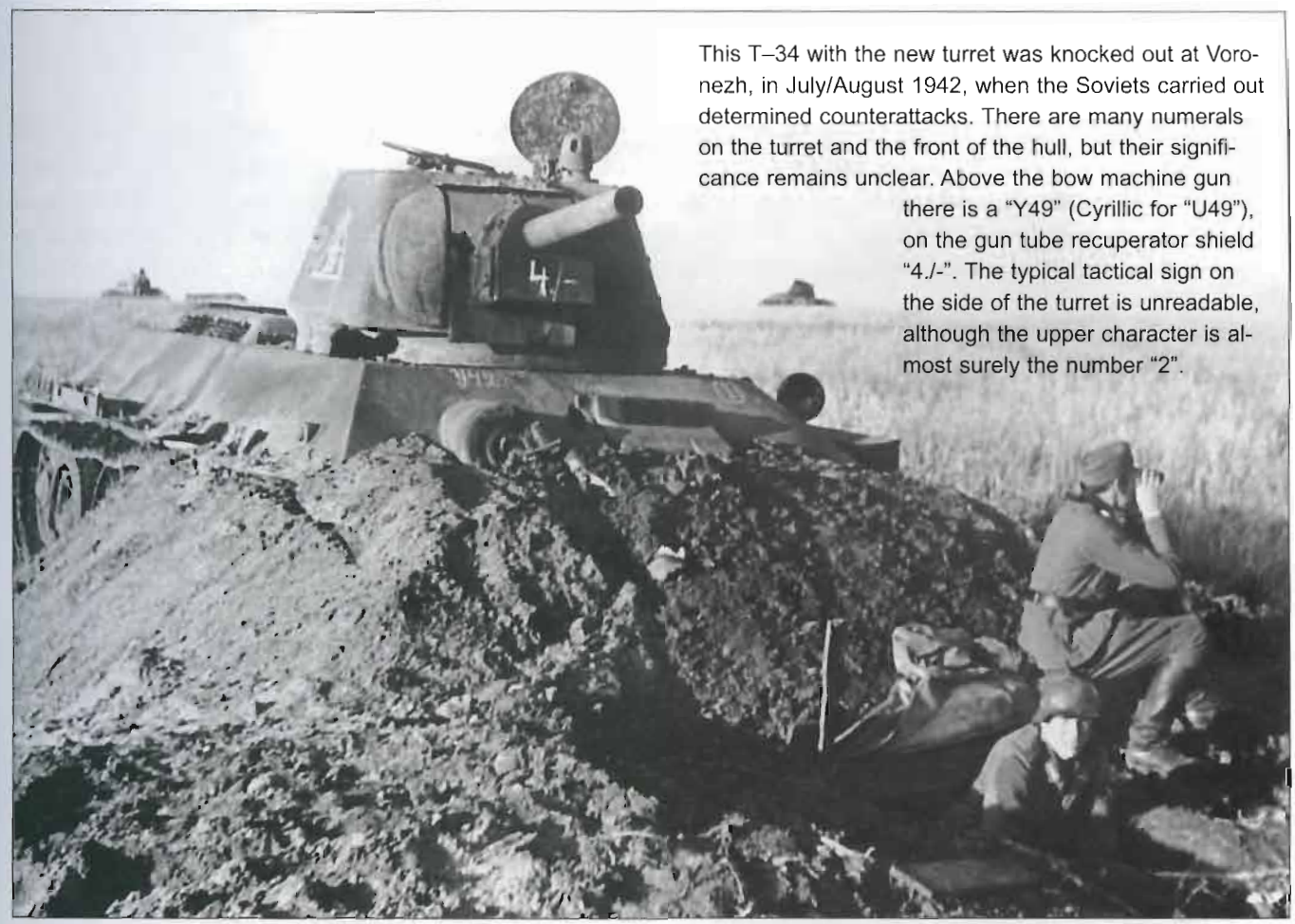
Above: An early series "Model 1942" T–34 with a "hexagonal" turret, summer 1942. The turret (note the three-part mould seams) was mounted on an old type hull, confirmed by the presence of old tracks from 1941. On the front of the hull can be seen additional armor from the No.183 Factory. A typical tactical sign (a rhombus, inside which there is the number "2" and the number "11" under a dividing line) is seen on the turret. Next to the tactical sign, one can see the turret S/N — 428. Its appearance with the hatches open clearly shows why the Germans called this model " Mickey Mouse".

- V. Kulikov's collection -

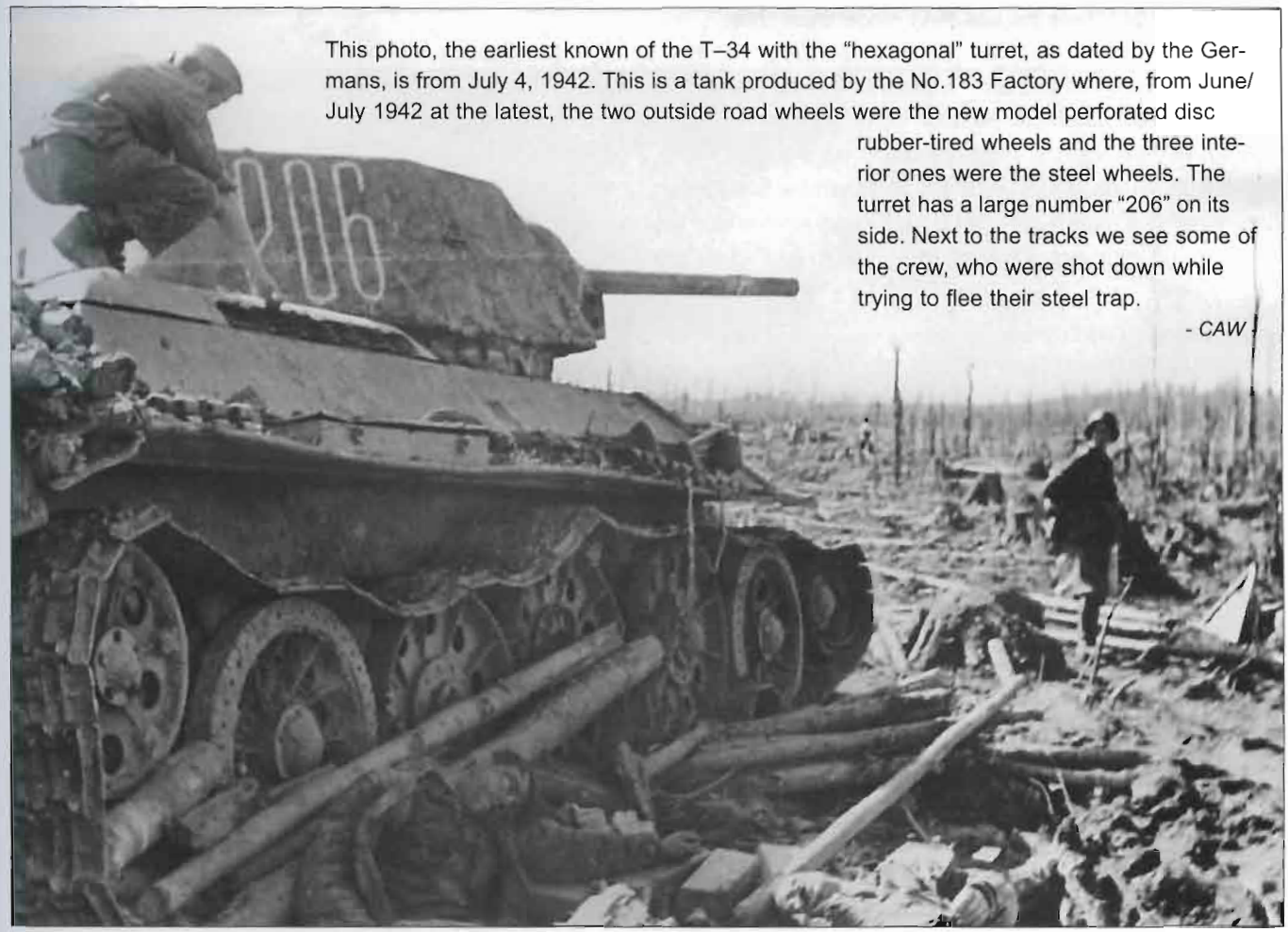
Below: A T–34 with a blown-off first type hardedge turret, fall of 1943. On the side of the turret can be seen clearly the mould seams dividing it into three parts (fore, aft and turret ring), as well as the fine, and regularly spaced, ribs. The mix of road wheels includes (front to rear); two rubber-tired old model (full disc), two steel, and a single new model rubber-tired (perforated disc).

- CAW -





This T–34 with the new turret was knocked out at Voronezh, in July/August 1942, when the Soviets carried out determined counterattacks. There are many numerals on the turret and the front of the hull, but their significance remains unclear. Above the bow machine gun there is a "Y49" (Cyrillic for "U49"), on the gun tube recuperator shield "4./-". The typical tactical sign on the side of the turret is unreadable, although the upper character is almost surely the number "2".



This photo, the earliest known of the T–34 with the "hexagonal" turret, as dated by the Germans, is from July 4, 1942. This is a tank produced by the No.183 Factory where, from June/July 1942 at the latest, the two outside road wheels were the new model perforated disc rubber-tired wheels and the three interior ones were the steel wheels. The turret has a large number "206" on its side. Next to the tracks we see some of the crew, who were shot down while trying to flee their steel trap.

- CAW

THE REAL T–34

The first operator's manual for the "T–34 model 1940" (built in summer/fall 1940)[66], issued in February 1941, stated objectively that *"the engine compartment in the rear of the hull"* held *"the V–2 engine, which weighed 750 kg, and was capable of 500* [metric] *HP at 1800 rpm"*. This kind of a performance, however, was rarely reached (it could be described as a kind of overboost), even in good circumstances. Theoretically, in an emergency, for a very short period of time, the engine could operate at 2050 rpm, but in practice this could lead to its immediate "cooking". The V–2 engine's normal working range was between 1700 rpm (nominal) and 1750 rpm (field), resulting in an output of between 400 and 450 metric HP. At these revolutions the tank performed well in the battles and on the march. All of the T–34's performance was measured and recorded within these values. Under these conditions, the tank reached a maximum speed of 47–48 km/h (29.5–30 mph).

From the beginning, there were troubles with the tank's engine and power train. While a lack of details prevents one from pinpointing the exact reasons for the problems, there is no doubt that the T–34's gearbox and the engine's ventilation were not among the best in their categories. This made the T–34 more prone to mechanical malfunctions than the Pz.Kpfw. IV and M4 Sherman tanks. With time these problems were mastered, but it was only during 1943 that a satisfactory level was reached.

With a fuel capacity of 460 liters (121.5 US gal.), the tank had a theoretical range of 230 km (144 miles) over dirt roads and 300 km (188 miles) on paved roads, at an average fuel consumption rate of 200 liters per 100 km (.85 gal. per mile)[67]. Theoretically, this was an excellent performance, but these statistics have to be interpreted in the proper context. A range of 130–150 km (75–81 miles) cross-country was deemed sufficient, as a deeper penetration into enemy territory was impossible and very dangerous for units that had advanced too far. The fact that the tank was able to advance forward for 200 km (125 miles) meant little if the driver could not physically manage to drive it that far and the logistics tail could not be organized over such a distance[68]. In a correctly organized army of that era, there was not even a need for tanks with such a range. To save wear and tear on tracked vehicles, during the longer move-

This T–34 tried to avoid enemy fire and hide behind the house. Obviously, this maneuver was not successful, Western Front, early fall of 1942. Note the late 1941 model track links.

- CAW -





This T–34 is from the summer 1942 production of the No.183 Factory (angular side differential gear covers, missing middle bolts at the sides, wavy exhaust shroud covers and triple hinges). The white stripe on the rear plate and the white triangle on top of the turret are especially interesting. These may have been "quick identification" signs for the Soviet air force, and other units from the same corps.

- ADM -

ments tanks were transported by rail cars. In this way the units moved faster and the crews were spared unnecessary fatigue. As an example, with an average speed of 20–25 km/h (13–16 mph), a column of tanks (without other sub-units) not excessively long should theoretically have taken 15 hours to reach a new assembly point 300 km (190 miles) distant[69]. In practice, this took between 36 and 48 hours because the tanks had to remain in the column for organizational reasons and to maintain battle readiness of the unit. Additionally, the drivers had to rest every few hours, the troops had to eat and the tanks had to have a technical inspection[70].

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[66] Officially, designations such as T–34 "Model 1940", "Model 1941", or "Model 1942" did not exist. Certainly, all these tanks differed from each other, but only externally; generally, they were all the same vehicle. It is possible that the division into models was applied only after the war.

[67] The commonly published data regarding the tank's range is unreliable. This is, most certainly, due to the faulty translation of the driving conditions. The T–34 manual gives ranges of: [1] paved road [meaning highway with asphalt top]: 300 km, and [2] country road [meaning unpaved one]: 230 km. In Western literature these have been translated as [1] highway and [2] country — meaning cross-country. In reality, while moving cross-country a tank consumes more fuel than on a country road, as a field is usually softer and less even than a country road. If we accept the above data interpretation as a genuine error, and additionally support it with data from German experiences (such as field tests on the T–34–85), it can be determined that the T–34's cross-country range was 190–200 km (120–125 miles).

[68] It should be noted that, according to the contemporary manual, an infantry division was to defend a sector of maximum 10 km (6 miles) width, and that penetrations of 30–50 km (20–30 miles) were considered the most effective from an operational point of view. The infantry corps staging area was about 20 km (12 miles) deep, and the army reserves were up to 30 km (20 miles) behind the front. According to battle experience on the Eastern Front, the Soviets considered that 50–80 km (30–50 miles) was the maximum range of a breakthrough — at that distance from the main front line army group-level reserves were usually engaged. The maximum range of radios in Western tanks was 7–15 km (4–9 miles).

[69] As a result of the conditions on the Eastern Front, rail transport of German Panzer Divisions terminated 100–150 km (60–90 miles) from the main front line, but sometimes they approached as near as 50 km (30 miles) — depending on the existing circumstances. The Soviets, on the other hand, moved their tank corps under their own power over distances of up to 500–600 km (312–375 miles)! According to their requirements, a range of even 300 km (180 miles) was considered as too small.

[70] In a T–34, as in any other tank with poor ventilation, it was too hot and stuffy during summer, and too cold and stuffy in the winter. As a consequence, it was very difficult to sit in the driver's seat for more than 2–3 hours, especially since driving the tank required much physical exertion. Even the traditional 100 grams [a shot of vodka] did not help the drivers" (*T–34: Put k pobyede*, op. cit., p. 39).



These two T–34s collided on the battlefield near Orel in July 1942. The torn off turret has the name Mikhail Kutuzov painted on it (a Russian general during the Napoleonic era), while the turret-less hull has special brackets, probably for transporting wooden beams.

- CAW -



This photo shows a similar scene at the same time and in the same area. Note the similar brackets on the rear plate of the burning T–34. Both photos give the appearance of being taken during action. In reality, the photographer visited a battlefield already under German control where his friends from the infantry set off a few grenades and a canister of gasoline with some tank ammunition.

- CAW -

This is how a correctly organized march was to look. In war, however, during operations at the front and in the areas immediately behind it, rarely was anything properly organized. That is why the use of the rail system, capable of moving men and tanks at an average speed of 60 km/h (37 mph), was obviously the optimal means of transport during longer marches between areas of operation. This was especially true when a complete armored division, rather than just a few tanks, had to be transferred. In the Red Army these matters were looked at differently than in the west and that is why the emphasis was always put on attaining the maximum possible range.

The main armament of the T–34 was the 76.2 mm L–11 gun, a failed design that had to be replaced in a hurry by a more functional and effective one. The 26 caliber-long[71] barrel fired a projectile with an initial speed of 555 mps (1825 fps). In the years 1935–38 these characteristics acceptable, but in 1940 they made the gun obso-

[71] So it was the equivalent of the KwK 37 L/24 with a muzzle velocity of nearly 450 mps (1,480 fps).



T–34s of Maj. V.S. Arkhipov's 106th Tank Brigade, training in the rear areas, September 1942. Both tanks are products of the No.183 Factory, but the one in the foreground has a peculiar turret. It is one of the earliest cast types, which was assembled from 3 parts (the front, upper and rear), and patterned on the softedge type. The turret has the name Molotov (then Soviet Prime Minister) painted on the side, and the number "169" underneath. The number can be interpreted in the following way; the 1st Battalion (two per brigade), 6th Platoon (nine per battalion), 9th tank in company (ten vehicles per company, with the commander's with a "0"). Note the canvas muzzle-cover on the gun.

- V. Kulikov's collection -

lete. The gun caused many problems and often did not function correctly. It jammed frequently and did not allow for firing with precision. In short, it had many faults. The gun was installed in a turret power traversed by an MB–20 electrical motor. The motor enabled the turret to traverse a full 360 degrees in just over 10 seconds.

Each of the tank's tracks consisted of 74 links, each link being 550 mm (21.65 in.) wide, with a ground-contact length of 3840 mm (12.63 ft). This gave the tank an excellent ground pressure factor of 0.62 kg/square cm, a result very close to the limits of possibility.

Undoubtedly, the tank's accomplishments were very good — but not really revolutionary. Its combat capabilities were likewise only relatively good. It is true that during battle, the T–34 had an advantage over the enemy thanks to its thick, sloping armor. But the experience of the battles on the Eastern Front showed that these pluses could be negated to a large degree by the enemy's high quality projectiles and by his superior tactics. German tanks always had weak side armor (thinner plate of lower quality steel), but this was rarely a problem because they were used properly in combat. It was quite a different situation on the Soviet side, with most of the T–34s destroyed as a result of the reigning chaos on the battlefield. This allowed the Germans (confirmed by photos) to hit the Soviet tanks from the side or on the turret. The T–34's undeniable virtues quickly lost their value during battle, mainly due to the authentic faults that made it impossible to maximize its advantages. The crew was almost blind and deaf, and the observation slits were too small, while the optical equipment was of poor quality. If there was a radio, it most probably did not work. If it was made to work, most of the commanders were unable to make good use of it until 1944. Initially, the radio was the 71–TK–3, with a range of up to 18 km (11 miles) while on the march. Until the second half of 1943 it was installed only in company commander's vehicles (every tenth tank) or, in best circumstances, in the platoon commander's (every third tank). A similar situation existed with the observation equipment (the TOD–6, TOD–7, and also the PT–6 and PT–7[72]). Certainly, they were fitted in every tank, but their quality was worse (probably much worse) than their counterparts in the German tanks. To these problems could be added the loud engine.

[72] Instruments designated with a "6" were for the L–11 gun, while the "7" meant ones for the F–34.

This may not seem important, but the Germans (and the Soviets during trials) paid attention to this factor and learned to take advantage of it in battle.

As if all these problems were not enough, the quality of manufacture was decreasing alarmingly in wartime. Between late 1941 and fall of 1944, the quality fell to nothing short of disastrous. Not only were armor and projectiles of inferior quality, but so were the mechanical components; turning the already high failure rate even higher. Believing that power was in numbers, the Soviets, instead of lowering the production rate to increase quality and train their crews better, pressed for numbers and numbers alone. It was for that love of numbers that Soviets turned down modernized models in 1943 on the brink of a series of huge offensives. They needed more tanks, even if inferior, to stage these.

The cumulative effect of all the tank's drawbacks was that the Soviets could only operate the T–34 well during the beginning of a battle, when they had in front of them about 2 kilometers of terrain that allowed them to follow through with their battle plan. At that time a unit commander could still count on his subordinates being where they were supposed to be. But, with the passing of every minute, his knowledge of their actions gradually diminished because he could neither see nor hear them. During an engagement, as the situation developed, the T–34's crew quickly lost its orientation. Dust, explosions, and noise; all these were responsible for the crew's inability to spot through the vision slits the stalking Panzers. The lack of radios precluded any co-operation between the tanks. The Germans were quick to learn how to exploit this weakness and, already from the beginning of the 1942 operational season, battling the T–34 did not pose a big problem for them. As it was already stated, tactics and cooperation between units was the key to success. Since the Germans' concepts of armor engagements were superior, in practice they usually gained an advantage over the T–34.

In short, the T–34's advantages meant little because its faults and the eastern way of thinking of the Soviet designers, as well as the eastern tactics and style of waging war, negated them.

This advancing armored unit, followed closely by infantry, was photographed in summer/fall 1942. The tank in the foreground comes from the No.183 Factory and has a peculiar tactical sign. The hexagon has a "2" inside, and a "7" underneath it, with a "1" to the right of the "7". The first and second numbers are probably the unit's designation, while the last number may be the tank's individual number as the other tank does not have that part of the designation. This may mean that the "1" may not be as important as the other two numbers.

- S. Zaloga's collection -



MODERNIZATION

It appears that a condition of sending the T–34 into mass-production was the undertaking of a widely encompassing program of modernization, or even the rebuilding, of Soviet industry in order to give the Red Army a fully functional tank. And there was a lot to be worked on. In the Soviet Union there was a lack of equipment crucial to the production of complicated T–34 parts that its creators had designed. It is sufficient to recall the circumstances surrounding the production of the hull's front armor plate to understand the kind of difficulties that had to be overcome.

According to the initial design, the entire front part of the hull was to be made from a single piece of armor plate. It was to be cast, rolled, cut to size, hardened, formed on a special 10,000-ton press (which meant that it had to be bent 120 degrees), and then hardened again. This one-piece glacis then had to be precisely fitted to both side plates. This was not easy, especially when taking into account the angle at which all three plates were in relation to each other. The whole process was very difficult and time-intensive, which not only raised the price of the tank but also limited the scale of the production. But the designers had meant the T–34 to be an absolutely simple vehicle. And that is probably why Morozov opted to... keep the initial design!

After the first series-built T–34s failed miserably in military trials held at the end of 1940, the situation became almost critical. The only solution appeared to be the creation of a functional tank, which would have pushed the T–34 from the ranks. Orders came from the highest level. To this end, during one week in November 1940 (after the completion of an investigation, Resolution No 428 of the Defense Committee, and Order No 268 of the Intermediate Industry Ministry), a decision was made regarding a modification program. Its guidelines were set during a meeting held on December 29 1940. The modernization work was divided into three stages, each depending on the level of difficulty.

This abandoned T–34, an example of atypical markings, was photographed in the fall of 1942. Two geometrical figures make up the marking — a divided triangle with the number "41" over a "6" separated by a dividing line, and a square with the letter "A" inside. Both were painted at the rear of the turret, which indicates that they were for the other crews to see while attacking. Note the rough texture of the cast turret and the turret ring ribs (by the German officer's face). These seem to be atypically large and they connect the turret body edge with the ring's bottom. They have straight rather than rounded edges.

- CAW -





These two photos were arranged for the photographer visiting the Voronezh battlefield in July 1942. The tank is a No.183 Factory T–34 of the recent production series, with the "hexagonal" turret. The brigade level tactical sign, a rhombus divided in the middle by a "moustache", contains the number "2" in the top part and the number "16" (or "18") in the bottom part. On the turret roof there were painted lines, which were to guide the painting of markings for quick aerial recognition. ATTENTION: this is one of 2–3 earliest type of the "hexagonal" turret with some features common for the later hard-edge and softedge variations.

- CAW -



Stage One — short-term modifications not having impact on the overall design of the tank. Above all, this concerned the creation of a new track link, as the former, patterned on the BT tracks, was insufficient for a heavier tank. It was also deemed necessary to increase the ammunition storage, as well as to... extend the range (sic!), and to improve many internal features of the T–34. The main gun and, eventually, the turret were to be changed. In this way moved forward the aspirations to create a new T–34, which soon after received the factory designation of A–41. Many of the A–41 features proved to be exchangeable with the T–34's, and were immediately incorporated into the tank on the production line. The tank, that was to result from this, the A–41, never materialized.

Stage Two — a complete modification of the tank, making it more functional, and much friendlier to its crew. The tank resulting from this modification was designated as the A–43.

Stage Three — designing of a developmental version of the T–34, which were designated as the T–44 and



Above: This T–34, a product of the No.183 Factory, being examined by its victors near Stalingrad, was photographed in early September 1942. The details typical for this plant are clearly visible, including the wavy exhaust shroud covers. Note the tracks with the "wafer" type links, introduced in late 1941. This track was phased out by the "standard" one in 1942.

- CAW -

Below and right: This T–34 was abandoned somewhere on the central part of the Eastern Front in the fall of 1942. All exterior fittings and equipment have been ripped or shot off. The resulting "bald" appearance makes it impossible to identify its unit or origin. The side of the turret bears many hit marks from small caliber ordnance, with which the German soldiers fired on the wreck.

- CAW -



This T–34 was photographed during the winter of 1942/43. Its most interesting characteristics are the markings on the turret — a dark (red?) stripe on the side for identification by friendly troops and a white stripe on top of the turret for aerial identification. The dark stripe is obscured by snow at the front of the turret.

- *CAW* -





This T–34 wreck was blown apart by an internal explosion, when taking part in offensive actions in the Stalingrad region, during the winter of 1942/43.

- *CAW* -

T–34T. The former was to be a completely new tank, based on the A–43, while the latter was to be an A–43 with improved internal systems (mainly the epicyclical steering gear).

The foremost task of Stage One was the design of the modifications related to the replacement of the gun. In this case, V.G. Grabin and his KB at the No.92 Factory were chosen for the task. It was the same KB that in 1939 designed the F–32 gun (the equivalent of the T–34's L–11 gun) for the KV–1 heavy tank. The new gun had nothing to do with the L–11 though, and was designed from scratch, based on the infantry gun.

After the Intermediate Industry Ministry ordered the production of the gun on June 2, its design was initiat-

ed that month. The particular characteristics were established using a two-track system; the designers established them in the factory while the decision-makers established their own at the highest level (during a joint Central Committee and Cabinet meeting of June 13). After Marshal Timoshenko referred the issue, concentrating on the T–34's armament, it was set out that the tank's standard armament would be a 76.2 mm gun based on the F–22 L/41.6 divisional-level anti-tank gun of the same caliber. On June 14, it was decided that the new gun should be ready for testing on September 1, 1940. In principle, the KB met the deadline because the testing began on September 15. After they concluded, the F–34 prototype was installed in a BT–7 and on October 1 the firing tests continued, ending on October 20 after several malfunctions (parts cracking). A week later the gun was delivered for state trials, during which its functioning in the A–34/2 was tested. The state trials concluded on December 17. Meanwhile, at a meeting of the Defense Committee, a decision was made to begin its mass-production on January 1 1941. However, it was officially accepted into the RKKA inventory only in June 1941. In the meantime, a small problem occurred in the factory. As a result, the first 82 guns were assembled in February so that the required monthly production rate of 300 was reached in March.

The F–34 was a good gun and incorporated many novel features. In order to achieve such a good performance, its construction had to differ somewhat from Western European guns. As a result, the F–34 was heavier, and slightly inferior to the adequate American 75 mm M2 cannon mounted in M4 "Sherman" tanks, and the

A good view of the "Mickey Mouse"variant. This tank fell victim to soldiers of the 4.Pz.Div. near Kharkov, February–March 1943. The lack of an armored machine gun ball mount indicates that it may have been a product of the UTZM or ChKZ factories at the end of 1942. The "standard" tracks, 550 mm wide, which were introduced in late 1942 especially for the 1942/1943 "wet season" (fall thru spring), are clearly visible. The turret ring ribs are almost invisible — but they are present. These ribs were always present on the hardedge turrets, while on the softedge ones they were extremely rare — and then in certain places only.

- MWP -





The representative of the Komsomol (Communist Party Youth Organization) in Khabarovsk presents the crew of a unit commander a T–34 funded by a collection from his young subordinates, winter of 1942. The tank's turret has a commemorative inscription, probably painted in red, acknowledging the contributors. Note that even the interiors of the turret hatch covers are painted white.

- Planeta -

later KwK 40 of the German Pz.Kpfw. IV. This was made worse by the low quality of the armor-piercing ammunition produced in the Soviet Union at that time. And so, the firing of the F–34 from a distance of 500–1000 meters (550–1100 yards) produced results equal to those of the shorter and weaker American gun, and the different German 75 mm KwK 37. The fact that at a range of up to 500 meters the F–34 was only marginally better than the KwK 37 is really intriguing. Despite the fact that the concepts of the two guns were diametrically opposed, their capabilities were similar. The deciding factors proved to be the quality of the ammunition and armor of both countries on the one hand, and the precision of design and manufacture of the weapons on the other.

The Soviets noticed that the installation of the T–34's armament was still far from being completely satisfactory. That is why, along with the decision to produce a T–34 armed with the 76.2 mm F–34, work was begun to "jam" into the turret another gun that would have been more effective in combat against the Panzers (a repetition of the experience with the A–20/A–20G).

The idea of a T–34 with a specialized gun was initiated in June 1941, simultaneously with the re-arming of the T–34 by replacing the L–11 gun with the F–34. Timoshenko once again presented the issue at the joint Central Committee and Cabinet meeting of June 13, the same that ordered the F–34 into being. It was decided to investigate the issue further, which was done at the next meeting on June 27. During the discussion it became apparent that there was nothing to deliberate because the standard 45 mm tank and anti-tank guns were already obsolete[73], and work on their successor was being carried out only by W.G. Grabin of the No.92 Factory's KB. That was the long-barreled 57 mm ZIS–2 anti-tank gun, capable of propelling a projectile with an initial velocity of ca. 1,000 mps (3,290 fps), which was to have guaranteed the piercing of 70 mm (2.75-in.) of armor at a distance of 1,000 m (1,100 yds). The gun's capabilities looked so tempting that a decision was made to install it in the T–34. The realization of this idea proved to be difficult because in the second half of 1940 the No.92 Factory was busy preparing for the mass-production of the F–34 gun.

Nevertheless, after the initial problems were conquered, the assembly of the first prototype of the ZIS–2 was started in September. The gun was ready at the beginning of December and was immediately sent for factory tests. The gun showed itself far from perfect. The tests ended in March 1941 and, despite not having its basic flaws corrected, the gun was installed in a T–34 and sent for state trials at the ANIOP proving grounds in Sofrino. The military were quick to point out two basic deficiencies; poor quality of the barrel (short service life

[73] It also quickly became evident that entire batches of ammunition manufactured for them before the war were faulty, and did not meet expectations at the front.



This T–34 is ready to be collected by its crew at the beginning of 1943. The turret bears an inscription commemorating that the tank was funded by Mongolian Communists. The upper part reads *Choibalsan* (Mongolian Communist leader) and the bottom one *Revolutsyonnaya Mongolia* (Revolutionary Mongolia). Between them is located the tactical sign: a rhombus with the number "9" below the divider.

- Planeta -

due to overheating[74]) and excessive dispersion of the shots. The gun was sent back to Grabin and, after a number of improvements were made, in July 1941 it was sent for further testing.

The trials held between July 6 and 18 ended successfully and the gun was recommended by the military for mass-production. At that time the Soviet Union's situation was so bad that there was no one who might have



This T–34 from the same unit, but with a commander's cupola, serves as an improvised rostrum for a political officer during a rally in Austria in May 1945. Note that the front part of the lower turret has no snow camouflage.

- Dmitri Karlenko's collection -



This T–34 was blown apart by internal explosions, which ripped off the hull side along with the entire suspension and threw the turret at least 10 meters away. The hardedge turret is missing the roof, which was always ripped out by the force of an explosion.

- CAW -



A shot of a T–34 in an almost identical situation. In this case, the explosion not only threw the turret clear of the tank, but also the V–2 engine. The circular body on the left is the main fan, installed between the motor, the gearbox and the transmission. The long wavy objects in front of the motor are the exhaust pipes.

- MWP -

opposed the decision. The gun was actually good and the military pressed to have it because they believed that the F–34, and especially the M1934 45 mm, guns were not powerful enough to battle the German Panzers. At the time, their decision seemed appropriate. On the other hand, however, the gun was expensive to produce (main-

[74] The barrel was worn out after merely 100–150 shots, while the service life expectancy of German barrels averaged about 600–1,000 shots of AP.



This set of three photos, showing the same battlefield, was taken during several days.

- all photos CAW -

Top: We see a close-up of the rear fuel tanks and their brackets, and in the background a turret with a big hole. This one is atypical, as the German shells usually created holes corresponding to their diameter.





We see additional T–34 wrecks, the one in the foreground ripped apart by an internal explosion. Note that the force of the explosion has torn the fighting compartment roof off, permitting the viewing of its interior, together with the turret ring. It is also possible to see a portion of the turret traverse mechanism and the bolts securing the turret ring.

ly due to the long barrel), and was a painful challenge to the Red Army's supply system, which had to absorb a completely new gun and the ammunition for it.

But life itself corrected all the decisions made. After the assembly line for the ZIS–4 (this was the designation given to the gun's tank variant) began its work in August, the production was suspended already in September, and then abolished altogether on December 1. Up to that day barely 133 guns were assembled, most of which were installed in T–34s. The first batch of 21 guns found its way to Kharkov's No.183 Factory in mid-September, just before the evacuation of the Factory started. The next batch of 20 guns was sent to the STZ (*Stalingradskiy Traktorniy Zavod*, Stalingrad Tractor Factory) in Stalingrad.

The first T–34–57s were issued to armor units being formed in the period September/October 1941, and were used in the Battle for Moscow. Theoretically, they were to be employed as tank destroyers, helping the tanks equipped with the F–34 gun, but in practice they were pressed into the line as normal tanks. They were used until lost, or until their main armament was exchanged for the F–34 gun due to the lack of the 57 mm ammunition.

Both new guns were designed with the new turret in mind, which was to become the characteristic that differentiated the A–41 from the T–34. It seems almost certain that the A–41 turret was built along the same lines as that of the A–43, at least at some point during the modification process. The turret modification was also divided into three stages:

- ✓ Stage One — limited modernization of the existing turret;
- ✓ Stage Two — major modernization of the turret, including re-shaping (this is where the so-called "hexagonal" turret came from);
- ✓ Stage Three — a new turret with a ring diameter enlarged by 200 mm.

Since more advanced changes could not be expected in the immediate future, and keeping in mind the A–41, the existing T–34 turret was modified and the F–34 gun was "shoved" into it (Stage One). All actions toward creating a new turret (Stage Two) were dropped with the start of "Barbarossa", the German invasion of the Soviet Union.

A similar shortcut was applied to address the tank's cruising range. The A–41 was to have a longer range but, because its design was to be only marginally different, it was decided to implement the changes directly in the T–34. Due to this reason, the additional long and rec-

tangular fuel storage tanks appeared on the T–34. Each tank had a capacity of 33 liters (8.73 US gal.) and initially two, and later four, of these were mounted on each side of the rear of the hull. This adaptation increased the tank's fuel capacity by 130 to 265 liters (34.4 and 68.8 US gal.), which meant an increase of 30 to 60%.

The most advanced modification of the T–34 was the T–34M tank, designated as the A–43 at the factory. This, in fact, was not a modification, but rather a complete redesign that led to the creation of a new vehicle. Except for the transmission and the glacis plate, the T–34M had nothing in common with the T–34. Nevertheless, it is widely assumed to be a member of the T–34 family member. The only reason that may explain this assumption may lie in the fact that it was to be the T–34's successor. The work on the T–34M was considered as Stage Two.

This version of the T–34 was built as a result of the military's dissatisfaction with the faults of the mass-produced version and their testing of two Pz.Kpfw. IIIs bought in Germany. The concept of a more functional and valuable successor to the T–34 already originated in March 1940, and the initial work on it started in April. However, it was not until January 1941 that the factory had enough spare machining capacity to put the project into its workshop. The need for speed was so great, and the number of anticipated changes so numerous, that it was decided to use already existing improvements or mock-ups of unfinished components. An example of this was the F–34 gun, for which it was planned to create a completely new turret. The complete proposal, drawings and a wooden mock-up of the new tank were presented at one of the meetings of the Defense Committee in January 1941, which ordered its implementation. The first two prototypes were to be ready in March and, by inference, soon after the mass-production was to start.

While the T–34 took three years to complete, the modified version was developed at lightning speed. The tank was created in approximately half a year, and it was known immediately how it was to function. Why such a difference? All evidence points to two reasons; the first was that the Soviets thoroughly examined the German Pz.Kpfw. III Ausf. E/F, and the second was a result of the production of the T–34, which confirmed all of the military's fears from the period March-June 1940. These resulted from faulty designs (especially the turret), and the use of foreign-made components in the prototypes, whose place had to be taken by domestic products in the mass-produced tanks. These factors were reflected in the reliability of the T–34.

The tests of the German Pz.Kpfw. IIIs in the summer of 1940 must have made a great impression on the Soviet generals, as recently published memoirs tend to suggest. The operating characteristics of the Pz.Kpfw. III made it a complete opposite of the T–34. One of the



This old type of T–34, with an "M1941" hull and a "flat" cast turret, was probably abandoned by its crew after the tank lost a track, spring 1943.

- *CAW* -

Panzers was sent to Kubinka for thorough military testing, while the other was sent to the No.183 Factory, where it was completely taken apart and examined in order to learn its technical characteristics. It quickly became obvious that, with the exception of the armament and armor protection, the Pz.Kpfw. III was a better tank in every respect. By Soviet standards, the operating conditions for their crews were almost luxurious. While the crew's soft and comfortable seating must have made the biggest impression on the designers, the tank's equipping with a functional radio, its turret ring (which was slightly larger than the T–34's) and the sufficient room for even 5 soldiers must have also caught their attention. The tank's suspension and engine, ventilation and rationally designed armor protection could not have avoided their attention either.

Almost half a year later, in November, the true quality of the mass-produced T–34 became obvious. The military received at that time the first three T–34s, which were assembled by September 5 1940. The tests ordered

on October 25 were carried out at the Kubinka proving grounds and the results were slightly less than catastrophic. The tank was declared unfit for front service due to a long list of faults. The main gun's ability to fire accurately was treated as a success. The military, once more, raised the possibility of giving up on the tank and ending its production. The depth of their disappointment with the new tank can be gauged by the fact that they even considered replacing it with...the light T–50 tank, or even restarting the production of...the BT–7! On the other hand, these same officers demanded production of the T–34 with the 45 mm gun. This was an effect of the weak performance of the L–11 gun and the lack of new guns that could effectively combat enemy tanks

As a result, hopes focused on the A–43, the T–34's successor, intensifying the work on the new vehicle. That is why many of the modifications on the A–43 could be described as copies of various components from the Panzer III or KV tanks. Studying photographs of the model built by KB–24's designers, it is impossible to miss the extreme similarity between its motor cover and suspension and those of the other two tanks. As an example, the layout of the suspension almost certainly came from the KV in order to shorten the design period. This is confirmed by the fact that the T–34M's road wheels were identical to those on the KV.

Even the front hull, although copied from the T–34, was not left unaltered. The upper glacis was less radically sloped (52° instead of 60°); the lower was assembled from two parts, sloped at 57° and 37°. Another innovation, taken from the latest designs on the T–34, was to move the radio from the turret to the hull, resulting in the introduction of the side-mounted antenna "pot".

The engine compartment was completely re-designed. The leading designer, I.S. Bier, substituted the V–2 engine with the stronger, 600 HP V–5. The power plant was to be turned 90° and placed sideways to shorten the hull and enlarge the fighting compartment. The new engine was to be coupled to a new T–34 gearbox with 8 speeds forward and two reverse (another design borrowed from the Pz.Kpfw. III). In this way the vehicle would have been more flexible in driving, making the new tank more similar to Western tanks than the tough and uneven original T–34.

In Mariupol, V.S. Nikichenko designed a totally new turret, which was a combination of T–34 and Pz.Kpfw. III



This photo shows a T–34 in a similar predicament. This time the crew tried to withdraw by reversing the tank, but the shot-off idler wheel negated that attempt. The rubber rim, torn from one of the road wheels, next to the idler offers proof of the poor quality of workmanship in attaching the rim to the wheel. The close-up shows a tactical number, probably painted on the tube recuperator shield by the original owners.

- CAW -



This T–34 unit is practicing an attack on the steppes stretching between Orel and Kursk during July 1943. These tanks belonged to a Guards brigade commanded by Maj. V.V. Yablokov, one of seven such units belonging to General Rokossovski's Central Front.

- Dmitri Karlenko's collection -



features. The turret roof was slightly sloped at the front, and a commander's cupola was installed at the back. The sides and rear took on a look slightly similar to German tank turrets. However, the side doors were replaced by observation ports, and the front of the turret was altered to fit the cast F–34 mantle, which was introduced in the T–34 in 1942. One of the biggest virtues of the turret was that its turret ring's diameter was enlarged to 1,600 mm (63 in.), resulting from the widening of the hull of the A–43. This, in turn, was possible after the original concepts of the A–20, which used one straight side armor plate sloped at an acute angle, were abandoned. The new hull was ergonomically and rationally designed, without unduly overburdening the suspension.

A tank designed in such a way could have easily met with the approval of the military and truly proved to be a functional vehicle on the battlefield. After the papers made their way through the red tape, a decision was made to immediately send the tank into mass-production. The first two prototypes were to be ready by August 10. Such a short-term deadline was realistic because the No.183 Factory and its suppliers had already started work on the tank. A complete set of component units for two vehicles was to be delivered to the No.183 Factory by July. Because the Soviet leadership ordered the tank mass-produced without any needed test results, it is obvious that assembly lines were to be prepared to start the mass production of the new tank. This is proven by the fact that three A–43 hulls were prepared at the No.183 Factory by April 17, as were 5 turrets in Mariupol at the beginning of May. The preparations for mass-production in the Mariupol facility were proceeding at full steam, so much so that by autumn it was purported that it had already produced 50 new turrets.

When, on June 22, the Germans invaded the Soviet Union, the growing chaos made it impossible to continue any kind of work on this tank. Its realization was unrealistic, however, because the engine was still being designed. In the end, the Party Central Committee's ambitious plans of May 5 1941, which planned for the production of 2,800 T–34s in 1941 (500 of these being the T–34Ms), were doomed. Testifying to just how ambitious the plans for the new tank were, is the fact that, already from May 1941, the new T–34M was referred to using two designations; the A–43 and the A–43B. This was the result of a decision to not only create a basically good tank, but also to improve its battle characteristics over those of the T–34. That is why, already in May, the designers were ordered to design, based on the A–43, a new version that was 3.5 tons heavier and 5 km/h (3.1 mph)

Another unit poses for the photographers somewhere in the field. Note the tactical sign — two concentric squares with a dividing line in the center of the inner square. This tank has three rubber-tired road wheels with relief openings and two steel ones.

- V. Kulikov's collection -





Two photos of staff T–34s taken in the Kursk Salient in the summer of 1943. The tactical numbers are those of the 5th Guards Tank Corps, commanded by Gen. A.G. Kravchenko (in his tank's turret hatch, bottom photo). Note that the commander is standing in the right hatch, not the left one which was the tank commander's place. From this photo, it appears that unit commanders gave up their place for the loader, who loaded and fired the gun. That allowed the unit commanders to concentrate on commanding their subordinate units. There was no other way as there was only one gun sight in the turret, which had to be used by the soldier responsible for firing the gun. The tactical number was also painted on the top portion of the back of the turret. Besides "–01", and "–02", the number "–06" has also been confirmed in use.

- top S. Zaloga's collection, bottom Planeta -



slower. These differences were a result of increasing the front and side armor thickness of the turret and hull to 60 mm. This decision was a reflection of the general trend to increase the armor protection of the Red Army's tanks, which showed itself in the armor industry already from the beginning of 1941. In this regard, the basic A–43 (a.k.a. T–34M) was to retain the armor protection of the standard T–34.

The creation of versions of the A–43 did not end there. As early as April 1941, the ABTV issued a TTT for a tank (almost certainly based on the A–43) but with the top and bottom armor protection increased from the original 16–20 mm (.62–.79 in.) to 30 mm (1.18 in.). In this way the T–60 tank, weighing 27.5 tons, was to be created. After the inevitable increasing of the side and front armor, its weight could have reached 31 tons. Even earlier, in February 1941, another TTT appeared at the No.183 Factory, foreseeing the use of the epicyclical turning mechanism in the A–43. That particular version was given the working designation of T–34T. This new demand from the ABTV was a consequence of the appearance "on the market" of the epicyclical maneuvering mechanism, which was designed at the end of 1940 at the VAMM under the direction of A.A. Blagonravov.

This was a linking of Stage Two and Stage Three, which led to a tank completely different from the T–34 (the T–44), and that is why it will not be dealt with here.



Summer maneuvers in preparation for the German offensive in the Kursk Salient.

Left: A T–34 with circular cylindrical external fuel tanks holders, peculiar to the ChKZ.

- Robert Bock's collection -

Below: Under "fire" from photographers, a platoon of T–34s with riding infantry speeds toward the "enemy". Note how the tanks appeared in summertime; the rear was completely covered with dust while the front showed the vehicle's original camouflage. What is more interesting, the second tank has a completely different tactical code from the other two; it appears that it may be "300–I".

- S. Zaloga's collection -



CRISIS

According to the original assumptions of the Cabinet and Party Central Committee of June 5 1940, in the second half of the year 1940, the No.183 Factory was to deliver to the army 500 T–34 tanks, which were to be built according to the 1939/40 standard designs. These expectations proved to be overly optimistic and it is not known who was responsible for them. Worthy of consideration is the fact that the leadership expected the first ten mass-produced tanks already in... June! After an examination of the production documents, it is easy to reach a conclusion that someone "there" lied very smoothly and convincingly.

As the tank was prepared for mass-production, a delegation of engineers from the STZ factory came to Kharkov. Seeing the stated requirements, its members must have grabbed their heads in shock. The cadre of the Kharkov factory could not even manage the growing avalanche of production problems. That is when it became apparent how far the production of the T–34 would be from the existing production norms. Since the production of the T–34 required the use of modern designs (e.g. the frameless hull), the incorporation of new technological designs was a must, something in which the KB–24 could not be of help.

A familiarization with the conditions that existed during the bringing of the T–34 into mass-production permits to understand why such a large role in the creation of the tank is ascribed to the production technologists of the No.183 Factory. Everything points to the fact that the design cadre of the No.183 Factory proved to be irresponsible, maybe even incompetent, and someone else had to correct their work. The T–34 was simply an eruption of the designers' fantasies, which was hard to control. To put together a tank, like a toy, from components produced individually was one thing, but to start its mass-production was something different altogether. And so, continually, one set of plans followed another, and one component replaced another.

As a consequence of a growing number of this type of problem, with the exception of the prototypes and perhaps the first few vehicles, not one tank featuring the single-piece glacis plate (which in practice could not be formed quickly and well) left the production line of the No.183 Factory. But even the production of this design proved too difficult. It was only the contribution from the Mariupol Metallurgic Works that led to the actualization of designs that permitted the speeding up of the T–34's production. In the end, the front part of the hull was assembled from three parts: a linking girder, to which were riveted or welded the upper and lower armor plates. Some time later, the same solution was applied to the rear of the hull, dropping the rounded shape in favor of directly joining the two plates.

The cast turret from VZ–2 steel, with a frontal armor thickness of 60 mm, was another result of the cooperation between the Mariupol and Kharkov designers. The designing of an alternative turret was considered a necessity already in the second half of 1940 because the Kharkov one was too difficult to produce (as an example, the angle of the bend of over 100°, the joining of the armor plates in a checkerboard pattern, etc.), especially for facilities that did not specialize in this type of



This T–34 belongs to the 6th Tank Corps' 22nd Tank Brigade (diagonal stripe across the gun mantle). The tactical number denotes that it belongs to the commander ("0") of the 2nd Company ("2"). In this photo, and the following one, it can be clearly seen that the tactical sign was painted on a background different from the camouflage paint.

- V. Kulikov's collection -



Another tank from the 6th Tank Corps' 22nd Tank Brigade', attacking during the period summer/fall of 1943. This tank also has the dual tactical code, consisting of the rhombus with the "22" brigade number and the tank's "14" individual number, as well as the tactical number. The tactical number is repeated on the back of the turret, with smaller numerals separated by two parallel bars, probably indicating the 2nd Platoon. The tactical number signifies that this is the 4th tank of the 1st Company.

- *WAF* -

work. The first such turrets appeared at the end 1940, for the vehicles armed with the L–11 gun. Differing from the later "Sormovo" turret, the Mariupol-Kharkov variation was more bulged at the front.

Initially, the production of the cast turrets was small because a number of technological problems was discovered, which caused bad castings. But the casting process was quickly mastered and it was possible to supply the turrets to the No.112 Factory, as well as the STZ. To simplify production, in March 1942, the turret's rear gun access hatch was eliminated. This step was taken as a result of a change that was made on the welded turrets three months earlier, when the 3-part rear turret plate was replaced by one simple plate.

Still in 1940, the process of simplifying the tank's assembly continued. The radio was moved from the turret to the hull as, in the end, the tank commander could not simultaneously command and act as the gunner and radio operator, which the tank's designers forced him to do. However, since unit commanders had to somehow communicate with their subordinates, the radio was installed on the right side of the hull in the machine gunner's place. This modification was also adopted in the A–41 and T–34M prototypes. Later, the panoramic periscope was removed from the turret and the opening was plugged — and soon after removed altogether. In March 1941, after producing 450 vehicles, the Kharkov factory began to assemble the first T–34s armed with the new F–34 gun. It completed 550 of these up to the German invasion.

A number of other smaller or less visible improvements were introduced before June 1941. On the other hand, after June 22 there came an avalanche of changes. While those changes made before June were aimed at making the T–34 a better tank, those made after were only to simplify and speed up the production. Everything that stood in the way was altered. Externally, the tanks produced in October were very similar to the June vehicles but, inside, they had many changes.

The production technology was being changed nonstop. Just until the end of 1941, almost 5,650 individual changes were introduced, and an average of 3,500 more in the following years. This added up to over 16,000 just at one factory alone (No.183). Just what kind of changes these were is illustrated by an assignment that Morozov gave to one of his subordinates.

"*After many hours of operating the motor, the fuel starts to condense in the fuel pump and, from there, leaks*

onto the floor of the hull. Some poor driver's valyonky (felt boots) are soaking through and his feet are freezing. Please consider this and offer a solution."[75] In reality, it was the driver's hatch that was not watertight and so, after every rain or after driving through a large puddle, the driver had wet feet.

It was not until the end of 1941 that another modification was introduced, which was impossible not to notice. The rubber-tired road wheels were replaced by all-steel construction wheels, which had internal amortization. This change was designed at the STZ Factory in October and, when an acute shortage of rubber struck the Soviet industry, this type of wheel became prevalent in all factories. Along with the new road wheels, a new type of track entered production. It was cheaper to manufacture and suppressed some of the noise produced by the all-steel road wheels. The new track (referred to here as "transition") was 550 mm wide, (same as the previous), but its sole was actually smooth, which did not allow it to grip the ground well. Compared to the previous track, the links of the new track differed in the number of pin eyelets (five instead of nine in the toothed link, whose shape was changed slightly) and the number of the track pins (72 on the new track versus 148 on the previous). Because the new track had 72 links (as opposed to 74 on the old), the design of the sprocket wheel had to be changed slightly. It appears that all these changes coincided with the elimination of the rubber rim on the idler wheel.

The first tanks with the steel road wheels were delivered to the troops at the beginning of November 1941, and their use was phased out only in the summer of 1943. That does not mean that rubber-tired road wheels were absent in 1942 altogether. Photos prove conclusively that in the spring of 1942 tanks with even a complete set of rubber-tired road wheels were again being delivered to the troops. At the same time, factories were delivering tanks with various steel and rubber road wheel combinations. Usually, only the first wheel had a rubber rim, but at the No.183 Factory almost every tank had two wheels with the rubber rim; they were the first and the last. This was because these two wheels bore the most weight and needed the best shock absorption. The front wheel bore the impact of the cross-country driving and the rear wheel bore the impact of the track being pulled across the sprocket wheel.

The road wheel combination depended on the rubber supply situation of the particular factory while assembling a series tank. Judging from the photographs, the No.112 Factory was best supplied, where the old style full rubber-tired wheel sets were installed. The worst-off

This T–34 was blown apart, and its turret (minus the roof) rests on top of the hull, Belgorod area, mid-August, 1943. A number of machine gun drum magazines can be seen stowed on the turret's interior rear wall.

- CAW -





A burning T–34 with the "hexagonal" turret, mid-August 1943 in the Kursk Salient. Note the German jerry-cans attached to the handrails. Note also that the track consists of links of varying width. Behind the German's right knee one can clearly see adjacent links with a width of 500 mm and 550 mm.

was the STZ, where the steel wheels were almost exclusively installed[76]. At the No.183 Factory, the mixed combination wheels were most frequently fitted. However, they were replaced by new rubber-tired wheels, which had relieving holes, already by June/July 1942. The mixed road wheel combination was also commonly installed on tanks from the No.174, UTZM and CzKZ factories, but there the older model rubber-tired wheels were mostly (if not exclusively) used.

A little bit earlier, in the fall of 1941, a new hull was introduced at the STZ. It was a simplified design, with

[75] Listrovoy / Slobodin *Konstruktor Morozov* — Politizdat 1983, p. 74.

[76] Interestingly, that factory seems to never have used mixed road wheel sets. If rubber-tired road wheels were used (an extreme rarity) all ten were put on a vehicle.



T–34s attacking with infantry, summer 1943. It appears that this photo was taken during an actual action.

- *WIH* -

the glacis plate welded into the interlocking sides. The same idea was implemented at the No.112 Factory (the Krasnoye Sormovo Factory in Gorki), with one exception. At the No.112 Factory only the hull front was connected using the interlocking plates, while at the STZ both the front and rear of the hull were connected that way. That difference was caused by a change from the No.183 Factory, where a new way of connecting the top and bottom armor plates at the rear was being introduced. The use of a rounded bottom armor plate, where it met the top plate, was abandoned in favor of a rectangular one. As a result, the shape of the engine hatch changed from rectangular to circular.

Since no other plant employed the interlocking seams, vehicles from the STZ and No.112 factories can be easily identified. It appears that, in the case of the STZ, this change was accompanied by changes in turret and gun mantle design so characteristic of vehicles produced at that factory. These changes were introduced mainly to simplify the production of certain elements of the turret. The lower front part of the turret was cut instead of having rounded edges and the front part of the gun tube recuperator cover was made out of a straight plate, instead of a bent one. In contrast to the Kharkov and Gorki turrets, most probably during the 1942 production, the STZ turret had two observation periscopes installed on the roof. One, an aiming periscope, was for the loader and the other for the commander.

The Sormovo T–34 also differed from the Kharkov ones. In February 1942 the gap beneath the turret ring was shielded with six steel strips, which were meant to protect the turret against blocking by small arms rounds, shrapnel or ricochets. On some tanks, these strips were fitted only at the front (in two segments, in order not to block the turret traverse) while on others only at the sides (also in two segments, connected at the road wheel suspension inspection opening).

These changes, and many others, inside the vehicle, were noticeable only initially. With time, these changes began to become less obvious as a result of variable supplies of components, simplified production and general overhauls of older tanks.

At the end of 1941, T–34s were assembled at three different factories. This was because, along with increasing production in Kharkov, everything possible was being done to start production of the T–34 in other factories. Whereas the BT production for the entire Red Army could be handled by one factory, this was not possible with the T–34, especially not in the face of the coming war. That is why, still in 1940, the Soviet authorities decided to begin T–34 production at the STZ in Stalingrad. As a consequence, the combined T–34 output of both factories up to July 1 1941 was 1,225 tanks. Of these, 931 were made at the No.183 Factory in Kharkov, 115 in 1940[77].

With the outbreak of the war, the No.112 Krasnoye Sormovo Factory in Gorki was converted to the production of the T–34. On July 1 1941, it was ordered by the State Defense Council to take on the production of the new tank, but its organization progressed rather slowly. The chief reason lay in the fact that in this factory every-

[77] As of June 1 1941, the entire RKKA had a total of 892 T–34s, of which 832 were in the westernmost military districts.

thing had to be organized from the basics. The first cast turrets were faulty. Using the Mariupol expertise, however, the first 20 T–34s were delivered to the Red Army in October. Due to a shortage of engines, resulting from the evacuation of the Kharkov Motor Factory, the "Sormovo" tanks were fitted with M–17F gasoline engines. The same tanks were also built at the STZ, giving a total of 365 tanks from both factories by the end of the year. Another 904 T–34s with the gasoline engine were built until May 1942.

The T–34 tank production at the "Krasnoje Sormovo" increased slowly, mostly due to the lack of experience and the unfinished reorganization of the production. Only 161 tanks, 156 of these with gasoline engines, were assembled there by the end of the year. All of them had a new type of hull, using simplified technology, which allowed for quicker, but less precise production (a similar situation to that at the STZ). While the earlier manufacture of the hull components of one tank took 200 hours, in December 1941 this was reduced to only 36 hours and the time of the hull assembly was reduced from 9 days to only two.

At the end of 1941, the STZ had become the largest producer of the T–34 in the Soviet Union, delivering 1,250 tanks to the military, including 250 before the war broke out (294 by the end of June). Such a large production rate was possible due to the unusual decisions of the USSR leadership, which strove to concentrate in Stalingrad most of the facilities producing T–34 components. While the tanks themselves were assembled at the STZ, the armor plates were manufactured next door at the (later famous) Krasniy Oktyabr steel mill. Next, the armor plates were either shipped to the STZ, or the No.264 Factory (the Stalingrad Ship Yards) where the hulls were assembled and then sent on to the STZ. Many component parts were also manufactured in Stalingrad, and those that could not be were shipped from sub-contractors in the hinterland. And that was where the problems started to occur. These problems had a deciding effect on the earlier decision to concentrate the production of all the components in the town. Stalingrad was an industrialized island in the empty steppe, making it dependent on rail, or the not-always-efficient river transport.

This T–34 produced by the No.183 Factory bogged down in soft terrain between Slavyansk and Izyum, where a German unit was credited with destroying as many as 23 T–34s in one battle. As seen in the photo, during this battle one of the Soviet units there used white quick recognition stripes that ran around almost the entire turret (almost certainly, they were not present on the turret's front). A wooden beam can be seen under the tracks; they were used to extricate bogged down tanks in cases where a tow was not immediately available.

- CAW -



Similar to the British, the Soviets used turret-less tanks for crossing anti-tank ditches. In this case, after blowing a gap in the embankment, this course of action failed. The tank, having crossed the ditch, was immediately stopped in the gap by a frontal hit from a German weapon. Note the vertical stripe (or the remnants thereof) on the rear of the turret.

- *CAW* -





Above: A blind charge had to end in this way. Both T–34s are loaded with extra ammunition and fuel, indicating a planned action with distant objectives, or a long march from the rear area prior to this action.

- *CAW* -



This ripped apart T–34 was produced at the No.112 Factory (turret ring deflector strips) and was photographed in the fall of 1943. Note the peculiar set of applique armor on the upper glacis. Unfortunately, the tactical numbering on the turret is not legible.

- *CAW* -

Right: During a charge in the fall of 1943, this T–34 landed in a trench next to a house, touching the wall with its gun barrel. The tank's tactical sign can be seen clearly on the side of the turret; it consisted of the number "7" inside a triangle, with the number "35" under it. Apparently, the triangle usually identified an independent regiment. In this case, the "7" would be the unit's designation, while the "35" would be the tank's tactical number, meaning that it was the 5th tank in the 3rd Company.

- *CAW* -



Above: This T–34 serves as a shelter for the Germans in the front line, summer of 1943. The tank is a No.183 Factory product after an overhaul or modernization, during which the ChKZ-made cylindrical tank brackets were added on the sides. The soft-edge turret does not yet have the pistol ports under the vision ports on its sides. It means, it was produced prior to Autumn 1942.

- S. Zaloga's collection -





This and facing page: These pathetic remnants are of T–34s destroyed by the German guns in the summer of 1943. As can be seen, the internal explosions brought about the same results; the disintegration of the hull through the separation of one of its sides from the main frame, and the blowing off of the turret from the hull, with the turret (without its roof) landing a number of meters away from the rest of the tank. Thanks to these wrecks, it is possible to examine many of the production details, especially the suspension, of the T–34.

- *CAW* -

T–34 production in the second part of 1941 was as follows:

Plant	*112*	*183*	*STZ*	*Total*
June	–	170	86	256
July	–	209	93	302
August	–	266	155	421
September	–	228	165	393
October	20	41	124	185
November	58	–	200	220
December	83	25	219	327
Total	161	939	1042	2104[78]

Maximum production in the factory of Stalin's City reached its peak at the same time, when Kharkov's No.183 Factory started to pack up. The State Defense Council (Gosudarstvenniy Komitet Oborony, GKO), by Directive No.667 of September 13, ordered the immediate evacuation (unfortunately, already late) of the Kharkov industrial works. The No.183 Factory's evacuation started on September 17. The last (43rd) train left for Nizhniy Tagil on October 19. From the factory, beside a part of the equipment, it was possible to evacuate only 10% of the work force and 20% of the engineering cadre, as well as a small portion of T–34 components. The remains of the factory were concentrated in the Ural Railway Stock Factory and closely associated with the Mariupol Metallurgic Works, which was also evacuated from the Ukraine.

At Nizhniy Tagil, work was started immediately to adapt the factory to arms production. This proved very hard due to the lack of much of the specialized machinery left behind in Kharkov. The facility was in chaos and the morale of the workers was very low. The temperature fell to –40° Centigrade and some parts of the expanded factory did not even have roofs over them. The hunger and diseases claimed many victims due to the lack of medical care. The work force, composed mainly of women, children and the old, lived in wooden huts and barracks, where it was as cold as in the factory. How-

[78] This listing is not 100% certain, as different, partially contradicting data exists in the literature. For comparison: the Third Reich manufactured 1,158 Pz.Kpfw. IIIs and 330 Pz.Kpfw. IVs during the same period.





ever, it was easier to warm up at the factory than in a barrack, despite the fact that each room had 15–20 inhabitants. The work and sleep (in the same beds) was handled in alternating 12-hour shifts. A very simple law applied to all; "who does not work, does not eat". That is why even 14–16-year children reported for work, and overtime! It is not hard to imagine why many did not survive such an ordeal. It was not possible to manufacture tanks in such conditions. The situation did not change until the end of 1941. The first assembly line was ready only in December and at the end of the month 25 T–34s, assembled from components brought from Kharkov, were delivered to the Red Army.

To master the confusion, at the end of January 1942, Stalin nominated Col. I.M. Zaltsman as the director of the factory, asking him to take care of the problem. He said:

"I know that you like heavy tanks, but now please concentrate on the medium T–34 tanks. The Front commanders have called me on the telephone and asked to increase the production of these agile vehicles that have performed so well in the deep snow and on bad roads. It will soon be February and the Komintern No.183 Factory evacuated to Nizhniy Tagil is still producing too few tanks. We have decided to correct the situation. Try to be in Nizhniy Tagil tomorrow morning, take a look around and take over the factory. Do everything that is possible to noticeably increase the production in the near future. Report to the Central Committee regularly on developments. That's all. Till the next time."[79]

The assignment was not so simple. All of the Soviet Union was mired in a horrible mess caused by the chaos in the organization and decision-making process of the state administration. The strain from the war conditions caused friction between many institutions at the lower level. As an example, the lack of components for the F–34 gun resulted in Zaltsman being visited by two somber Comrades from the local NKVD. As they were carrying out the orders of Lavrentiy Pavlovich Berya[80], who was responsible for the production of artillery, the specialists in enforcing Leninist principles were sure of themselves, and they threatened Zaltsman with liquidation. Their surprise must have been great when their victim reached for the telephone and asked his boss, Stalin himself, to explain their place in the Soviet pecking order.

Later, Stalin again had to help his trusted subordinate a number of times. In March he had to find a train carrying mazout (primitive heating oil) for the factory, without which the factory would have had to shut down production. The train became stuck somewhere along the way (at that time this usually meant that the cargo was appropriated by a comrade with initiative, who probably was also in a difficult situation), and neither Kaganovich (the supplies Narkom), nor Prime Minister Molotov were able to find it.

After the chaos was brought under control, Zaltsman handed the factory over to a Comrade Paton. However, he remained the factory director until July 1942, while at the same time serving as a deputy Narkom for the Tank Industry, which allowed him to solve many problems on the spot. Y.Y. Matskariov became the chief engineer, while A.A. Morozov remained the chief designer, being responsible for the modernization and development of the tank.

Thanks to their efforts, the No.183 Factory became in 1942 the biggest producer of the T–34. As a result, the tanks built there were also the cheapest. Of course, in the USSR, this was not an important factor, and its significance is hard to imagine today because the ruble was not a hard currency. However, it may be worthwhile to see how this compared in the Soviet industry.

The first T–34 prototypes, assembled in 1939 at the No.183 Factory, cost slightly over 595,000 rubles each. The price of the first 100 T–34s assembled in 1940 fell to almost 430,000 rubles — which doubtlessly still reflected the complicated production process at that time (a series 1939 built BT–7 cost 101,000 rubles). Supporting strongly this factor is the unit price of 250,000 rubles of the over 1,500 vehicles built in 1941.

After 1941, the mass-production of the increasingly simplified tank caused the price to go down to the absolute minimum. It was a completely different story at the factories that were just starting the production of the T–34, and where there were large costs associated with the beginning of the tank's production from the ground level. The table below shows how the price evolved at the different factories.

	1942	*1943*	*1944*	*1945*
183	165,810	141,822	140,996	136,380
112	209,700	179,300	174,900	173,000
174	312,700	210,705	177,800	171,000
UTZM	273,800	190,800	179,400	–

For comparison purposes, it should be mentioned that each KV–1S heavy tank cost 300,000 rubles to produce in 1942, twice the amount of the No.183 Factory's T–34. In 1942, just this single factory "sold" the government 950 billion rubles worth of tanks (not counting spares etc.) and a year later more than a trillion rubles worth!

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[79] *T–34: Put k pobyede*, op. cit., p. 108.

[80] During the war, each of the Politburo members was made responsible for one of the armament production branches. Beria was Stalin's artillery Narkom, for example Malenkov became his aircraft minister and Molotov headed the tank industry.

STAGNATION

The relocation of the production, the starting of new assembly lines, usually in great haste, and the loss of many sources of raw materials, had a pronounced effect on the quality of the produced T–34s. If in mid-1941 the failure rate of the vehicles can be described as moderate, after 1941 it was closer to being catastrophic. The lack of precise data precludes a detailed examination of this matter, but it appears to be a certainty that during this period the T–34 had many problems with the transmission and engine, not to mention other components such as the main gun. It is worth mentioning that, in the second half of 1942, many German soldiers reported about T–34s being abandoned by their crews. This testifies to the bad morale of the Soviet tank crews, as well as to the vehicle's bad mechanical relialibility[81].

As late as the second half of 1944, Red Army tank units tried to replace all tank engines with more than 30 hours of operation. This was done to try to guarantee that the engines would be able to function for 75–100 hours during the coming attack. This seems logical since the factory's peacetime guarantee in the first half of 1941 was only 150 hours, and, therefore, expecting only 100 hours of operation at the front appears reasonable[82]. It could not be otherwise, since during the period 1942–1943 the Soviet industry reached its technological bottom. As an example, at the beginning of 1942 almost every tank had faulty side clutches. The total service life of the tank also declined steeply. Tanks that were repaired by field workshops and returned to duty broke down very frequently, reducing the combat strengths of the tank corps by up to 50%. Due to the lack of adequate data, it is difficult to state how often this happened. But it seems that during the period between the spring of 1942 and summer of 1944, the T–34 tank became almost a one-time-use weapon. As an example, during its march to Prokhorovka, the 5th Guards Tanks Army left along the way (not counting those which were repaired expeditiously) as many as 15% of its tanks. This represented 110 tanks, equaling almost a full-strength Panzer division. In August 1943, the 1st Tank Army went into action armed mostly with vehicles that were repaired after being towed off the Kursk battlefield. Due to the faulty condition of the repaired tanks, its combat strength immediately fell by 50%.

It is certainly worth remembering that during the two months of fighting in the Kursk salient the Soviets lost 6,000 out of 6,500 tanks employed there, which represents a 90% loss. The German losses were 45% of their tanks, which underlines the superiority of the German equipment, as well as their higher technological level, allowing for repeated repairs and overhauls.

Of course, with time, the quality factors of the T–34 started to change for the better, but it is doubtful that the Soviets were able to reach a satisfactory level of production before the end of the war[83]. The decision-makers, however, were not interested in such problems. The most



This T–34, with a "C–01" (in the Cyrillic alphabet this stands for "S–01") tactical code on its turret was photographed while in action in the fall of 1943.

- *Planeta* -

[81] Corroborated by *Neizvyestniy T–34*, p.52–52.

[82] It was different in the West. A factory guarantee of 150 hours meant that the component would work for 175 hours. If the guarantee was not met (150 hours), the factory suffered financial penalties and the component was returned for correction. In the entire existence of the USSR a guarantee of 150 hours meant that the component would probably last 100–120 hours.

[83] Corroborated by data published in *Neizvyestniy T–34*. In 1942, only 7% of the tanks leaving the factory were free of defects. In 1943 this percentage rose to reach 14%, and in 1944 it reached 30%.





Above: A German motorcyclist passes a still burning T–34 on one of the roads leading to the river Dnepr in the fall of 1943. The tactical number "44" can be seen on the turret as can be the external fuel tank brackets on the rear armor plate.

- CAW -

Left: An armored unit trains near Novorossiysk in the fall of 1943. There is a triangular tactical sign on the turret but, unfortunately, it is not legible.

- V. Kulikov's collection -

important thing for them was that the greatest possible number of tanks be produced. And the quantity of produced T–34s at the beginning of 1942 was still insufficient. Additionally, in the summer of 1942 the STZ was beginning to be threatened by the German advance. Realizing that danger, the State Defense Council decided to gradually move the production of the tank to three other factories: the UTZM (*Uralskiy Zavod Tyazhelogo Mashinostroyenya im. Ordzhonikidze*, Ordzhonikidze Ural Heavy Machinery Factory, Uralmash for short) in Sverdlovsk, the CzTZ (*Czelyabinskiy Traktorniy Zavod*, Czelyabinsk Tractor Factory) in Czelyabinsk, and the No.174 Factory (Voroshilov Plant) in Omsk. Tanks from these three factories were very similar to the earlier ones and had many characteristic components of the main producer — the No.183 Factory. This was because the factories had already been delivering T–34 components to the assembling plants. Owing to this fact, by the end of 1942 the visual identification of tanks by their plant of manufacture became difficult, and in most cases even impossible. It can, however, be assumed that if the tanks manufactured by the Kharkov No.183 Factory had three hinges on the rear engine plate, those of the new manufacturers had only two. At UTZM and CzTZ the hinges were narrow, identical to those used by the No.183 Factory after its evacuation to Nizhniy Tagil. At the No.174

Factory, on the other hand, the two hinges were wide and quite similar to those used at the No.112 Factory. The difference between the two factories lay in the fact that on the vehicles from No.174 the edge of the plate was visible while on those from No.112, the upper plate covered the lower plate.

A good example of the organization of the new factories was Uralmash. The UTZM was not chosen at random. Already in the fall of 1941, the assembling of T–34 hulls had begun there, and later the casting of turrets was also organized. Finally, in April 1942, the production of complete hulls and turrets for the No.183 Factory was begun, and then (by order of the GKO) by July 28, 1942 the factory started to assemble complete T–34s on location. The first UTZM-made T–34 left the halls a month earlier than expected and the first 15 tanks were assembled in September. The last T–34 left the UTZM in the fall of 1943, when the factory switched to the production of assault guns based on the T–34 chassis. With the recapture of Stalingrad and Kharkov, the preparatory work to resume the production of the T–34 in those cities was started. However, this was not realized before the end of the war.

It was a similar story with the Czelyabinsk Plant, which was ordered to start production of the T–34 in July 1942 when the Soviet leadership was certain that the STZ's output would be lost. At that time the factory was called the CzKZ (*Czelyabinskiy Kirovskiy Zavod*, Kirov Czelyabinsk Factory), after the Kirov (Heavy) Tank Factory was moved to Czelyabinsk from Leningrad as a result of a decision taken on June 25, 1941. Many other firms were moved there, including those that were producing the tank diesel engines (combining the Leningrad and Kharkov factories). In this way the famous *"Tankograd"* (Tank City) was established. In the summer of 1942, it was made responsible for making up the lost T–34 production in Stalingrad.

A burned out "Mickey Mouse" T–34 belonging to a unit which used the code "KK–1", and which fought around Kiev in the late fall and winter of 1943. This unit was part of the 3rd Guards Tank Army.

- CAW -



The CzKZ was already contributing to the production of the T–34 by end of 1941/beginning of 1942 by supplying various components. That is why after only 32 days the first "Kirov" vehicle rolled off the factory's production line. The work force of the recently built factory, consisting of 75% women and children under 16, assembled the first 30 T–34s in August (the first was completed on August 22), and the last ones in March 1944. Then production was stopped for the same reasons as at the UTZM.



The importance of the transfer of production to the new factories is confirmed by the fact that the No.112 Factory and the STZ produced monthly, on average, over 200 tanks each. On the other hand, in the first month, the two new factories delivered a total of approximately 50 tanks, which was about 25% of the production of the doomed STZ Factory. But this was only the beginning of production at the two factories. Meanwhile, the relocated No.183 Factory was already producing 25 tanks a day (about 750 a month).

The assembly of the T–34 went on at the 6 factories during the entire first half of 1942 without any significant changes. It was only in June that work began to improve the tank, which was the result of a June 5, 1942 order from the State Defense Council demanding modernization. The work was initiated immediately, first at the No.183 Factory and then, gradually, at the other factories, which incorporated the design changes.

The undertaken work consisted of two phases:

- ✓ Phase One — the modernization of the production T–34;
- ✓ Phase Two — an attempt to start production of the T–34's further developments, designated as the T–34S (this was a competitor of the KV–1S; apparently the S stood for *Skorostniy*, or Fast) and the T–43.

Left: This tank, from the same unit, was penetrated by an AP hit on the lower extremity of the rear of its turret overhang. Note the partially visible letter "K" below the handrail and the deflector strips around the driver's hatch, meant to protect the driver's episcopes from small caliber rounds.

- CAW -

Below: This photo shows tanks of the same unit parading through Kiev. There is an additional tactical number ("481") painted on the top front part of the turret, and an "artist" changed the KK–1 into a BB–1.

- Planeta -





These two shots present T–34s from the 144th Independent Tank Battalion carrying infantry. Despite the winter surroundings, the tanks have not had winter camouflage applied.

- V. Kulikov's collection -





A political meeting before going into battle, winter 1942/43. The tank in the foreground still has the old tracks (the "transition" pattern) and lacks the driver's hatch deflector bar under the driver's hatch cover.

- V. Kulikov's collection -



Another victim of German shells still smoulders in early winter of 1943. The tactical number "37" has most probably been painted in red on the remainder of the white camouflage.

- *CAW* -

The T–34S was designed at the No.183 Factory already in June, and then was sent for tests in June, lasting until almost December 1942. The tank incorporated several changes, including the most interesting to the military and the authorities — a new turret with a commander's cupola, and a five-speed gearbox.

While the work on the new gearbox ended in success, the turret was a complete dud. Its design was based on the concept of a flat turret, and the addition of a commander's cupola and the change of the angles of the walls only added to the crew's confinement! What is interesting is that the cupola's small size restricted its use to ob-



Above: This T–34 was abandoned somewhere in Poland in 1944. The rear hull plate has the No.183 Factory wavy-edged exhaust covers, but its sides have been secured with all five bolts and it has two wide hinges at the lower edge that were typical of the No.112 Factory. This would suggest that either this tank has gone through an overhaul, or that the wavy exhaust covers were delivered to factories other than just the No.183.

- CAF -

Below: This T–34 would not go any further. A shell had penetrated the front road wheel, and possibly the lower hull. Note that the idler wheel is in a lower position than the road wheel. The idler was raised and lowered to set the tension of the track by means of a screw that was located on the glacis plate, next to the fender. In the background a dead horse lies in front of a wagon, from which ammunition boxes have spilled.

- CAW -





A "Mickey Mouse" T–34 parades through the streets of a liberated city at the beginning of 1944. Note that the tactical rhombus on the turret side was placed inside a circle.

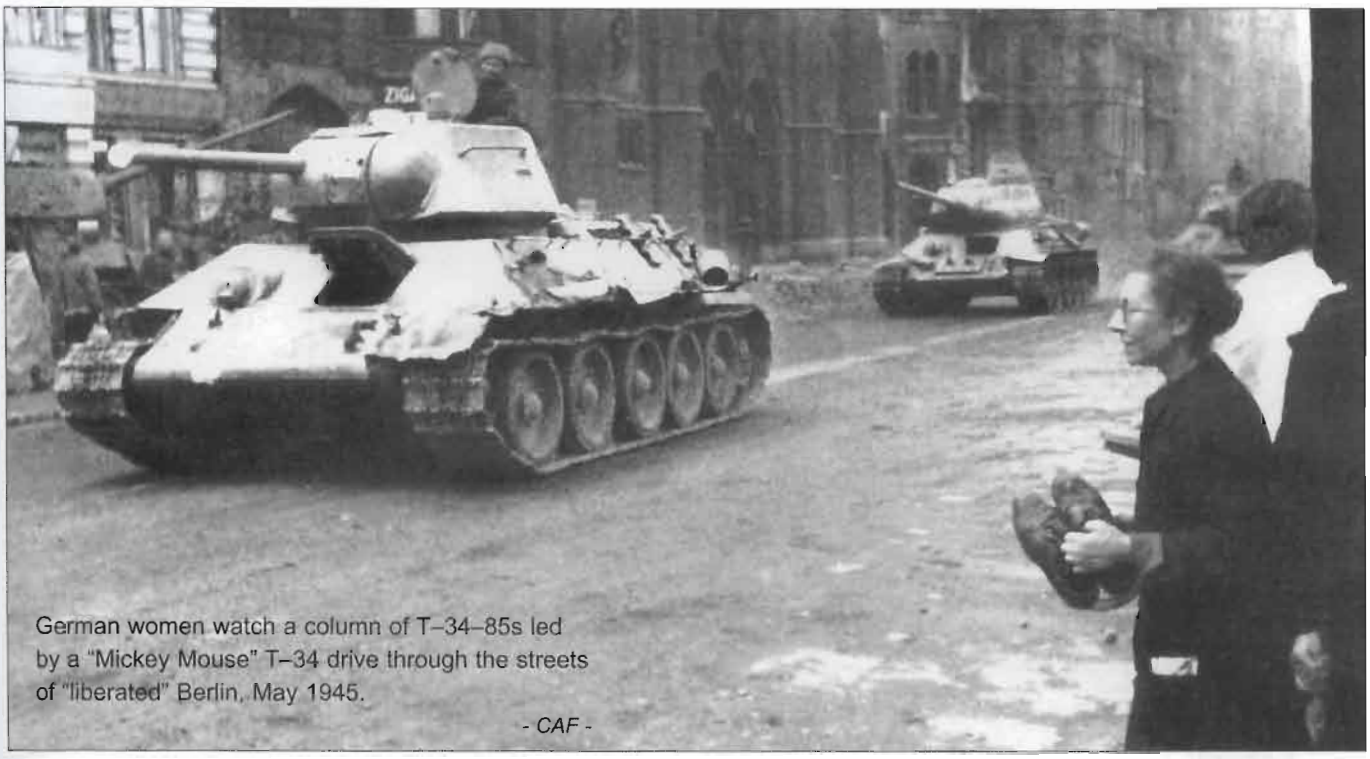
- Robert Bock's collection -

servation only. The old hatch still had to be used for entering and exiting the tank.

A concrete step forward was the designing of the T–43 tank in the second half of 1942, and sending it for tests during the winter of 1942/43. Unfortunately, the work was never successfully completed because the leadership of the Soviet Union had other priorities. As a consequence, the ABTV lost the possibility of obtaining a good tank, which would have allowed for the evening of the odds against German tanks in 1943.

A T–34 produced in the winter of 1942/43 rolls through the city of Viipuri in Finland (now Vyborg in Russia, after being "liberated"), June of 1944. This tank belonged to the 30th Guards Tank Brigade.





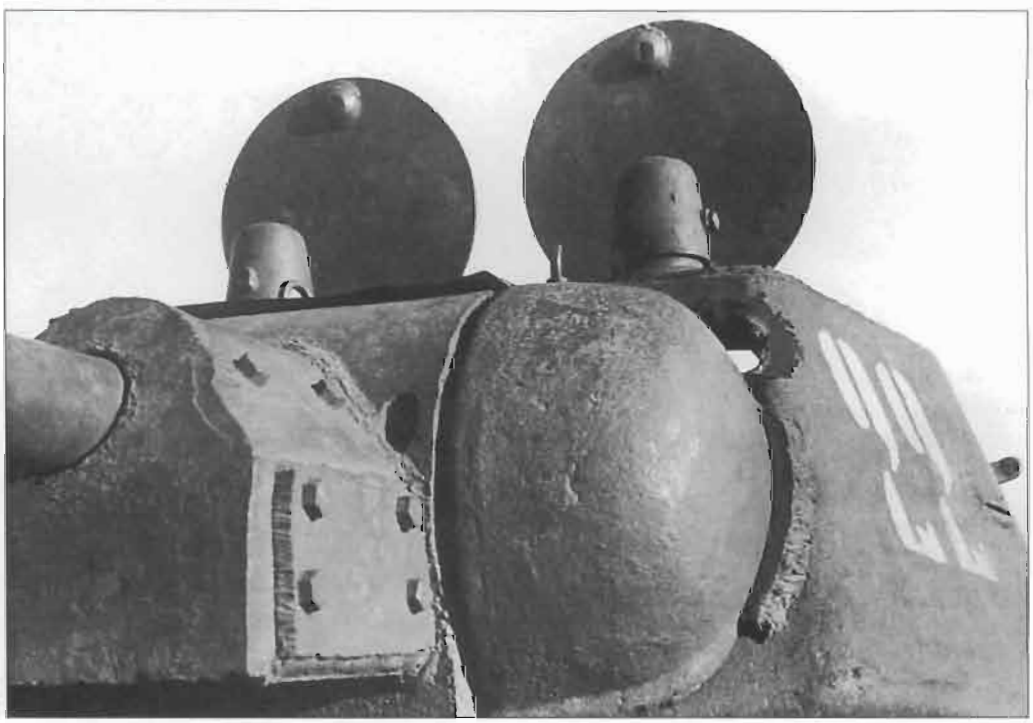
German women watch a column of T–34–85s led by a "Mickey Mouse" T–34 drive through the streets of "liberated" Berlin, May 1945.

- CAF -

The work on the new version of the T–34, that is the A–43 (T34–M), was begun in Nizhniy Tagil in June 1942. This vehicle reflected the conditions under which it was produced. This meant that, instead of being a new tank such as the A–43, it was just a heavily modified T–34.

The most important changes dealt with two issues: the need to increase and reshape the armor, and the associated need for a new turret. The new design was to use the existing T–34 undercarriage and lower hull, with only minimal modifications. The widening of the T–43's fighting compartment was accomplished by reducing the slope of the side armor plates. At the same time, the engine compartment was protected on the sides with perpendicular plates and at the rear with reconfigured plates. The thickness of the protective plate over the engine was reduced so that the rear of the turret could clear it when turning. This eliminated the need to increase the height of the turret. On the upper glacis, whose thickness was increased to 60 mm (2.36 in), and which was slanted at an angle of 52–55°, the driver's hatch was moved to the right and the hull machine gun position was eliminated. The latter change was consistent with the contem-

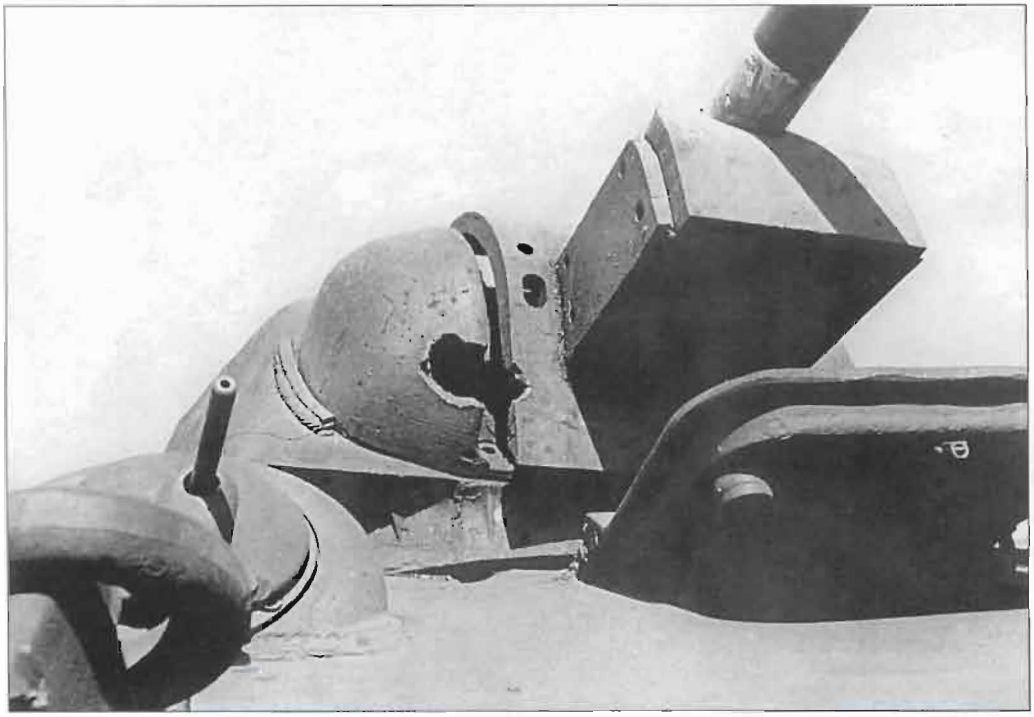
Close-ups of hits sustained by T–34s during summer and fall of 1944.



This penetrating hit on a soft-edge turret at the junction between the turret body and the mantle casing, where the protective bar was welded, most probably killed the turret crew. The open hatches do not signify that the crew escaped with their lives but, rather, that they were opened by curious Germans who wanted to check the effectiveness of the their shells. The two panoramic sights, in front of the "mouse ears", suggest that this tank was built in the fall of 1943.

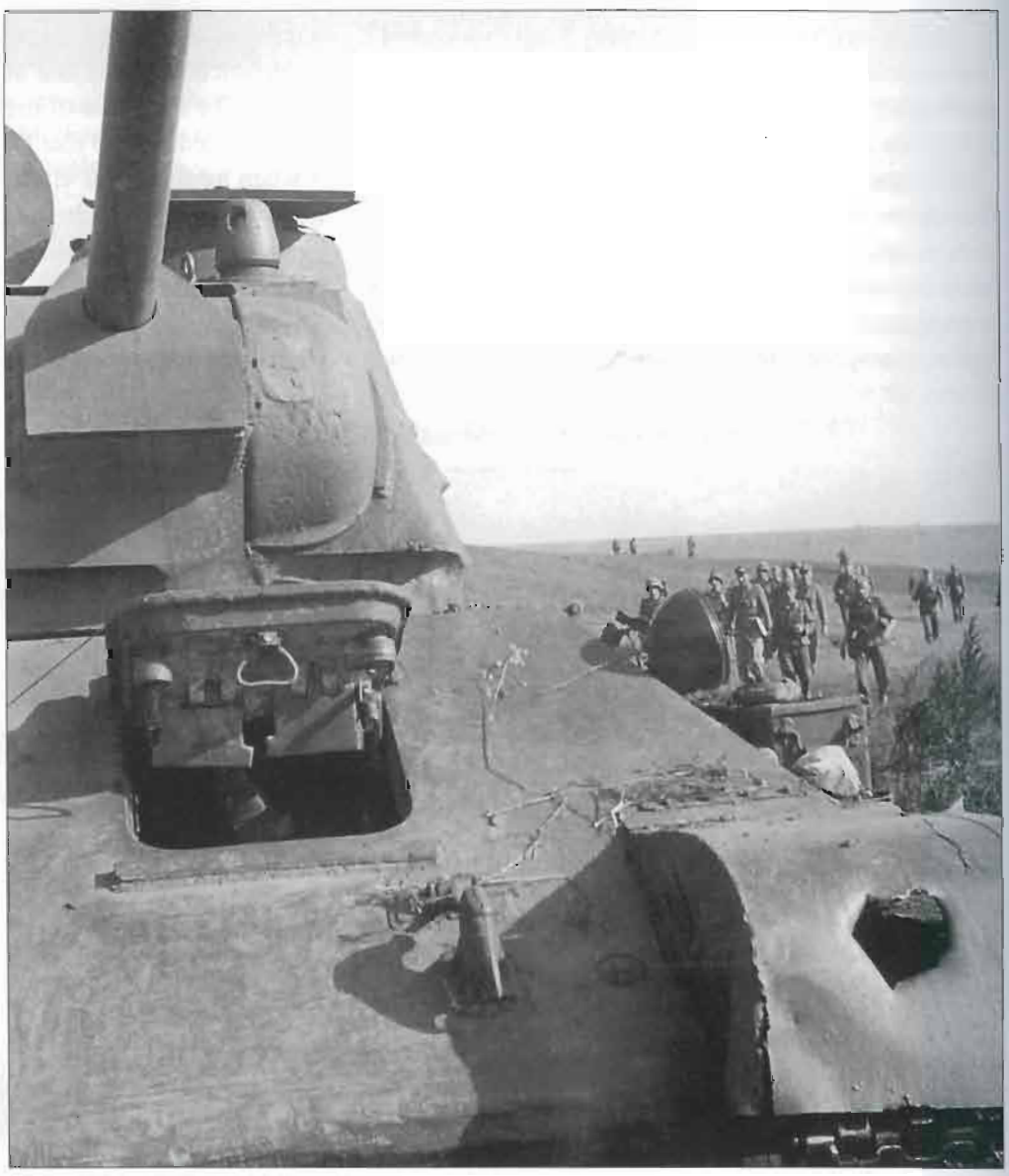
- CAW -

Close-ups of hits sustained by T–34s during summer and fall of 1944.



A penetration of the gun mount casing also damaged the mantle. This photo also shows the details of the hardedge turret, including the turret ring ribs.

- CAW -

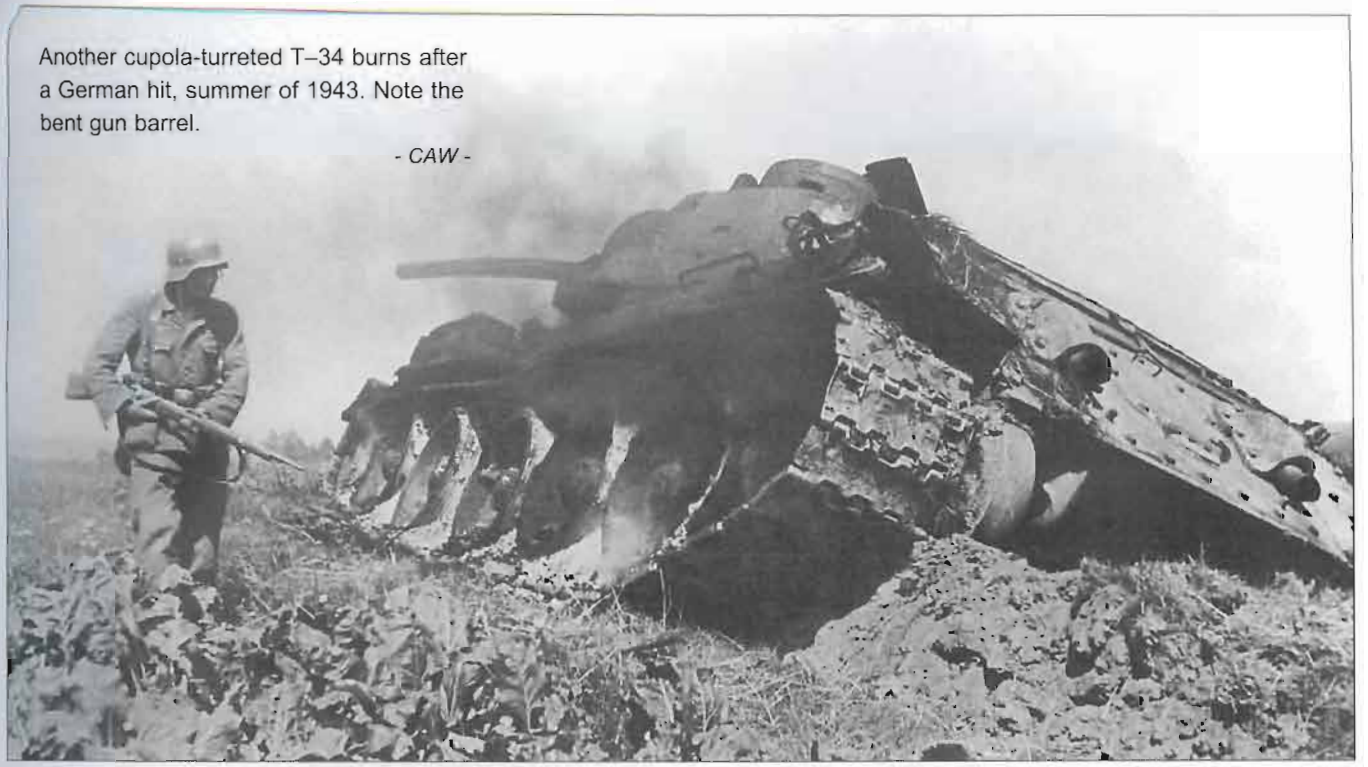


Equipped with a commander's cupola, this T–34 was knocked out by soldiers from the Grossdeutschland Division. The first hit was lucky for the crew because the round went through the front fender without damaging the track. It is easy to see that this turret is the hardedge type by the way its front was cast.

- CAW -

Another cupola-turreted T–34 burns after a German hit, summer of 1943. Note the bent gun barrel.

- CAW -



Below: A T–34 (ChKZ-made, judging by the peculiar design of the cylindrical fuel tanks brackets) abandoned by the side of the road, fall of 1943. After the cupola appeared on the turret, the crew was given another observation device, the MK–4 episcope. Up to this date the panoramic sights, such as the PT–4 or PT–4–7 (older PT–7 were then an exceptional rarity) were used for target acquisition, while gun laying was made solely with the TMFD–7 telescopic sight. With time another PT–4–7 (or even an MK–4) was installed for the loader, and the commander was able to use the PT-K.

- CAW -





This burned out T–34, with a commander's cupola, received two hits on the turret, which tore off the gun barrel recuperator sleeve. On the side of the softedge turret, next to the hole, was painted the word "SIBIRAK" (Siberian), probably in yellow paint. The same word, although almost invisible, is painted on the hull side, behind the headlight.

- CAW -

porary trend toward simplifying technology and increasing protection at the expense of almost useless armament. The hull was shortened, but it is not known by how much. As a result of this operation, the spaces between the first, second, and third road wheels disappeared.

At first, the T–43 was to have a turret with a 1420 mm (55.9-in.) diameter, but, later on, in the spring of 1943, the turret ring diameter was increased to 1600 mm (63 in.). The length of the turret was increased so that it presented the smallest possible target from the front while, at the same time, guaranteeing comfort to the crew. This turret can be taken as the first prototype of the later 85 mm gun turret, especially for the second model. With the F–34 cannon inside, it was quite comfortable, and the commander's cupola with a hatch cover on the top made it useful at last.

Due to the thicker armor and the new turret, the tank weighted 32.2 tons, and later reached 33.5 tons. After the installation of the 85 mm D–5T gun, the weight rose to 35.3 tons. This caused some minor problems with the suspension, which experienced quicker wear than in the standard T–34. If the weight had been kept at approximately 33 tons, this vehicle would have performed very well on the battlefield, as its driving characteristics would have been similar to those of the T–34–85. Its armor would have been thicker than the T–34–85's and, its eventual armament with the 85 mm gun would have made it a much better tank than the T–34–85, with only slightly worse driving characteristics.

The first prototype of the T–43 was assembled in December 1942 and was immediately sent for intensive testing, during which, up until April of 1943, it covered a total of 3,000 km (1,875 miles). In April, on the basis of the experience gained during testing, three more T–43s were assembled (these had the turret with the 1600 mm ring). These vehicles differed substantially from the original design and incorporated many changes, which were the result of the testing. Some were small, such as the new driver's hatch and slightly different dimensions, while

Right: This T–34 with a softedge turret was immobilized somewhere in Russia in March 1944. The front part of the turret side displays a tactical sign, a rhombus with a "B" (Cyrillic "V") above the number "100" or "102", while on the rear of the turret there is a red number "9". The color of the turret's rear presents a puzzle, as it appears that either the number is framed or there are stripes present there. Standing on the right with a cane, Gen. Richter (Knight's Cross recipient) looks at the dead crew.

- CAW -



Above: This excellent photograph shows a German reconnaissance group using the wreck of a T–34 as cover and an observation post, beginning of 1944. Note the two panoramic sights on the turret roof: the commander's PT-K on the right and the loader's PT–4–7 on the left.

- CAW -



others, such as a wider hull and less ground clearance, were rather substantial. As a result of these changes, the tank's weight reached 34.1 tons. All prototypes had a frontal armor of 75 mm (2.95-in.), and the side and rear armor was 45 mm (1.77-in.). The turret front and sides were protected by 90 mm (3.54-in.) of steel, and the hull had a thickness of 30 mm (1.18-in.) on the bottom and 20 mm (.79-in.) on top.

It is interesting to note that at first there was no provision for a radio in the tank model crewed by four. The introduction of the radio in T–34–85 in late 1943 can be seen as proof, as this was when the crew grew from 4 to 5.

Undoubtedly, in 1943, the T–43 was a very attractive design, pleading to be realized. Unfortunately, the tank's need for additional design improvements, and Stavka's decision to maximize T–34 production, caused the T–43's downfall. The planned T–44 tank, and intentions to arm Red Army tanks with the 85 mm gun, proved to be the last two nails in the T–43's coffin.

Neither of the prototypes was ever mass-produced. However, thanks to the successful solution of a number of problems, above all the upgrading of the gearbox on the T–34S, it was possible to improve the mass-produced T–34. This assortment of changes brought about the creation of, what is referred to in literature, the T–34, "Model 1943". In reality, nothing like that appeared. As was the case with the T–34, "Model 1941", the T–34 was simply produced without any differentiating between models. The modernization of the tank was a slow and continuous process. It took almost nine months, from late 1942 until mid–1943, to incorporate all the changes of the "Model 1943". The final version of the "Model 1943" started to roll off the assembly lines only by the spring, and even as late as the summer, of 1943.

Compared to its predecessor, the "Model 1943" variant had many more or less meaningful changes. A reasonably functional air filter "Cyklon" was installed on the motor. It was replaced a year and a half later by a newer and fully (?) functional one. Beside this, a few other changed were introduced inside the vehicle, such as the enlargement of the fuel tanks to a capacity of almost 600 liters (158.5 US gal.). To these should be added some external improvements such as:

- ✓ a new type of track,
- ✓ additional fuel tanks — almost simultaneously introduced rear box-shaped tanks (in September) and cylindrical side-mounted ones (in October at the earliest, during 1943, as a result of standardization, they started to phase out all other models in the factories)[84],
- ✓ an armored mantle for the hull machine gun,
- ✓ handrails on hull and turret for mounted infantry and equipment,
- ✓ one (or three) deflector bar(s) under (or under and on both sides of) the driver's hatch to protect against small arms ricochets,
- ✓ and a new hexagonal turret.

The new turret and the cylindrical external fuel storage tanks were the most striking features of the new "model" of the tank. The box-shaped tanks were capable of holding 40 liters (10.6 US gal.) each, while the cylindrical ones held 50 liters (13.2 US gal.) each. As a result, the total fuel storage was increased by 80 liters, or 150 liters (21.1 or 39.6 US gal.). In reality, with the cylinder tanks the capacity was only 100 liters (26.4 US gal.) more, as the odd cylinder usually held engine lubricant.

The hexagonal turret was designed by M.A. Nabutovsky shortly after the No.183 Factory had moved to



A camouflaged group of infantry is mounting a T–34 with an unusual marking on the side of its turret; a heart with a droplet inside and two bars underneath. We can only guess at the colors, but the summer camouflage colors must also be kept in mind, beside red and black. The mounted infantry group was composed of 13–14 people, which meant around an extra 800 kg of weight. Together with the full fuel drum and extra ammunition, the tank could have exerted a weight of 31.5 tons, instead of 30 tons.

- *WAF* -



Two photos of T–34s from the same unit that were destroyed in the Ukraine, March 1944. On the turret's front there is an incomplete tactical sign, a rhombus inside a circle, with the number "100" above the divider and nothing below it.

Above: An immobilized T–34 can be seen in the foreground and a completely burned out one in the background.

- CAW -

Right: This vehicle is from the last production series and has the cylindrical tanks for oil or BSh smoke generators at the rear of the hull.

- CAW -



the Urals from Kharkov. The main reason for this design change was to simplify the turret manufacturing process, rather than to improve the crew's comfort level. Due to the chaos in the organizational and decision processes that existed during the winter of 1941/42, and the limited production capacity of the newly established factories, the turret's production was delayed. In the literature on the subject, it is assumed that the first tanks with the new hexagonal turrets appeared at the front in August/September 1942 at the earliest, but German photos of wrecks of tanks with such turrets were taken as early as the first half of July. A State Defense Council resolution of June ordering the installation of such turrets as of July 1, 1942, seems to corroborate this fact.

There was one type of Nabutovsky's turret, but it was manufactured in three main versions (a stamped, and two cast ones, referred to as softedge and hardedge and at least five technological variants, which was the result of the different capabilities of the individual steel mills and the turret manufacturers. Some manufacturers as-

[84] It is often assumed that the rear external box tanks (there were two of these, with equal capacity: one was shorter but wider, the other longer and narrower) identified a particular tank producer. The No.183 Factory used both types at the same time, intermittent with the cylindrical ones!





These two photos show T–34s in similar difficulty. They illustrate the difference in appearance between the newer (left) and older (upper) series. The newer vehicle on the left has two panoramic sights on the turret roof (the loader's PT–4 or PT–4–7 on the left and the commander's PT–K on the right) and an angular hull front girder.

The older series tank, knocked out in the Berdychev area in January 1944, has the rounded front girder and only one sight on the turret.

Both turrets are the hardedge variation and have a commander's cupola. The turret ring ribs are almost invisible.

- CAW -



Above: This late 1943 production (two different panoramic sights on the turret roof) T–34 was knocked out in the spring of 1944. Note the relatively fine ribs on the turret ring of this softedge turret. The number "733", perhaps in black, is visible under the handrail on the back of the turret.

- CAW -

Below: A staged storming of enemy positions performed by one of the units taking part in the capture of Lvov in July 1944. Two panoramic sights on top of the turret are visible, and a fuel drum is secured in place by the hull side handrails (it's capacity was enough to replace the three cylindrical external tanks). There are spare track links on the turret side, and a tactical number ("18") is painted at the front of the turret side.

- V. Kulikov's collection -





Soviet troops march by in the region of Riga, summer of 1944. The leading tank is a No.112 Factory product, with an early hull (maybe even from a 1942 series, as the bow MG is not in a ball mount). There are deflector bars around the turret ring, and two panoramic sights on top of the turret; a PT-K on the right and probably a PT–4–7 on the left. The leading vehicle has a white "433" tactical number, while the one behind has the number "435".

- V. Kulikov's collection -

sembled the hexagonal hardedge turrets from as many as ten component parts, of which seven made up the turret ring area. Others formed their softedge turrets from only two components — the turret body and turret ring. In both cases, the armored roof plate was welded to the sides of the turret.

The hardedge turrets with the highest number of components possibly first appeared at the No.183 Factory, where P.P. Malyarov had to work out a much more complicated assembly because of the sparse equipment, and the Uralmash, where there were initial problems with the production of the hexagonal unit. While the body of the hardedge turret consisted of three parts, there were two types of these turrets; one type consisted of an upper section, a lower section and the floor section over the engine, and the other type consisted of the front section, the rear section and the floor section over the engine. It appears that, with time, the casting process was mastered enough to phase out the hardedge turrets altogether. While the upper-lower type turret may have lasted some time, the front-rear version probably disappeared very quickly. It is very hard to state anything categorically in that matter, because even if sometimes the turret mold separation lines are not visible, that does not mean they are absent — the molds were assembled on one side of the cast, so if they are invisible from the outside, that does not necessarily mean that they are not there.

One should bear in mind that each batch of the turrets was slightly different from the previous ones. This was a consequence of the technological process, which simply was not sophisticated enough to maintain extreme precision. This is best illustrated by the vertical ribs present around the circumference of the rings on the hardedge turrets. Usually they were of various lengths and widths (the edges of some were straight, concave on others) and were differently spaced. Sometimes they were fine enough not to be visible in the photos[85]. These ribs were always present on the hardedge turrets, while the only externally visible ribs on the softedge turrets were those under the overhang floor — because in that variation they were molded inside.

To overcome the problems manifesting themselves while casting the new type of turret, Uralmash created a stamped variation of the hexagonal turret, manufactured there alongside the cast variation. This was not an easy technological process, as a 5,000-ton press was needed to produce the turrets designed by Varyushev and Arsenyev. The top, main part of the turret was pressed from one sheet of 45 mm armored plate. The turret body was then welded to the cast turret ring.

This was the largest of the three hexagonal turrets — slightly longer and wider than the others. While differences in measurements between the two types of cast turrets occurred, they were minimal. Depending on the manufacturer and the production series, as an example, the width of the turret (where the ring joined the turret body) differed by an average of 3–5 cm (1.18–1.97-in.).

In October 1942, UTZM began the production of the stamped turret for itself and the CzKZ, but later other manufacturers also received them (the No.112 and No.183 Factories for certain). No less than 2,670 stamped turrets were made by March 1944.

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[85] The ribs appeared on the flat turrets not later than in the fall of 1941 and stayed until the end of the wartime T–34 production, on all turret variants, including the T–34–85 turrets. These ribs were a result of the technological process — the steel was distributed more evenly in a ribbed casting mould than in a flat one.

The hexagonal turret was a bit taller than its flat predecessor. This was due to the reduction of the slope of the walls and to the increase in the size of the gun mantle, which automatically forced the widening of the front of the turret. A new, more productive, ventilating fan was also fitted, as were two round hatches for the crew. At the same time, the rear hatch (for removing the gun) was eliminated because, with the installation of the new bolted mantle, it was no longer necessary. It was possible to replace the gun from the front, along with the gun mantle.

As has already been noted, the changes were introduced gradually at the various assembly plants and, until autumn of 1943, there was no standard T–34 tank. For example, at CzKZ the side spare fuel tanks were introduced at the beginning of October 1942, while at the No.112 and No.174 Factories the older rear tanks were still being installed in April 1943. The situation was the worst at the No.112 Factory, which was still assembling tanks with the flat turrets and without hull machine gun armored sleeves at least until the spring of 1943 — even though these already had the "Cyklon" filters and, probably, the five-speed gearboxes. The installation of the filter was begun at the CzKZ in the middle of January 1943. At the No.183 Factory, the armored hull machine gun ball mount was introduced as early as late summer /early autumn 1942, while, at the same time, the No.112 Factory was fitting the handrails for mounted infantry.

These handrails are the most telling (if small) features, identifying the mid-production series of the "Model 1942" T–34. The earlier series, both with the flat and hexagonal turrets, had bare hull sides. Carrying out the orders of the State Defense Council to weld on the handrails, each factory had the freedom to design them. That is why at the No.112 Factory the tanks had four identical handrails on each side of the hull, one or two on the front glacis (a little narrower than the hull side ones), and even two or three, of two different sizes, on the engine rear plate. Often, there were four handrails on the upper part of the engine cover instead of two. On the other hand, the No.183 Factory and CzKZ fitted long handrails, two on each side of the hull.

The same was done on the turrets; the handles or handrails were welded to the two rear-side plates and sometimes to the rear plate. Although these were at first meant to serve the infantry, the crews quickly started to use them for securing the tank's equipment and their personal gear.

Even the layout of the cylindrical spare fuel tanks can be used to identify the manufacturer of the vehicles. The UTZM, CzKZ and No.183 factories installed their tanks on rounded mounts that differed in the sophistication of the design. No.183 Factory's supports were the simplest, while the UTZM used the most elaborate design; on the right hull side there were four curved supports with cutouts for guiding the handrail through.

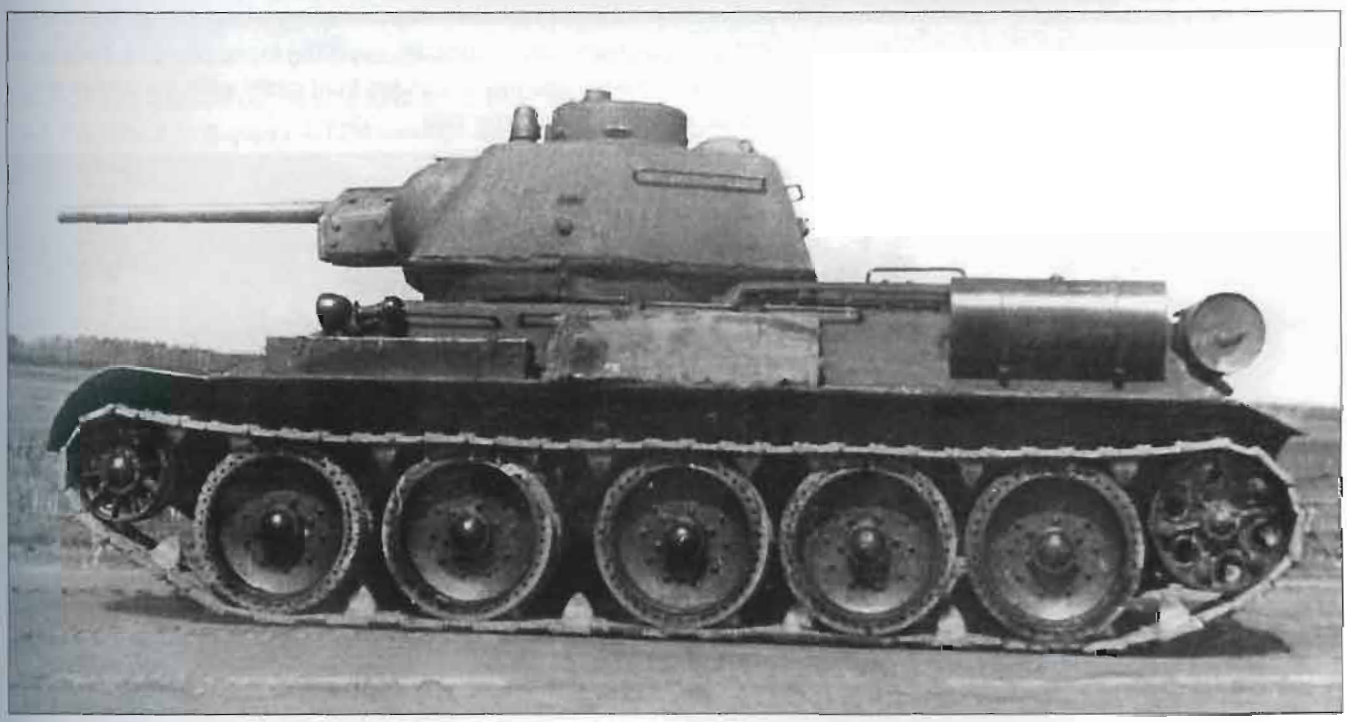
In 1942 the radio was replaced by the newer R9, but theoretically only, as most of the tanks left for the front without one. Somewhat earlier (from spring/summer 1942), the track links were standardized ("standard") and gradually produced in all of the factories. By late 1942 and early 1943, the used track links were replaced by the wider (550 mm) "winter" links, which had an improved cross-country performance later. The standardized links with a wafer-shaped ground contact surface were narrower — only 500 mm (19.68-in.) instead of



This and facing page: These three photos present T–34–76s from the 1944 series production. These tanks were made either at the No.183 Factory or at ChKZ, where the No.183-patterned tanks were assembled at that time with the two narrow rear plate hinges. This vehicle type had two different panoramic sights, handrails arranged like those on T–34–85s, an angular front girder, a horn, and the rear fuel tanks.

- V. Kulikov's collection -





the earlier 550 mm (21.65-in.). The "winter" links were identical, except that they were 550 mm wide, and made of 27SGT steel.

There were virtually no modifications made to the tank in 1943. Only changes made in 1942 were introduced, and tested by the spring of 1943. In the summer of 1943 the commander's cupola on the turret, recently designed in January independently of the T–34S and T–43 experiences, made its appearance. The turrets with the cupola appeared in the middle of June 1943, and 5,740 of them were mounted on tanks by mid-March 1944.

Small round ports under the side vision slits were reintroduced at the beginning of 1943, but it was not until the spring that they became more common. In the fall of 1943, for unknown reasons, the handrails were omitted on many vehicles (possibly as a step to increase production that was needed to replace losses). At the end of 1943, tanks for carrying oil on the rear of the hull were

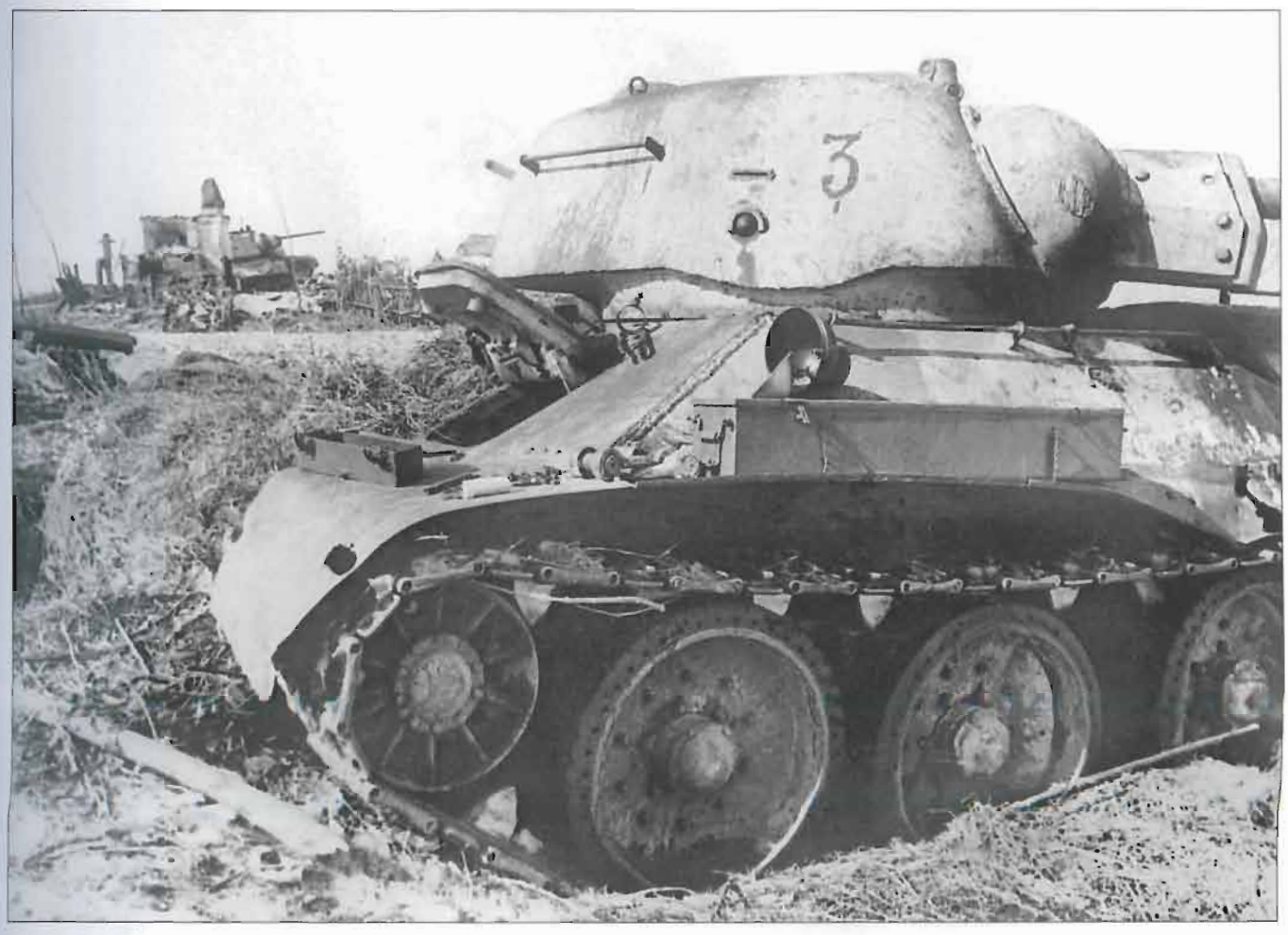


- S. Zaloga's collection -

Above and below: These two photographs show T–34s still in combat in winter 1944/45, capturing towns along the Polish – German border. The two tanks are almost identical, except that the top one has a rounded front girder while the bottom one has an angular one. The top tank has a white "241" tactical number on the turret side.



- Author's collection -



This T–34 was knocked out west of Kharkov in early March 1943. The turret is a "stamped" UTZM variation and has a small red number "3" painted on its side.

- CAW -

introduced. This allowed for the carrying of fuel in both (or all three) barrels that were mounted on the hull sides.

Somewhat later, the rounded linking girder was replaced by an angular piece. The internal layout of the fighting compartment also underwent changes. Some of the internal tanks were removed to make room for more ammunition. The rounds, packed in wooden boxes, were placed on the hull floor. Consequently, the fuel capacity was reduced from 640 liters (169 US gal.) to 530–550 liters (140–145 US gal.), and the ammunition complement was increased from 77 rounds to 97–100 rounds (depending on the manufacturer and the tank series).

Of the small changes, it is worth mentioning the repeated attempts to improve the tracks. While the target was always to standardize the tracks, it was also important to shape the grooves in the bottoms of the track links for maximum performance. This was attained in 1943 and from then on the 500 mm tracks became standard until the end of the war.

The latest model of the 9RM radio was also installed in the tank, and the internal communications equipment was replaced by the TPU–3R or TPU–3bis-F systems. In the fall of 1943 began the process to outfit each vehicle with two PT–4–7 periscopes or, alternatively, a PT–4–7 (or the older PT–4) and a PT-K. When the turret had a commander's cupola, the observational equipment was augmented by an MK–4.

All the changes made to the T–34 during the period 1942–1943 increased the weight of the tank to over 30 tons. The later innovations had only a cosmetic effect and did not affect the vehicle's quality. The last series vehicles from 1944 had standardized fittings (identical to the T–34–85) for the rear tanks for oil and the side fuel tanks. The rounded front linking bar was replaced by an angled one, the eyelets for lifting the turret were moved from the roof to the side walls and the hull front plate (standardized for all the factories, which meant that the toothed pattern, characteristic of the No.112 Factory, disappeared) had extra track links attached to it. This was the last modification of the T–34, already referred to as the T–34–76, which, if one wishes, could be called the "Model 44".

At the same time, an attempt was made to increase the armor protection of the series production vehicles. Work on increasing the tank's armor had already begun in the spring of 1941, when the decision was made to produce the T–34M, which was to have a frontal armor thickness of 60 mm. It was attempted to realize this idea



This T–34 produced by the No.183 Factory, with the tactical number "283" painted inside the rectangle on the turret side, was hit at least twice (note shell holes on the rear plate, near the exhaust covers), while fleeing the battlefield in late August 1943. The crew burned inside, to which the black rings of burned paint around the hatches attest. The "ears" of the "Mickey Mouse" were raised only later by curious Germans.



This wreck of a T–34 with an Uralmash stamped turret was abandoned by the Soviets on the Mius River front in late August 1943. The most interesting feature of that tank is the tracks, just introduced at the UTMZ factory. Every other link consisted of two halves!

- CAW -

in the current production of the T–34 and to cover the tanks with additional armor, as on the KV–1. The decision to proceed on this course was made at the beginning of May 1941 and Timoshenko and Zhukov brought up its realization at the end of June, when the war was already on. Two prototypes of the T–34 with the additional armor plates were assembled in July but, because of the war, the scheduled August production was not undertaken. This subject came up again at the end of 1941 when, as a result of news that new German weapons were penetrating the hull front armor, on 25 December a decision was taken to increase the armor at that spot. At the No.183 Factory, an attempt was made to produce a 60 mm frontal armor plate. However this idea was not realized, most probably due to the technological problems. As a result, several elements were combined into a plate, usually of 15 mm thickneess, that was welded to the surface of the 45 mm front plate. This applique armor was also welded on at various repair facilities which overhauled tanks, such as that in Leningrad for example. There, the applique armor was even welded onto the bottom half of the front hull.

The series production of vehicles with the applique armor was begun at all three factories at the beginning of 1942 (at the No.183 Factory in March, at the STZ in January, and at the No.112 Factory in February), with each one designing its own way of cutting the elements. Many of the modified vehicles also had additional applique armor welded onto the front, sides, and even rear, of their turrets. At the No.112 Factory however, the turrets were cast with the frontal armor increased to 75 mm. Together, perhaps about 500 of such uparmored T–34s were assembled, with about half of them having the applique armor on the hull front and the turret. There are many indicators that this concept was revisited later on and additional vehicles were assembled in such a manner. It appears that this was also done in the repair shops, even as late as 1944 and 1945 (see pages 60–66).

The question of using the applique armor plates as additional armor was taken up once more in August 1942 at the Institute of Physics where, under the direction of A.F. Joffe, it was tested thoroughly. This was also done at the No.112 Factory, where V.V. Krylov designed an interesting way of shielding the tank's entire sides and turret. According to his concept, plates of 16–20 mm thickness were to be fastened to the hull sides and around the entire turret using special racks. In this system, the positioning of the armor plates would have made their



This T–34, heavily laden with extra ammunition and a barrel of fuel behind the stamped turret, was photographed in April 1944 during the fighting in Crimea. Its crew painted the number "12" on the upper side of the turret, next to the handrail, and the tactical number "1109" on the turret's front cheek. In 1944 the four-digit tactical numbers were introduced to number the tanks within brigades. Read left to right, this number would mean that this T–34 was either the 9th tank (the last vehicle in the 3rd Platoon) of the 1st Battalion's 1st Company, or a Corps-level HQ vehicle. It could not be a command tank of the 2nd or 3rd Brigade because it has no radio. It appears that this tank was produced in 1942/43, as it still lacks the second panoramic sight and a radio, but there is a pistol port at the turret side.

- Robert Bock's collection -



Two photos of a T–34 immobilized in a roadside ditch, August 1944. The top photo gives a detailed front view of the UTMZ's "stamped" turret.

- *CAW* -



upper edge higher than the sides of the hull, thus protecting the lower part of the turret. The entire kit weighed 3.26 tons and it was to protect the vehicles from the effects of the APDS rounds used by the Germans in the short-barrelled Pz.Kpfw. IVs and later the Pz.Kpfw. IIIs.

However well Krylov's shielding worked theoretically, it appears that an attempt to use the so-protected tanks in August 1943 failed miserably. All these vehicles were destroyed by the Germans as easily as the series produced T–34s. Later the concept was dropped completely be-



These sad remnants of destroyed T–34s (the mutilated bodies of the crew can be seen in the foreground) lie alongside one of the roads that the Germans used to retreat in February 1944. Another wreck can be seen in the background. On the side of the turret of the wreck in the foreground can be seen a tactical designation that is exact to the one shown on p. 175, an encircled rhombus. The designation "K–3" may point to the fact that the tank may belong to another brigade. The inset shows the "wafer" patterned 500 mm wide track links. This type, later called the "universal", immediately became the standard, phasing out all the others, and was also used after the war.

- *CAW* -

cause the Soviets noticed that the Germans stopped using the APDS rounds. The idea was considered once more at the end of the war when the tank crews wanted to counteract the effects of the Panzerfaust projectile through the addition of wire mesh screens to the surfaces of the tanks. This solution, however, did not become widely applied.

Along with the problem of up-armoring the tank, the Soviets started to consider the possibility of giving the T–34 a more effective gun. In this case, the process started only in the spring of 1943, when firing tests were conducted on a captured Tiger tank. It was decided then that the F–34 gun was outdated and that it was crucial to replace it with a more powerful one that would be able to take on the German tanks. Initially, however, it appears that not enough attention was paid to this problem. Most probably, it was assumed that the only dangerous opponent would be the rarely-seen Tiger. The severity of the problem only became clear after the fighting during the Battle of Kursk when it became obvious that the Germans not only had the Tiger, but also the Panther tank. Additionally, almost all of the medium Pz.IV tanks and the assault guns were armed with the 75mm L/48 gun. At the same time, starting in the second half of 1942, the Germans started to install Soviet and their own guns of 45–51 calibers in their Panzerjaeger. This allowed their crews to gain a slight advantage over the T–34 crews in carrying on accurate and effective fire. The Soviets then came to the conclusion that they needed, as quickly as possible, to install in the T–34 a longer gun which would have allowed for effective fire at longer distances. The work on this matter was started along two tracks. The installation of the 57 mm gun was considered once more, and at the same time it was decided to modify the F–34 gun so that its parameters would match those of the 76.2 mm anti-aircraft gun.

In the first case, the idea came up because in the spring of 1943 a decision was taken in Moscow to produce for the Red Army the 57 mm ZIS–2 anti-tank gun. It was to replace the useless 45 mm gun, even the one with the long barrel. In this way, naturally, the solution from 1941 made a case for itself; the same gun could be installed in the T–34, especially since it was already developed to a large degree. After the adaptation of the earlier development, in July1943 the ZIS–4 gun was installed in 4 tanks at the No.183 Factory. They were immediately sent out for trials. The trials were successful, but at the same time work on the 85 mm gun had advanced quite far. This work unmistakeably disqualified the idea of installing the 57 mm gun in the T–34. In the second half of the war the 57 mm gun could not achieve satisfactory results, although it could combat the lighter armored German vehicles much better than the 45 mm gun.

Unfortunately, the 85 mm gun had a similar effect on the attempt to install in the T–34 turret the modified F–34 gun of 76.2 mm caliber. The new gun of that caliber (the S–54) at first had a barrel lenghtened to 60 calibers, but then it was shortened to 55 calibers (according to other sources, 58 calibers). For this reason, its predicted firing parameters were not achieved. As an example, it was expected that the initial velocity of a fired antiaircraft shell (having a larger casing) would be over 1,100 meters per second. It was also assumed that, at a distance of 1,000 meters, an antitank round could penetrate 140–156 mm of armor angled at 30 degrees. However, despite the expectations, these results were not achieved in firing tests. In practice, the initial velocity was 840 m/s and the absolute range of direct fire shots was 1,000 meters. Despite the failure to achieve the expected results, these parameters were still satisfactory and especially worthwhile since they did not mandate any construction changes to the tank or worsen the crew's combat effectiveness. At the same time, any possible logistical problems associated with introducing a new weapon were avoided. The costs of modernizing the gun and bringing it into production were minimized, although the cost of producing new antitank rounds for it proved to be high.

After the initial tests and the elimination of noted faults, both guns were subjected to testing in October 1943. It was at that time that the 57 mm gun was ultimately abandoned. On the other hand, the work on the 76.2 mm gun was continued to the end of 1943, during which a decision was made to manufature it. However, this decision was quickly cancelled (only 62 units were assembled) because, as a special gun, meant to only combat enemy tanks, it did not have the approval of army dissidents. In their understanding, it would have been more useful to rearm the tank with the 85 mm gun.

The problem with the S–54 gun was an exact mirror image of the question which became apparent in 1943 in the USA, where deliberations were being made about the need to replace the short-barreled 75 mm gun with the long-barreled 76 mm gun. The Americans made the same decision as the Soviets and later regretted it bitterly. The Soviets regretted their decision only slightly less. It is true that mass production and the relatively shorter lines of communication allowed them to rearm many of the tank brigades with the T–34–85 just before the beginning of their „liberation"campaign in mid-June 1944. But the gun did not prove itself as effective as it should have in the battles against enemy tanks.

A No.112 Factory-made T–34–85 leads a tank unit during the Victory Parade in Moscow, May 1945. Note the new type of turret ventilator cover at the front of the turret; a second one was fitted behind the commander's cupola.

- WAF -



T–34–85

As has already been pointed out, work on a more powerful gun for the Red Army was begun in the spring of 1943, after becoming familiar with the Tiger tank. The deciding tests on it were conducted in mid-April, when the captured tank was shot to pieces with guns serving in the Soviet armored forces at that time. It was only after the Battle of Kursk that the various levels of the army command and national leadership started to insist on a quicker pace of the gun's development. The work's pace was accelerated, however, only at the end of 1943, and this despite a conference held at the Kremlin in the middle of August 1943. Its purpose was to analyze the technological ramifications of the Battle of Kursk.

Unfortunately, the available information in the subject literature makes it impossible to completely explain the moves and decisions taken at that time. It is also difficult to recreate the effectiveness of the influence and actions of the competing firms on the course of the events. However, the available scraps of information seem to point to an existence of a decisional chaos in the second half of 1943. This was undoubtedly the result of an initial order forbidding the modernization of the T–34 during the installation of the 85 mm gun in the tank. At that time it was still believed that the hexagonal turret was able to accomodate everything.

The 85 mm M1939 anti-aircraft gun, the equivalent to the German 88 mm Flak gun, was used as the basis for the modernization of the T–34's main armament. It was decided to convert this gun simultaneously into an anti-tank gun (contrary to earlier experiments, it was made somewhat similar to the German anti-tank guns) and a tank gun for heavy tanks and assault guns. The first task was easy, the second was more difficult. In the end the efforts yielded partial success. Already in mid-April 1943, the GKO issued an order to construct an 85 mm gun for assault guns and by mid-July such a vehicle was undergoing factory tests. At the beginning of August, after finishing national tests, which none of the assembled guns passed (the S–31, S–18 or D–5), the RKKA accepted the vehicle with the D–5 gun into its inventory. The

This T–34 has a D–5 gun installed in the new turret with the 1,600 mm diameter turret ring. It appears that this vehicle is one of the earliest prototypes of the T–34–85. This is confirmed by the use of a turret from a T–43 and a hull from the summer 1943 series. The mould seams are clearly visible on the turret sides and are different from those seen on the later, series-produced turrets.

- Robert Bock's collection -







Above: Rear view of a T–34–85 produced at the No.112 Factory (upper rear plate on top of the lower, two wide hinges) with the "alternative" (8-part mould) turret.

Left: Rear view of a T–34–85 produced at the No.183 Factory with the standard late 1944/early 1945 series turret.

D–5 was chosen because it posed the least amount of problems and offered the best chances for quick modification.

Meanwhile, already at the end of June 1943, the construction bureau of the No.183 Factory received an order to design a turret for the 85 mm gun. The duration period of the necessary modifications was to be minimal so that it would not negatively affect the tank's series production. By the end of August, the designers studied all possibilities and came to the conclusion that the only solution to the problem lay in the increasing of the diameter of the turret ring to 1,600 mm. However, this required a modernization of the hull fighting compartment and met with a number of objections from the au-

T–34–85 turrets.



Right nad below:
A No.183 Factory turret produced in late 1944/early 1945. This is the second variant, without the left side port-plug, but with a bulge on the side for the modified traverse mechanism.



thorities. After overcoming the objections, work on a prototype was begun in the factory. This work ended, at the latest, in October 1943.

The entire modernization of the vehicle turned out to be very simple. The fighting compartment was modified in the simplest way possible and the gun was installed in the already-existing turret; a modified turret from the T–43 tank.The D–5 gun designed by F.F. Pietrov from the No.9 Factory was chosen. In the opinion of the specialists from Nizhniy Tagil, during the period summer/fall 1943 it was the only gun which could be installed in the tank. This decision was taken after a short period of direct cooperation between the specialists from the No.183 Factory and Grabin's CAKB. This cooperation, according to the wishes of Narkom Malyshev, was begun in August. On his advice to Moscow, at that time the team of designers under the direction of M.A. Nabutovsky was brought in from Nizhniy Tagil. It was composed of six people who may have been intended to cooperate with Grabin. However, they, in a neighbourly fashion, also established contact with the No.9 Factory. It was there that they found the D–5 gun which had been accepted as the armament for the SU–85 assault gun, while at Grabin's facility they only found rejected guns. In such a situation, the cooperation between Grabin and Nabutovsky's team could not bring any results.

This situation brought about a certain problem in the history of the development of the T–34–85. As is evident from the text above, after V.G. Grabin's earlier solutions had been rejected, other than the D–5, at that time there was no other gun „on the market" that was suitable for installation in the tank.Despite this, there were no attempts for three months to change this situation! At the same time, there was no decision regarding the production of the T–34 with the D–5 gun, despite the fact that the SU–85 assault gun was being produced since the end of August. The cause of this inaction was the construction of the D–5 which, when installed in the T–43, made very difficult the loading of the gun as its top parts almost touched the roof of the turret.

These small problems do not alter the fact that, already in the fall of 1943, the Soviets were ready to be-

T–34–85 turrets.



Left and below: The 2nd version of a turret produced by the No.112 Factory in May of 1944.



Below: An "alternative" turret from the No.112 Factory, made from an 8–part mould. Only one side is shown, as the other is a mirror image. It is obvious that the "alternative" model has a more bulging gun mantle.

Both turrets from the No.112 Factory have the S–53 gun, while the No.183 Factory turret already has the ZIS–S–53 gun.

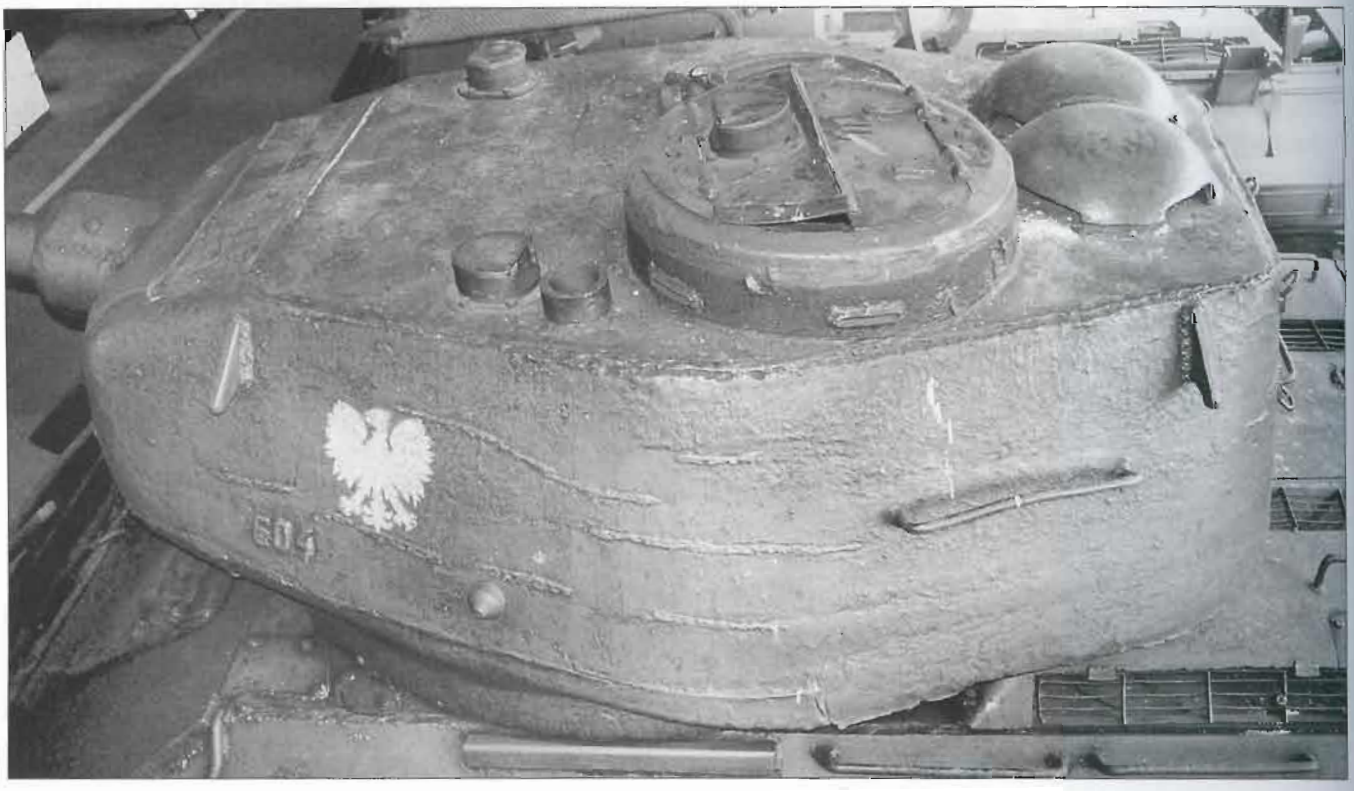


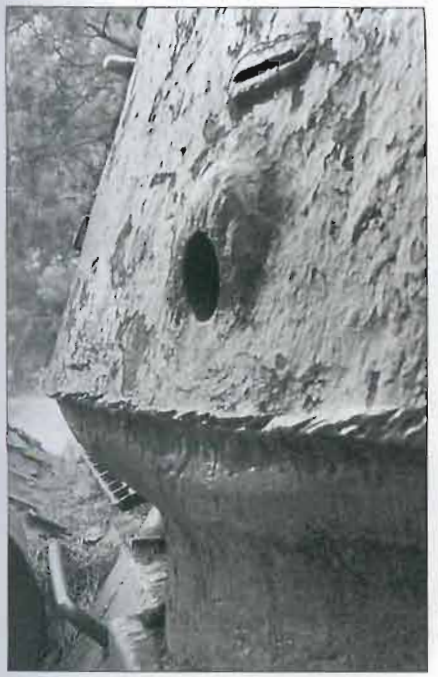
gin the production of the new tank. It appears, however, that they did not start the process because they did not want to alter the existing turret. And so, instead of modifying the turret to fit the existing gun (which was done three months later anyway), they did nothing. It was not until the end of October, that is at the time when the T–34–85 with the D–5 gun was being prepared for the national tests, that the authorities decided to renew work on designing a new 85 mm gun, this time exclusively for the T–34 tank. Preparations were made for all eventualities, and work started on designing a gun for a turret with a 1,600 mm ring, as well as for the standard hexagonal turret. Instead of modifying the D–5 gun and designing for it a suitable turret, it was decided to try to jam the new gun into an old turret. This was typical Bolshevik logic!



Above: The No.174 Factory turret, with side seams similar to those used in the No.183 Factory. The early mantle for the S–53 gun (side projections) was adjusted to conform to No.183 Factory's one.

Below: A turret made at the No.112 Factory (tank S/N 4120559, indicating the December 1944 series) of the "large" turret variation. This turret was very wide, allowing for an internal width of up to 1.9 m (74.8-in.) at the widest point, which was almost 20 cm (7.9-in) wider than the standard No.183 turret.









This series of photos will allow the reader to visualize the differences in the shape of the various turrets. Generally, all of the turrets have the same size, but their shapes, especially on the sides and at the front, differ somewhat.

Left to right, first row:
- No.112, 2nd version.
- No.112, "alternative" (8-part) version.
- No.174 model.

Left to right, second row:
- No.112, "large".
- No.183, "standard" version, late 1944/early 1945.

The competition was entered by 3 producers, each of whom prepared a gun:

- ✓ KB of the No.92 Factory — LB–1[86], for a turret with a 1,600 mm ring;
- ✓ Grabin's CAKB — S–53, for a turret with a 1,420 mm ring;
- ✓ CAKB of No.88 Factory — S–50, for a turret with a 1,600 mm ring.

The assignment was tackled most competently at the No.92 Factory, where the work on the new gun was most probably started a week or two sooner than at the CAKB. Already in October, attempts were made there to equip the gun with a muzzle brake. A vehicle, produced by the No.183 Factory, with a T–43 turret was used. At exactly the same time, an identical T–34–85 with the D–5 gun was undergoing national tests. They demonstarted the need for the gun's modernization. The tank armed with the LB–1 also failed the tests, and so it too had to be improved.

Despite this mess, the responsible authorities decided at the beginning of December 1943 to recommend that the tank from the No.183 Factory armed with the D–5 gun enter series production. This recommendation

[86] In the literature, this gun is sometimes referred to as the LB–85, to differentiate it from the later 100 mm LB–1. However, originally, they both carried the same designation.











Top, left and right: No.183 "standard" turret.

Above, left and right: No.112, 2nd version turret.

Left: No.112, "alternative" version. The tube-bearing portion of the gun mantle in this model is somewhat shorter, with a larger space between the gun barrel and the mantle. The mantle itself sticks out forward a little more, compared to the previous two.

Below, left: No.174 model turret.

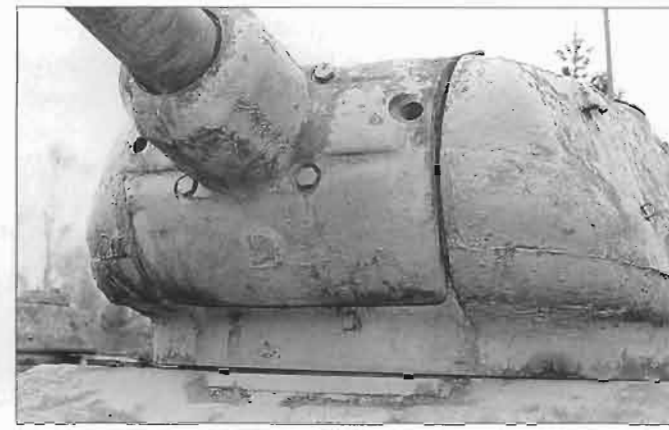
Below, right: No.112 "large".

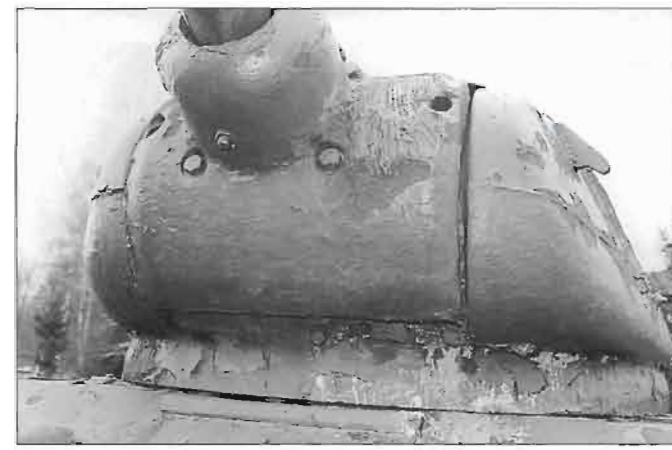


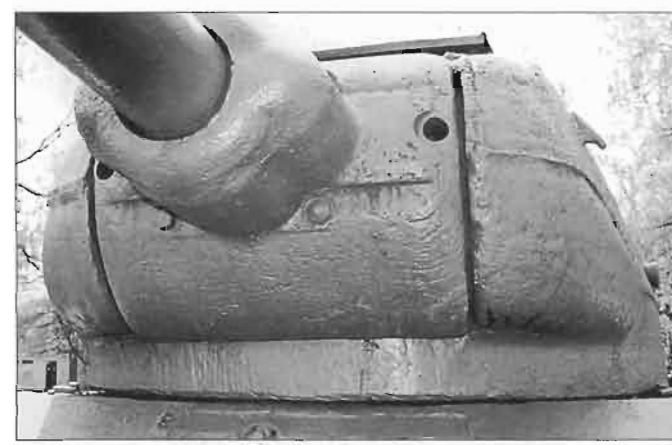


was accepted. By decision No.4776 of the GKO taken on 15 December, the tank was accepted into the Red Army's inventory. Its production was ordered to begin in January 1944 at.... the No.112 Factory. The question arises, why not at the No.183 Factory? The answer lies not in the efficiency of the factories (at the 183 the produc-









Small differences occur in the shape of all known wartime T–34–85 turrets and it is very difficult to document them. These photographs should illustrate the problem.

Above, left: Nr.112, 2nd version.

Above, right: Nr.183 with ZIS–S–53 gun.

Right: No.112 "alternative".

Below: No.174 model with S–53 gun.

tion was almost three times of that at the 112), but rather in the turret. At the No.183 Factory the turret was not modified (it was not even attempted), while at the No.112 Factory the turret was modified in only a couple of days to accomodate the D–5 gun. The turret was only loosely based on the T–43 one. As a result, production at the No.112 Factory was begun according to plan. Later, this turret was modified six or seven times.

The first D–5 guns reached the factory in December (10 units instead of 50) which, with a later shipment, allowed for the assembly of 25 vehicles by the end of January. In February, 75 more T–34–85s were to be assembled, and in March a further 150 tanks. These plans were realized. And so, in January 1944, the Red Army finally received the tank which, in the fall of 1943, the authorities did not want to send into production.

Meanwhile, on 1 October, the CAKB started work on its gun. During a meeting it was decided to design two guns for two different turrets.

After V.G. Grabin defined the objectives during a conference of the CAKB NKV, a silence fell over the room. It was only after Grabin posed a direct question that G.M. Siergiejev, one of the three specialists who had the responsibility of finding the correct design for the gun inside the hexagonal turret, offered an answer. Siergiejev stated that the design of the gun would not pose a problem, which pleased Grabin very much. However, P.F. Muraview disagreed with Siergiejev, pointing to some practical matters.

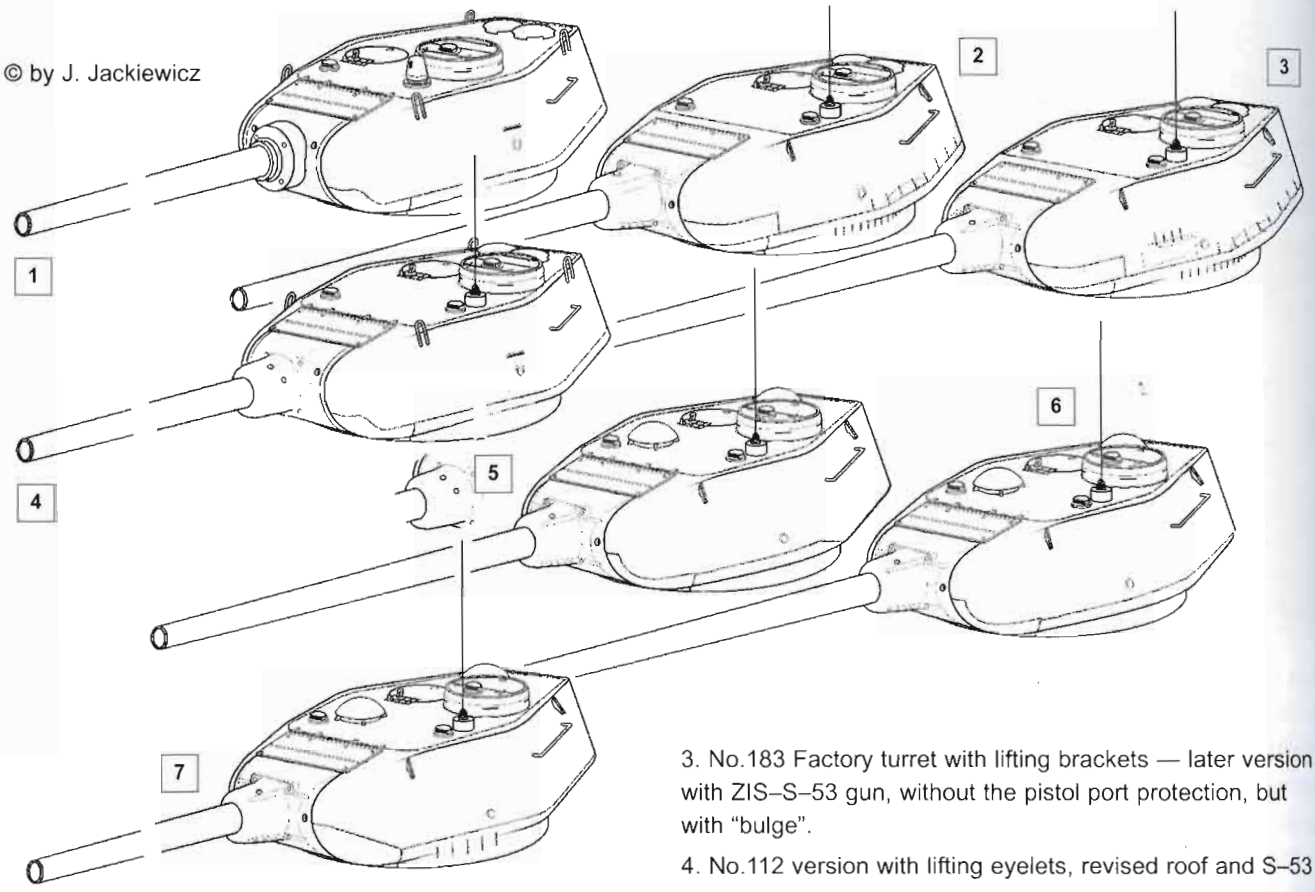
G.J. Shabarov and I. Ivanov led the team which was concerned with arming the turret with a 1,420 mm ring. The team which worked on the S–50 gun for the turret with the 1,600 mm ring was made up of V. Mieshchanin, A. Boglevskij and W. Tjurin.

Each team's work was finished in lightning tempo. During the work on the guns, not all of the problems concerning their installation in the turret were solved. Additionally, the design details were not finalized either. However, all these shortcomings were understandable; after all, the guns were designed in less than a month!

In December 1943 all three guns were sent out for testing. As an example, the S–50 gun was tested during the period 15–25 December and on the last day it was sent out for national tests, in which all three guns took part. The tests were finished on December 31 and ended

in a fiasco; none of the guns passed. Despite this, the S–53 gun was considered as having the largest potential and, by a decision taken on January 1 1944, was accepted into the inventory of the Red Army. However, this was done under the condition that the gun be modernized. This was carried out under intense pressure, and in a dizzying tempo, in two stages. During the second attempt the design bureau of the No.92 Factory took over the development of the gun which, after modifications at the factory, had its designation later changed to ZIS–S–53.

Evolution of the T–34–85 turret at the No.112 and No.183 Factories.



1. The earliest No.112 Factory version with lifting eyelets and D–5 gun.

2. No.183 Factory turret with lifting brackets — early version turret with the S–53 gun.

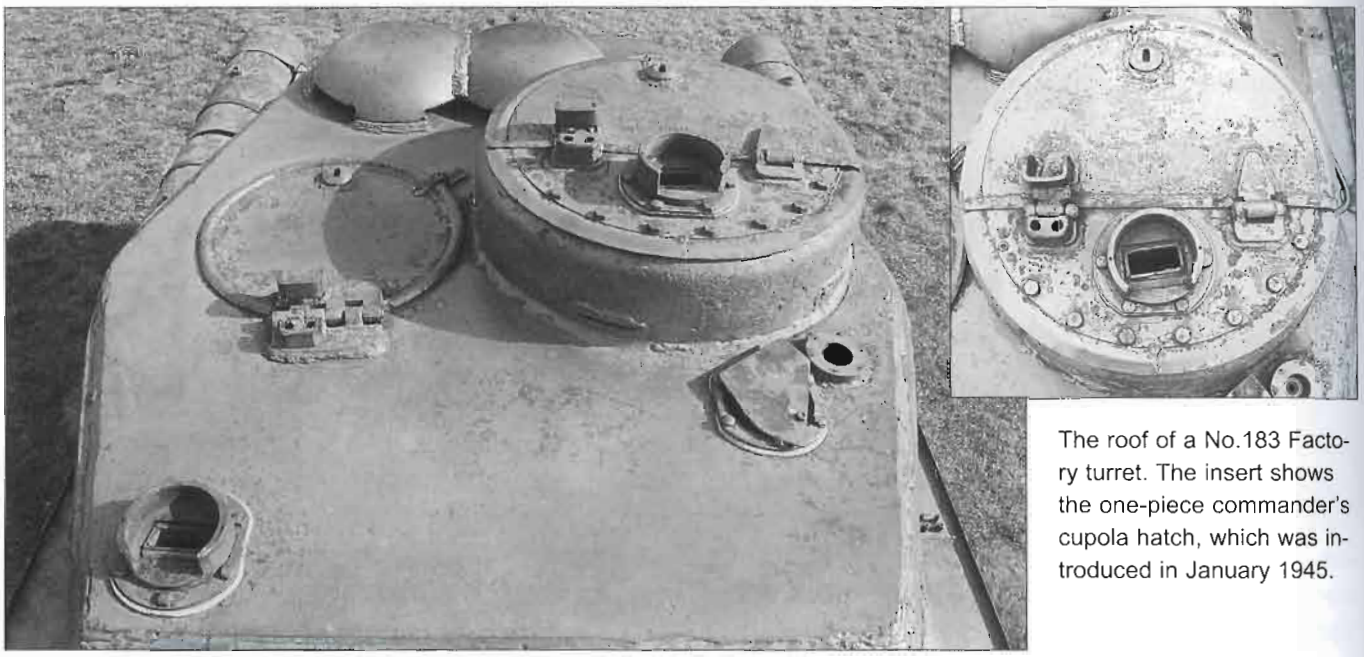
3. No.183 Factory turret with lifting brackets — later version with ZIS–S–53 gun, without the pistol port protection, but with "bulge".

4. No.112 version with lifting eyelets, revised roof and S–53 gun.

5. "Mushroom" turret with two different mantles.

6. A variation of the "mushroom" turret.

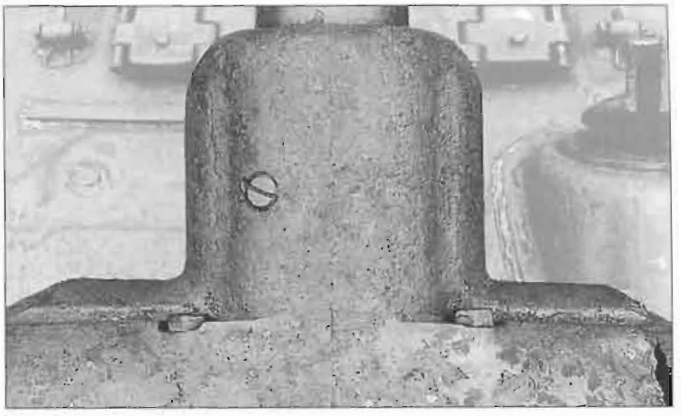
7. Probably a post-war turret.



The roof of a No.183 Factory turret. The insert shows the one-piece commander's cupola hatch, which was introduced in January 1945.

T–34–85 gun mantles.









Top, left: No.112, "alternative".

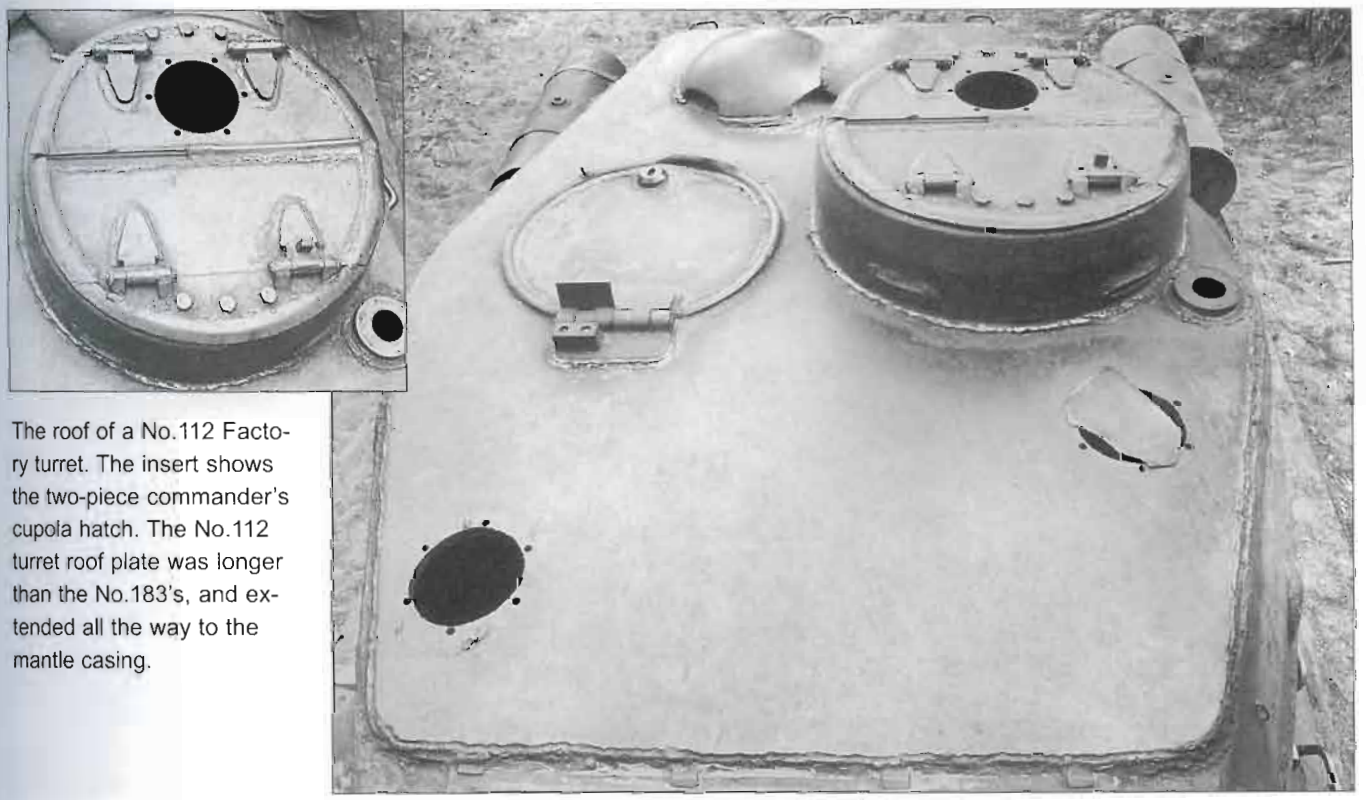
Top, right: Late No.183 for the ZIS–S–53 gun.

Above, left: Early No.112 2nd type for the S–53 gun.

Above, right: Late No.174 for the S–53 gun.

Under this designation, the gun began to be produced at the end of October 1944 and, in 1945, it completely replaced the earlier version.

Of interest is the fact that, even before the gun was ready for the assembly lines, Grabin attempted to push its production through the system. He imposed on the director of the No.112 Factory a decision to prepare the



The roof of a No.112 Factory turret. The insert shows the two-piece commander's cupola hatch. The No.112 turret roof plate was longer than the No.183's, and extended all the way to the mantle casing.

factory for the production of the tank with the new gun[87]. At the same time, he asked that the Narkom of arming and producing tanks approve the project, and the leadership of the factory to carry it out. When, at the beginning of February, government officials began examining the various solutions on the spot, the factory was already carrying out initial work relating to the assembly of the first tanks with the new armament!

According to official data, the gun had passed tests in the hexagonal turret, as well as in the new one with the 1,600 mm ring. However, some dissidents had doubts and called into the factory Nabutovsky, who critically examined Grabin's entire concept. Not only did the gun barely fit into the hexagonal turret, taking up so much space from the crew that they were unable to operate it, it also could not be properly installed in its housing. To illustrate how incorrect the design was, it is sufficient to point out the fact that if the tank was hit by a projectile the gun would have fallen out of the housing!

Support staff and plans were immediately brought in from the No.183 Factory and the turret from the No.112 Factory was adapted to the S–53 gun. The entirety of this work took only a few days and, already in February,

[87] Almost certainly it was the hexagonal turret, as the D–5 tailored turret would not have accepted the S–53 gun. Nabutovskiy's memoirs should also be interpreted with this in mind, not forgetting that he is describing the story in a very much one-sided fashion (*T–34: Put k pobyede*, op. cit., chapter *Ukototitiel "Tigrov"*). It is important to underline here that, according to the available data, clearly the specialists working in various parts of the USSR to modernize the T–34 were not aware of other technological improvement.

This row of T–34–85s, produced at the No.112 Factory, was photographed during a commissioning ceremony in February 1944. These tanks from the 38th Tank Regiment bear the name of Dimitri Donskoy, a Russian military leader who defeated the Mongols at Kulikovo Pole. The regiment's soldiers nicknamed it "the Sacred" because its equipment was paid for with money collected on December 5 1943. The offerings were collected in churches in response to an appeal from Moscow's Metropolitan Sergey, the head of Russia's Orthodox Church. The tanks photographed are the earliest variant, with the "lifting eyelets" turret and the D–5T gun. The commander's cupola is in the center of the turret roof, with a PT–4–7 panoramic sight in front of it, and the radio antenna pot on the right side of the hull. Some of the tanks had brackets on the glacis plate.

- Planeta -





This T–34–85, a product of the No.112 Factory, is crossing a stream in the Far East during the Soviet offensive against Japan in August 1945. This is a winter/spring 1944 production vehicle, with an antenna pot on the right side of the hull and most probably the rounded front hull girder. The turret is a No.112 "large" version, with the ZIS–S–53 gun.

- Author's collection -

ahead of the plan, the first tanks armed with the new gun rolled off the assembly lines of the No.112 Factory. In the middle of March, the S–53 gun began to be installed in tanks produced at the No.183 Factory, and in the middle of June in those produced at the No.174 Factory. At the last factory, in June only 13 vehicles were assembled and in July another 93 vehicles.

The new 85 mm S–53 gun was truly better than its predecessor, the D–5. Pietrov's D–5 gun was heavier



An earlier model of a No.112 Factory T–34–85, probably produced during the spring of 1944. Clearly visible are the mantle with the D–5 gun, the narrow handrails on the glacis (where the single spare links are attached), the No.112 external fuel tank bracket, and the rounded front girder. Although the antenna is not visible, it was almost certainly present on the side of the hull.

- S. Zaloga's collection -



T–34–85s, made by the No.112 Factory, from Col. P.S. Zhukov's 36th Guards Tank Brigade, storm enemy defenses in Moldavia in May of 1944. Judging by the placement of the external tanks (right at the back) and the turret-mounted antennas, these are brand new vehicles. But the tanks still have "lifting eyelets" on turrets.

- Robert Bock's collection -

(1,500 kg versus the S–53's 1,150 kg) and somewhat more difficult to operate. It also had a shorter barrel (51.6 calibers, as opposed to the S–53's 54.6 calibers).

The 85 mm gun was installed in one type of turret which, however, differed slightly, depending on the originating factory. Generally, there were two types of turret, those produced at the No.183 Factory and those produced at the No.112 Factory. While the first was produced in one version, there were no fewer than 6–7 versions (not counting their variations) produced for the No.112 Factory! The main differences between them were limited to the use of different roofs (longer at the 112) and differences in the shape of their sides in the middle. Additionally, the first series from the No.112 Factory had a com-

Remnants of a No.112 Factory T–34–85 destroyed in Rumania in the spring of 1944. Worthy of note are the internal details of the lower hull (in background) and the inside of the turret ring.

- CAW -





Another photograph of a No.112 Factory early T–34–85 with the D–5 gun taken in the summer of 1944. The turret has the antenna pot, and the tactical number "24" and the name of its contributor ("Ufa") are painted on its side.

- Author's collection -

pletely different housing for the D–5 gun and a different set-up for lifting the turret (eyelets, which were later dropped). The early series turrets from the No.112 Factory had the commander's cupola located in the center while on the later ones it was moved slightly toward the rear.

However, what is more important, the turret from the 112 had a slightly different shape from the one installed at the No.183 Factory. Just as was the case of the flat turret from 1941, the 183 turret was more rounded at the front while the 112 turret was slightly flatter. Additionally, the turret from the No.183 Factory had side protrusions on the sides of its center/rear section. Earliest in the summer of 1944, a bulge appeared on its left side due to the modernization of the mechanism for rotating the turret. In contrast to the 112 turret, the 183 turret was less, or more, ribbed.

Another variation of the standard turret from the No.183 Factory was a ribbed turret like the standard (although the number of ribs was smaller), but with a gentler curve in the mold joints at its front[88].

During the production of the T–34–85 at Gorkim, several variations of the turret appeared. Two of them were rather unique. The first turret is referred to here as the „large". Its lower edges extended further to the sides and extended quite far over the edges of the sides of the hull. The second turret, whose mould was made up of 8 segments, is referred to here as „alternative". The mould segments were put together in such a way that the casting seams made a cross on the sides of the turret. The lower parts of the turret and the turret ring were cast as one section.

Despite the differences between this turret and the multi-segmented hexagonal turret, there are many indications that the first was a continuation of previous technological solutions. It appears certain that this type of turret remained in production approximately to the end of 1944. It was then replaced by a turret which we name "mushroom", and which appeared in period photos in the spring of 1945. The casting of the turret was more or less similar to the othet No.112 turrets but, at

[88] There is a frequent opinion in the literature that these were the repaired vehicles, given the fighting compartment roof with a larger 1,600 mm (63-in.) diameter turret ring during the overhaul. This is not true. The hulls with an antenna pot at the side were the first series factory-built vehicles, and not the "puzzles". If however there would be an aerial pot at the side and the antenna on the turret, then (and only then) this might be such an elusive "puzzle" after a factory overhaul. Given the amount of work it would take to convert the old tank into a new one by replacing the roof plate or cut a larger diameter turret ring, it is highly improbable anyone would bother with it during wartime and mass-production of expendable tanks. The chief difficulty would have been in tearing or torch-cutting out the roof plate welded between the three 45 mm (1.78–in.) armored steel plates. On the other hand, this story, most probably originated by Janusz Magnuski, might be the case in Poland shortly after the war, before the indigenous production of the T–34–85 started.

- Author's collection -



Left and right:
Two shots of No.183 Factory's T–34–85s with interesting markings, which were photographed in action in 1944. However, more intriguing than the markings or the two-tone camouflage are the unusual shapes of their gun barrel recuperators. Right: It seems to be a form of a counterweight set to improve the gun's balance. Note also the armored plate covering the gun mantle from the top (see also p. 194, top). Usually, in this spot a piece of common sheet-metal was fastened with screws.



the back of its side, the casting seam from the forms ran along the edge rather than in the middle. This suggests that perhaps in this turret the part which was over the engine compartment was thinner to decrease the turret's weight. It should be emphasized here that this was only one of two types of the turret. In general, both looked the same, and differed only in this one characteristic; on one the casting seam ran along the edge of the turret, on the other it ran along the lower part of the side.

On all types of turret, the single ventilator cover was replaced by two ones. At the end of the war (beginning of 1945) the two ventilators were separated on No.112 "mushroom" turret; one was moved to the front over the gun (that is, where it was most needed) and the second

This staged photograph of dismounting infantry during an attack on enemy positions was taken in June 1944. The tank is a result of the workers and intelligentsia toiling at the No.183 Factory. The tactical number "448" has been painted on the turret side.

- V. Kulikov's colection -







stayed where it was. The separated fans received new, more pointy covers and were attached to the turret in a different way. The periscopic sights PTK or PT–4–7 were only installed on the newest turrets at the No.112 Factory, and later the MK–4 was installed as standard. In January 1945 the commander's cupola had its two-part hatch replaced by the one-part unit.

Apart from the turret (and, obviously, its equipment such as the TSh–15 sight), basically, the T–34–85 did not differ from the T–34–76. As far as the hull and the various mechanisms are concerned, they were simply a result of the continuing modernization of the vehicle.

The tank's hull remained essentially the same. The earliest series vehicles still had the antenna on the right side of the hull, and the rounded front linking girder. Just as on the last series T–34s, attachments for spare track links appeared (in March 1944 at the earliest, but not at all factories) on the front of the T–34–85's hull, and a signalling horn was installed at the front of the hull's left side. A 9RS radio, of better quality and with a range of 27 km (the 9R had a range of 22 km), was installed. Certainly, almost from the beginning of production, the T–34–85 had a slightly modified motor and the efficient „Multicyklon" air filter. A new type of mud guard (with

sharp edges rather than the rounded) was introduced at the No.183 Factory, but it is not known exactly when this was done. The last modification, brought in during the spring of 1945 at the No.112 Factory, was a new type of road wheel. It had been designed already in 1940.

As on the preceeding T–34–76, the T–34–85s from the No.112 Factory differed from those produced by the No.183 Factory in the details of the hull rear. The tanks from the No.112 Factory had two wide hinges and the upper plate was on top, while those from the No.183 Factory had two narrow hinges (not three like those from the period 1942–1943) and its upper plate was let in into the lower one. It should be also mentioned that tanks from the No.174 Factory differed from the other factories in the same details; its tanks had two wide hinges and its upper plate was let in into the lower plate.

An interesting initiative introduced in the T–34–85 was a firefighting system which, however, was not introduced widely. Only 30 such modified tanks were assembled at the No.112 Factory.

It can be said that the T–34–85 tanks were generally produced in 4 different versions. The first included the tank with the D–5 gun and its command version with the RSB–F radio, both produced by the No.112 Factory. Of the first vehicle, 250 were built, of the second, only 5. In February the production lines started to turn out a tank with the S–53 gun. It became the basic production model. This model was also produced as a line version and as a command version with the RSB-F radio (the command version was most probably produced only at the No.112 Factory).

The production of the T–34 in 1944 was as follows:

	112	*183*	*174*	*Total*
T–34–76	795	1,883	1,163	3,796
T–34–85	2,953	6,583	1,000	10,536
Total	*3,748*	*8,421*	*2,163*	*14,332*

This and facing page:
This series of photographs shows No.112 Factory-produced T–34–85s training during the summer of 1944 in the Warka-Magnuszew Bridgehead, near Warsaw. The Polish armor brigade co-operated there with the Soviet 164th Tank Brigade of the 16th Tank Corps. Tanks of the164th Brigade had the letter "T-", followed by two digits, as the tactical number. The first digit most probably indicated the company number within the brigade, in this case a "3", while the second digit was the tank's individual number within the company. These tactical numbers were also present on the back of the turret. Note that vehicle T–31 has a Red Star painted on the turret side, but T–36 does not.

- WAF -







Another No.183 Factory T–34–85 during the summer 1944 fighting in Belarus and Ukraine. The turret of the foremost tank has the side pistol port protection and no ribs over the mould seam, dating it as an early series.

- Dmitri Karlenko's collection -

Along with the beginning of production of the T–34–85, at the No.183 Factory a developmental version of the tank was supposedly designed. It bore the designation T–34–85M. Its main design changes were; the first ver-



This souvenir photo of the 143rd Tank Brigade's officers, who are using as a backdrop a T–34–85 produced by the No.112 Factory, was taken during the winter of 1944/45. The tank has the rare "alternate" turret, but with ZIS–S–53 gun (note the cover of gun mantle for gun barrel). The mould seams run along, and up and down, the side of the turret, creating a cross (the perpendicular seam is on the right edge of the "2").



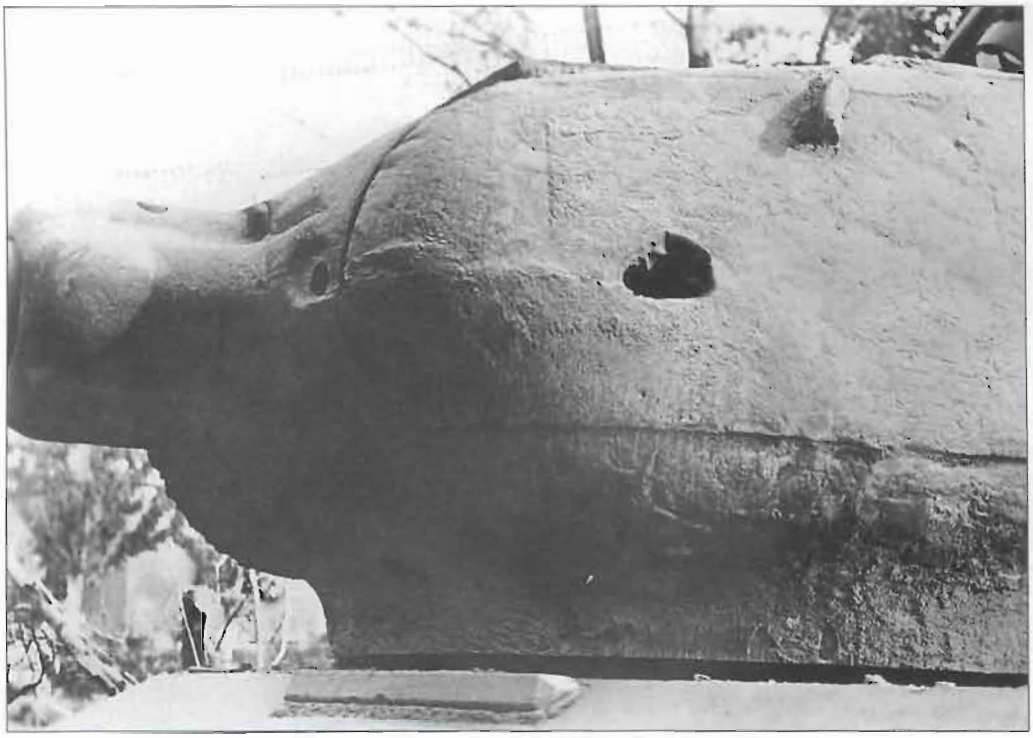
sion had an improved armor design, the second also had a redesigned hull rear.

The first version had the hull's rear, bottom and top armor thickness reduced in return for a thickened front armor (a 75 mm plate, protection for the hull machine gun and a 90–100mm thick driver's hatch). At the same time, the gearbox was modified, which improved somewhat the tank's driving parameters. The second version, beside the above mentioned changes, also received a new

Above and below: Two photographs of T–34–85s of the 2nd Tank Army that were destroyed by the Germans during the fighting around Warsaw in August/September 1944. Both were manufactured by the No.183 Factory, which is confirmed by their turrets (with the S–53 gun), and by the hull rear plates. The turrets feature the side port protection and a lack of the side "bulge" on the modified traverse mechanism, details which identified turrets that were produced more or less until the end of 1944.

- CAW -





Close-up of a No.183 Factory-made turret with the S–53 gun. Note the slight rounding of the turret cheek between the two penetration holes and the width of the gap between the turret ring and the hull. This gap, which was not possible to cover in any way, of at least 1–1.5 cm (.50-in.) was one of the weakest spots on the T–34–85.

- *CAW* -



Tank of the same production series. It shows well the side projections of the gun barrel mount (by which we can differentiate between the S–53 and ZIS–S–53 guns) and other characteristic elements of 1944 turrets that were installed on vehicles from the No.183 Factory.

- *CAW* -

hull rear, under which were placed fuel tanks with a capacity of 380 liters. This caused changes in the compartment for the transmission and the exhaust system. As a result of lenghtening the hull, the total length of the vehicle increased from 6,200 mm to 8,300 mm. Its weight increased to 32.3 tons.

Despite the fact that the concept of this modernization hit the mark, and that the vehicle, as all indications show, proved itself worthy, unfortunately a decision was not made to add it to the Red Army's arsenal.

After the war, the production of the tank was continued. Vehicles assembled or used after the end of the war can be easiest recognized by the presence of a coiled cable on a special bracket on the left side of the hull. This modification appeared at the earliest during the period end 1945/beginning 1946. Immediately after, the concepts of production were generally changed, which improved the quality of the finished tanks. This is easy to see when looking at the cast turrets, their war-time rough appearance disappeared forever.

It is true that it is now more often accepted that the production of the T–34 ended in 1946, but this seems to be impossible. At the center of this matter lies the hull of the post-war tank which underwent a real modernization. The front linking girder was eliminated and the top and bottom plates of the hull front were joined directly.This is the appearance of the tanks produced in Poland in 1950 and later. Meanwhile, in the USSR, such vehicles do not

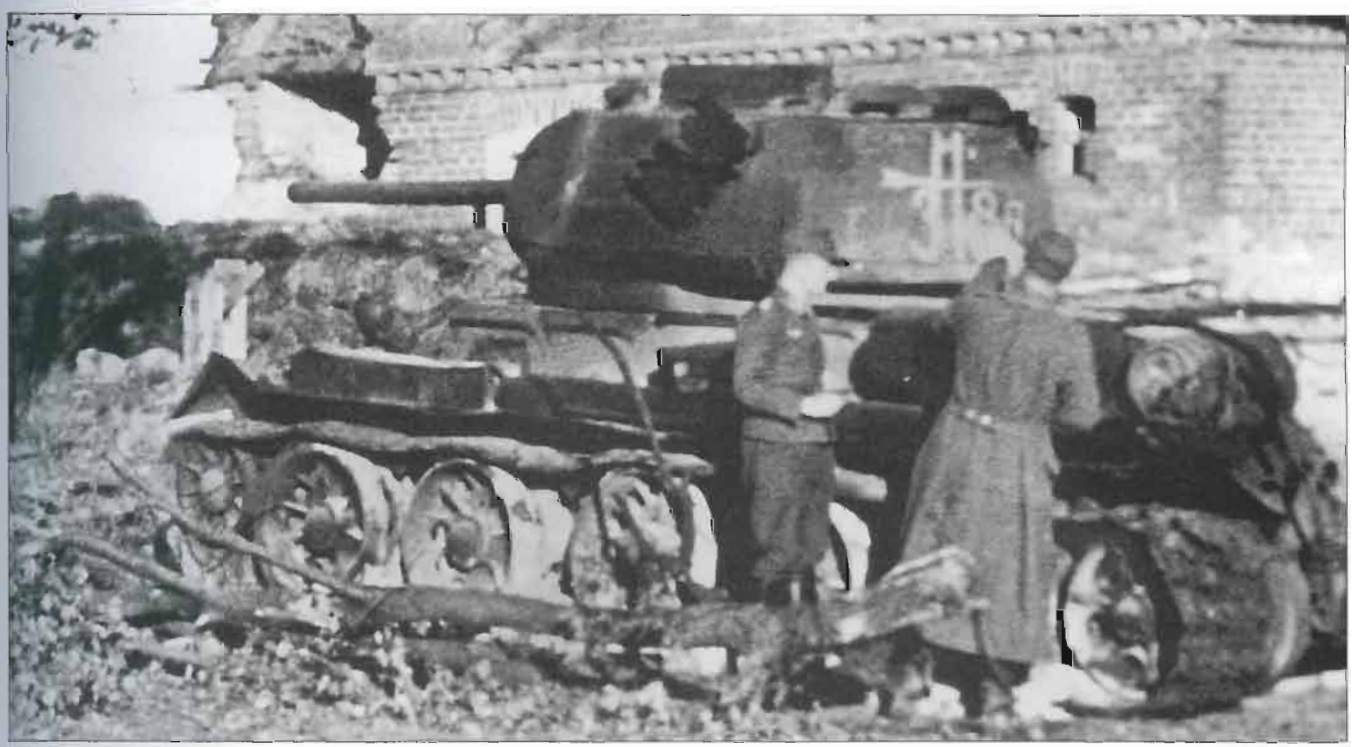


Above: Ammunition is being loaded into a T–34–85 marked in a manner peculiar to the 2nd Guards Tank Corps in the second half of 1944. Above the arrow is the Cyrillic letter "L"(indicating the 4th Guards Tank Brigade), the number "181" below the arrow signifies the vehicle's tactical designation, and the letter "a" indicates the 1st Battalion of the brigade. The aerial quick identification sign, consisting of a broad white band, is painted on the tank's glacis and turret. Especially interesting and puzzling is the contraption on the right side of the turret behind the tactical sign.

- AA -

Below: This burned out wreck (most probably produced at the No.112 Factory) of a T–34–85 from the 2nd Guards Tank Corps, was abandoned in an East Prussian village. Its tactical sign on the rear of the turret identifies it as being from the 2nd battalion (Cyrillic letter "b") of the 26th Guards Tank Brigade (Cyrillic letter "I").

- CAW -





Above and below: These two photographs show another T–34–85, produced by the No.112 Factory and destroyed in October/ November 1944 in East Prussia. Its tactical number is "244". This is a vehicle from the 1st Battalion (letter "a") of the 25th Guards Tank Brigade (letter "B" above arrow).

- CAW -



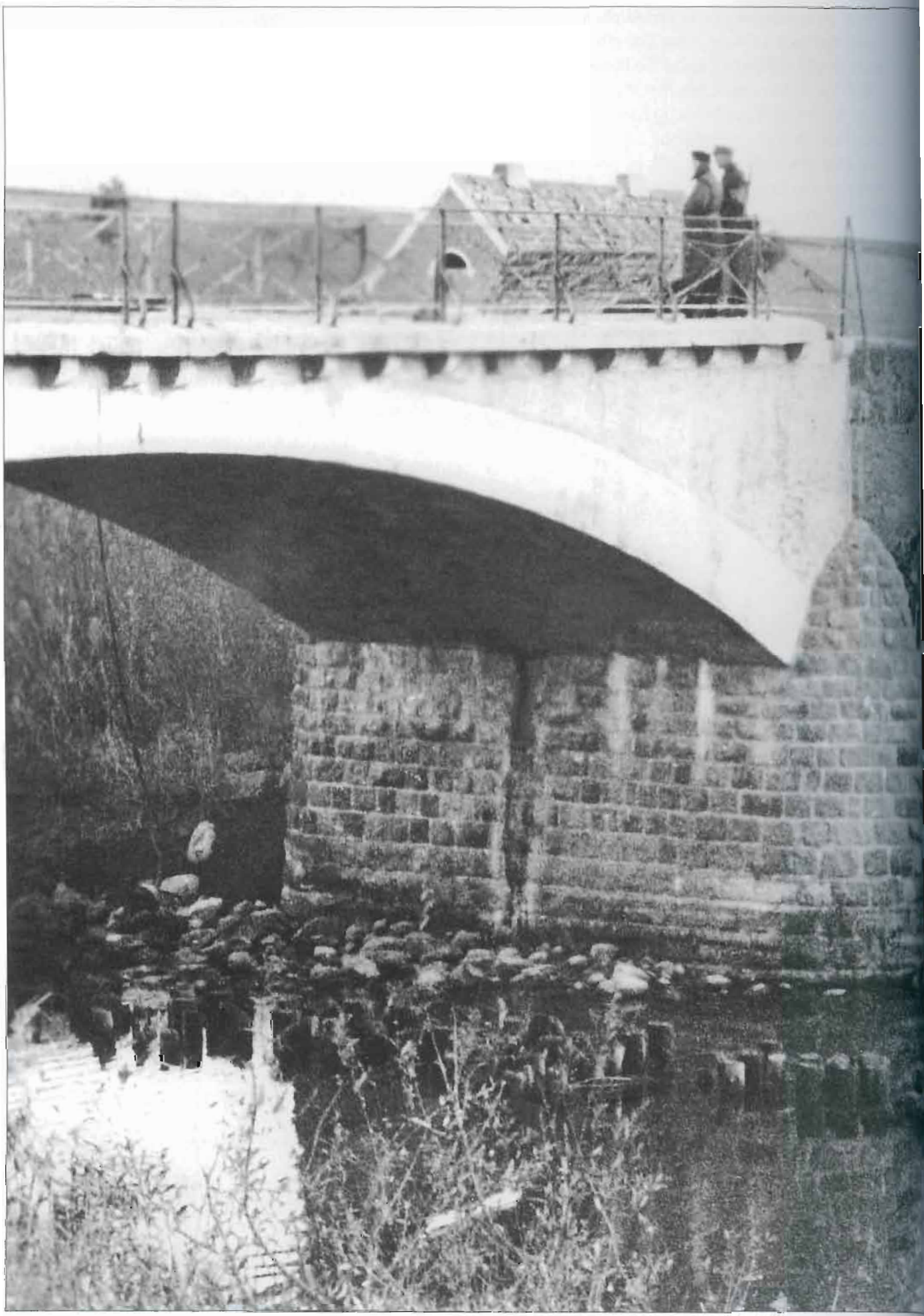
appear on monuments or in period photographs. This means that such a change came into effect late, most probably shortly before the sale of the licence to other countries. This, in turn, indicates that the production of the T–34 in the USSR surely had to continue to, at least, the same time. It is obvious that the Soviets could not have ended the production of the tank in 1946, and then have subjected it to far-reaching modifications which remained on paper only.

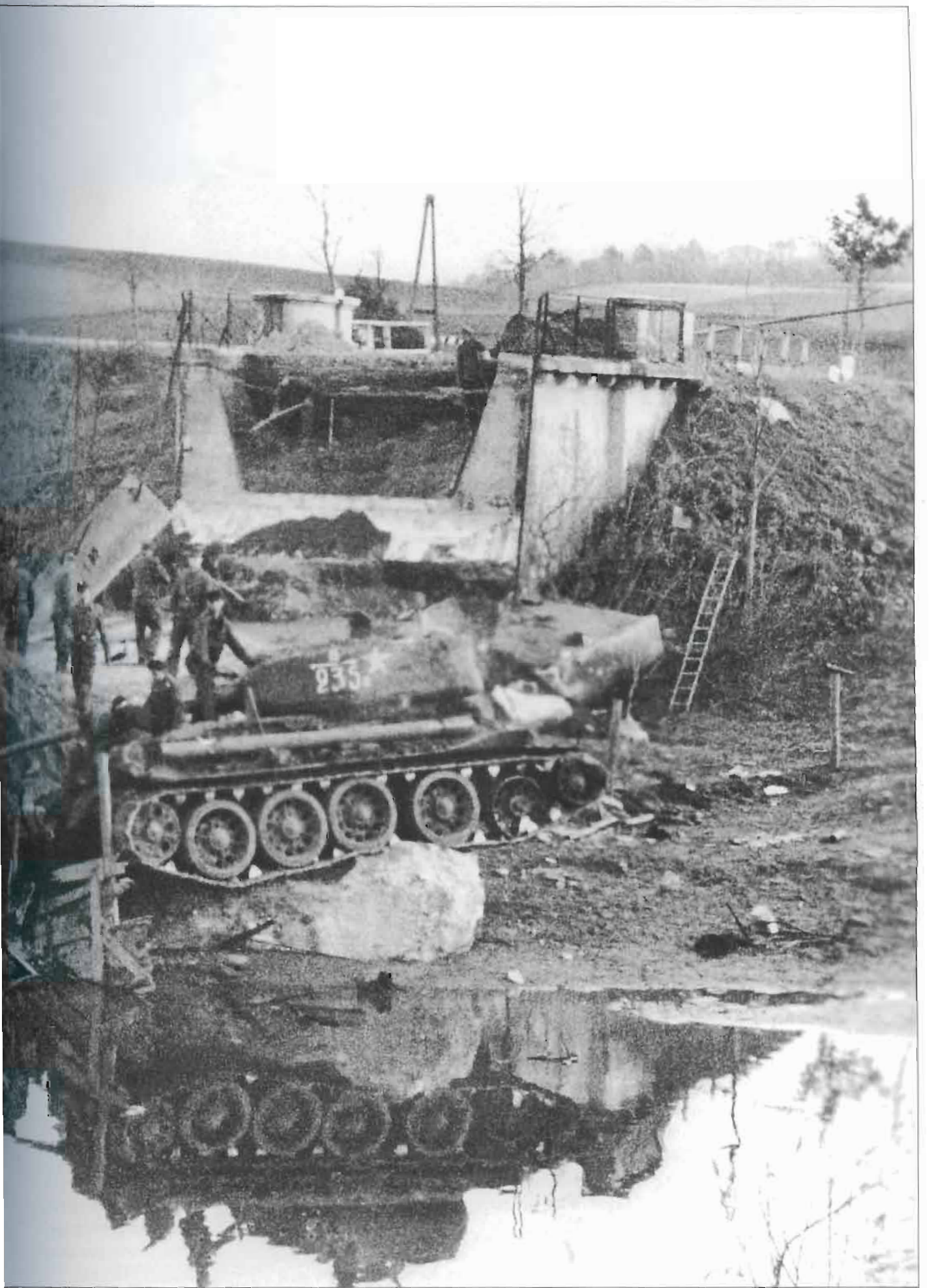
It is worthwhile to remember that by June 1945 (in the case of the No.174 Factory, by May) 6,002 T–34s had been assembled. At the end of the war there were at least 11,000 tanks of this type in service, mostly of the newer variants and at least in good condition. After the end of the war in Europe, during 1945 another 6,549 tanks were produced, a rather sizeable number. Therefore, as

Pages 213–215: Three photos of a T–34–85 of the 25th Guards Tank Brigade that fell, together with the blown-up bridge, in Eastern Prussia, when the 2nd Guards Tank Corps entered German territory in October 1944. This tank has the tactical number "235" and the letter "a", identifying it as the 5th vehicle (3rd Platoon) from the 1st Battalion's 2nd Company.

- CAW -






235



a result of having a fleet of 17,000 T–34s, the very limited production of the T–54 begun in 1946, and lastly, the stagnation of the post-war military, the maintaining of the production of the T–34 was the obvious course to follow. When bringing into production a new tank, one does not immediately stop the production of its predecessor. During the course of the war, when the production was huge, the exchange of equipment took approximately three years. During peacetime, this time period was, at least, doubled. Additionally, this vast number of vehicles produced during the period 1944–1945 had to be utilized to the utmost, and not simply discarded on the scrap heap. For this, a constant and large production of spare parts had to be produced, and occasional renovations of the factory equipment had to be made.

In this entire question it is certain that in the USSR the T–34–85 underwent a fundamental modernization only at the end of the 1950s. This resulted in the creation of a new version of the tank, the T–34–85 „Model 60". Of the changes which were instituted, some were substantial and others were minor. Of the substantial, the following are worthy of mentioning; the installation of the FG–100 infra-red device for night driving (which caused the moving of the existing headlight to the right side of the hull), the replacement of some of the observation equipment, and the replacement of the 9R radio with the 10–RT–26E radio. In the engine compartment 2 VTI–3 air filters were installed, the warming up of the motor (for easier starting in winter) was made possible, and the generator was replaced by a more powerful unit.

However, what is more important, the tank received the new V–34–M2 engine. This indicates that the engines for the T–34 (wartime designation was V–2–34) were still produced in large numbers (at that time, already over ten years had passed since the end of the war). This, in turn, can lead to the conclusion that, in terms of numbers, the T–34 was still a substantial component of the Soviet armored forces.

At the end of the 1960s, an even newer version of the T–34–85 appeared, and was designated as the „Model 69". During this modernization, all observation equipment was replaced with infra-red devices, the R–123 radio replaced the previous one, and the tank was adapted to crossing water obstacles along their bottoms (possibly incorporated into a sub-variant). The road wheels were replaced by those from the T–54, which probably caused small changes in the suspension.

* * *

It is also important to remember that not only were the tanks built after the war modernized to the „Model 60" standard, and later the „Model 69" standard, but that tanks from war-time production were also modernized to those standards! As an example, there is a known photograph of an Iraqi tank destroyed in the 1980s. It was produced in the No.112 Factory during the period 1944/1945.



This unit, equipped with T–34–85s, was photographed during a charge in early 1945. The vehicle in the foreground has a Red Star with the tactical number "320" below, and some kind of insignia in front of it (a Guards emblem?).

- Author's collection -



These T–34–85s, from the early 1945 production series from No.183 Factory. The unit's tanks carrying the word "Lembitu" ("To Lembit") were funded by Estonian workers. These vehicles belonged to one of the corps taking part in the battle for Koenigsberg at the beginning of 1945. Letter B (V in cyrylic) indicate a troop, and 23 a vehicle.

- Robert Bock's collection -

PRODUCTION

In all, 6 factories produced the T–34 tank.

1. Uralskiy Zavod Tyazhelogo Mashinostroyenya („Uralmasz", UZTM) in Swierdlowsk — from mid-1942 to mid-1943
2. Czelyabinskiy Kirovskiy Zawod („Tankograd", CzKZ, previously CzTZ) in Czelyabinsk — from mid-1942 to beginning of 1944
3. Zawod No.174 in Omsk — from mid-1942 to end of war





These two photos of T–34–85s produced at the beginning of 1945 (turrets are typical of 183 Factory) showing the markings of one of the tank corps that fought somewhere on the Polish-German frontier in early 1945. The traditional rhombus with "moustache" contains the number "44" on top and the number "38" at the bottom. Additionally, a varying number of bars were painted on the front of the turrets, possibly denoting a particular battalion or company within the brigade.

- Planeta -



A T–343–85 of the 7th Guards Tank Corps passes an American Lend Lease M16 anti-aircraft half-track of the 287th Anti-Aircraft Artillery Regiment somewhere in Poland, mid-February 1945. The tank has the typical No.183 Factory turret, with the tactical insignia of the 16th Guards Tank Brigade (a mustachioed rhombus with "16" above the divider and the number "32" below). The number "32" also appears in large digits on the back part of the turret's side.

- Robert Bock's collection -

	183 ChTZ	*183* UTZ	*STZ*	*112*	*174*	*CzKZ*	*UTZM*	*Total*[89]
1940	115	—	—	—	—	—	—	115
1941	1,560	25	1,250	161	—	—	—	2,996
1942	—	5,684	2,520	2,718	417	1,055	267	12,661
1943	—	7,466	—	2,851	1,347	3,594	452	15,710
1944	—	8,421	—	3,619	2,163	445	—	14,648
1945	—	7,356	—	3,255	1,940	—	—	12,551
('45 I)	—	3,592	—	1,545	865	—	—	6,002
('45 II)	—	3,764	—	1,710	1,075	—	—	6,549
TOTAL	**1,675**	**28,952**	**3,770**	**12,604**	**5,867**	**5,094**	**719**	**58,681**

4. Stalingradzkiy Traktornyj Zawod (STZ) in Stalingrad — from beginning of 1941 to fall of 1942
5. Zawod No.112 „Krasnoje Sormovo" in Gorky — from end of 1941 to end of war
6. Charkovskiy Traktornyj Zawod (ChTZ) No.183 in Charkov — from end of 1940 to fall of 1941, later...
7. Uralskiy Tankovyj Zawod (UTZ, previously UWZ) No.183 in Nizhniy Tagil — from end of 1941 to end of war.

It is important to understand that the production numbers given above are not the final word on this matter. The above table, as is probably the case in all others, does not take into consideration the countless tanks that passed through these factories after a complete overhaul. The best indication of this comes from the data concerning the production of the No.183 Factory. According to the data given above, over 30,500 tanks were produced there. However, on May 26 1945 the factory workers celebrated the fact that they had turned over to the army the factory's 35,000th tank. From this, it appears that, besides producing over 30,000 new tanks, the factory also overhauled 4,500 heavily damaged vehicles that were recovered from various battlefields. After their overhaul, they were delivered to the Red Army as new vehicles. Using the same factor between the new and overhauled vehicles for all the factories, it can be assumed that the Red Army received another 6,500 T–34s during the span of the entire war. As a total, this would give approximately 65,000 tanks produced in the years 1940–1945, or a total of 58,500 during the duration of the war in Europe. The total losses during the war totaled 45,000 tanks of this type.



This and facing page: These two shots show a column of T–34–85s somewhere on the Polish-German frontier, early 1945. The leading tank in the photograph on the right is a product of the No.183 Factory, displaying a triangular tactical sign and the tactical number "343", and behind it is a No.112 Factory product. That second tank (with the tactical number "342") is shown as the leading vehicle in the photograph to the left. In front of the tactical number is the unit's tactical insignia, a triangle with what appear to be three dots. The 9th Tank Corps used a similar insignia.

- Robert Bock's collection -

[89] It seems that only the line vehicles were mentioned in this table.



A T-34-85, produced in the No.112 Factory, in the ruins of Gdansk (Danzig), spring of 1945. This shot clearly shows the details of the top of the turret, typical for the producer. This is a "large" turret model.

- WIH -



This T–34–85, most probably a product of the No.183 Factory, was photographed on the streets of Gdansk in the spring of 1945. This tank belonged to the 8th Guards Tank Corps that was hammered so badly by the Germans around Warsaw a year earlier. The tactical number "849" on the turret had the Corps' tactical sign and the identification white band above it. It appears that the number signified that this was the 9th vehicle in the 4th Company of a brigade that was coded with the number "8". Beside the "8", the numbers "3" and "9" are also known. This corps was composed of 6 brigades and regiments, in addition to the HQ and independent battalions.

- Author's collection -



1st Lt. M. Anikanov's crew poses for a photo somewhere in Austria, April of 1945, with their T–34–85 as a backdrop. Its tactical markings are a "K" followed by an encircled "3", and the tactical number "3193", indicating that this unit is a part of a corps.

- CAW -

Above: This T–34–85, a product of one of the No.183 Factory's last wartime series, drives through a German town near Berlin in April 1945.

- Planeta -

Below: This 1945 series production T–34–85 fires in the evening. Particular attention should be paid to the gun barrel, which displays two unique features — a strange element on the mantle's gun sleeve, and two rings in the middle of the barrel that may have been some kind of counterweights.

- Robert Bock's collection -

This wreck of a T–34–85 produced by the No.112 Factory was photographed on a street of the devastated Berlin in the summer of 1945. The tactical number "232" and the remnants of the quick identification band can be seen on the turret.

- CAF -





Above and below: These T–34–85s were photographed at the end of the battle for Berlin, May 1945. Both photos show tanks that were field-modified with chain-link panels welded in the most vulnerable spots. The panels were meant to protect the tank crews against penetrations by Panzerfausts. Although from different units, both tanks have similar quick identification stripes around their turrets.

- above WAF, below Robert Bock's collection -





Above: A T–34–85 from an unidentified unit enters the center of Prague at the beginning of May 1945.

Below: This tank unit is preparing for a parade in post-war Germany. All of the tanks have the one-piece commander's cupola hatch covers, top-covered MK–4 episcopes, and driver's hatch with its inside painted white. The tanks have a three-digit tactical numbering: 154, 153, 152 and 150. Each tank's last numeral is also painted on the front fender, next to the small star.

- Robert Bock's collection -





Above: The crews of this tank unit are preparing to march through Manchuria in early August 1945. Two interesting facts of this operation in the Far East were that two armored divisions took part in it and that a number of old vehicles were used, including T–34s produced in 1941 and even T–26s and BTs. However, a number of units were stiffened with the newest T–34–85s, as is proven by the tank in the background that is the type of No.112 Factory vehicle with "mushroom" turret. It has "25" as its tactical number and next to it a star with a white outline.

- WAF -

Below: This T–34–85 from the No.183 Factory was also photographed in Manchuria. The atypical quick identification sign on the turret appears as if it was pasted on.

- Planeta -



This crew of a T–34 with the "V4" tactical sign and the phrase "Dayesh Krim" (Crimea or Bust), celebrates the Red Army's victory in Sevastopol in May of 1944. There is a photo of a different tank with the same markings, suggesting that the "V4" designated a unit rather than an individual tank.

- Planeta -



Heavily loaded T–34s are moving further into Poland after crossing the Bug River in July 1944. Note the towing hook welded onto the lower rear plate between the hinges. These certainly appeared on tanks produced at the No.112 Factory already in the spring of 1943.

- V. Kulikov's collection -





This T–34 was probably destroyed during the August 1943 battles on the Mius River front. Its four-digit tactical number ("5325") is certainly unusual. Behind it is a square divided into three fields with letters or figures inside. The top character is a Cyrillic "P", which is an "R" in our alphabet.

- CAW -



This burned-out wreck of a T–34 has the Uralmash turret T–34, with a commander's cupola, fall of 1943. This shot clearly shows the rear of this type of turret. Judging by the external fuel tanks brackets, this tank is a ChKZ product.

- CAW -

One of the best known, this propaganda photo shows T–34s attacking with fusiliers in Belarus in July of 1944. These are tanks from the 24th Tank Regiment of the 46th Mechanized Brigade commanded by Col. N. Manzhurin. The numbers are painted in red, as is the star, which had a white or yellow outline.

- V. Kulikov's collection -



SPECIAL VERSIONS

The concept of arming the T–34 with a flame thrower was born already in 1939, that is, at a time when the tank was still being tested. At the same time, the initial armament for the A–32, and later the A–34, was configured. The final version of the armament crystallized in January 1941 when it was tested in a T–34. This was the solution to a competition posted by the GKO in November 1940, in which it was required that a T–34 be armed with a flame thrower capable of firing a distance of up to 90 meters. The competition was won by No.174 Factory, whose flame thrower was judged as the best during national trials carried out in May 1941. At the same time, the ATO–41 flame thrower, as it was designated at that time, was accepted into the arsenal of the RKKA. In the period from 1942 to 1943 it was modified so that it could fire up to 130 meters. This version was the ATO–42 and, compared to its predecessor, had a larger container for its fuel mixture, more bottles of compressed air and a number of other changes in its armament subassemblies. In the spring of 1943, No.183 Factory produced the next version, the ATO–43, which, instead of compressed air, used the fumes produced by the tank motor to propel the flaming fuel mixture. In this way was solved the problem of filling the bottles with compressed air, which in turn allowed for the reduction in their number.

The first prototype of the OT–34 (Ogniomietnyj Tank) was built during June and July of 1941 and passed its trials but did not go into series production due to the war's overall situation. It was not until the middle of 1942 that, after the subsiding of the chaos which existed at the end of 1941/beginning of 1942, the production of this type of tank began. This was done at the "Krasnoje Sormowo" facility. In this factory the ATO flame thrower was installed in all models of the T–34, regardless of turret type, which were built there. Once the T–34–85 version came into existence, the flame throwers were automatically installed in it, creating the OT–34–85.

The ATO–41 was fed from a container with a capacity of 105 liters, which allowed for 10 bursts. The complete assembly, depending on the model, weighed no more than 130–150 kilograms. The number of rounds for the main gun was not reduced as the entire assembly was mounted in the station of the bow machine gunner. Initially, this did not pose a problem but, as 1943 wore on, the need for a radio in every tank was recognized. This forced the relocation of the radio into the turret, where it was utilized by, among others, the commander. This also caused the elimination of the antenna fitting on the side of the hull and its installation on the rear turret wall in the OT–34–76 versions.

Meanwhile, in 1942, a very specific version of the T–34 appeared on the front with the side flame thrower. It was installed in steel boxes mounted on the both sides

T–34–85 from the No.183 Factory with an unusual long handrail on the turret. The tank carries the slogan "We Won" on the front plate, and "Al. Nevski" on the turret. Please note the colorful star on the loader's hatch and the specially trimmed front fenders.

- M. Jaroszyński-Wolfram's collection -





The hull of this T–34–76 was produced at the No.183 Factory in 1941. It has the flat turret with two periscopes on the top. This is the flamethrower version with the two big tanks mounted on the rear sides of the hull. The unit insignia, a rhomboid with the number "1" on top and "045" on the bottom, is clearly visible on the turret.

- V. Kulikov's collection -

of the rear part of the hull. This was a permanent fixture slightly similar to a grenade launcher. The individual barrels, five on each side (ten in total) could be fired electrically in salvoes or one at a time. When fired, the flaming mixture could reach a distance of up to 60–90 meters, covering the terrain around the rear sides of the tank with a devastating effect, much like a normal flame thrower. The weakness of this type of armament lay in



Flamethrower tank during the battle near Kharkov, spring 1942. A sheet for quick identification from the air can be seen on the engine deck. The purpose of the thick chains hanging on the back of the vehicle is unknown.

- Robert Bock's collection -



This Flamethrower tank, with the last type of the flat turret and STZ hull, was destroyed by an internal explosion in 1943.

- CAW -

its defensive nature, as it was not possible to frontally attack identified targets.

During the war there were 1,170 OT–34 tanks built and over 400 OT–34–85s, of which 210 were built in the first half of 1945.

Among the special vehicles based on the T–34 were tanks equipped with mine rollers. They made their combat appearance in 1943. The mine roller assembly was composed of two rollers mounted on a frame. This assembly was attached to the tank's two special hooks, which were welded to the hull's lower front plate. The assembly was also secured with two steel cables to eyelets on the slope of the hull front.

The roller, which weighed 5.3 tons, was manufactured in Tula under the designation PT–3. The earlier versions, PT–1 and PT–2, did not reach mass production. The mine roller was accepted for production in April 1943. It was probably used in action for the first time in August 1943 in a regiment of the Voronezh Front in the Kursk area. The mine roller was installed on both the "76"and "85"versions of the tank.

Command tanks made their appearance at the front in small numbers. Equipped with special combinations of radios with a longer range (RSB-F), they were used by corps and army level commanders. According to available information, approximately 200 of these vehicles were built from beginning of 1944 to mid-1945. All were built based on the T–34–85. There are also in existence vehicles where the antenna housing is mounted on the roof of the turret, which would indicate that a larger radio was mounted on the inside, serviced by the machine gunner and the commander. One such vehicle has been preserved in the museum of the Armored Forces Officer School. If this is a vehicle which was delivered during the war, that would make it a tank which was produced before the spring of 1944. This is indicated by the serial production numbers of the School's vehicles from the period of 1944–1947. Occasionally, tanks of this type are referred to as T–34K, but it is really not known for sure if this is not just an alternative designation.

The "Armored Propaganda Tube" appears to be a very specialized type of vehicle. It seems to be a local front initiative built in one of the repair shops. This supposition appears to be confirmed by the complete lack of any evidence of a series production. Two enormous speakers mounted on the sides of the turret were shielded by armor plates welded to the sides of the hull. From the front, the assembly was shielded by horizontal shutters. Beyond these alterations, the tank did not differ from the standard line vehicles and could participate in every standard armored operation. According to the available information, a tank of this type was used during the summer of 1944 to disrupt the German defense by calling on its soldiers to desert. Its, probably entire, crew was composed of captured German tank troops who served in the Committee for a Free Germany.

An equally rare version of the T–34 tank was the bridge layer tank TM–34 (Tankowyj Most), of which a few units were built in the Leningrad workshops (Facility No.27) at the Leningrad Front. The vehicles were based on pre-war experiences when the Soviets created a bridge tank based on the T–28. They were not accept-





Two photos of the flamethrower version during state tests at the beginning of 1944. This vehicle was assembled at the No.112 Factory, but its turret comes from the UTZM Factory. Note the antenna mount on the rear wall of the turret (second photo).

- V. Kulikov's collection -

ed for equipping the Red Army, remaining a local initiative. The version was constructed on damaged vehicles, without turrets, as well as on line vehicles with turrets. The TM–34s, after being incorporated into the army in November 1942, took part in the battles of the Leningrad Front in 1943 and 1944.

Starting in 1943, gradually but on a big scale, based on T–34 tanks, the Russians started to create the T–34T (T = Tyagach — literally "puller"or "tower") recovery vehicle. Its mission was to give technical aid to the fighting vehicles during battle and to tow damaged vehicles from the front line. These vehicles were converted from tanks that were damaged in previous combat and could not be made battle-worthy. Specifically, ones that lost their turrets, either due to being shot off the hull by enemy fire or by being blown off the hulls through internal explosions. When a tank's turret was torn off the hull the turret ring lost its shape and the upper plate of the fighting compartment was slightly deformed. This made impossible the installation of a new turret ring so that the turret could turn without jamming or other problems.

The T–34Ts were exclusively converted at the rear repair workshops, mainly at the army and front level. The vehicles were equipped with special equipment and eventually with external installations, such as a hoist. While initially the turret opening was covered with a tarpaulin, gradually many of the vehicles had built roofs over the fighting compartments, covering the turret ring gap. These were outright improvisations using wood and, on a larger scale, armored plates. It seems quite certain that in the second case an opening (or two) was always cut out for the crew, over which were installed the standard



Above: This flamethrower variant with the softedge hexagonal turret was disabled by the Germans in the spring of 1944. This tank can be identified as an early 1944 production by the pistol port in the side of the turret, the horn on the right side and the angular linking girder.

- S. Zaloga's collection -

Below: This Flamethrower tank, photographed from the rear at the beginning of 1944, was produced on the base of the No.174 Factory hull. The tactical code "50K" is visible on the turret, as is the antenna pot on the rear wall. Note the unusual hinge next to the starter hatch, as well as hinges of the rear hull plate, typical for No.174 Factory.

- S. Zaloga's collection -





Two photos of the same Flamethrower tank destroyed by the Germans in 1944/1945. This tank is a very late-production tank, spring-summer 1944. It can be recognized by the lifting hooks on the turret and the MK–4 periscopes. The tank has the angular linking girder, and the tactical code "S–6" on the turret.

- D. Sieńkowski's collection -

turret hatches. Over time, probably still during the war, it was intended to install on steel bases the commander's turret cupolas. However, this seems highly improbable. After the war, a number of self-propelled SPK–5 cranes were built in the USSR using these vehicles.

The most interesting fact is that a recovery vehicle based on the T–34 was already produced in April 1940. It was designed by a team under the direction of N.G. Zubariew. This recovery vehicle project was designated as "Machine 42". In September 1942 two prototypes of this vehicle were assembled in Factory No.183 under the designation of "Object 42". However, due to the necessity of keeping a high tempo of production of the fighting vehicles, the production of "Object 42" was abandoned. Instead, a decision was made to adapt damaged T–34s as recovery vehicles.

During the war a number of developmental prototypes were built, such as a vehicle to cross water obstacles along their bottoms. The first prototype did not have a designation, the second was called SG–34 and a third PTH–34–85. All had special modifications, air intakes and changes that made the tanks waterproof. At the same time, the army tested many improvising methods to waterproof the tanks with a variety of materials.

The T–34–100 tank, which was developed in the second half of 1944, did not make it past the prototype stage. It was intended to replace the T–34–85 in the near future. The idea of re-arming the T–34–85 with the 100 mm gun emerged at the same time that this gun was used to re-arm the SU–85. However, since the realization of this concept would have only occurred in the second half of 1945, when the planned production of the T–54 was to begin, it was abandoned. As a result, only 2 prototypes were produced; one was an improvised tank, the second a more substantial effort. The improvised version carried a turret from Factory No.112 ("mushroom") into which an LB–1 gun was fitted while the substantial



version resulted from rebuilding a standard tank. As a result of the developers' efforts, the bow machinegun disappeared and the sides of the hull were widened, as was also done with the T–54 tank to accommodate the widened turret ring whose diameter was increased to 1.7 meters. The turret, which was slightly enlarged, was flattened. Both prototypes were built during February and March of 1945 and passed the national trials in April of that year.

Another variation that was built on the T–34 was a self-propelled anti-aircraft tank. A wartime conversion was probably improvised in a repair workshop. The German pilot who made a report about it in the spring of 1945 described it as a "Moebelwagen" on a "Christie" chassis. It appears that the Soviets installed a 37 mm gun, as machineguns would not have been visible to the pilot, on a hull which was protected by surrounding armored plates. A further modification was built after the war in China. The turret with the gun was replaced by an open turret with two co-axial 37 mm guns. The vehicle performed quite well and took part in the Vietnam War in the 60s and 70s.

- *Robert Bock's collection* -





- *V. Kulikov's collection* -

Two photos of T–34–76s with the PT–3 mine rollers. The top photo was taken during the Battle of Kursk 1943, and the bottom one during a proving ground trial.

This T–34–85 (the turret is from the No.183 Factory) with a mine roller frame was photographed while rolling along a Manchurian road in August 1945.

- *ex-WAF* -





Two photos of the same Flamethrower tank destroyed by the Germans in 1944/1945.
This tank is a very late-production tank, spring-summer 1944. It can be recognized by the lifting hooks on the turret and the MK–4 periscopes. The tank has the angular linking girder, and the tactical code "S–6" on the turret.

- D. Sieńkowski's collection -

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this mean in practice? While this seems improbable, this was a result of overhauling the vehicles. This must have been more than a capital renovation as it resulted in almost new vehicles, explaining the appearance of a new set of serial numbers at the end of the 1940s and the beginning of the 1950s. The reality that we are not looking here at renovations is proven by the fact that when the T–34–85 was exported to Poland in 1951, in addition to a large number of new vehicles, there were several tanks with serial numbers from the period of WW II. It is rather obvious that a tank produced in 1944/1945 had to have gone through a general overhaul by 1951, especially if it was to be exported. This would suggest that tanks with serial numbers from WW II underwent a standard renovation and retained their original serial numbers. That, in turn, suggests that vehicles with new numbers came from a new, mass, production. Additionally, the new numbers can not be attributed to the fact that the tanks were to be exported, as all exported vehicles were used by the Red Army before they were sent out, in this case, to Poland.

This T–34 recovery vehicle was photographed parading along the streets of Prague in May 1945. It was based on a T–34–85 tank, and its fighting compartment was covered with an improvised armor plate.

- ex-CAF -

This T–34 recovery vehicle was photographed on a street in Sopot (Poland) at the beginning of 1945. Please note the non-standard hatch (black square, on right side of hull top) manufactured in the unit workshop.

- ex-WIH -



[90] All of the citations without references come from archival documents in the CAW collection; their original text has been retained.

AN APPRAISAL OF THE TANK

In the opinion of the author, the T–34 is one of the most attractive tanks ever built. The vehicle is proportional and makes a good impression. It seems impossible that it would not appear pleasing and attractive to everyone. However, the undeniable charm of the T–34 can not hide the fact that it is difficult to judge such a tank solely on its merits. In the way of such a judgement stand two issues:

- ✓ the disarming effect of a propaganda campaign, carried on for many years, which forces the negation of many evaluations of the T–34, something that is not easy to do;
- ✓ the lack of a sufficient number of competitors, to which the T–34 can be compared.

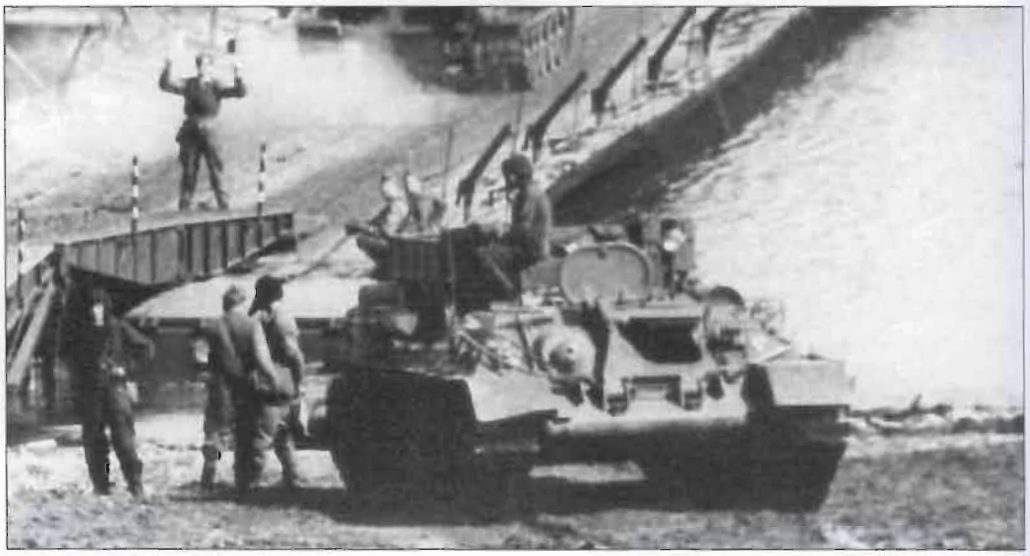
Actually, the only tank to which the T–34 can be compared to in every category is the M4 "Sherman". It had an equally long history to the T–34, and was developed at the same time. The comparison between the T–34 and the Pz.Kpfw. IV often results in excesses. It is understandable that unfair comparisons are always made when the object is to show the brilliance of the T–34 design. From the point of view of the Pz.Kpfw. IV, only the operational possibilities of the two vehicles can be compared, as, at the same time, they were both the standard tank of two opposing armies. From such a comparison, it is not possible to deduce that the T–34 was the product of Soviet designers whose work was superior to that of their German counterparts, or some spark of Bolshevik genius. The T–34 and Pz.Kpfw. IV emerged from completely different environments, were the results of different beginnings and, what is most important, mirrored two different eras in the development of tanks. The frequent comparisons in literature between the T–34 and the Pz.Kpfw. III must be considered as mean-spirited jokes.

Similar excesses often arise when the T–34–76 is compared to the "Panther"[91]. As is the case of Pz.Kpfw. IV versus the T–34, both tanks mirrored two different tank concepts, where the Pz.Kpfw. V proved not only to be



This T–34 recovery vehicle was produced in Poland in the 1960s. A small hexagonal turret is visible on top of the vehicle.

- ADM -



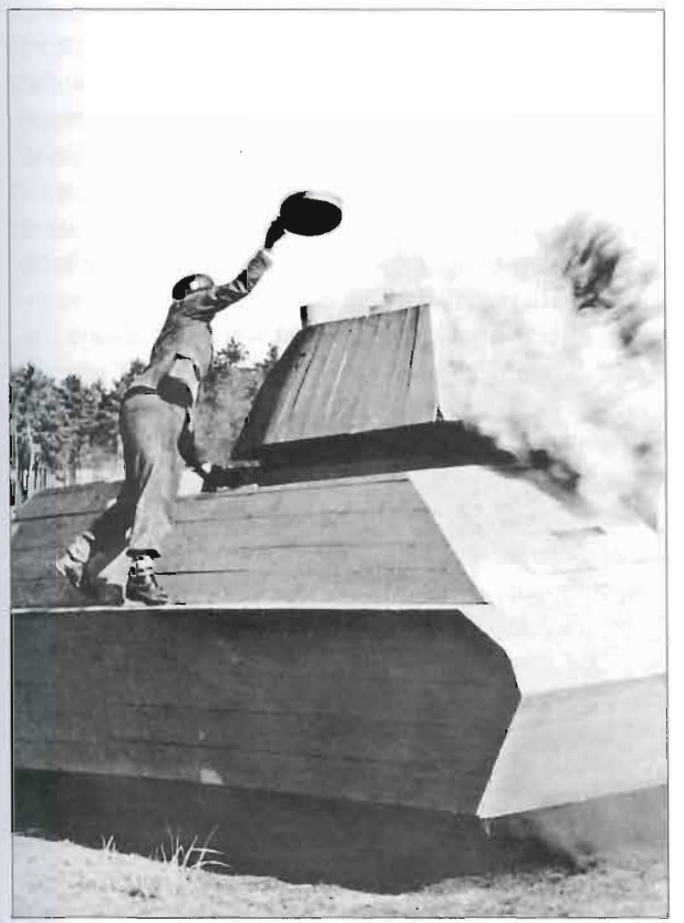
A German recovery vehicle based on the T–34. The box on the rear of the vehicle, additional equipment on the glacis and the open crew hatch, can be seen clearly.





This series of photos shows the "most special" version of the T–34; a wooden mock-up mounted on a car, and used for training German soldiers to combat Soviet tanks. As we can see, in addition to mines, smoke candles were used to blind the tank's crew.

- CAW -





[91] It is probably wiser not to comment on the musings of some authors on the T–34's capabilities in battle with the "Tiger".



A T–34–76 "Model 1941" is "parked" beside the bench. The tank has a cast turret, and a single headlight. Its hull front is bolted to the linking girder.

- T. Anderson's collection -

a better tank than the T–34–76 or T–34–85, but also $^1/_3$ heavier. Consequently, in this case too, a direct comparison between the technical capabilities of the two vehicles can only yield false conclusions (unless a comparison is made of the mechanical reliability during certain periods of their history). This is especially true if, as in the case of a large part of the subject literature, the object is to prove the indestructibility of the "Panther". As in the case of the comparison between the T–34–76 and the Pz.Kpfw. IV, only the possibility of examining their operational capabilities remains. This is a result of the simple fact that both tanks were used at the same time as standard equipment by opposing armies.

While comparing the T–34 to other tanks, it must always be remembered that it differed from western European vehicles. We are not talking here about small developmental questions, but rather political and civilization factors. The tank's concept was a combined result of the initiatives of the developers, military officers at the highest levels and the political masters. All of them, whatever their motivations may have been, were determined to create the same tank; small, cramped and only briefly effective on the battlefield. Succinctly put, it was different from western tanks.

The concept of a tank, which was accepted in the 1930s and from which sprang the T–34, was developed in the 1940s. As a consequence, the Soviet tank was, and still is today, a vehicle of minimum characteristics, cramped and technologically inferior to the western tanks. From the development of the T–34, all Soviet tanks have been low, cramped, limiting the operations of their crews and, to be honest, designed for a short life span. The quality of the ammunition, guns and armor have usually been inferior to their western counterparts, which has been compensated by increasing the caliber of the gun and reducing the size of the various vehicle components. As a result, Soviet tanks have been well armored and armed and have had good driving characteristics, but there has been a price paid. The tanks' cramped crew space and short life spans have been reflected in a smaller ammunition capacity and a limitation on the optical equipment. This is the way it was with the T–34 and that is the way it is now with the T–72 and its successors. Thanks to these factors, the Soviet tanks gave a slightly better performance than the western vehicles, but not always. Sometimes, it was possible to only pull even with the western tanks, which had always been designed to maximize the survivability of the crew and their vehicle on the battlefield and to ensure that the crew performed with maximum effectiveness. The vehicles were also always bigger and roomier inside, assuring the crews of greater comfort and safety. As a consequence of the compounding of these factors, the armored forces of the USSR were always very large while those of the western countries were smaller, although more effective. In combat simulations carried out during the Cold War, it was a given that for every lost "Leopard" three Soviet tanks would be destroyed. Despite the fact that, even today, the Russians reluctantly admit that this was so, it remains the truth that their eastern system of waging war has always placed more emphasis on numbers rather than quality or, most importantly, precision. It is in that way that we must comprehend the T–34; a mass-produced tank designed for carrying out uncomplicated combat missions.

In order to comprehend the authentic, realistic combat capabilities of the T–34, it must be compared to medium tanks used by other countries. After examining such an assembly of armor, it becomes apparent that the T–34 was not such a wonderful tank at all. If not for the propaganda touting its success for years, we might have

considered it as an average vehicle. If in 1941 it would have been possible to bring into production the T–34M, then the early version of the T–34 would have been considered a failure. Instead, the T–34 became the only basic tank of the Red Army. In a country such as the USSR, despite its visible faults, it simply had to be excellent. Just in case, it should be noted that we are not taking into account here likes or dislikes, or more or less subjective opinions but, rather, real or factual faults of the tank. The Soviets, who praised the tank's qualities, were perfectly aware of its faults.

There can be only one overall evaluation of the T–34 — undoubtedly it was a good tank; one of the best used on the battlefields of WW II. The problem lies in the fact that this category was quite small and, because of it, half of the tanks automatically become the best. Consequently, it can be stated that the T–34 was as good as the Pz.Kpfw. IV or the "Sherman" and was better than every British medium tank ("Matilda", "Cromwell" or the "Comet"). We can end the comparison here as there were no other competitors in this category of tank. Summarizing, among the 6 medium tanks (not counting the "Panther") used by the USA and European countries during the period 1941–1954, the pride of the Soviets places in first place, tied with two others; the M4 and Pz.Kpfw. IV (the latter overshadowed by its rivals due to its age). The reader must decide for himself if such a placement is admirable or not. Whatever the verdict is, surely the tank's opinion will be far from splendid or perfect.

Before going on to a detailed comparison of the three tanks, it would be valuable to note that, on the battlefield, all of them had similar combat capabilities, with the slight variations depending on the particular time period and the vehicle modifications. At times, a particular tank would be slightly superior to another, but this would only last several months. While a tank was better than the others in one category, at the same time it would be inferior in other areas. Simply put, they were equally good vehicles that originated from different concepts. This can be seen especially well when comparing the M4 to the T–34. Their designers created completely different vehicles which proved themselves equally effective in the field.

The T–34 equipped with the F–34 gun had only a marginal advantage over the Pz.Kpfw. IV but, at the same time, it was only marginally worse than the M4, a tank that the Soviets complained about.[92] That the T–34 initially was not a very good tank, was proven by the Soviets' actions. In the first half of 1941, they attempted to improve the vehicle and start the production of the T–34M. The differences between the T–34M and the T–34 point to some of the biggest faults of the latter tank, which also made it inferior to the Pz.Kpfw. IV on the battlefield. These were, above all, poor visibility (lack of vision slits, commander's cupola, and good observation equipment and gun sight), lack of effective communications and a cramped turret. These factors made it impossible for the crew to operate effectively in battle. As an example, the loader became exhausted very quickly due to the physical exertion in his extremely uncomfort-

[92] We are comparing tanks from the period beginning 1941 — mid-1942: the T–34 with the best. Production F–34 gun, the M4 with the welded hull made from rolled plates, and the Pz.Kpfw.IV Ausf. E/F.



This early T–34–76 was immobilized and looted by the Germans during winter 1941/1942. Clearly visible are the early type driver's hatch, 74–link tracks and towing hooks. The tank also has the bolted-on linking girder. These details were typical of the No.183 Factory.

- T. Anderson's collection -



Two photographs of a first-series T–34 with the L–11 gun. It was knocked out by the Germans in summer 1941. Note the 3 marks on the hull rear that were probably made by either a 37 mm gun or an anti-tank rifle (all penetrated the plate).

- T. Anderson's collection -

able position and from breathing in the gun powder fumes. The commander of the tank was also the gunner and, in many cases, also a unit commander (platoon, company, etc). In practice, this meant disaster as he could aim the gun, command the tank or command his subor-



dinate crews. Whatever he chose to do, it came out badly because he heard very little (the T–34 was not only loud on the outside, but also inside due to the loud engine), saw almost nothing and the radio functioned poorly (if at all). The vision was especially troublesome as it was limited by the poor quality of the observation equipment and the lack of room in the turret, which made it almost impossible for the crewman to turn on his seat.[93] When it came to radio communications, the situation finally changed in 1944 when the T–34–85 came into service; at least, that is what the available literature from that time suggests. There are no noted serious complaints about radio communications (probably copied from the Americans) in the material. The only fact that can be confirmed absolutely is that radios were standard equipment in every vehicle.

These faults, as most developmental faults, were a result of incompetence or the conceit of the designers, as well as the faulty original concepts. The most serious resulted from the T–34 being a successor of the BT, and led to many bad consequences. The least of them was the problem with the tank's suspension, based on 5 pairs of independently suspended road wheels. Experience showed that this solution was not the best, and that it was not really necessary for a tank such as the T–34.[94]

Another problem, much more real, was the acceptance of a faulty concept of the tank, which, as an example, resulted in the acceptance of the A–20 hull for the A–32 tank, and later the T–34. This led to serious problems with the use of the space inside the tank. The shape and design of the turret was a typical example of the abstract thinking of the designers who were mainly interested in satisfying their own imagination and ambition instead of creating a practical tool adapted for the needs of the soldiers. It is true that the mistake made during the initial work on the shape of the hull's armor plate was quickly realized. However, unfortunately, there was no time to correct it (T–34M). Even worse, it was quickly forgotten. As a consequence, the concept of a cramped tank remained, bringing about the next conceptual monster; the T–44 and its follower the T–54. The designer cadre that omitted to ensure that the T–34 had sufficient interior space was exactly the same bunch who ignored the same factor during the design work on the T–44.

The 40–48 degree angle of the side and rear armor plates of the T–34, combined with a low ground pressure factor, caused the lack of space for anything inside the vehicle and, especially, in the turret. While the shape of the hull armor may have been adequate for the A–20 armed with a 45 mm gun, it caused an excruciatingly cramped space when it had to accommodate a functional radio, a 76.2 mm gun and an efficiently operating crew. The cramped space was not only the result of installing a larger gun, which obviously had to take up more space, but also because the turret's sides were sloped even more. While the sides of the A–20 were angled at 25 degrees, on the A–34 they were angled at 30 degrees. This was done to slightly increase the armor performance and, above all, to reduce the frontal area of the tank's turret, which was to make it harder for enemy gunners to achieve hits on the vehicle.

There was no possibility of modifying the turret as there was almost no chance to increase the diameter of the turret ring (it had a 1,420 mm diameter, while a 1,650–1,700 mm diameter was necessary), an effect of faulty design of the hull sides. This was a fundamental error made by the design team, and which later had a negative influence on attempts to modernize the vehicle. When comparing the T–34 to other tanks, it can be seen easily that, from the beginning, it was decided to implement an armor arrangement that was not thought through to the end. That arrangement compressed the ceiling space of the fighting compartment in the following ways:

- ✓ from the sides by using plates that were not moulded, and whose placement was decided only by taking into account the requirements of the motor, and the driver's and bow machine-gunner's stations,
- ✓ from the front by a plate angled at 60 degrees,
- ✓ from the back by the engine compartment, which was limited by the shape of the hull's rear armor plates.

As a result of these factors, the increase in the diameter of the turret base of the T–34–85 was paid for by making that area more vulnerable. The protection of the turret ring became thinner than on the earlier model. The linking of the armor plates became weaker and the turret's base became more vulnerable to ricochets and small caliber rounds. The solutionto this, although not very effective, was the installation of protective steel strips around the turret.

The objective body of evidence confirms that these were concrete problems. The negative opinion of the design mentioned above is clearly illustrated by the conflict between the army and the designers during 1940/1941 and by further development work (especially the

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[93] This was a really serious problem. It is not understood by anyone who looks at the T–34 from the "outside", especially if they do so with the eye of a modeller. In the "hexagonal" turret (which was bigger than the previous "flat" turret) there is no elbow room and a person has trouble with turning (automatically eliminating the possibility of using the side vision slit on the turret). The gun's breech cuts the turret in two, isolating both crewmembers as if they were in cages. Not everyone could become a loader; the peculiar way of loading rounds simply had to be learned. In the winter, when the crew wore sheepskin or padded jackets, the situation almost became tragic.

[94] As an example, replacing the suspension with torsion bars could have lowered the tank's weight by 300–400 kg. This could have also added a bit of extra space in the crew compartment.



An unbelievable situation; this T–34–76 produced in 1941 (probably autumn), confirmed by the idler wheel without rubber rim, was hung up on the PAK 38 gun after running it over. It was blown up and the turret flew into the air, coming down and crushing the top of the hull. New 550 mm tracks with the first "waffle" pattern are visible on the wheels.

- T. Anderson's collection -



This tank, one of the earliest series-production T–34–76s, was abandoned by its crew in a field. It has the flat turret hatch with pop and the long exhaust pipes. Most importantly, the turret features an obtrusive vision port rather not seen in any other photos of the T–34 with the flat turret. This turret could possibly be one of the earliest that was cast at the No.183 Factory.

- T. Anderson's collection -

T–34M and T–43[95]). All this, obviously, leads to a conclusion that the theses put forth by various authors about the tank's wonderful armor are simply a mythology resulting from the propaganda about WW II. It is possible that this is simply a misunderstanding, where the correct theory of the advantages of sloped armor is equated to its distorted practice when applied on the T–34. However, the same can be said about the other "wonderful" virtues of the vehicle; the engine or armament, as an example. When these opinions are examined with greater detail, their absurdity becomes more apparent.

Among the proponents of the official perception of the T–34, dominates the belief that three particular factors played an especially important role. Two of them had a revolutionary character; the armor (particularly its shape) and the engine (diesel). Both factors grew to unbelievable proportions, becoming the fundamental base of the myth of the T–34. According to almost all authors, the armor and the diesel engine were a distinct revolution in the design of tanks and laid out their future development. Russian authors especially underline this matter and now insinuate that sloped armor and the use of the diesel engine originated in Russia, and were later copied in the west. There can not be anything further from the truth.

[95] It is important to emphasize here that a completely new turret, more spacious and comfortable for the crew, but with the 76.2 mm gun, was created for the T–34 tank. It was a good design, but the flow of events forced the designers to adapt it for the 85 mm gun, thus slightly degrading its merits. This was almost a repeat of the situation with the A–20/34 turret from 1939.

The sloped armor appeared in the plans of tank designers of probably most countries during the first half of the 1930s. Not being aware of theoretical works published in the professional literature of that era, it is difficult to point to a firm date when such a theory appeared. It suffices, however, to remind the reader that already the early French work on ballistics showed the effectiveness of sloped armor. The results forced certain developments practically in the entire world.

It is a safe bet to say that effective sloping of armor on tanks began in France in 1934, when the FCM–36 tank was designed and then sent into production at the end of 1936. That vehicle's armor was 40 mm thick and was sloped the same way as later was the T–34; the edge of the turret and hull almost formed one continuous line. The only difference was that the T–34's armor was sloped at 40 degrees and that of the FCM–36 was at 30 degrees. At the same time, in some cases the front and side armor



Above: This T–34–76 was photographed during the battles in the spring of 1942. It is possible that this tank was produced at the STZ Factory, but its turret was "imported" from the No.183 Factory.

- S. Zaloga's collection -



This T–34–76 was immobilized on a street in Stalingrad during the summer of 1942. Most probably, this vehicle was produced at the STZ Factory and had No.183 Factory turret.

- T. Anderson's collection -

of the FCM was sloped at 45–55 degrees. Strangely, somehow this reminds one of the design that Cyganov and Dik implemented in the BT–SW...

At the end of 1937 (that is, when Dik and Cyganov designed their version of the armor), in the USA, a prototype of the T5E2 tank was designed. Its frontal armor was almost 30 mm thick, angled at 45–60 degrees. Only in Germany (and Great Britain, which is understandable) did this concept fail to appear during that time (1937–1941). This was as a result of a lack of knowledge. As Rau from WaPruf 6[96] rightly stated, the armor of German armored personnel carriers and armored cars shows that the concept of sloped armor was known and understood, and also applied. However, despite the existing knowledge and application, all projected designs and prototypes of new tanks had the standard box-like shape. It was only the Mcensk hysteria that caused a sudden and total switch to sloped armor on tanks.

What is most important however, the design features incorporated in the T–34 were not adapted in any country, not even in the USSR! If the frontal armor of tanks was a reflection of the dominating tendencies in the world of armor, then the shape of the side and rear armor was, more or less, a warping of these tendencies. As an example, a sufficient thickness of the rear armor would have increased excessively the entire weight of the tank. This made it impossible to make the armor thick enough in the one place where it was most needed. Such a hull design made it necessary to install the fuel tanks in the fighting compartment, rather than at the back of the tank, increasing the danger to the crew.

The successors of the T–34 (the T–44, and later the T–54) had a completely differently shaped side and rear armor. It was shaped according to battleground needs, and not the ambitions of the designers; put simply, the vehicle's side and rear walls were made perpendicular.[97] The rationalization of the armor arrangement was already attempted on the T–34–85M. The frontal armor was increased at the cost of the rear armor, as well as the top and bottom (that is, the same was done as was often in the west).

The matter of sloping armor was also differently solved in the west; on the M10 and Pz.Kpfw. V, for example. In both cases, the vehicle sides were shaped similarly to the T–34, but in a more rational manner. Therefore, contrary to the statements in the subject literature, the idea of following the BT–SW with the KB–24 (both having extremely sloped armor), which then became the pattern for the T–34, should be considered as mostly a failure.

When considering the T–34's armor, an even more absurd legend exists concerning its quality. Among the armor authors and enthusiasts, there exists a completely unfathomable conviction that the T–34's armor was of very high quality, even better than the one on the "Sherman". How was this possible if the Americans used a very high quality steel for their armor, while the Soviets produced an inferior quality steel throughout the entire war?

The Russian authors and veterans have driven so far in their illusions concerning the quality of the Soviet steel that they have even concluded that the on-board machineguns of German aircraft penetrated the M4 armor but could not do so to the T–34's armor. It is interesting how this conclusion could have been reached when the T–34's top armor was 16–20 mm thick, while the M4 was protected by 13–25 mm of armor plate.[98] If we also consider the fact that the angle of the side and



This T–34–76 was probably knocked out by the Germans in the summer or autumn of 1942, indicating an early (from 1941) hull and an early cast hexagonal turret. That turret was characterized by a perpendicular (just behind the gun mantle) weld seam and a horizontal one (running through the side vision port).

- T. Anderson's collection -

This T–34–76, a product of the STZ Factory, was partly dug-in and served as an armored anti-tank gun. Stalingrad region, summer 1942.

- T. Anderson's collection -



rear armor plates on the M4 made it more resistant to fire from enemy aircraft than the T–34's armor, the picture becomes more interesting (the rounds fired from an aircraft hit the "Sherman" at an angle of 40 degrees, but hit the T–34 at an angle of 15 degrees).[99] If the Soviets noticed penetrations of the M4 armor, then the same must have happened to the T–34. Even if the greater vulnerability of the "Sherman's" cast hull is taken into account, the differences between it and the T–34 could not have been great enough great to justify a forceful comparison of the T–34 against the M4, which is sometimes done.

The front of the M4's hull, constructed of rolled plates that were welded together, was protected by an armor plate of 51 mm thickness set an angle of 56 degrees.[100] This was the same protection as on the T–34. The side armor was made of welded plates with a thickness of 38 mm, making it slightly weaker than the T–34's side armor (when taking into account the slope, the T–34's effective thickness was 45–52 mm). This, however, was a factor common to almost all of the medium tanks of that time; even the "Panther", which the Anglo-Saxons — according to their own statements, were not able to destroy in Normandy due to its strong armor — was similarly armored (40 mm).

In practice, on the battlefield, all medium tanks had an identical possibility of survival. The differences in the side armor were so minor that, for practical purposes, they did not exist. The difference, approximately 15 mm, in the side armor of the T–34 and M4 may have made a difference when facing the German KwK 40 gun at 2,500 meters. In such a situation, the T–34's side armor could have survived a hit that the M4's armor may have not. The problem lies in the fact that at such a distance practically no gunner could hit the target. On the other hand, at the standard range of 500–1,200 meters the difference in the side armor did not matter.[101]

Sloping armor was of course a factorable factor, but mainly when compared to Soviet pre-war standards. Such armor was penetrated much easier by a piercing round with a ballistic cap than a full caliber round without the BR–350 cap. The Germans developed the first type of

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[96] Jentz/Doyle — *Germany's Tiger Tanks* — Schiffer 1997, vol II, pp. 8.

[97] But, what is interesting, it is difficult to say anything complimentary about the designers of the JS–3, which was as abstract as the T–34–76 Model 40. Its armor was arranged in a very interesting manner, but as a result of that invention there was no room inside the tank. Although its hull was 7 meters long, it could only carry 28 rounds! Just like the JS–2, the JS–3 could not fire while in motion. As a contrast to the JS–3's hull design, the M 48, while also having an atypical design, was a lot more rational. The tank's excellent characteristics made it very functional.

[98] From German experiences in North Africa, it became evident that the standard MG 151/20 (Me 109 F/G, Ju 87D), when firing armor-piercing ammunition, could penetrate armor up to 20 mm thick.

[99] Presuming that the angle of attack of the aircraft is 35 degrees.

[100] It is important to note that earlier the hull front was a bit thinner, but at a greater angle (60 degrees), that is, just like the T–34. However, the Americans acknowledged that the space in front of the turret was insufficient and redesigned the vehicle's front. The Soviets did not even think to redesign the T–34 in such a way, although similar changes were incorporated in the designs of the T–34M and the T–43.

[101] Theoretically, it can be accepted that, when shooting frontally at a tank that is facing the firing vehicle at a 45 degree angle, the vertical armor plate of the tank being fired at had a practical thickness of 55 mm (for the M 4) or 73 mm (for the T–34). The difference then was only 18 mm (not accounting for the quality of the steel), while the KwK 40 and PAK 40 guns could penetrate over 110 mm of vertical armor plate from a distance of 1,000 meters.



This T–34–76 was ripped apart by an internal explosion in the beginning of winter 1943. The turret serial number "1890" can be seen clearly.

- T. Anderson's collection -

ammunition already before 1939, and it gradually entered production (PzGr 39) in 1939 so that by 1941 it was the standard in certain types of weapons.[102] Such shells did not slide easily off the sloped armor, especially if its angle was less than 61 degrees.

Contrary to common opinion, the quality of the American and Soviet armor can be described as comparable. In 1940, the main armor of the T–34 may have been a little harder (certainly it did not reach 400 Brinells, while the American reached 320), probably due to different technological concepts existing in the two countries. Later the situation changed; the American armor improved qualitatively (although its hardness remained the same) while the Soviet worsened in all respects. The American steel gradually improved until November 1943 when the problem of crystallization on the inside surfaces of the moulds was solved. Apparently, the Soviets were emerging from the technological hole in 1944, but there is no concrete proof of that. Rather, it seems certain that the T–34 armor plates produced in 1945 were as poorly produced as those from 1943. Their average hardness did not exceed 250–280 Brinells, and their overall resistance (thermal, etc.) was very low. So low, in fact, that in the west these armor plates would not have passed quality control standards.[103]

To build the T–34, the Soviets used two types of homogenous armor plates; cast and rolled. Armor from rolled plates had better protective properties (on the average 15%), and so the cast armor had to be thicker. Unfortunately, the quality of the Soviet castings left a lot to be desired. The cast parts were not dense enough, and had air bubbles in them (a result of haste, the inability to maintain technological standards and the use of less efficient fuel in the furnaces), which was not acceptable. The casting process itself was complex, and even in good conditions (for example, in the USA) there was no guarantee that each series production would be of uniform quality.

In the USSR, the production of armor plates, cast as well as rolled, utilized types of steel that had a very changed chemical quality (almost completely eliminating expensive enriching metals). This process weakened the steel overall, making the plates more susceptible to penetrations. Already during the pre-war peacetime, the produced steel was qualitatively weak, mainly due to technological problems. Its specific chemical makeup had a peculiar effect, making it very hard but not elastic. After an improvement, which occurred at the end of the 1930s, a catastrophe struck in 1941. As a result of a breakdown in the steelworks in the technological process of steel production, and a loss of ore producing areas, at the end of 1941 new types of steel for tank production had to be created. The new types of steel minimized the use of such components as vanadium, chrome, nickel and molybdenum, metals that were essential in the production of good quality armor plates.[104] Additionally, it

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[102] Opinions on this matter differ quite a bit; from a lack of such ammunition, to it being used quite regularly. It is possible that what is meant here is that, for some types of guns (as an example, the KwK L/42) there was a lack of such ammunition, while for others (such as the Flak 18) it was already the standard.

[103] In the West, armor plates, in which quality control detected cracks, were not accepted in the armament factories for the production of tanks. On the T–34s preserved in Poland, large or small cracks are rather common. During the construction of the tank hulls such cracks were simply welded over.

[104] Evidently, the steel used in Stalingrad was of better quality than in other locations. If that is really true, then the Soviet armor industry hit the technological bottom only in the fall of 1942, at the same time that the Germans occupied most of Stalingrad. On the other hand, the quality of the hull seams at the STZ Factory was lower than at the No.183 Factory.

was necessary to replace the high quality manganese from southern Ukraine with a poorer quality ore recently discovered beyond the Urals. The entire production of the metal had to be moved from the area around Nikopol (the only place where the metal was refined before the war) to the Urals. This was especially difficult because manganese was one of the main components of steel used by the Soviets for the production of arms and armor; a result of its hardening properties.

As 1942 passed, the crisis deepened so much that it was necessary to create... steel substitutes, characterized by even the complete elimination of the enriching metals. All these factors added up to one simple fact; the main armament and armor in the Soviet tanks was simply too weak to combat enemy weapons. As a result, German anti-tank rounds penetrated the Russian tanks' armor easier than they should have. When a round penetrated into a tank's interior, the hull's construction could not resist the resulting energy and burst. The armor plates were not joined precisely, but rather fitted together using the eye, mainly because that is how they were also cast, rolled and cut in the steel plants. The resulting gaps, reaching a width of even 3–4 cm, were masked with welds. As a result, the whole product was very weak.

Could tanks produced in such a way offer a challenge to the enemy? It is obvious that they could not. Merely sloping the armor could not compensate for such weaknesses.

The myth of the T–34's diesel also does not have anything in common with reality. It is not true that the USSR (Russia) is the homeland of the tank diesel. That type of engine was already installed in series produced tanks in 1935. This was the already-mentioned French FCM–36, which entered mass production in December 1936. This was just before the Moscow "invaders" were dropped into the engine department of the Kharkov factory to straighten out the mess which was dominating there at that time. The French tank had the Berlieta-ACRO engine (83 HP) installed, which allowed the vehicle to cover 230 kilometers on the highway on one tank. That was a very good result for that type of vehicle, and at that time it was the equivalent to 300 kilometers for the T–34.

During the period end 1937/beginning 1938, the first trials, in which a diesel engine was put into a new tank, took place. However, due to strictly logistical reasons, that concept was abandoned. This did not have anything to do with the concept's possibilities or the imagination or talents of the designers. Obviously, the concept was valid since, at the beginning of 1942, the Americans returned to it and started to install the diesel engine in the M4A2 "Sherman". That was not done for the American army, but, rather, for export; to the English and the Russians. The only exception was the Marines, who operated within the logistical organization of the navy and not the army. While the installed engine was significantly heavier than the V–2, it also had a longer life.

It should be noted at this time, however, that the first modern diesel engine created for use in combat equipment was designed in Germany. Already at the beginning of the 1930s, the first type of such a power unit was produced (at that time the Soviets began work on the BD–2 tank engine). This took place at the firm of Junkers, which during the 1930s worked on such power units, culminating in 1939 in the Jumo 223. The engine weighed 1.4 tons and produced 2,200 HP. The adaptation of such engines in tanks was dropped however, based on the same reasons that the Americans had. The Germans did install diesel engines in some wheeled prime movers, but such vehicles played a minor role in the Wehrmacht. The gasoline engine was already tested, resistant and less likely to fail (the life expectancy of western engines was up to 400 hours, of the V–2 only 100–150 hours), and did not cause logistical problems. All the vehicles used the same type of gasoline and because of that it was possible to transfer fuel to a tank from a truck and, in a pinch, even use aviation fuel. It was not possible to tank up a German tank with Soviet gasoline as it was of low quality and damaged western engines. The Americans used an 80 octane gasoline (96–100 for aircraft), the Germans 74 octane (87–96 for aircraft) and the Soviets 50 octane (75 for aircraft). The quality of the Soviet gasoline reflected the backwardness of the oil industry in the USSR. That is why the use of diesel engines made more sense from the Soviet point of view. It is due to these circumstances that the diesel engine found itself in the T–34, although the authentic advantages[105] of installing it in a tank (increasing the vehicle's range[106]) were not the only deciding factor. Each tank's design was adapted to deal with its country's dominating conditions (after all, the country's leadership laid out the parameters of the tank's design and techni-

[105] It is sometimes stated that the diesel engine guaranteed that the vehicle would not burn as easily as one with a gasoline engine. But, it seems that, in the case of a well-designed fuel system and engine compartment, the difference was so small that it was insignificant (see comparison between the Pz.Kpfw. III and the T–34). Considerable differences, however, were noted when comparing the M3 "Lee" and the T–34, as the American tank burned high octane aircraft fuel and gave off a large amount of fumes. It is also a fact that diesel, once lit, was more difficult to extinguish than gasoline.

[106] The total capacity of the T–34's fuel tanks was 460 liters, on which the tank could cover 300 kilometers along paved roads. As a comparison, the Pz.Kpfw. IV used 210 liters of fuel to cover 100 kilometers of paved roads and was able to drive 220 kilometers on paved roads and 150 kilometers cross-country on one tank (470 liters). On the other hand, the M4 "Sherman" covered 200 kilometers of paved roads on a full tank of 660 liters of gasoline, while the diesel engine version could cover 240 kilometers on a tank of 560 liters.

cal capabilities, which addressed the specifics of the existing industry and raw materials) and the army's logistical system. That is why western tanks did not need as large a range as the Soviet tanks. They were designed to operate in a much more urban environment, densely criss-crossed by roads and rail lines. The conditions in the Soviet Union were quite different and the larger range of the Red Army's main battle tank played a greater role than in the USA or Germany.

In addition to the above "basic advantages" of the T–34, its enthusiasts especially admire some of its non-existent virtues. As an example, its short height is praised often. In actuality, that factor had very little importance. The T–34's height was barely 34 centimeters[107] less than the M4 "Sherman's", which was a complete contrast to the Soviet tank, and 18 centimeters less than the T–34–85's. In the field, already at a distance of 300–500 meters, such minor differences were hardly noticeable, and could hardly be exploited. The appreciably smaller frontal surface area of the hull and turret was more important in this case, making it harder for enemy gunners to register a hit. As is known, the frontal surface area of the original T–34 was reduced to the absolute minimum. This minimum proved to be so effective that hitting it was almost impossible; unfortunately, firing from the resulting turret proved so difficult that its front had to be altered as quickly as possible to make it closer to the "Sherman's".

The T–34 was apparently supposed to be very fast, but in actuality it reached a speed of 47 km/h.[108] In second gear, the tank drove at 15 km/h and in third at 29 km/h.[109] The model with 5 gears reached a speed of 14–30 km/h in gears 2–4. As a comparison, the Pz.Kpfw. IV Ausf. E/F drove at 8–30 km/h in gears 2–5, and the "Sherman" reached 10–28 km/h in its 3 middle gears. The American tank's maximum speed was 39 km/h on a paved road (the model powered by a diesel reached 48 km/h), and the Pz.Kpfw. IV reached 42 km/h.

It is obvious that the early T–34 was only 5–7 km/h faster in second gear, which did not make a big difference. The same applies to the maximum speed (faster by 5–8 km/h), which was hardly ever reached, especially in combat or during route marches. In addition, due to having more middle gears and a better transmission, both western tanks handled more elastically. The T–34 produced during the period 1941–1944 handled stiffly and was therefore more prone to part failure, especially if the part was produced during the war. Although driving the tank was relatively simple, it required a significant expenditure of physical energy, and gear shifting, compared to the Pz.Kpfw. IV, was difficult.

More important was the fact that the T–34 was faster in second gear, but that was something which made it more difficult to manoeuvre during battle. In combat the T–34 was slower than the M4 and Pz.Kpfw. IV because it lacked at least another middle gear. That would have allowed it to increase its speed by 5–7 km/h, and not 12–15 km/h at once. As a result, the driver of an M4 could drive, as an example, at 17 km/h in third gear, while the driver of the T–34 drove already at 12 km/h in second gear. If he wanted to drive faster, he had to build up speed, as an example, to 23 km/h in third gear. If he drove slower in third gear (say, 17 km/h) then the engine, operating on smaller revolutions, did not provide enough power to the vehicle and the tank simply stalled out. Such technical limitations automatically influenced the tactics of the armored units of the RKKA. The units attacked using charges too often, bringing on disastrous consequences. Generally, while attacking together with infantry, the T–34 driver could only drive in second gear.

There are some other driving parameters of the T–34 worth mentioning. The Soviet tank was able to climb or descend a slope of 30 degrees (like the Pz.Kpfw. IV), cross a 2.5 meter ditch (the German tank could cross a 2.3 meter ditch) and climb over a vertical wall .73 meters high (to the German tank's .6 meters). The "Sherman" could climb and descend slopes twice as steep, cross ditches 2.3 meters wide and climb over walls .61 meters high.

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[107] Their width was basically identical; the M4 was 2.6 meters and the T–34 was 3 meters. The difference was mainly due to the width of the tracks.

[108] By order, data was confirmed by national tests carried out on the T–34 during summer of 1940 (48 km/h). The published data mentions a speed of 53–56 km/h, but this must have been reached with the tank's tachometer racing in the red zone (1,800 rpm). Maximum force is used only in difficult situations; that is, when pulling the tank out of a hole or boggy terrain and there is no other alternative. In practice, racing the tank as fast as possible occurred extremely rarely because of terrain features, the condition of the engine, etc. It was the same with the M4 "Sherman". It was also possible to maximize the engine's power for short periods of time, increasing its top speed by about 5 km. The Germans were not very interested in the maximum speed of their Panzers as, according to their official tables, every model of the Pz.Kpfw. III could drive at its top speed of 40 km/h, regardless of its weight and engine. The larger and heavier Pz.Kpfw. IV, with the same engine but a different transmission, according to the same tables, could also reach a speed of 40 km/h. In fact, that data was probably the minimum mark under which no Pz.Kpfw. III could fall, not even with an overhauled engine. During tests, the Soviets "squeezed" out a speed of just over 65 km/h from the Pz.Kpfw. III. This reflected exactly the tests which the Germans achieved during their factory trials, when the Ausf. E/F variants reached a speed of 67 km/h. In later models, the Germans abandoned the requirement for such a high speed because it could never be exploited in the field. The British did likewise with their "Cromwell" in 1944 when they reduced the maximum speed by 10 km/h (from almost 65 to just over 50 km/h).

[109] Data according to manuals from 1941. Data according to manuals from 1944: 2nd gear — 15 km/h, 3rd gear — 25 km/h.



This T–34–76 is ready for action. The hand rails, protective armored strips for the turret ring and the armor protection for the machinegun are typical of the No.112 Factory in 1943. The unit insignia, a triangle with numbers) is barely visible on the turret.

- D. Sienkowski's collection -



This T–34–76, probably a Sormovo product, was abandoned on a Kharkov street at the beginning of 1943.

- T. Anderson's collection -

It needed 19 meters to make a full circle, while the T–34 needed just over 15 meters[110] and the Pz.Kpfw. IV Ausf. E/F took up only 12 meters.

The 550 mm tracks allowed the tank to exert a ground pressure of .62 kilograms per square centimeter[111], a very good result.[112] Impressive as this statistic sounds, it was not as big a factor on the battlefield as the subject literature states. It is also true that neither the Americans nor Germans tried to reach the same parameters in their tanks. Even after 1941, when the information about the T–34 was well known[113], designers in both countries strived to create vehicles with a ground pressure of .75–1.1 kilograms per square centimeter. The Soviets also went down that road, using narrower tracks on the T–34–85 (500 mm), which gave them a ground pressure of .85 kilograms per square centimeter (later, identical pressure on the T–54), and even a larger ground pressure on other tanks. For a tank type such as the T–34, the maximized ground pressure values that were reached in 1941 were simply overkill and it was possible to easily sacrifice them partially for the sake of a thicker armor, better armament and other unnecessary design features.

The particulars of the T–34's competitors are as follows; the Pz.Kpfw. IV Ausf. E/F, having a ground-contact length of 3,720 mm and weighing 22 tons, had a ground pressure coefficient of .88–.91 kilograms per square centimeter, while the M4 "Sherman's" were a bit worse, with a ground-contact length of 3,374 mm and a ground pressure of 1.1 kilograms per square centimeter.

The quoted numbers would mean nothing if, for example, the German tank could not cover terrain that the T–34 could cross. However, there were dozens of experiences where the German tanks operated in muddy terrain as well as the T–34. Examples are also known where the T–34 could not manage to drive through a particular

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[110] The published data mentions 7–8 meters, but that is the distance of a turn and not the radius of a full circle.

[111] In 1941, the military specialists stated that the T–34M, having a ground pressure of.70 kilograms per square centimeter, had bad characteristics and had to be changed. This is a good example of the prevailing concepts during the designing of the T–34.

[112] Such parameters were usually prevalent in light tanks, which were used for reconnaissance. Due to that role, it was recognized that sometimes they had to drive over terrain softer than what the medium and heavy tanks had to cover.

[113] It should be continually kept in mind that, the tank is a combat vehicle and that it's role is to fight in larger formations on firm ground, rather than to individually drive around on boggy ground. Armored forces, as have all others since the beginning of warfare, have always marched on the best roads. Regardless of Soviet experiences, tank formations are not to be used in forests and they should not charge anti-tank obstacles placed in anti-tank ditches. Engineer units existed for this task, but in the Red Army they rarely kept up with the tanks, even if they were expected to carry out such a mission.



An unusual situation. Retreating Russian units tried to cross the stream by using the bridge and fording the creek. It appears that, after the first T–34 bogged down in the stream, the T–70 then drove on top of it (and at some speed, as it ripped off the T–34's turret). The T–70 was then squashed by a second T–34 (it has the name "Chernigovskiy" written on the turret). Note the seven ribs on the turret that is sitting in the water, usually they are not visible in photographs.

- T. Anderson's collection -



This ripped-apart T–34–76 (with a hard edged hexagonal turret) is from the fall 1942 production series. The tactical number "122" and the turret's serial number "996" can be clearly seen on the turret.

- T. Anderson's collection -

terrain, which could not be crossed by German panzers either.[114] The information given above proves only one thing; the T–34 simply had a slightly better margin of safety when driving across soft terrain, and nothing more.

As always, it is much more important to remember that the opinions about the tendency of vehicles to bog down (or not) are mainly a result of veteran opinions. But they, after all, pay less attention to objective conditions than to the end effect. The "Shermans" bogged down in the mud of the Hurtgen forest but the German tanks did not. Conclusion; the German tanks were better because they had a lower ground pressure coefficient. How was that possible, since the M4 had a ground pressure coefficient of .97–1.0 kilograms per square centimeter and the Pz.Kpfw. IV Ausf. J or Jg.Pz. IV/70 had a coefficient of approximately .95?[115] In addition, the "Sherman" had a larger coefficient of power to weight (13, as opposed to 10.5 of both German vehicles). Of course, the "Panther" outperformed the M4 in all categories, but that could not have been otherwise.

More important and interesting for this book, the situation was similar on the Eastern Front where the T–34 was concerned. During the winter crises, especially the winter of 1941/1942, the Germans lost tanks that bogged down in the mud, while they saw the T–34 cutting off their routes of retreat. They complained then that their tanks were worse than the T–34 because the Soviet vehicles crossed terrain that the Pz.Kpfw. IV and other German tanks could not. Actually, the Soviets lost whole columns bogged down in mud, just like the Germans, and their tanks' attempts to cut off or destroy the enemy could not have succeeded. The T–34s sank in the mud (good examples of this were the battles of Kiev, Korsun, Kamenec Podolski-Tarnow and Kovel at the end of 1943 and beginning of 1944). The difference lies in the fact that in the literature on the one side we have many accounts from American and German soldiers complaining about their tanks, while there is a lack of such complaints from Soviet soldiers about the T–34. This occurrence does not however testify to the quality of the tanks that were used, but rather about the intensity of the censorship in the USSR.

As has already been emphasized in this book, the fact that the T–34 produced in 1941 had a ground pressure coefficient of .62 kilograms per square centimeter, while the T–34–85's already reached .85, speaks the best about this type of question. Despite such clear differences, in the subject literature it is almost always stated that both models of the T–34 were equally better than German tanks and crossed boggy terrain with equal ease. This is obviously false as, at the beginning of 1944 (when the T–34–85 appeared), the Pz.Kpfw. IV and StuG. III, which were supposed to bog down in mud, had a ground pressure of between .73–.77 kilograms per square centimeter. It is also worthy to note that at the beginning of 1944, the gigantic "Elefants" crossed, on their own power, the wet Ukraine. Although their engines overheated and they bogged down very often, not one was lost due to these reasons. And yet, when looking at the driving conditions on the Eastern Front, there was no worse or more difficult vehicle.

Looking at this subject objectively, it should be stressed that there are some types of terrain on which tanks should not be driving. That is why, during the wet periods of the year, the decision to leave the road increased the chance of losing the tank. The reason for such an outcome was not so much the ground pressure coefficient as the need to manoeuvre with the vehicle. During the manoeuvring the tank may simply not have been able to grind through the mud and became stuck or threw a track. One T–34 may have been able to get through the mud while another failed; one may have driven through at one spot and another tank, 20–30 meters away, got stuck because the driver was less capable or the ground was softer. The battlefield is not a billiard table!

The effectiveness of the T–34's main armament also left much to be desired, something that the Soviets noticed already in 1940. The L–11 gun, which was practically useless, is not referred to here, but rather the F–34, which, contrary to the existing mythology, did not give the Soviets an advantage over the adequate armament of the Pz.Kpfw. IV or the M4. Listed below are the characteristics of three similar, competing guns (F–34, M3, KwK 40) and a fourth one, which was the standard armament of the Pz.Kpfw. IV tank in 1941 (KwK 37):

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[114] See section on events during 8–10 October 1941 at Mcensk, or the march of the 4th Tank Brigade near Moscow, when the Soviets chose such muddy roads that the T–34s almost drowned on them.

[115] There is a lack of objective data on the German vehicles. The Ausf. F weighed 22.3 tons and had a ground pressure of .88 kg/cm^2, while the Ausf. G, weighing 23.6 kilograms, had a ground pressure of .93 kg/cm^2. The Ausf. H, and later J, weighing 25 tons, must have had a ground pressure of almost 1 kg/cm^2. In practice, without their side skirts, they must have weighed about 24 tons, making their ground pressure approximately .95 kg/cm^2. By the same reasoning, the Jg.Pz. IV/70, weighing 25 tons and having 400 mm wide tracks, had to have a ground pressure of 1 kg/cm^2, and not the .90 kg/cm^2 that is often given in the literature. However, it is possible that the lower number applies to a vehicle without the side skirts and side armored protection for the engine compartment. The data giving a ground pressure of .87–.89 kilograms per square centimeter for the Pz.Kpfw. IV Ausf. H/J could refer to a new type of wider tracks ("Ostketten II") which had a width of 430–450 mm. These tracks, however, were rarely seen, starting in the summer of 1944, and were used more on the eastern front than on the western.

	USSR	USA	Germany	
	F–34	M3	KwK 40	KwK 37
Caliber (mm)	76.2	75.0	75.0	75.0
Length (calibres)	41.2	37.5	43.0	24.0
Barrel length (mm)	3,169	2,810	3,218	1,765
Initial speed (m/s)	680	618	740	450
Min. and max. elevation (degrees)	–5/+28	–10/+25	–10/+20	–8/+20
Range (m)	11,200	10,000	7,700	~6,500
Weight (kg)	1,155	405	472	~350
Penetration (mm), 30 deg/1,000 m	50	60	82	75–100[116]
Max. range of direct fire[117] (m)	800	~700	~800	400

[116] 75 mm with a round B, and 100 mm with a round C.

[117] Data obtained when firing at a target 2.5 meters high and 3 meters wide. Data for the KwK 40 and M3 guns is for illustrative purposes only, as in the west the range of direct fire was measured when shooting at a target with dimensions of 2 × 2.5 meters.

The weakness of the Soviet gun was the result of its characteristics, and the traits of the ammunition which it fired. Until the beginning of 1942, only one type of commonly used antitank round existed in the USSR; the UBR–354A. This full caliber BR–350A (the so-called APHE) round had a metal tip and an exploding charge in its rear section. The theoretical functioning of such a round was very simple; the round penetrated the armor with the force of the hit and then the charge exploded after it entered the interior of the vehicle. It is here that a problem appeared. The penetration capability of such a round depended on the quality of the steel used to cast the tip, and during the war the steel in the USSR was not among the best. Even if the pre-war production BR–350A round had a reasonable quality, already by the fall/winter of 1941, the same can not be said of the same product as lesser quality steel had to be used in its manufacture. However, there was one simple problem. After the BR–350A round hit the hardened German armor plate (hardness of 480–560 Brinells), it had a tendency to shatter on the harder plate, with the explosive charge detonating on the outside. To prevent this, and at the same time to increase the penetration capability of the round, during the period late 1941/early 1942 the BR–350B version entered production. It had a tip made of harder steel, making it an armor piercing round with tracer.

There were similar problems with the gun's barrel, which was produced from visibly inferior steel. Its standards also fell short of those from the first half of 1941, which influenced its life span and the accuracy.

The F–34 gun was installed in a turret that rotated 360° in 10–14 seconds.[118] It was powered by an electric motor, whose quality was poor in the majority of the mass-produced T–34s. On the other hand, the Pz.Kpfw. IV turret was powered hydraulically and turned 360° in 26 seconds[119], and the "Sherman's" turret made one revolution in 15 seconds.

The accuracy of the Soviet gun while firing from a stationary position at a target 1,000 meters away was estimated to be 50%, while the German KwK 37 gun's was estimated at 73%.[120] Already past its prime, the German gun, despite its weak characteristics, still proved more precise than the Soviet F–34. The T–34's ammunition stowage capacity was 77 rounds (later increased to 100), while that of the Pz.Kpfw. IV Ausf. E/F was 80 and the M4's was 97 rounds.

After the tank was modernized in 1943, the T–34–85 made an appearance, officially only differing from the T–34 by its armament. According to the accessible documentation, all driving characteristics remained the same. However, this could not be true as the T–34–85 weighted 4.5 tons more than the vehicle produced in 1941. Problems with establishing the vehicle's range point to changes

[118] It is not really known if this refers to the varying condition of the batteries or various turrets.

[119] Almost for certain, this refers to the unconstrained turning of the turret. A quick complete turn took about 14–16 seconds.

[120] Almost for certain, this data refers to the predicted practical accuracy. The theoretical accuracy of the German gun was estimated at 98%. The Soviet data may be slightly too high, as it was based on firing at a target that was 2.5 meters high and 3 meters wide (this was standard), while the Germans used a target that was 2 meters high and 2.5 meters wide.

[121] Sometimes, 550 liters is given as capacity. The particular capacity depended on the manufacturer and the production series.

[122] According to the manual, but with a range of 300 kilometers on paved roads, its range on unpaved roads must have been the same, or even less, as that of the T–34–76 in 1940 (as a result of the greater weight), that is; 210–220 kilometers. The actual range of the vehicles produced during 1943–1944 was approximately 350 kilometers on paved roads with the internal fuel tanks topped up.

[123] Data comes from German tests performed on the tank in 1944.



Two photographs of tanks immobilized by the Germans on a road, 1943/1944. The tank in the background with the flat turret, number "11" on the turret rear in the right photograph, was produced at the No.112 Factory. It is equipped with a radio. The tank in the foreground of the top photograph is more interesting; the front glacis has appliqué armor around the flame thrower, the square fuel tanks at the back and a softedge turret with a commander's cupola (compare with the bottom photo on p. 235).

- T. Anderson's collection -



that arose. With the tank's total capacity of 570–580 liters[121] (that is, approximately 110 liters more than the T–34–76 "Model 41"), the range was supposed to stay the same; 300 kilometers on paved roads, 250[122] kilometers on country roads and 160–180 cross-country.[123] The only certainty was that its ground pressure coefficient rose from .62 kg/cm^2 to .85. As a comparison, the M4 with the 76 mm gun had a ground pressure of 1.0 and the version on the HVSS chassis had a .77 coefficient.

There exists a common belief that the T–34–85 was a very good tank, did not break down and performed well



- Planeta -

Two photographs of T–34s from a unit taking part in the "liberation" of the Balkans during the summer of 1944. The unit insignia was a "7" inside a square. The other markings designate its component units. The T–34–76 (produced at the No.112 Factory) has a hexagonal hard edged turret with a commander's cupola and two periscopes. The tactical number "53" can be partially seen at the rear of the turret.

T–34–85 in the right photo, produced at the No.183 Factory, has a tactical number "27" painted at the front of the turret. The number at the back is not clear, although it does end with a "7".



- V. Kulikov's collection -

in the field. It, however, appears that such opinions miss the mark completely because they apply to the war-time tank while being based on experiences with the post war production vehicle. The post-war version, alas, was a completely different vehicle due to the higher quality of its production, especially the engine and component parts of the transmission.

The armor protection remained the same, making the tank vulnerable to penetrations from almost all German guns. Even the frontal armor could be penetrated by all

	USSR		USA	England	Germany	
	S–53	D5	M1	17 Pdr.	KwK 40	KwK 42
Caliber (mm)	85	85	76	76.2	75	75
Length (cal.)	54.6	51.6	52	55.1	48	70
Length (mm)	4,645	4,366	3,962	4,202	3,218	5,250
Initial velocity (m/s)	792	792	1,036	1,204	990	1,125
Min/max elevation (deg)	–5/+25	+22	–10/+25	–5/+20	–10/+20	–8/+18
Maximum range (km)	12.9 km	12.7 km	12 km	~12.8 km	8 km	10 km
Weight (kg)	1,150	1,500	586	920	496	1,084
Penetration (mm), 30 degrees, at 1 km	85	85	135	192	89	149
Ammunition supply (rds)	56	56	71	77	87	79–82
Range of direct fire (m)	1,000	1,000	~1,200	~1,300	~1,200	~1,300

German tank and antitank guns of calibers 75–88 mm, although, in the case of the 75 mm L48 gun, theoretically, that could only be done at distances under 500 meters. The T–34–85's new gun was the only factor that improved its performance on the battlefield over the T–34–76, although this was primarily when facing the Pz.Kpfw. IV or similar tanks. When it fought against new vehicles, such as the "Panther", nothing helped because the 85 mm gun had a worse performance than the new British, American or German 75 or 76 mm guns. In table above is the raw data as a comparison.

The length of time for the turret to revolve 360° fell to 17 seconds, while the "Panther's" took between 15–18 seconds (in the T–34–85 the drive was electric, and in the Pz.Kpfw.V, as usual for the Germans, it was hydraulic). The M4's time remained the same.

The theoretical accuracy of the 85 mm gun was 63% at 1,500 meters, while the "Panther's" 75 mm L/70 gun was almost 100% (theoretical) and 72% (actual) at the same distance. Similar differences existed between the Soviet gun and the American and British guns.

Compared to the T–34–76 produced in 1941, the T–34–85 produced in 1944 must be rated quite negatively. Despite its faults, the Model 1941 presented a worthy opponent for its enemies, which the "85" could not do. It is true that the T–34–85 was a bit better than the T–34–76, but, after comparing the two tanks using the general conditions on the battlefield, the earlier model gave its crew better possibilities to survive. Just like the T–34–76 could face the Pz.Kpfw. IV Ausf. E/F on equal terms, so the T–34–85 could face the Pz.Kpfw. IV Ausf. H. The problem lay in the fact that in 1941 the Pz.Kpfw. IV was a relatively rare tank, while in 1944 it was one of 4 basic vehicles of the Panzerwaffe that could challenge the T–34 successfully. Despite the evolution of the tank, Soviet T–34 tank crews in 1944 had comparatively worse conditions to operate in than those who fought in 1941.

From the above discussion, the conclusion could be reached that the Soviets lacked on the battlefield a new tank that could match the "Panther" (that is, the T–43 or T–44). However, the problem did not lie exclusively in the lack of a successor, but rather in the modernization of the T–34. This matter becomes clearest when the T–34 is compared to the M4 "Sherman". The American competitor from the end of the war (already designed in 1943[124]) was much better than its version from 1941. Its modernization was many times more effective than that of the T–34. The Soviets managed to keep the battle worthiness of the T–34, but at the cost of lowering its overall quality. Meanwhile, the Americans improved every characteristic of their vehicle. More important, the Americans could afford to maintain a large production of the M4 and, at the same time, improve the quality of its components; the quality of the armor and armament, as well as the motor and suspension, improved continually. In the Soviet Union, on the other hand, everything stood still. Despite this, Soviet authors concluded: The "Thirty-four" was the only tank among the countries at war that did not age and did not lose its impressive fighting qualities. Behind this undeniable characteristic of the machine stood the titanic work of the designing collective led by A.A. Morozov and all the workers of the Ural tank factory.[125] Unfortunately, this opinion has prevailed until today.

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[124] The vehicle with the new 76 mm gun was ready for production in the summer of 1943, and the new HVSS suspension in the fall of the same year. The decision to put both modifications into production was, however, taken only in the beginning of 1944 and in the spring of 1944, respectively. Such modified "Shermans" made an appearance in small numbers in the second half of 1944.

[125] Listrowoj/Slobodin — *Konstruktor Morozow* — Politizdat, 1983, pp. 75.

THE T–34 IN THE POLISH ARMY

The T–34 made its appearance in the Polish Army relatively late, only in the summer of 1943 (beginning of July) when it was delivered to the 1st Tank Regiment, which was subsequently expanded into the legendary "Heroes of the Westerplatte" 1st Armored Brigade. All of the vehicles then delivered to the Polish unit came from the No.112 Factory and had the flat turrets. Many of the tanks had additional appliqué armor on the front of the hull, and probably all of them had the additional fuel tanks attached to the rear of their hulls. The 1st Infantry Division Received 32 tanks of the latest production, that is from the period mid-March — beginning of June. The vehicles which survived the battle of Lenino had the following serial numbers: 3030588, 3030736, 3040914, 3040925, 3051026, 3051086, 3051242, 3051268, 3051302, 3051327, 3051330, 3051338, 3051346, 3051350, 3051361, 3051366, 3051377, 3051378, 3051379, 3051385, 3051391, 3051394, 3060003, 3060005[126] (reading from left to right: 3 = year of production, 06 = month of production, 0005 = number of vehicle produced in that month; the complete number was stamped on the beam linking the front of the hull). The numbers of the other 8 tanks are still unknown, but it can be considered as certain that they were part of the same series as the tanks listed above.

The tank regiment went into action for the first time in October 1943. It was to support the division in the actions around Lenino, but its actions were unsuccessful. The lack of experience, skill and knowledge contributed to the failure. In the action 7 tanks were lost, mainly in the German positions, and they were considered as write-offs. The lack of radios and the Soviet armored tactics made it impossible for the Polish unit to carry out any kind of coordinated actions or to exploit the fact that approximately fifteen tanks broke through the German line.

After the experiences in the autumn fighting near Lenino, the RKKA command was not disposed to throw the Polish tankers back into the thick of fighting. In the fall of 1943, equipment began to arrive for the then-forming 2nd Armor Regiment. It was created, with the intention of forming of the 1st Tank Brigade from the two tank regiments. Those tanks were also from the latest production series from the No.112 Factory, although these vehicles had the hexagonal turrets. Some of them even had the commander's cupolas. Their numbers were: 0308722, 0308741, 0309757, 0309767, 0309778, 0309794, 0309798, 0309800, 0309801, 0309802, 0309804, 0309805, 0309807, 0309808, 0309809, 0309811, 0309812, 0309813, 0309814, 0309815, 0309816, 0309817, 0309818, 0309820, 0309821, 0309822, 0309824, 0309825, 0309826, 0309829, 0309833.

From the above information, it is obvious that most of the vehicles were produced in September, barely a month before being turned over to the Polish unit (which took place on 22 October).

Along with preparing the unit for the next battles, which was planned for the summer of 1944, on Polish territories, the 1st Tank Regiment slowly made good the losses from the fighting in the autumn of 1943 and took in replacements. In March 1944, it received further tanks (with hexagonal turrets) produced at the No.112 Facto-



The beginnings of the Polish Armor Forces, Sielce, July 15 1943. During the 1st Division's oath-taking, Col. Berling and Wanda Wasilewska inspect the unit. They stand in front of a spring/summer 1943 production series T–34 from the No.112 Factory.

- ex-WIH -

ry. A total of 14 tanks were received, including several older vehicles that had undergone capital repairs and several vehicles from the latest February production. These had the following serial numbers: 4010017, 4020504, 4020506, 4020513, 4020516, 4020526, 4020529 and 4020794. Additionally, several vehicles were received with shortened numbers, indicating that they were either produced at the No.183 Factory or repaired and had their numbers copied carelessly. These vehicles had the following numbers: 30381, 35121, 35170, 37124, 31190 and 31124. During the stamping of serial numbers on tanks produced at the No.183 Factory, the zeroes were omitted (certainly in 1944), creating an unbelievable mess when identifying individual vehicles. Therefore, in some cases, it is difficult to determine the real serial number on the vehicles. In the case of the shortened numbers, it appears that the numbers should be interpreted in the following way; the first number indicates the year of production; the second, and perhaps the third, indicate the month of production; the last four numbers indicated the number of the vehicle within that month's production at that factory. The full serial number of the ones listed above should probably read: 3030081 (?), 3110090, 3050121, 3050170 and 3070124.

It was with this complement of tanks that the unit went into action in August 1944 in the Magnuszew bridgehead, where it received its baptism as a brigade. After the battle there, the brigade was withdrawn behind the front, and then put into quiet sectors of the front, where it provided relief and honed its military craft. In mid-January 1945, the brigade took part in the January operation that brought the Soviets to the Oder and involved the Poles in the bloody fighting in Pomerania. Thanks to reinforcements, the brigade went into action at full strength — 64 T–34s and one command T–70 — and, in addition, its tanks were more modern. This was because, to replace the vehicles which it lost, it received 15 brand new T–34–85s with the following serial numbers: 4080220, 4080224, 4080304, 4080305, 4090323, 4090326, 4090327, 4090330, 4090337, 4090340, 4090365, 4090372, 4090390, 4090391 and 4090399

It appears that all of these vehicles came from the No.112 Factory. The Polish unit received them on October 1.

At the beginning of the offensive, the brigade operated in the region of Warsaw, its southern outskirts (Wlochy and Piastow) to be more precise. The enemy did not put up any resistance and so the liberation of the Polish capital went smoothly. From 13 to 19 January, the brigade was not in contact with the enemy; it did not fight or suffer any losses. As a result of this, the mood among the troops was very good, especially when passing through





Two photographs of Sormovo-produced T–34–76s taken during a parade in Sielce, July 1943. Both tanks display elements characteristic of that factory. Applique armor is visible on the tank in the second photograph.

- ex-WAF -

[126] The data regarding the serial numbers of the tanks received during the war come from J. Magnuski — *Wozy bojowe LWP 1943–1983*, MON 1985.

liberated localities, where the population lined the streets to greet the Polish troops. While in Wlochy, the brigade's leadership noted: *"with surprise and great interest, the populace watched the black, dangerous vehicles driving by — T–34 tanks that Poland did not have in 1939, but which the Polish Army had now thanks to its Soviet ally".*

The continuing march looked the same. The Germans continued to flee, forcing the Poles and Soviets to pursue intensively. As could be expected, the supply situation worsened immediately. There was no problem with the ammunition but fuel started to get scarce, causing problems with unit cohesion. While the brigade had two fuel units when it began its attack, on 18 January it was down to one, with re-supply being a doubtful possibility. The three-day rations allowed the troops to function reasonably well, but this was hampered by the condition of the equipment. At noon on 17 January, the brigade had 59 operational T–34s, but was down to 53 already by next day's evening; seven vehicles needed medium-level servicing and another 4 immediate attention. It can be seen clearly that as a result of continuous 24 hours operation that led to the exceeding of the safety margins of the poorest vehicles, 6 vehicles fell out, which was over 10% of the unit's establishment.[127] Wanting to protect its cadre, several days later the command entered the following in the unit diary: *"The old equipment from 1943, after having covered 1,500 kilometers, produced expected results. After a 200 kilometer march, 15 tanks need medium or short term maintenance and repairs."*[128]

At the end of the month, when the brigade ended its victorious march, the situation was exactly the same. There was no organized resistance and battles were only fought when the Germans decided to resist. In the evenings and at night, little groups of German troops



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This series of photographs was taken of the 1st Tank Regiment during its crossing of the river Wol in October 1943. It is probable that this is how the Polish T–34 looked at the battle of Lenino.



- ex-WAF -

[127] A play on words: Matczast — this is a combination of "materialnaja czast", that is combat equipment such as guns, tanks etc., but not rifles of machine-guns. But this could also be a fragment of a severe curse (that is; motherf...ng equipment). It could also be a short form of "Matuszka" (Mommy) or "Matuszka Rosija" (Mother Russia).

[128] It appears that the limit of more or less 100 motor hours was established at an average speed of 15 km/h. This would suggest that the tanks drove notoriously badly in second gear. They still had their original engines.



- ex-WAF -

20 Germans. Tank losses started in the night of 24/25 January during the clearing of the town. After being hit by a grenade (what is meant; a hand-held antitank one), vehicle number 319 burned out, and vehicle number 313 was damaged by a Panzerfaust.

After capturing Bydgoszcz, the brigade had to halt in the town due to the lack of fuel. On 26 January, a transport column was sent to Rembertow to pick up gasoline, but this time, due to the lack of fuel, the unit's anti-aircraft company had to remain in the rear. On 30 January, for the same reason, the HQ T–70 had to be left behind. On that day, the brigade was already in Groslutau, having behind it a 500 kilometer march. The brigade's order of battle was as follows: 1st battalion — 19 tanks, 2nd battalion — 16 tanks, 3rd battalion — 10 tanks, HQ — 2 tanks.



- ex-WAF -

came out of the woods and attacked the units of the RKKA and the Polish Army, for whom the greatest problem was still the fuel supply. Having arrived in Muchow, on 21 January the brigade settled in for a one day rest. Thanks to the arrival of three repaired T–34s during the night of 20/21 January, the brigade's strength rose to 47 operational tanks. They were distributed in the following way: 1st battalion — 16 tanks, 2nd battalion — 17 tanks, 3rd battalion — 12 tanks, HQ — 2 tanks plus 1 T–70.

Taking advantage of a break in operations, the brigade immediately sent out trucks to Warsaw to pick up fuel, ammunition and food. After re-supplying, the brigade once more moved against the Germans, finally participating in its first battle when it took Bydgoszcz from the march. The motorized fusilier battalion was the first to enter the city, and was immediately followed by the 1st tank battalion. Losing 3 dead and 6 wounded, the infantry captured a column of trucks and took 40 prisoners, killing another 45–50 Germans, at least by its count. The tankers destroyed 6 cars and 3 guns, and killed about

An operational halt, and a wait for further orders, allowed the command to analyze its January operations. The brigade destroyed over 50 cars, 40 wagons and 6 guns, and killed over 150 enemy troops. It took 112 prisoners and also freed about 80 British and French prisoners. It lost 2 tanks in action, 11 wounded and 4 dead. The brigade's commander, colonel Malutin, was very proud of his unit. He wrote: *"The moral attitude of the armored brigade's personnel during operations was very good. Without exception, every soldier went into battle with joy, wanting to exact revenge on the enemy for his brother, father, sister and mother."*

The real problems started in February and March in Pomerania and at Gdynia, where the brigade lost almost all of its tanks. The amount of ammunition used by the brigade testifies to the scale and intensity of the fighting there. During the winter/spring fighting in northern



This T–34–76 was photographed during a break in its march across the USSR in winter 1943/1944. This tank was produced at the Sormovo Factory and has atypical insignia on its turret. Although the tank is considered to be from the 1st Tank Regiment, its markings cast doubt on this assumption. Note ammo boxes on the sides and additional "square" fuel tanks on the back.

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Poland (from 14 January to 18 March 1945), on average, each of the brigade's T–34s fired 120 76 mm rounds and 165 85 mm rounds.

To bring the brigade up to a fighting standard, the Soviet command besieging the Tri-City (Gdansk-Gdynia-Sopot) area decided to turn over to colonel Malutin 25 new T–34–85s (along with their crews) that had just arrived from Russia. Some of these vehicles were: 407605, 411094, 411517, 412164, 412202, 412274, 0315010[129], 0412174, 4020527, 4070945, 4120292, 4120309, 4120368, 4120370, 4120387, 4121151, 4121266, 4121536, 4121714.

It is quite certain that these vehicles were entered into documents as having been turned over to the Poles.

Until mid-April 1945, the 1st Armor Brigade was the Polish Army's only armored unit to have taken part in the fighting. Only when, in mid-April, the brigade captured the tri-city area and was taken from the front line, did other armor units go into action. The idea of expanding the Polish armored forces appeared only in the spring of 1944, when it was already known that the crossing of the Polish-Soviet border (or more appropriately, borders) was going to be inevitable and would make it possible to radically expand the Polish army.

As a result of Polish-Soviet agreements, it was agreed to establish a number of armor units. Most of them were to be incorporated into the 1st Polish Armor Corps, which was to be part of the 2nd Polish Army. The organizational structure of the corps was to be, obviously, a copy of the RKKA structure. Its core was to be composed of three completely new armored brigades, for which the Polish side could not guarantee cadres (just like for all other technical types of its units). Faced with such a situation, the two sides agreed to form units where the equipment and cadre would be Soviet, and only the privates were to be provided from a Polish draft. While it is true that in time the Soviet officers were to be replaced by Poles, such plans turned out to be more complicated than originally planned, and many Soviets had to remain in commanding positions until the end of the 1940s. As a result, all armored units of the Polish army were Polish in name only.

The functioning of the brigades was completely dependent on the wishes of the RKKA command. Each unit was composed of a Soviet officer cadre and Soviet tanks. All crews passed through the standard training cycle, almost exclusively in the 29th and 31st RKKA training regiments. A few gained some knowledge in the Polish 3rd Training Regiment, which was being established along with the combat units. The Poles in the units were mostly privates, coming from the draft in *"Poland, western Belorussia and western Ukraine"*, as was scru-

[129] This is, quite certainly, an incorrect number.

[130] According to J. Magnuski, this happened in October (between 11th and 17th; pp. 99), but documents from the 4th Armor Brigade mention September (same days); see main text later in book.

pulously noted in the diary of one of the units. As in all other units of the Polish Army, only the priests were exclusively Polish. They, along with the Red Army's political officers, gave the rank and file spiritual sustenance and the will to fight.

The 2nd Armor Brigade was the first unit to be established. The Red Army ordered its formation already on 26 May 1944. However, due to unknown reasons, the start of its formation began only on 1 August near Berdichev, where the center for forming Polish units of the RKKA was located. On 23 August, the brigade's nucleus relocated to Chelm, where the Polish Army's command created the organizational center for the Polish Armed Forces. On 19 August, the unit already had 582 soldiers, of which, however, only 6 were NCOs. *"The largest problems during the formation were that the brigade did not have stores of food or uniforms. Additionally, since the personnel were recruited mainly from farmers, it was completely unfamiliar with military service"* In the fall[130], the 2nd Armor Brigade, along with the other two armored brigades, received the first T–34–85s that were to be used for training. Those were new tanks from No.112 Factory produced in September. The corps received the following vehicles: 4090341, 4090387, 4090392 and 4090394.

The unit was formed, trained and organized until the end of January 1945. On 28 January the brigade was completely equipped and reached battle readiness. What "battle readiness" meant in those days can best be illustrated by the fact that on 25 January, when its formation was completed, in its ranks the 2nd Armor Brigade had 211 officers (80% of authorized strength) and 1,203 NCOs and enlisted men (85% of authorized strength). It had 65 T–34–85 tanks (those were frontline vehicles; the ones used previously stayed in the unit and were used for training), 6 M–17 anti-aircraft vehicles (on M3 half-track chassis), 71 trucks, 3 Bren Carriers (MK–1), 14 motorcycles, 4 57 mm antitank guns and 6 mortars.

The brigade's tanks made in Factory 183 had the following numbers:

41272, 412375, 412491, 412633, 412635, 412664, 412671, 412675, 412683, 412688, 412705, 412716, 412721, 412728, 412734, 412735, 412737, 412744, 412748, 412756, 412760, 412762, 412764, 412767





These two photographs show T–34–76s from the 1st Armor Brigade taking on ammunition. The first photo shows a tank from the No.112 Factory, while the second shows a tank with a turret from the STZ Factory mounted on a hull from the No.183 Factory. It is worth noting the way that the eagle has been painted on the left side of the turret (the dark splotch has been applied on top of previous paint).

- ex-WAF -



Tanks of the 1st Armor Brigade drive across Poland in summer of 1944.

- *ADM* -

and Factory 112:

4111696, 4120311, 4120317, 4120321, 4120324, 4120328, 4120329, 4120356, 4120363, 4120377, 4120381, 4120382, 4120389, 4120396, 4120398, 4120399, 4120400, 4120405, 4120417, 4120462, 4120500, 4120512, 4120524, 4120529, 4120548, 4120553, 4120554, 4120559, 4120561, 4120572, 4120574, 4120575, 4120576, 4120577, 4120578, 4120581, 4120582, 4120583, 4120564, 4120587.

In February 1945, as all the units belonging to the 1st Armor Corps, the 2nd Armor Brigade was transferred near the present Polish-German border. Although the Soviet air force had air superiority (at least in theory), the Polish units were attacked by the Luftwaffe. Luckily for the Poles, the attacks were unsuccessful due to the small number of the operational German aircraft. In total, the brigade travelled 1,400 kilometers, of which 350 were by covered by the tanks driving on their tracks.

During the final preparations before the attack, the 2nd Brigade had attached to it the 26th and 27th Assault Gun Regiments, 2 batteries of SU–122s from a Soviet unit and a company each of sappers and fusiliers. The brigade was to cooperate with the 1st Motorized Brigade and the Soviet 7th Tank Corps. At that time, the commander of the 2nd Armor Brigade was colonel Wierszkowicz, and the battalion commanders were as follows: Major Diergaczow (1st battalion), Major Bilajew (2nd battalion) and Captain Chizniak (3rd battalion).

The histories of the 3rd and 4th Armor Brigades were similar. The 3rd Armor Brigade received its order to proceed to its assembly area on 3 February 1945. It too experienced the Luftwaffe's attention during its march toward the German defensive line on the Oder and Neisse rivers. One of its rail transports was bombed 15 kilometers southeast of the Ols railway station, resulting in 18 dead and wounded soldiers and 4 damaged vehicles (one of them was an M–17). On 14 April, the brigade and its supporting units (25th Assault Gun Regiment and a battery of M–17s from the 26th Anti-aircraft Regiment) were moved into the attack region, 1.5 kilometers from Hammerheiser. There, it was included in the reserve of the 1st Armor Corps. Its mission was to follow through the gap in the enemy lines that the 4th Armor Brigade was to create.

The vehicles with the following serial numbers belonged to the 3rd Armor Brigade:

Factory 183:

411565, 412317, 412368, 412605, 412606, 412666, 412685, 412687, 412706, 412707,412713, 412715, 412725, 412729, 412731, 412733, 412747, 412753, 412757, 412759, 412761, 412763, 412765, 412769, 412770, 412783, 412788, 412807, 412820, 412828

Factory 112:

4120101, 4120104, 4120107, 4120116, 4120269, 4120284, 4120333, 4120347, 4120352, 4120367, 4120369, 4120385, 4120387, 4120395, 4120402, 4120410, 4120414, 4120419, 4120420, 4120421, 4120424, 4120435, 4120767, 4121010, 4121103, 4121105, 4121318, 4121403, 4121413, 4121423, 4121426, 4121431, 4121432, 4121499, 4121808.

The establishment of the 4th Armor Brigade was begun on 2 August 1944 in the village of Osikow near Berdiczew, and on the next day its commander, Lieutenant Colonel Jan Wereszczagin, showed up there. Already on 8 August, the unit received 3 Mk–1 and a car, and on 22 August it already had 300 men in its ranks. Among

them were the three tank battalion commanders, they were: Captain Michalkow (1st battalion), Major Rykow (2nd battalion) and Major Syrow (3rd battalion). All commanders took over their commands by 10 August. Initially, there was not much to do, so the cadre of the Polish brigade learned... Polish.

On 22 Agust, the unit received an order to move to Zawadowka, near Chelm, where it arrived on 24 August. After the brigade made itself at home, it started to receive equipment needed to start training. It is worthwhile here to examine in detail how the equipment arrived, as the manner in which this happened was typical of all units. At the same time, this look illustrates well how units were formed in the RKKA. And so:

- On 7 September, 1 ZIS 5 arrived,
- On 11 September, 2 training T–34–85s arrived,
- On 17 September, 1 training T–34–85 arrived,
- On 18 September, 1 training T–34–85 arrived,
- On 19 September, a training Dodge $^3/_4$ arrived,
- On 21 September, a training Dodge $^3/_4$ arrived,
- On 5 October, a Willis Jeep arrived,
- On 18 January, 10 Studebaker trucks arrived,
- On 28 January, 30 T–34–85s arrived,
- On 29 January, 5 T–34–85s arrived,
- On 30 January, 30 T–34–85s arrived,
- On 1 February, 4 ZIS–5s arrived,
- On 2 February, 8 ZIS–5, 2 RAB AA, 1 ambulance and 1 Dodge $^3/_4$ arrived,
- On 3 February, 8 ZIS–5 arrived,
- On 4 February, 8 ZIS–5 arrived.

Unfortunately, there is a lack of data on the disposition of the equipment, and so there is no information about where the 4 training T–34–85s came from, or where they were sent to later.[131] This does not change the fact that none of those vehicles was included in the complement of any of the armor brigades, at least not up to the summer of 1945. They are not mentioned in any of the equipment inventories or, obviously, in the orders of battle of any of the combat units. This was an unusual situation as, normally, only used vehicles were designated for training purposes, while the first T–34–85s were brand new. Their engines were new and the tanks were fully operational.

On 25 October, lieutenant colonel Stupinov took over the command of the 4 Armor Brigade. Under his watchful eye, the brigade trained, almost without break, until January. The results were recognized as satisfactory, although in reality the soldiers primarily received theoretical instruction. When, on 4 February, the brigade received an order to move to Raducz, it became evident that it could not carry it out. It became clear that the crews did not know how to drive the tanks (between 26 and 28 January, the brigade received its equipment — 65 T–34–85s that were handed over by a Soviet unit). As a consequence, the unit remained where it was stationed for another three weeks for additional training and, on 22 February, it received another order to move to the assembly of the 1st Armor Corps, which was preparing for the Berlin offensive. The brigade reached Nekl near Poznan from where it carried out a 180 kilometer road march to Glasow. While the unit covered that distance, there was (according to the unit's chronicler) not much joy as the drivers had not learned much during February. The march's tempo (approximately 20 km/h) gave them nothing but trouble. Frequently, a tank left the road and, to the joy of the officers, knocked down a tree.[132] During the march, the brigade experienced another incident; an attack by 7 Fw 190s near the Zoldin-Pitric area at approximately 1600 hours. Although the German aircraft operated without hindrance (there was no air cover, or protection from the brigade's anti-aircraft unit), they were not able to successfully hit the moving column.

Later, the unit set up camp in Olesnica Slaska, where, on 1 and 2 April, Easter was celebrated. The Polish Catolicism did not hinder the brigade's commander from reporting to his superiors that in his unit *"The political-educational-moral state was satisfactory"*[133]. It is known what the chaplains did during the holiday, but, unfortunately, how the political officers kept themselves busy is a mystery. It is known that during that time the Corps commander, General Jozef Kimbar, visited the unit. He said *"The 4th Armor Brigade, although last by number, in terms of organization, discipline, combat training and carrying out its basic missions, was first in the Corps"* It is not known if the general had a special affection for the unit, was led to a wrong impression of its level of training, or if that was a typical polite expression before battle. No less mystifying, the statement that the armor unit, whose drivers could not drive the tanks, was the best in the Corps, touched on the grotesque. It put an almost tragic label on the brigade.

Despite the fact that its soldiers lacked elementary combat skills, the 4th Armor Brigade was naturally classified as fully capable of going into battle. On 3 March, it had 1,317 soldiers, 65 T–34–85 tanks, 9 "bronieviks" (armored cars or APCs), [134] 71 cars and trucks and 2 mo-

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[131] J. Magnuski (pp. 99) states that the tanks were divided; two per brigade.

[132] From the document's context, it is clear that the drivers could not operate the tanks due to their inexperience. "Meanwhile, the T–34 went straight ahead and there was not even any need to continually manipulate the steering levers." Could it be that the drivers operated the vehicles after making only a few circles in the field next to the camp?

[133] Report from 2 March.

[134] That is, armored cars and armored personnel carriers. It appears that what is meant is 3 Bren Gun Carriers and 6 M–17s.



torcycles. As its armoured fist, it had the following tanks with serial numbers:

4122, 47538, 411348, 412159, 412199, 412387, 412392, 412429, 412452, 412454, 412519, 412559, 412586, 412599, 412601, 412607, 412618, 412662, 412674, 4120680, 412702, 412718, 412743, 412745, 412746, 412749, 412750, 412751, 412766, 412774, 412778, 412782, 412786, 412787, 412789, 412790, 412795, 412796, 412801, 412802, 412803, 412804,

Series of photographs taken during the 1st Armor Brigade's crossing of theVistula River into the Magnuszew bridgehead in August 1944.

- ADM -

Above: A T–34 from the No.112 Factory that was delivered to the brigade in the autumn of 1943. The tank (number 235) has a hexagonal turret, a commander's cupola and additional fuel tanks (the lower but wider type) at the rear.

Below: These are older T–34s with the flat turrets.







412806, 412808, 412813, 412817, 412818, 412825, 412827, 412831, 412832, 412833, 412834, 412835, 412836, 412837, 412838, 412839, 412840, 412841, 412842, 412843, 412844, 412874, 412911[135]

At the same time, and in the same area, as the other brigades of the corps, assembled the "ace" of the corps' — the 16th Armor Brigade. This was a strictly Soviet unit and there was not even any attempt to reclassify it as Polish. Simply put, a RKKA unit was simply attached to a Polish corps. That is how it happened to have a high number and its name; Dnow-Luzyc Red Banner.

The decision to attach the unit to the Corps was taken already in October 1944, but the reasons behind it are not known. After a complete refitting in the rear areas by the end of the year (only remnants of the brigade were withdrawn from the front), the unit was brought up to

[135] In the original (J. Magnuski, pp. 100) it is 4129611, but, looking at the number sequence, the numeral "6" must be a typo.



This is the tank of the commander of the 1st Armor Brigade in summer 1944, supposedly photographed during the fighting near Studzianki. However, this photo and an earlier series of photos (see pages 206–207) may have been taken after the battle.

- *ADM* -

combat readiness near Warsaw at the end of January and beginning of February. At that time it received new tanks with crews, which drove the tanks almost directly from the factories. These vehicles had the following serial numbers:

Factory 183:

412354, 412531, 412612, 412741, 412754, 412772, 412773, 412805, 412810 (or 840), 412846, 412848, 412850, 412851, 412852, 412854, 412855, 412857, 412858, 412859, 412860, 412861, 412864, 412865, 412866, 412871, 412875, 412876, 412877, 412890, 412891, 412895, 412897, 412901, 412905, 412906, 412910, 412911, 412912, 412917, 412932, 412937

Factory 112:

4120530, 4120535, 4120600, 4120625, 4120627, 4120630, 4120631, 4120633, 4120636, 4120638, 4120640, 4120642, 4120643, 4120645, 4120646, 4120647, 4120649, 4120650, 4120659 (or 654).

At the same time as the armor brigades, the 2nd Motorcycle Battalion of the Corps received 10 T–34 tanks: (412285, 412369, 412615, 412693, 412758, 412809, 412815, 412819, 412821 and 412830 produced at the Nr. 183 Factory) and a sub-unit of the corps command, officially attached to the 6th Communications Battalion, received another 5 tanks (4110131, 4120418, 4120501, 4120516 and 4120537 produced by the Nr. 112 Factory). In total then, the 1st Armor Corps fielded 275 T–34 tanks for the Berlin offensive. All of the tanks were of the latest 85 mm version with ZIS–S–53 guns, also the latest version, and had minimum wear.

Despite the fact that the war was coming to an end, the Berlin offensive proved very costly to the 1st Armor Corps. Despite the lack of any kind of chances for success, and unbelievable logistical and military problems, the Germans fought unusually stubbornly and brought the Polish troops many operational problems and losses.

As an example, the 4th Armor Brigade went into battle in the morning of 17 April and at noon was involved in heavy fighting for Usmendorf, where it suffered proportionately heavy losses and wasted a lot of time. Among the casualties was the brigade commander, lieutenant colonel Wereszczagin, who was wounded. It is interesting that, as other brigades of the corps, this unit was heavily disrupted by... the enemy's air force. During most of the days, Luftwaffe aircraft hung over the Polish formations breaking through the Oder line, breaking up the attacks and disorganizing the formations. Neither the Soviet air force nor the Polish anti-aircraft defense could effectively oppose the Luftwaffe. As a result, in the unit diaries appeared entries such as the following: *"The enemy air force... disrupted the brigade's combat formations with incessant strafing"* (4th Brigade) Just on 17 April, the 3rd Armor Brigade was bombed three times and, on 24 April, *"attempts to bypass the enemy to carry out its assigned mission failed. The actions of the tanks were nullified by the enemy air force."* The losses caused by the fighting and the Luftwaffe attacks were not large (on the first day, 2 T–34s were destroyed and 7 were damaged, mainly in the fighting for Niska), but the difficulties resulting from air actions were felt deeply.

Following the conclusion of the initial, heaviest stage of the fighting, the Corps' units pursued the enemy in relative peace. The German war machine finally broke down and the only problem proved to be mines and soldiers with panzerfausts. The sporadic actions by Germans using these types of weapons slowed down very effectively the march of the Polish troops. As an example, in

Three photos of T–34 tanks (No.112 Factory) from the 1st Armor Brigade crossing the Bzura River on Jan 20th 1945. The white tactical numbers have been applied in the standard manner, it appears that the number was also painted on the glacis, as is the case with tank "210" (2nd photo) that is visible on the front plate, as well as on the turret. Note the small Polish flag on top of the early ("flat") turret.







the following stages of the Corps' battle trail, the 3rd Armor Brigade lost 6 destroyed T–34s on 25 April (and one damaged) and another 4 (and one damaged) on the next day.

It was not until the very end of the fighting, when the Corps approached the river Elbe, that further intensive actions came, when the Polish command wanted to cut off from the river a German troop grouping and prevent a mass crossing of the river by civilians to the western occupation zone. General Kimber's direct orders of the type *"the brigade* [the 2nd, author]*, without regard for losses, is to reach the Elbe river near Bad-Schandau by the end of the day."* As an example, in difficult fighting, the 4th Armor Brigade captured Ulberzdorf near Neustadt on 8 May 1945. The unit was blocked by the Germans in the evening and kept in check until the armistice. It was noted in the 2nd Armor Brigade *that "as the unit approached the river Elbe, the enemy put up continually more stubborn opposition."* The 3rd Armor Brigade, which had limited success near Neustadt thanks to the actions of the 2nd Armor Brigade, battled for the town itself for two hours, very slowly *"defeating the enemy's*





Above: This T–34, produced at the No.112 Factory (the cylindrical fuel tank closer to the center of the hull) has a main gun from the STZ. Representatives of the Soviet and Polish armies stand on the tank.

- D. Sienkowski's collection -

Right: This tank from the 1st Battalion, 1st Armor Brigade, was photographed during the fighting at the Pomeranian Wall and along the Baltic coast. It is one of the first tanks delivered in 1943. The tactical number "123" indicates that it is the 3rd tank of the 2nd Company, 1st Battalion.

- ADM -



T–34 number "122" of the 1st Armor Brigade is being towed out of some muddy terrain. Supposedly, the T–34 could drive across every type of terrain.

- ex-WIH -



Above: One of the latest acquisitions of the 1st Armor Brigade photographed during a parade in Praga (a suburb of Warsaw) in 1945. The tank was produced at the No.112 Factory, and features the "large" turret mounted on the hull typical for T–34–76. Some series of hulls for T–34–76 were trabsferred to assembly lines of T–34–85 in the end of summer 1944.

- ADM -

Below: Another one of the new acquisitions of the 1st Armor Brigade during the same parade. The turret indicates that the tank was produced by No.183 Factory, but serials are only of No.112 production. Tanks were of August and September production, and were received in October 1st, 1944.



strong resistance" (this referred to German and Vlasov soldiers).

The breakthrough itself was made in a very simple manner. The 1st battalion of the 2nd Armor Brigade, after taking up a good jump-off position, suddenly attacked to break through; *"... the accurate fire from the tanks demoralized the German columns moving on a narrow mountain road, confusion and panic broke out, and the infantry started to run away..."*. Later, a unit of the 2nd Armor Brigade carried out a very successful raid, ending in the capture of the German crossing point. The Polish troops showed a great deal of determination in this action and, despite German counterattacks, held the eastern bridgehead until the brigade's main body arrived. Despite the ending of the war, and cutting the Germans off from the crossing, the 2nd Armor Brigade, as one of the few units of the 1st Armor Corps, still had to take part in sharp engagements in the battle for Bad-Schandau. Its tankers claimed the destruction of 3 assault guns, 5 tanks and 4 mounted anti-aircraft guns on the streets of the town. It was the last day of fighting. The Corps left for the Czech Republic between 9 and 11 May; as an example, the 4th Armor Brigade *"rode into"* Czechoslovakia on 12 May. There was no fighting there, only countless columns of German troops were rounded up.

The April/May 1945 fighting was bitter and brought the Polish army serious losses. The 2nd Armor Brigade lost 43 T–34s and 370 soldiers, 104 of them were killed. The 3rd Armor Brigade lost 34 T–34s destroyed and another 10 were damaged, and 2 M–17 s were also destroyed. The brigade also lost 312 soldiers dead wounded or missing. The 4th Armor Brigade lost 36 destroyed



Left: This T–34/85's tactical number "215" was painted on the tank by hand during the fighting in the Tri-City (Gdansk, Gdynia and Sopot) area in the spring of 1945.

- ex-WIH -



Right: This souvenir photo was taken right after the war ended. Clearly visible on the turret side is the unit insignia (typical for this formation) of the 1st Armor Corps and the tactical number "2123".

This T–34–85, with the tactical number "217", was photographed on Swietojanska Street, in Gdynia, while on the way to the cemetery. Note the hand-painted tactical number.

- ex-WIH -



This T–34–85 was probably from one of the Soviet units cooperating with the 2nd Polish Army during the Dresden Operation in the spring of 1945. This tank was produced at the No.112 Factory. It carries a tactical symbol on the turret side. Note that there are no spare track link brackets on the glacis plate.

- Author's collection -



T–34s and two transporters (an M–17 and a Mk–1) and 397 soldiers. Together, the three brigades, the core of the Corps, paid for the unit's successes with the loss of 113 vehicles and 1,079 soldiers. The entire corps lost 119 tanks, 24 assault guns; 451 soldiers were killed (including 77 officers) and another 1,080 were wounded (including 182 officers). During the operation, the 16th Armor Brigade suffered the heaviest losses. It was surrounded and had to face determined German counterattacks. The unit fired off 5,320 HE rounds, 2,500 AP rounds and 325 subcaliber rounds; that is, approximately 120 fire units. A total of 45 T–34–85s were written off the brigade's complement[136]. It is interesting that those losses were not counted as part of the Corps' losses (cited above from documents), which clearly illustrates the specific attachment of the brigade. In total, then, the Corps' tank write-offs reached 60% of its initial strength.

These high losses, however, were offset by numerous successes. During the last offensive (16 April – 9 May), the 1st Armor Corps destroyed 178 enemy tanks and assault guns, 123 APCs, almost 450 trucks, and killed approximately 9,000 soldiers. Its units captured 3,800 prisoners, 11 tanks, 30 APCs, 24 prime movers and 450 trucks. When it comes to successes of the Corps' individual brigades with T–34s, according to their own accounts, they are listed below:

Brigades:

	2nd	*3rd*	*4th*	*Total*
Tanks	56	57[137]	15	128
Assault guns	34[138]	–	9	43
Tankettes	–	–	2	2
Armored vehicles	82	64	9	155
Guns	243	115	56	414
Trucks	?	491[139]	103	~700
Prime movers	152	24	–	176
Enemy killed	?	3613[140]	2570	~8000
Prisoners	?	2278	100	~3000

[136] As a comparison, the entire 2nd Polish Army lost 40 heavy tanks and assault guns (the Su–76 company of the 9th Infantry Division was completely annihilated), 143 anti-tank guns and 20 other guns.
[137] Tanks and assault guns, destroyed and captured. The same applies to the other columns, which give a total of destroyed and captured equipment.
[138] In the original; "Ferdinands".
[139] Including destroyed.
[140] The data concerns killed and wounded, differentiating between regular infantry, and soldiers operating *panzerfausts*.



This is the first of two photos of tanks from the 1st Tank Brigade taken just after the war, in 1945 or 1946. This T–34–85, produced at the No.112 Factory, has the tactical number "3537" and the white eagle insignia above it. The number indicates that the tank is from the 1st company of the 3rd battalion (that is, the 5th company in the brigade) and the 7th tank in the 3rd platoon.

T–34s did not just serve in combat units. In October 1944, by order Nr. 3020010[141] of the National Leadership, on 3 October the 1st Polish Tank School was established in Chelm Lubelski. As with almost all units of the Polish Armed Forces being established in the area of Chelm, the cradle of the Polish Army, the initial existence of this unit was quite tragic. The soldiers froze and starved and, taking advantage of the lack of instructional help, which halted all instruction, kept supplied by foraging in the surrounding fields (probably not their only source) and "organized" firewood by hacking down the nearby forests.

The first equipment, in the form of 35 trucks from the 11th Guards Brigade, made an appearance at the unit only on 19 November 1944. By the spring of 1945, some other vehicles were assembled and the teaching personnel arrived. However, this unit did not turn into any kind of a school. This was a rather motley organization, meant to train in the simplest way lower grade officer cadres that could lead small armor units into battle. On 9 April 1945, the school, by that time named the Armor Forces Officer School, received an order to relocate to Modlin, where it remained for over two years. In the summer of 1947, the school was ordered to move to Poznan (the last transport left on 25 August), where it stayed until the army's reformation in the mid-90s.

Initially, the school's officer cadre was composed of 234 Soviet and 78 Polish soldiers (25%). When the war ended, the school's composition was completely different; there were 12 Soviets and 91 Poles (91.5%). As a result of the end of the war, the school apparently received as a gift from the Red Army almost 100 tanks[142], which included 35 T–34s and 40 "other". The "other" included 3 T–60s. By 20 June 1945, when the 4th graduating class left the school's premises (the 1st class graduated on 15 February 1945), the school had sent 1,382 officers to the armor forces. During that time the school already was down to only 25 tanks, 16 of which were T–34s. During the war the school received, among other tanks, 9 T–34s with the following serial numbers; 8978, 19456, 31297, 41127, 103119, 306607, 420815, 420896, 4010025 and 212567.

Another non-combat unit was the 3rd Training Tank Regiment, which was established in the spring of 1944. Already on 5 May 1944, General Berling issued order 05/OU for its formation, and several days later it received its first T–34s. By mid-July, the unit already had 25 T–34s, including a real rarity, a T–34–85 with a D5 gun produced at the No.112 Factory. Its listed serial number was 52209, which without a doubt is incorrect (it is possible that it really was 42209). The serial numbers of the remaining T–34s were; 3497, 6188, 07901, 33426, 33613, 34186, 34468, 35101, 35638, 37718, 121138, 306422, 401003, 420937, 421035, 3020401, 38190, 210052, 240221, 304022, 4010228, 4020286, 4020328 and 4020350. All of the tanks had overhauls in their history (some more than one), which were done at the 264th Rembaza (Repair Base). The tanks arrived at the training regiment in the following way; on 14 July the first 8 T–34s

[141] According to another document — Nr. 302010. In another, the command was referred to as "Main".

[142] One of the documents gives the figure, but it is difficult to confirm it in supporting detailed documents.



This tank, produced at the No.183 Factory, probably belongs to the company or battalion commander ("00" at the end of the tactical number). The tank in the background has the tactical number "2313".

arrived (delivered from the UCSA BT and VM KA), on 25 July another 17 tanks arrived from Rembaza, on 16 October 4 tanks were received from the 1st Armor Brigade. On 15 November 3 tanks were sent to the Armor Forces Officer School. Additional T–34s were given up to the 16th and 1st armor brigades in the fall of 1945 to make good losses which they had suffered in action; the 1st Armor Brigade received 6 T–34s and the 16th Armor Brigade received 10 tanks.

From among the tanks mentioned above, at the end of 1948 the officer school had the following T–34–76s; 306422, 35638, 38190, 34186, 4010025, 420815, 31297, 35170, 3490 (it is possible that this was 3497), and the following T–34–85s; 44225, 4110133, 4120573, 412519, 412429, 411348, 45415 and 4020350.

This crew was one of the most industrious in the Polish Army. It ensured its success in later civilian life by securing German property in the suitcases stowed on the tank.

- ex-WIH -



AFTER THE WAR

After the war ended, in August 1945 the distribution of the armor units equipped with the T–34 in the Polish army was quite specific. Only the 2nd Polish Army had an armor brigade equipped with T–34s. It was the 16th Armor Brigade, organized along establishments 10/500 and 10/506, with 1,414/828[143] soldiers, 48 trucks and 21 T–34–85s. The 2nd, 3rd and 4th brigades were still part of the 1st Armor Corps, while the 1st Armor Brigade was under the command of the military leadership in Warsaw. In total, the armor forces of the 1st and 2nd Polish Armies counted 61 tanks in their inventory. Armor forces without tanks, and that was not only because the 7th Independent Tank Repair Battalion (establishment 10/390) had at the time 66 tanks (including 22 medium and 21 heavy) to work on. At the end of the war a disproportionately high amount of equipment was with the 1st Armor Brigade. Its complement was:

Troop	*OdB*	*men OdB / actual*	*cars / trucks*	*T–34*
Command	010/500	62/51	28	–
Stab company	010/504	177/200	19	2
1. battalion	010/501	157/149	17	2
2. battalion	010/501	157/188	18	21
3. battalion	010/501	157/151	28	3
motorized battalion fusilier	020/502	531/484	9	–
anti-aircraft company	010/503	52/37	45	–
recovery company	010/504	128/110	2	–
medical troop	010/506	14/13	–	–
Total		*1491/1444*	*156*	*28*



Two photos of T–34–85s from a Polish unit that marked its tanks in a mysterious way, summer 1945.

Above: Note the Maxim machine gun on the back of the hull.

- ADM -



Right: This Polish T–34–85 has the number "21" inside a triangle, suggesting that it was previously in a Soviet unit. This could point to the 16th Armor Brigade, but the available documentation does not confirm that any of the units from the 1st Armor Corps carried such markings.

- ex-WIH -



This T–34–85 (white number "243" on the turret) belongs to the 2nd Motorcycle Battalion of the 1st Armor Corps, 1945. Note that the top of the gun barrel has thin, slanted stripes painted on it. Additionally, a part of an insignia is visible on top of the gun mantle.

- ADM -



A column of Polish tanks from the 2nd Motorcycle Battalion of the 1st Armor Corps drive through Lublin, summer 1945. The unit was composed of 10 tanks. The first tank, a product of the No.183 Factory 183, had the serial number 412693. The original corps insignia was supplemented by the eagle at the front of the turret side. The same eagle was painted on the front glacis.

- ex-WAF -

On 10 September, the unit had 1,441 soldiers and 166 trucks in its complement. By 10 October, the complement grew to 34 tanks. The T–34s were distributed in the following way:

[143] Establishment/actual status.



This T–34–85 is undergoing an engine compartment overhaul. The tank belongs to the 1st Armor Corps, and it carries the numbering and insignia ("300" with a white eagle above it) of the 1st Armor Corps during the Dresden Operation.

- ex-WIH -

	10 September	*9 October*
HQ	2	1
1st Battalion	2	21
2nd Battalion	21	12
3rd Battalion	3	–
Total	*28*	*34*

As a comparison, the armor brigades of the 1st Armor Corps had the following establishments on 9 September and 20 October:

	9 September	*20 October*
2nd Armor Brigade	26	32
3rd Armor Brigade	30	31
4th Armor Brigade	29	31

The Armor Corps was still the most powerful unit of the Polish Army after the end of the war. The morale of its soldiers, however, was not of the highest standard. In the last third of the month, in the first week of peacetime, the Corps lost 6 officers and NCOs dead or wounded, and another 5 NCOs and one private deserted. On 1 September 1945 the armor force counted 17,317 soldiers in its ranks, of which 9,145 belonged to the 1st Armor Corps (the official establishment called for 20,938 soldiers). The unit's equipment included 97 cars, 1,028 trucks, 141 special cars, 2 tractors, 4 prime movers, 210 motorcycles, 28 guns (57–76 mm), 95 mortars, approximately 60 guns (76–152 mm), 8 M–17 anti-aircraft half-tracks, 108 armored cars and APCs and 3 prime movers mounted on tank chasses.

Of the Polish Army's total of 254 tanks, 199 were T–34s. Almost a half, 94 T–34s, belonged to the 1st Armor Corps, of which 9 served in the 2nd Motorcycle Battalion. Another 20 T–34s (at the end of September) were employed at the 3rd Tank Training Regiment (a total of 26 vehicles served there), and many others were on the establishment of the Armor Forces Officer School (a total of 60 vehicles). All together, at the end of the war, the Poles had 269 tanks remaining. Those

tanks, as it quickly became evident, were to last for almost 5 years!

It is not hard to guess that, in the period immediately after the war, one of the most important missions for the Polish Armed Forces was to solidify the authority of the peoples' civilian government. It was mainly the infantry that was used for this purpose. However, in some situations, there was also enough work for the tankers. As an example, after the 1st Armor Corps moved to Siedlce, its idyllic existence there (exemplified by the handing out of 370 decorations to the unit's soldiers on 10 June) was soon ended. On 18 June, at 2200 hours, the commander of the "Tadeusz Kosciuszko" 1st Infantry Division issued a verbal command. The division was to immediately depart into the forests in the Ruskow – Kisielow – Drazniew – Meznenin area and destroy the armed bands operating there. During the day, actions were carried out in other regions. Confrontations with the armed bands were feared enough to have the 1st company of the 2nd battalion sent into the area. It appears that this was the only action where Polish T–34s were used against an enemy identified as the AK (Armia Krajowa — Home Army).

The brigade was also used later in actions of that type; among others, against the "Ostoj" AK band. During an operation against that unit, 2 Vlasov bandits were caught with rifles, as well as 2 individuals from the "Ostoj" unit and 3 suspicious persons. Additionally, as a result of the operation *"the brigade obtained much information about the AK band"*. The command of the 1st Armor Corps blamed the lack of better results on the unfriendly attitude of the local population; *"The large concentration of the rural population, on whom the AK had a big influence, hampered operations because the smallest movement by the army units brought attention upon it..."*

The largest problems with the underground were noted in southwest Poland, where the 8th Tank Regiment faced AK bands, NSZ bands and Ukrainians. That regiment started operations on the internal front on 18 April 1946, when it was ordered to field 2 companies of tanks against *"Ukrainian bandits"*. The 1st company was attached to the 8th Infantry Division in the Sanok area, and the 2nd company joined the 9th Infantry Division in the region of Przemysl. The combat operations end-

These T–34–85 tanks of one of the units of the 1st Armor Corps undergo a base inspection in 1946. These tanks, of No.112 Factory production, carry a full set of the stamped road wheels introduced at the beginning of 1945. Both vehicles carry the full insignia of the corps, a 4-digit number and a white eagle inside a red circle.

- ex-WIH -



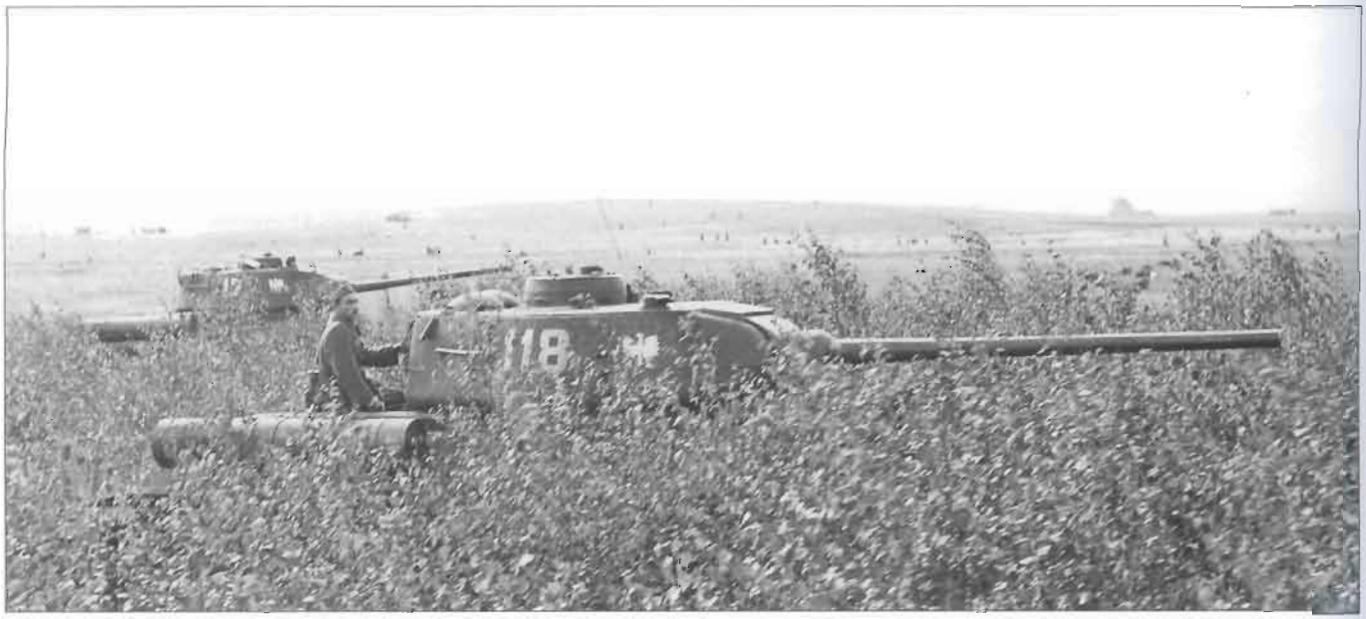


Left: A very unique photo, taken during the war or immediately after it ended, of two T–34–85s of the earliest production series from the No.112 Factory. Both have the D–5 gun mounted in the early turret with the commander's cupola toward the front and the PT–4 periscopes. Note the lack of lifting eyelets on the turret of the tank in the foreground (tactical number "27"). From available data, the tanks belonged either to the Officers School or the 3rd Tank Training Regiment. According to Janusz Magnuski, one of the tanks should have serial # 52209 and tactical number "723" on the turret.

- ex-WIH -

Bottom: Polish T–34–85s during maneuvers in the 1950s. One of them (the one in the background) might be pictured also in the photo above. The light on the tube-bearing portion of the gun mantle suggests that this tank received the new ZIS–S–53 gun. This tank, serial number 52209, was used in 8th Tank Regiment in 1946. Note the armored plate on the top of the mantle instead of the typical sheet cover of the tank in the foreground.

- ex-WAF -



ed for the tankers on 26 June without any losses. While a large amount of rifle ammunition was expended, the guns did not fire even once.

Even the 3rd Tank Training Regiment was sent into these types of operation. At the same time, it managed to carry out capital repairs at its workshops on 8 T–34s, and medium-level repairs on another 14 tanks, during the year. The unit's soldiers, while *"providing a defence of the population, guarding order and ensuring securi-*

[144] The text in the original stapled document was smudged, most probably by the authors of the unit's diary.

[145] It is worthwhile here to underline that the Soviet officer cadre still in the service of the Polish Army carried out the commands of the Polish command. Meanwhile, the Polish Armed Forces were separated from the Czechoslovakian units by the insertion of Soviet units, which were following orders from Moscow.

ty", killed 14 bandits, and captured 98 others, handing them over to the UBP (Polish Secret Service). For these actions a total of... 500 soldiers were decorated!

The combat trail of the Polish armor forces was also varied in another way. While the war with Germany had just ended, and the war with the bands had not yet started fully, the Polish government already started to prepare for combat against... Czechoslovakia. Not being able to come to a diplomatic settlement, the Polish leadership ordered a concentration of armed forces on the border with Czechoslovakia, up till then being open. The mission of freeing Poles from under the Czech yoke was put on the shoulders of the 1st Armor Corps. It, after withdrawing from Czechoslovakia in the second half of May, was stationed in the Slask (Silesia) area and represented the most powerful offensive force of the Polish Army.

In the evening and night of June 12, General Kimbar put his units on alert, demanding an immediate march into combat. Despite the lack of knowledge in the units about what was going on (it appears that consternation reigned in many), they all carried out the order. During the period 13–15 June, the units reached the area around Rybnik, from where they dispersed to take positions in the sectors assigned to them. Among the concentrated units were the 2nd Armor Brigade, the 3rd Armor Brigade and the 27th Assault Gun Regiment. In the last unit, *"not many members of the regiment knew much about the existing situation regarding the border with Czechoslovakia. (As it later became evident, most of the officers and a part of the soldiers did not want a war with the Czechs).*[144] The Corps commander's order from 15 June finally explained the situation. *"The basis of the political situation was: The Polish Armed Forces are acting in the defence of 200,000 Poles who were being persecuted by the Czechs."* On 16 June the commander of the 1st Armor Corps issued an order to take up the starting attack positions on the Polish-Czechoslovak border. The 3rd Armor Brigade and the 27th Assault Gun Regiment took up positions in Jastrzebi Zdroj, where they immediately prepared for defence and carried out reconnaissance on the roads in the region of expected combat actions. During the wait for the order to attack (signal to move forth), soldiers of the Red Army's border forces arrived and "informed" the Polish soldiers that they were not to move anywhere. In this way, luckily, there was no fighting because *"The conflict was averted and there was no war with Czechoslovakia because the USSR did not allow it."*[145]

Following the aversion of a Polish-Czechoslovak war, the armor units were evenly distributed across Poland. In this case, "evenly" meant that, they mostly moved to western Poland, as there was no danger of invasion from the east. As an example, the 2nd Armor Brigade ended

The training of armored crews in the art of camouflage. This T–34–76 with the hexagonal turret is probably from a training unit.

- ex-WAF -



up in Gliwice (its last elements reached there on 7 July), where it reorganized to the 5/15 establishment on 14 September. After being detached from the armor corps, the brigade was subordinated to the Slask Military District. But, already on 10 October, it was ordered to move to Poznan, from where it was redeployed to Wrzesnia. It finally assembled in Wrzesnia on 26 November, and there, on 1 March 1946, converting to the 5/25 establishment, was redesignated as the 2nd Tank Regiment.

As was the case in all other units, the regiment's condition was not very good. On 24 November 1947, the unit had 26 T–34–85s and 6 T–34–76s on its strength chart. From that total, 5 (including 2 "76s") had damaged gun barrels, some incurred during the war. Of the 26 TSz–15 sights (for the "85") 4 were damaged, of the 6 TMFD sights (for the "76") one was damaged, and of the 6 PTK panoramic periscopes 3 were damaged. Of the 19 periscopes, all needed to be replaced. However, none of these parts could be replaced or repaired as there were no spare parts. That automatically disqualified all 5 tanks with damaged gun barrels from training or combat missions. The regiment had 1,171 85 mm rounds and only 140 76 mm rounds.

Of the regiment's 32 tanks, 27 were mobile but only 17 were fit for missions. All of the vehicles had engines which had reached the maximum limit of their recommended motor hours. Some of the engines were in good enough condition for the technical commission to establish that 20 of them could be used for another 20–50 motor hours. Five of the tanks with exhausted engines needed a capital overhaul, while 17 others, whose engines could last another 17 motor hours, needed a medium-level overhaul. In addition to the needed engine replacements, all of the tanks required maintenance of the equipment, replacing missing screws, track repairs, and painting. Approximately 50% of the vehicles needed to have their main and side differential gears replaced, 80% needed a replacement of some of their road wheels and 30% needed work on their electrical systems.

The facts listed above do not indicate that the 2nd Tank Regiment was an especially slovenly unit. All other armor units found themselves in a similar state. This included the 1st Tank Regiment, in which, on 15 October, 16 of 32 tanks had engines at their maximum limit of motor hours. In contrast to other units, the 1st Tank Regiment was cited for having *"bad vehicle maintenance"*.

Such a state of affairs, understandingly, had existed since the end of the war. There was a shortage of vehicles in the units and those that were used did not have much combat value. After it mastered the worst mess, the Main Inspectorate of Armor Forces ordered a general inventory taking at the end of 1945/beginning of 1946. The mission was carried out by special commissions. The data arriving at the Headquarters was to represent the

An exercise at a training unit in recovering a bogged down tank. The tank in the foreground is from the 1943 production type, while the T–34–76 behind it has the flat turret. Neither has the bow machinegun.

- ADM -



In a similar situation, the T–34/76 (hexagonal turret) is being towed by a T–34–85. Both tanks have numbers that are almost the height of the turret, with the "85" having its eagle also unusually large.

- P. Kubiak's collection -



authentic state of armament of the units on 31 December or 1 January. The picture resulting from the documents is simply shocking. The armor force was not only lacking tanks, but also was not capable of combat operations. In most of the units, the vehicles were only fit to undergo repairs, which was not possible due to the lack of spare parts. The situation is illustrated well in the following table:

	total	*overhaul*	*general overhaul*	*AFV type*
4 Brigade	31	3	1	T–34–85
16 Brigade	34	–	18	T–34–85
52 SPA Rgt.	20	12	6	Su–76
25 SPA Rgt.	15	12	–	ISU–122

On the other hand, there were several units that, taking an advantage of the situation at the end of the war, overhauled their tanks using Soviet reserves. Thanks to their resourcefulness, they had a large number of tanks in their establishment. A good example was the 2nd Armor Brigade, whose 32 tanks were, as they were de-

This T–34–76, all signs point to it being produced in the second half of 1943, plows through a crowd of soldiers during a local parade in the 1950s.

- ex-WAF -







Two photographs of the same tank, tactical number "332", which was produced at the No.183 Factory. It is worth to note that, for a war-time product, the texture on the turret is much smoother than other turrets from the same factory. In the second photo, the tank has had two "XX" victory marks painted on the turret.

- D. Sieńskowski's collection -

scribed, all capable of movement. This meant that a tank could drive around, but could not take part in combat as it was not completely equipped (a lack of sights, damage to guns and other similar problems). As a result, even if the number of working vehicles in a unit was high, that did not mean very much. In the 16th Armor Brigade, for an example, of all the running tanks, nine had less than 50 motor hours left on their engines (of which 5 had only 5–10 motor hours). Realistically, that meant that they could not be used in combat. Summarizing the inspection of the units assigned to him, Major Rylov (the assistant to the chief of staff for technical matters in the

[146] In October 1945, 809 Soviet and 2,217 Polish soldiers left the Polish Armor units.

Inspectorate of Armor Forces in the IV Military District), wrote: *"...I am reporting that, in the IV Military District of the Armored Forces, none of the armored equipment has any combat value."*

In the case of the 1st Armor Brigade (1 Tank Regiment) the unit managed to raise its strength to 39 tanks (including 22 T–34–76s). However, 11 of the tanks had 0 motor hours left, 14 others had less than 50 hours and another 9 had around 50 hours. Even worse, there was no chance of a quick improvement in the situation. The Polish military leadership was well aware of that. *"Due to the limiting of expenditures on the overhaul of vehicles for the year 1947 at the Army Repair Facilities (28598385), the Main Inspectorate of the Armor Forces decided to overhaul the following armor equipment in that year: 6 JS 2, 20 Su–76, 5 Su–85, 6 JSU, 50 T–34, 30 T–70, 30 BA–64, 25 tank engines..."*

Matters of this type concerned absolutely all of the GIBP (Main Inspectorate of the Armor Forces) units, as there was a shortage of spare parts. The radical program to reorganize the armor forces did not improve the state of affairs. In October 1945 began a very long, lasting approximately 10 years, process of continually rebuilding the units. In the fall of 1945, coinciding with the first wave of demobilization[146], the first Polish strength establishments were brought in. The establishment of the armor brigades was defined under 5/15, which had 676 soldiers and almost an unlimited amount of equipment, depending on what the unit had after the war and on what it managed to "organize".

As was already emphasized, during the fall, the Polish Army command decided to finally dissolve the 1st Armor Corps and to disperse its units across the country to the just-created Army Districts. The 2nd Armor Brigade was given to the Poznan (III) Army District, the 3rd Armor Brigade was sent to the Slask (IV) Army District, the 4th Armor Brigade went to the Krakow (V) Army District, and the 16th Armor Brigade went to the Pomorski (Coastal, II) Army District. The 1st Armor Brigade was, of course, under the control of the Warsaw (I) Army District. The decision to dissolve the 1st Armor Corps was

This T–34–85 of the Polish Army has the tactical number "1681" painted on the side and rear (under the tarp) of the turret. The side fuel tanks are marked with description "Olej napedowy" (diesel fuel).

- ex-WAF -





This typical souvenir photo was taken in front of a T–34–85 produced during the war at the No.183 Factory.

- Sławomir Gonera's collection -

probably taken already in September, but, officially, it began to be carried out together with the demobilization.

At the same time as the units were relocated, peace-time establishments began to be brought in. However, they were so pared down that, along with the disastrous state of the equipment, they made the armor forces incapable of actions. Along with the creation of peace-time establishments, the units were reformed from brigades to regiments. According to the Staff orders, the units were reformed in the following way:

- ✓ 1st Armor Brigade became the 1st Tank Regiment
- ✓ 2nd Armor Brigade became the 2nd Tank Regiment
- ✓ 3rd Armor Brigade became the 6th Tank Regiment
- ✓ 4th Armor Brigade became the 8th Tank Regiment
- ✓ 16th Armor Brigade became the 9th Tank Regiment

Each of the combat regiments was to have 32 T–34s, 374 soldiers and 3 contract employees, while the 3rd Training Regiment, changed over from establishment 20/32 to 20/48, had 330 soldiers and 13 contract employees. The 40th Central Armored Equipment Depot changed its establishment from 25/4 to 25/8, with a strength of 78 persons. After all the changes, the armor forces of the Polish Armed Forces were composed of the following units (those with T–34s): 1st Warsaw Tank Regiment, 2nd Sudecki Tank Regiment, 6th Dresden Tank Regiment, 8th Pomorski Tank Regiment, 9th Tank Regiment, 1st Warsaw Independent Motorized Reconnaisance Battalion, 1st Training Tank Repair Battalion, 3rd Training Tank and Assault Gun Regiment, 40th Central Armored Equipment Depot, Armor Forces Officer School and the Tank Repair Workshop.

In November 1946, new changes were brought in. The tank repair battalion was reorganized (establishment 5/23) and the 3rd Training Regiment was reorganized to establishment 20/65 (377 soldiers, 855 students and 20 contract employees). At the same time, on 11 November an order to refer to the 3rd Training Tank Regiment without the assault gun addition came into official effect. However, this was not the end. The deepening crisis and the demobilization, the pains of everyday existence, as well as the desire to raise the value of the units, made it necessary to bring into existence new establishments in March 1947. For the same reasons, all of the armor regiments changed their establishments to 5/35. In April, the Armor Forces Officer School was linked with the Automobile Training School to form one entity, based on the establishment 20/73. Its monthly upkeep was 9 million zloty (data from the period end 1948/beginning 1949). In the summer, the state of the units armed with T–34s was as follows:

	Establishment	*Actual*
Armor Forces Officers School	15	16
1st Tank Regiment	32	32
2nd Tank Regiment	32	32
6th Tank Regiment	32	30
8th Tank Regiment	32	31
9th Tank Regiment	32	31

In the I (Warsaw) Military District, the 1947 reorganization was more difficult than the previous year's. In March, a flood took down the bridges over the Bug River, making it impossible to relocate equipment and demobilize soldiers. In the 3rd Training Regiment there was an outbreak of dysentery. At the same time, the state of the armored forces personnel left a lot to be desired, as was the case with the officer cadre. It is known that an order of the GIBP was deliberately disobeyed. It was ordered that the infantry divisions were to dissolve their divisional Su–76 companies and hand them over to either the assault gun regiments or the central depot. Of the 8 divisions falling under the order, in the fall of 1945, 3 divisional commanders refused to carry it out and demanded a separate order from the General Staff.

Generally, after the war ended, an unimaginable disorder reigned in Poland. It was typical of the beginning and end phases of a war, when the conflict is the most



These two photos show war-time production T–34–85s during a parade in the 1950s. In both cases, the tanks' MK–4 periscopes have covers over them — a modification brought in after the end of the war.

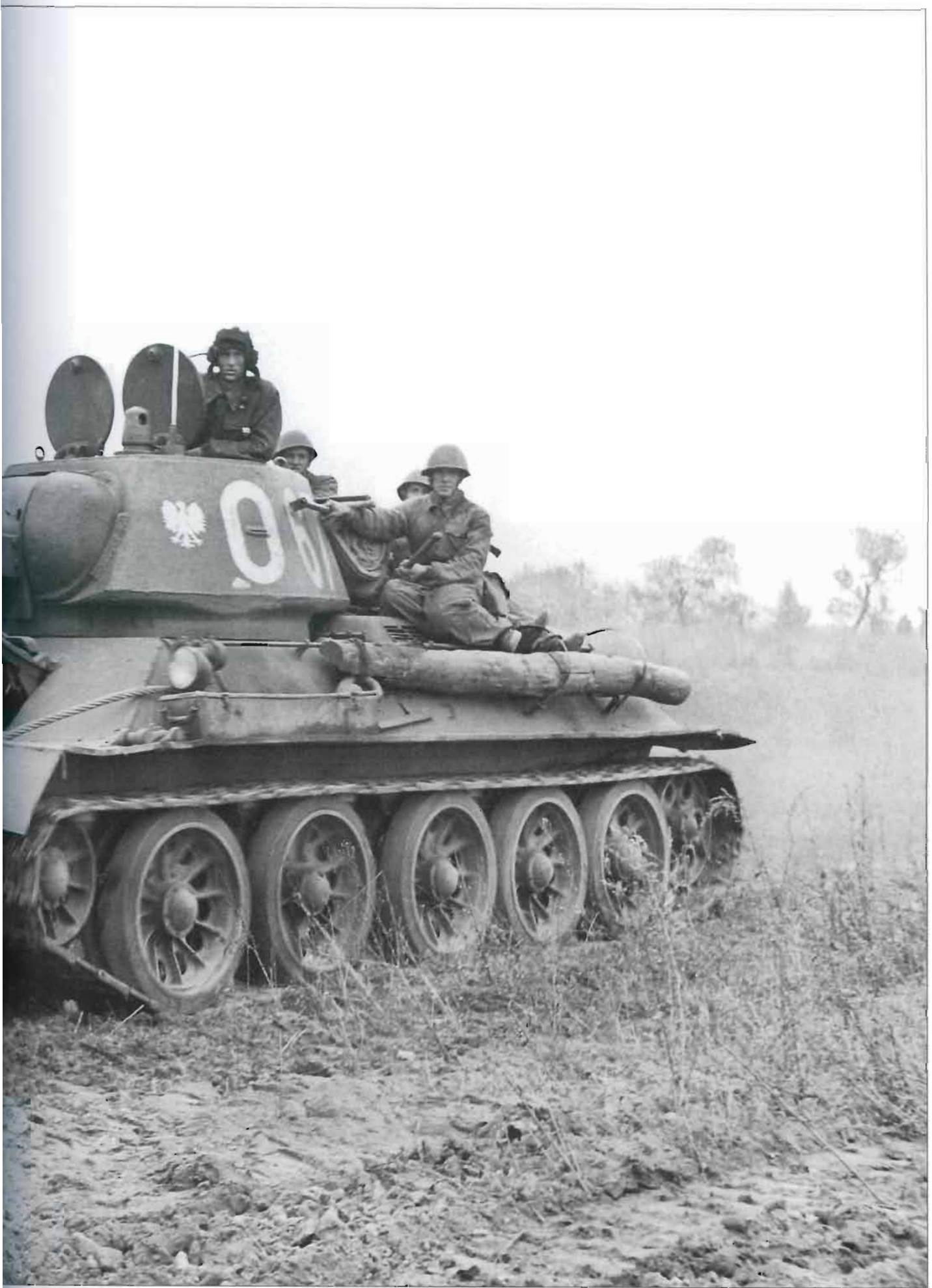
- D. Sieńskowski's collection (right), M. Jaroszyński-Wolfram's collection (bottom) -



This T–34–76, with tactical number "067", was photographed in the 1950s and has the PT–3 mine roller attached at the front. The tank's softedge turret has an antenna mount on the roof, indicating that the vehicle is a T–34K command version. The lack of a pistol port under the vision port, and the absence of a commander's cupola on the turret, indicate that the turret is an older version from the 1942/43 period. The angular mudguards and the protective strip for the driver's hatch (keeping out rain and mud) are post-war modifications.

- ex-WAF -







Above and below: Two photos of a Polish Army T–34–85 while training in the 1950s. Note the lack of the wire pipes on the rear plate, which was, theoretically, standard equipment on the T–34–85. The side differential gear covers have angular edges and the headlight is covered with canvas. In the second photo, the tank's markings on the turret produced at the No.183 Factory are better visible. Under the tactical number "128", there is a white stripe, whose significance is unknown.


128

dangerous for the civilian population. The army, deprived of activities to keep it busy, was dangerous for the surrounding community. A state of banditry existed and almost a civil war was being fought. Among this mess, the army represented a kind of a political police formation. This problem also applied to the armored forces of the Polish Army.

In the official disciplinarian reports from that period, there is a documented series of transgressions by the armored forces, caused mainly by drunkenness and the war-time loosening of discipline. The soldiers represented authority and did not hesitate in forcing obedience from the civilians. When implied threat did not work, they reached for their arms. As an example, this is what happened on 6 October 1946 when Lieutenant Pawlowski got stuck in mud with a service motorcycle, which he had taken without permission. The Lieutenant approached a nearby house and demanded that its inhabitants help to push him out of the mud. Faced by the aggressive soldier, and reacting with natural fear, they hid at the back of the house. Only one of the inhabitants, a Pelagia Wielkowska, tried to get rid of the intruder. The irritated soldier reached for his sidearm and fired two times at the door, mortally wounding the poor woman. Shortly after, the unit's commander reported to the GIBP the steps he took regarding his personnel to prevent such future events: *"steps undertaken — officer's conference, an order forbidding the drinking of vodka"*.

The stabilization of the situation in the army progressed slowly. In 1946, the command of the GIBP began to stubbornly demand from the staffs of the units in the field to behave according to the proscribed regulations and procedures. That, however, was not simple to execute. In the units, there was a lack of just about everything that was necessary for a peacetime existence. There was not just a lack of typewriters or pencils, but also of paper; the officers wrote their reports on the back of German administrative documents and German maps. In many localities, the water supply did not function and there was a shortage of fuel and food. The enforcement of discipline was very arbitrary. However, the central organs in Warsaw gradually moved to change the situation. As an example, by 1948 the loss of the clock from a T–34 (in February it became known that most of the tanks did not have them) was already a serious disciplinary problem.

In the second half of 1948, representatives of the GIBP carried out a series of field inspections so that the command could establish the actual state of the units. In many cases, the staff officers travelling in the terrain turned out to be technocrats or strict careerists. Their objective was to grab the companionship *"by the scruff"* and final-

This and facing page: Two photos of T–34–85s and escorting infantry during maneuvers in Poland during the 1950s. In the first photo, the tank has a set of road wheels brought into production at the beginning of 1945. In the second photo, the tank is a war-time product (of the No.112 Factory), which is illustrated by the roughness of the turret's finish.



- Author's collection -



ly end the slack war-time discipline and the abuses, and, at the same time, to bring in the appropriate peace-time supervision, bureaucracy and book-keeping.

One of the inspectors was a Major Pac, who, in the middle of November of that year, travelled to the 25th Assault Gun Regiment near Zagan, where, as can be ascertained from the report, he went into shock. According to him, the military unit looked more like a *"band of civilians"*. Pac was at a loss for words when he met the unit's chief of staff, who greeted him with the words *"my regards"*. In his report, Pac stated that the chief of staff was a *"civilian through and through"*. He also noted that in the unit, there was chaos, drunkenness, lawlessness and a lack of supervision. As a result of the chaos, the regiment deserved a negative assessment. Concluding, Pac suggested that it was imperative to replace the commander and put in a request that there be a prosecutorial investigation (he observed that the unit's stores were badly managed, which made him suspect that the personnel were trading in government property).

In addition to the bad state of the discipline, the state of all of the combat equipment attested to the catastrophic condition of the Polish Armored Forces at that time. On 1 January 1948, the combat effectiveness of the Polish Armored Forces was rated at only... 13%![147] This figure was reached by adding the functioning vehicles in all of the units. That is, those that were fully equipped and having at least 75 motor hours available on their engines. The high standards demanded at that time are best demonstrated by the fact that, in the 1st Tank Regiment 24 tanks did not have any motor hours left on them, and in the 2nd Tank Regiment another 17 were in the same situation.

Equally depressing was the state of the training of the tank crews after the demobilization, when the Soviet technical cadre and many of the experienced NCOs left the units. As a result, still in 1948, in the tank regiments, of the approximately 30 drivers only two or three had driven a T–34 200–500 hours, while the rest barely had spent more than 10 hours behind the steering controls! In case of the 6th Dresden regiment, the situation was as follows: 1 driver had driven 420 hours, 2 had 35 and 50 hours respectively, a few 10–25 hours and over one half only 3–7 hours.

As for the equipment, probably everyone lived with the hope that the spare parts received from the USSR, finally delivered at the end of 1947, would improve the situation. However, because the transports of the spare parts were received only after the 1948 production targets had already been set at the Army Mechanical Facilities (WZM), there was a problem in deciding who would use them for the overhaul of the T–34s. Since only enough time was found to perform 40–50 overhauls at the WZM, a decision was made to carry out a mass training of the unit repair cadres. Eventually those cadres were to be able to carry out even complicated overhauls. However, the instruction program meant that each unit had to give up one tank for the training purposes. The overhauls were

[147] We know from historical literature that the armed forces of all countries of the future "Warsaw Pact" were in an equally pitiful condition. In regard to the military conditions, the situation in the USSR was a bit better. However, the most important part of its territory was completely devastated, paralysing most of the intentions of the Soviet leadership. Meanwhile, in the west, anti-communist propaganda spread quickly, convincing most of the world that the communists were preparing to attack the west...



This T–34–85 is having its engine checked over during the 1960s.

- *ADM* -

begun in March 1949, and the WZM began operating an engine repair department. In that month, it overhauled 4 engines. It also had 16–18 V–2 engine overhauls set as its monthly target (the agreement between GIBP and WZM boasted about having 180 engines overhauled in 1948). At the beginning, however, a number of *"justified complaints"* surfaced. The quality of the overhauls performed in the units was probably on the same level. Despite the problems, the work went on at full steam and, in a year's time (actually 10 months), 26 T–34s were overhauled at the 1st Armor Regiment, 18 at the 2nd Armor Regiment and an impressive 75 at the 6th Armor Regiment. An average of 300,000 zlotys was saved on the overhaul of each tank. In total, these combined efforts managed to raise the combat effectiveness of the armored forces to 70% on 1 January 1949. This was a commendable improvement.

The organization of the overhaul work had been raised to such a level that, in the fall of 1949, the Army Mechanical Facility No.1 was dissolved and, based on its elements, a number of Mobile Repair Workshops were created. This move was to improve the efficiency of the repairs and overhauls in the districts.

By the beginning of 1949, the units were already stationed in their permanent bases, where they were to remain for the next 15 or so years. The relocation of the units looked like in the table below.

These units, at that time, had the following vehicles; 195 T–34s, 27 IS–2s, 52 JSU–152s and JSU–122s, and 48 SU–85s.

The condition and number of the available equipment was considered to be so unsatisfactory that the GIBP staff decided to haul vehicle wrecks from battlefields and out of junkyards. After a complete overhaul, the additional

Military District	*HQ in*	*T–34*	*SU–85*	*IS–2*	*SU–122*	*SU–152*	*Based in*
I	Warszawa	1 Tank Rgt.	13				Modlin
II	Bydgoszcz	9 Tank Rgt.		4			Szczecin
III	Poznan	2 Tank Rgt.	28				Wrzesnia
IV	Wroclaw	6 Tank Rgt.			24	25	Boleslawiec
V	Krakow	8 Tank Rgt.					Zurawica n. Przemysl

vehicles were to at least raise the level of equipment available for training. As a result, in 1948, began a great hunt all over Poland in search of wrecks.

On 9 March 1948, the Chief of the General Staff, General Mossor, wrote to the third vice-minister of National Defense, General Jaroszewicz, with a request to stop the Minister of Industry and Trade from cutting up tanks in junkyards, which had been sold to Poland by *"Marshall Rokossovski's armies"*. The General was referring to vehicles at the Assembly Point for Damaged Vehicles in Gorczyn, near Poznan. General Mierzycan from GIBP had earlier informed General Mossor that *"this matter is serious, especially since the Soviet Union is not accepting further orders for spare parts for tanks or prime movers"*. He asked for help in the field and agreement from the Ministry of Industry and Trade to hand over designated parts that had been prepared for scrapping. General Jaroszewicz was in agreement and wrote to the Minister of Industry and Trade that, *"due to the importance and urgency of the above-mentioned matter..."*.

To make it easier for the civilians to make a decision on the spot, on 27 December GIBP sent out a letter in 1948 stating that the wrecks with ripped apart hulls were available to be scrapped. Others, having only penetrations, were to be saved.

The information regarding the search for tank parts was widely circulated and soon after messages about found goods started to come in from all over the country. In mid-March 1949, 10 tons of tank track links were found in the "Baildon" steelworks. GIBP was informed of this by the CSZ in Katowice. Since there was an intention to melt them down as soon as possible, there was an urgency to examine the track links to see if they could be used. An inspection group, under Lieutenant Muszynski, departed from GIBP very quickly and, once it arrived, confirmed that the find was not worth much; 80% of the links had been worn out and the value of the remainder was doubtful.

In October 1948, 5 T–34s were found in the area of the Chybnia forest district, and the CSC Nr. 9 from Krakow once again informed about the presence of wrecks near Lapanow. In January 1949, the head office of Polish scrap yards informed that its members had uncovered wrecks in Dmenin (near Radomsk), near the village of Wojnowice, in Mlynek and in Nieznamienice.

If the condition of the wrecks allowed for it, they were overhauled by the units' cadres. Most often, however, they were transported to specialized workshops, mainly at the WZM in Siemianowice. In September 1949, it had 6 T–34–85s, 4 T–34–76s and 3 recovery tanks on location, all from the "concentration point for tank wrecks". It was planned to work on most of them in November.

This T–34–85 from the No.112 Factory has a "mushroom" turret with the split ventilators.

- ADM -





Two war-time production T–34–85s during maneuvers. Both tanks have atypical tactical numbers ("022" and "024"), suggesting that the photo was taken in the late 1940s.

- ADM -

The management of the workshop intended to overhaul the 3 recovery tanks (as well as a fourth, used by the WZM) with the serial numbers 0215, 3810, 3010258, 3 tanks with the serial numbers 412184 and 45132 ("85"s) and 3080319 (a "76"). On the other hand, it was decided not to overhaul wrecks with serial numbers 4487, 410294, 4674 and 400807 (all were "76"s, the last one's turret was ripped open), 3070259, 37408 and 36607. The WZM proposed that the overhauled tanks be picked up, which probably happened as some of them wound up on lists of overhauled vehicles, although by other units (see table below; it is worth noting that listed there is tank with serial number 3070289, while the WZM asked that vehicle with serial number 3070259 be picked up). Additionally, the workshop in Siemianowice had 6 turrets with the 85 mm gun, 6 incomplete 85 mm guns and 5 76 mm guns.

Some of the overhauled vehicles could not be used in combat due to minor faults, which neither the Polish army nor Polish industry could eliminate. As an example, this applied to the 6 overhauled T–34–85s that were found in Gorczyn (44382, 45636, 4110239, 4400644, 410635 and 410646, and a T–34–76 [0406029] that had been submerged in standing water). All of these tanks could drive but lacked sights, periscopes, gun mechanisms, etc.

Of interest is the fact that part of the overhauled wrecks managed to last for some time in the units as combat equipment. Right, according to official data, is the full listing of the T–34 wrecks that were obtained at that time, and which it was attempted to bring to an acceptable level of use (from left to right we read; date when wreck was obtained, unit which obtained the wreck, where the wreck was obtained, the wreck's serial and engine number, date and unit of overhaul, unit which received the wreck).

The total is 36 vehicles, of which, as the table indicates, almost all wound up in the combat units.[148]

Despite all efforts by representatives of the armored forces, the state of the armor units became worse every quarter. There was a lack of almost all items — spare parts, instruments, supply, ammunition and fuel. The Polish Army continued to "operate" with armament and equipment donated by the Soviets during the war. Polish tankers were dependent on all supplies from beyond the Bug River. According to the peacetime establishments being brought in just at that time, on 1 January 1951 the armored forces should have had 623 T–34–85s. However, on 1 July 1950 there were only 157 on hand. For these tanks, there was a supply of 40,800 85 mm rounds, of which 28,500 were armor piercing and 800 subcaliber rounds (0.2 fire units).

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[148] In some cases, the identification of vehicles and numbers appears to be incorrect. The numbers could be interpreted correctly in the following way: 4487 = 87th vehicle from the April 1944 production of the Nr. 183 Factory. 400807 = not possible to identify vehicle correctly. In the case of 4400644, probably meant is 4040644. 3041070 — this probably refers to a T–34–76, and not, as identified, a T–34–85. Nr. 7408 or 40357 — not possible to identify either vehicle.

T–34–85

date	*unit*	*taken from*	*serials hull / engine*	*date of overhaul / at*	*delivery date*	*delivered to*
X 48	WZM1	Gorczyn	4487/–	–	18 X 49	RWNCz–4
–	–	Gorczyn	410294/409921		22 X 49	RWNCz–4
X 48	WZM1	Gorczyn	4674/–	–	22 X 49	RWNCz–4
X 48	WZM1	Gorczyn	412184/–	12 I 50 / WZM	30 I 50	RWNCz–4
–	–	Gorczyn	400807/1152795	–	22 X 49	9 Tank Rgt.
–	–	Gorczyn	45132/4031018	12 I 50 / WZM	30 I 50	8 Tank Rgt.
X 48	WZM1	Gorczyn	410646/–	28 IX 49 / WZM	21 X 49	9 Tank Rgt.
–	–	Gorczyn	410635/4052102	28 IX 49 / WZM	21 X 49	2 Tank Rgt.
	–	Gorczyn	4400644/1004	8 X 49 / WZM	18 XI 49	2 Tank Rgt.
–	–	Gorczyn	410239/410074	8 X 49 / WZM	18 XI 49	I Tank Rgt.
–	–	Gorczyn	45636/4091074	28 IX 49 / WZM	31 X 49	2 Tank Rgt.
X 48	WZM1	Gorczyn	44382/–	28 IX 49 / WZM	31 X 49	2 Tank Rgt.
–	2 Tank Rgt.	–	4120478/401882	– / WZM	–	2 Tank Rgt.
–	2 Tank Rgt.	–	T–46417/4111724	– / WZM	–	6 Tank Rgt.
–	2 Tank Rgt.	–	412127/412103	– / WZM	–	6 Tank Rgt.
–	2 Tank Rgt.	–	312588/KP41225	– / WZM	–	2 Tank Rgt.
–	2 Tank Rgt.	–	0412501/309995	– / WZM	–	2 Tank Rgt.
–	OSBP		T–48145/411637	– / OSBP	–	OSBP
–	OSBP	–	42265/405282	– / OSBP	–	OSBP
4 VI 49	No.5824	Brochow	412140/–	– / –		RWNCz–10
4 VI 49	No.5824	Brochow	412461/–	– / –		RWNCz–10
4 VI 49	No.5824	Brochow	311264/–	– / –	–	RWNCz–10
4 VI 49	No.5824	Brochow	411141/–	– / –		RWNCz–10
II 50	4 Tank Rgt.		3041070/–	– / –	1950	RWN–4
IX 50	9 Tank Rgt.	field	4100757/409186	– / –	–	–

T–34–76

date	*unit*	*taken from*	*serials hull / engine*	*date of overhaul / at*	*delivery date*	*delivered to*
1948	1 Tank Rgt.	water	0406029/4050807	24 IX 49 / WZM	5 XI 49	8 Tank Rgt.
–	WZM	Gorczyn	3080319/401559	18 I 50 / WZM	30 I 50	8 Tank Rgt.
–	WZM	Gorczyn	307408/3119207	– / –	18 X 49	RWNCz–4
23 VIII 49	2 Tank Rgt.	Dlubwa R.	40357/409016	– / 2 Tank Rgt.	–	2 Tank Rgt.*
–	3 Tank Rgt.	–	3070289/310084	– / –	18 X 49	RWNCz–4
IV 50	OSBP	–	143180/–	21 VI 50 / OSBP	–	–**

T–34T

date	*unit*	*taken from*	*serials hull / engine*	*date of overhaul / at*	*delivery date*	*delivered to*
–	OSBP	–	BO–42124/305743	20 VII 49 / OSBP	–	OSBP
–	4 Tank Rgt.	–	–/–	– / 4 Tank Rgt.	–	4 Tank Rgt.
–	WZM	Gorczyn	3010258/301226	10 II 50 / WZM	10 III 50	RWNCz–10
–	WZM	Gorczyn	3070215/–	19 I 50 / WZM	30 I 50	6 Tank Rgt.
XII	1 Tank Rgt.	lake	310336/4944	– / –	4 I	RWN–4

* rebuilt as a prime mover; ** as a training vehicle.



This and facing page: These two photos show the issuance of orders to a passing column of tanks. Note the presence of rectangular, light-colored boxes on the sides of the tanks. On the first tank, the box is just in front of the external fuel tank, while on the other tanks the box is more forward, under the turret.

- ADM -

The situation in the entire Polish Army was equally bad. The country's leadership realised this and took steps to set the army on its feet. Negotiations with its Soviet partner were probably already undertaken during the period end 1946/beginning 1947. They bore fruit with the signing on 5 March 1947 of the document titled *"Agreement by the government of the USSR to grant on credit military arms and equipment to the government of the Polish People's Commonwealth"*. That accord afforded the Poles a credit of 100 million US dollars for the purchase in the USSR of military equipment necessary to outfit all of its armed forces. Although the Soviets could not satisfy all Polish needs (in the Soviet Union the production of new equipment had just started, which led to a lack of spare parts similar to that during WW II), overall the cooperation proceeded rather smoothly, especially from the beginning of 1950 when a feeling of a new impending world war started to dominate.

To finalize the agreement with the government of the USSR, a special delegation of the Ministry of National Defence left for Moscow. It was to establish the details, among others the price of the equipment (in accordance with *"appropriate world prices"*), and to establish the quality of the equipment offered for sale by the Soviets. The Polish delegation wanted, as much as possible, to buy the newest equipment that was being produced at that time. During deliberations in Poland, the Polish side also decided that it was imperative to create two receiving commissions. One was to accept equipment in the USSR (in the factories and depots) and the second one was to oversee the receipt of the equipment at the border. The deliveries began in the second half of 1947, but they never completely filled the Polish orders (due to reasons covered previously). During 1947 and 1948, over 4.2 million US $ was spent on the armored forces, while 19 million was spent on the air force. The emphasis on the high levels of spending on the air force gives a good indication of where the General Staff's priorities lay.

While in 1948 the purchases were of spare parts only, in 1947 some armor equipment of the newest production was also bought, including several T–34s. It is certain that the first batch of purchases was composed of post-war vehicles only, according to the Polish wishes *("newest equipment from current production")*. It was then that Poland received the JS–3s, while later deliveries contained only the JS–2s that were modified after the war. As for the T–34, one of the Polish documents referred to the "T–34 with the coupled machineguns and the S–53 gun" (in the war-time T–34s, both machineguns were operated individually). This is confirmed by the serial numbers, which were not seen during the war, but were based on the same system.

As part of that delivery, only a few T–34–85s were brought to Poland. Two of them were handed over to the 6th Tank Regiment. They were:

Serial number	*engine number*	*gun number*
609D0957[149]	601K5173	1491
611D1174[150]	607J0200	2508

[149] According to another document, 608D0957 with engine 601K51–73.

[150] According to another document, 611D1074 with engine 60700200. In yet another, it was identified as 411D1174.



By the end of 1948, both vehicles had operated for 177–182 motor hours.

Meanwhile, in mid-September, the T–34 with serial number 609D0970[151] was in the 8th Tank Regiment. Until the time it was handed over to the Officer School, the tank had covered 716 kilometers and put 81.27 motor hours on the engine. In September the vehicle was still with the regiment, but in October it was already at the Armored and Automobile Forces Officers School (OSBPiWS). In all probability, it stayed there until the end of 1948, when it already was up to 160 motor hours.

At the end of September, tanks were also sent to the 9th Tank Regiment. Their particulars were:

Hull serial number	*registration number*[152]	*engine number*
610D1084	611D1079	608I0086
610D1047	610D1039	607I0087
610D1050	610D1026	607I0085
609D1020	610D0997	607I0156

They were assigned to the regimental commander and the company commanders.

When, at the end of October 1948, the GIBP asked about the quality of the new equipment, Lieutenant Colonel Domanski, the commander of the 9th Tank Regiment, reported in November 1948 that the vehicles had worked on average 32–40 motor hours and had driven 172–329 kilometers. Two of them had minor problems. On 1 December 1948, that unit had a total of 34 T–34s, of which 31 were mobile, 4 required repairs and 2 needed complete overhauls (additionally, the unit had a BA–64 armored car and a T–34 recovery vehicle.

The 7 mentioned T–34s were the only tanks of that type which were bought at that time. Not one more armored vehicle was delivered to Poland until the fall of 1950.[153] The data below confirms just how needed every vehicle was. At the beginning of 1949, the Polish Army had the following armored vehicles:

	Establishment	*On hand*
T–34–76	42	42
T–34–85	153	141
Other	148	170[154]

[151] That is; the 970th vehicle (0970) from the September production (09) of 1946 (6). The significance of the letter "D" is unknown, but most probably it denoted a type of a vehicle in a particular factory. The letters were assigned according to the following code: A — JS–3, B — JSU–152, W — most probably — JSU–122, G and D — T–34.

[152] The registration number was most probably assigned by the army to a tank at the moment when it was delivered, put on the army's roster and had its maintenance and history log-book started. In one such Polish document, the tanks were identified by the registration numbers rather than the serial numbers.

[153] A document from 16 August 1947 has an entry which comments on *"receiving from the USSR"*, within the parameters of the I purchasing phase that was received in 1947: 2 JS–2s (actually JS–3s were received), 7 T–34s, 15 JSU–152s and 10 JSU–122s.

[154] Among others, 45 Su–76s, that is, 40 above establishment.



Left: A fire drill for the crew of this T–34–85.

- ADM -

Right: A T–34–85 fords a river. Note the atypical markings on the tank; beside the standard "734" number, there is a larger "1" painted toward the rear side of the turret.

- ADM -

On 1 February 1949, the situation in the various Military Districts was:

	MD1	MD2	MD3	MD4	MD5	MD7	Total
T–34	35	35	55	35	35	–	195
Other	24	24	37	48	–	–	138

From the above table it is clear that to fill out even the reduced peace-time establishments of the combat units there was a shortage of 12 T–34s. And yet, we are talking about vehicles that were extensively used, many during WW II, some of them with only 76 mm guns.

After having spent almost 43 million US $ to buy equipment within the I and II purchasing phases, during the summer and fall of 1948 the Polish military prepared its orders for the III purchasing phase. These were in the range of 49 million US $. As before, the greatest emphasis was put on the air force (27 million US $), while the armored forces were allotted barely 400,000 US $ (all of it directed toward buying spare parts). However, while accepting delivery of the orders, it became evident that actually 423,500 US $ were spent for the needs of the GIBP in 1949.That Polish order was completed at the beginning of October 1948 and was sent to the Polish military attaché at the embassy in Moscow for processing. A friendly letter from Zymierski to Bulganin was attached to the order.

On 27 October 1949, the Poles accepted transport 100/1601, which, among other things, included 85 mm ZIS–S–53–44 guns, as the Soviets referred to them, *"with the ZIP"*[155] (there were 5 sets of guns at a total cost of 27,590 US $, or 5,518 US $ each, and 5 barrels for the guns), that were ordered as part of the III purchasing phase. This equipment was transported to the 1st Central Military Equipment Depot, where, on 15 December, it was entered in the weapons registry. The serial numbers of the guns were: 1741, 1673, 2251, 8006 and 1620. As the available information indicates, these guns were sent to the 4th Central Arms Depot where, in June, were also stored 7 85 mm gun barrels. It was there that the gun ZIPs from the 1st Tank Regiment were sent, not being needed in the units at that time. Meanwhile, the 1st Central Arms Depot received gun sights[156]; they were:

- ✓ TSh–16 20 pieces
- ✓ TSh–17 10 pieces
- ✓ PT–4–17 5 pieces

As part of the III purchasing phase, 5 repaired ZIPs for the 76 mm guns were included.

The three deliveries from the USSR did not cover the needs of the Polish Army. The taking of wrecks from battlefields, and the use of operational tanks only created an illusion of a growing "might". On 1 January 1950,

[155] ZIP, or ZiP — Zapasnoje Instrumenta i Prinadlieznosti (Spare Parts and Equipment).

[156] Of interest, the gun sights were delivered in at least two shipments. Invoice # 15152 from 9 December 1949 read as follows: 8 PTK–5 ($ 900 US each), 3 TSz–16 ($ 400 US each), 10 TSz–17 ($ 409 US each), 5 ST–10 ($ 226 US each).



the state of the armor force still did not present itself very well. Of the 3,178 officer positions there were only 2,142 filled, of the 6,415 NCO positions 3,603 were filled and of 923 officer candidate positions 878 were filled. However, of the required strength for 11,327 privates, there were 17,557 in the ranks. According to all the establishments, in the combat units and schools of the armored forces there were to be 408 combat vehicles, of which 248 were T–34s. In fact, there were only 338 vehicles, of which 206 were T–34s.

According to the initial agreements, the Soviets agreed to deliver the indicated equipment in the period 1947–1949. However, the duration of the work concerning the selection and transfer of the equipment dragged out so much that, by mid–1949, the Poles had only used up just over 38% of their credit. On 25 May, the Polish military attaché in Moscow received from the USSR Ministry of Internal Trade a list of equipment that the Soviets could send to Poland encompassed in the III purchasing phase. It is not hard to guess that, regarding many items, the Soviet list did not match the original Polish list. As a result, on 8 June, Zymierski turned to the Polish government with a request that it ask the government of the USSR to agree to *"extend the periods of delivery ... until 1950 and 1951"*. In this manner originated the IV purchasing phase, which was the most important to the Polish Army. After he received a positive response to his request, Zymierski, on 25 June 1949, sent out to the various departments Directive Nr. 0011, which ordered an immediate analysis and listing of the requirements for the IV purchasing phase. The listing "was to encompass the most crucial armament and equipment ... for 1950 and 1951, with an emphasis on the year 1950. The order was to be put together by 1 August, and Zymierski was to approve it by 1 September. Of the 51 million US $ still available, the GIBP's share was 6 million US $. The air force received the largest share again, 20 million, while the Navy got 7.7 million and the artillery 9.4 million. However, in the final stages of confirming the requests, the total sum of the order grew to 65 million, of which 10 million was earmarked for the armored forces. However, this was not the end. On 12 October, the cost of the IV purchasing phase grew to 71.5 million US $, which represented the total value of the unused credit.

According to an undated note from the Headquarters of the GIBP, the Inspectorate of the Armored Forced attempted to convince the General Headquarters to set aside for it a sum of 9.87 million US $, which was to pay for 184 tanks and assault guns. Its author, colonel Grajworonski, stated bitterly that the GIBP received only 5.73 million US $ (indicating that the note was written in June). Later, the amount for armored equipment was raised but it quickly became apparent that not all of the vehicles were to wind up at the GIBP. To the overall ar-



A tank company of Polish-made T–34–85s deploys to attack during maneuvers in the 1960s.

my order was added the equipment requirement of the Ministry of Public Defence (MPD), which, among other wishes, wanted 26 Su–85s and 9 each of the Pe–2 and Il–2 aircraft. All together, the MPD put in a request for equipment worth 6.4 million US $, that is, 10% of the whole transaction!

The GIBP also wanted assault guns, even if they were JSUs, but most of the order was for T–34s. In mid-August, it was finally decided to order 141 T–34s for a sum of 2.5 million US $, of which 80 were needed as part of the IV purchasing phase. Those tanks were wanted in the year 1951, and it was planned to receive the remaining 61 tanks later on (in one of the documents there is even talk of...1955!). Additionally, spare parts costing 33 million zloty were ordered. This meant that, simply put, compared to the original stipulations (still binding in mid-July), the number of ordered T–34s was doubled, and at the same time 14 Su–85s were cancelled. The order, in its final version, was made as requirement Nr. 0818 on 17 August.

The order was completed finally at the beginning of October 1949, and was sent off to the Soviets in the last third of that month. In August 1950, began the process of filling the order, just after the last deliveries from the III purchasing phase. The majority of the order was transported to Poland from 16 August to 11 September 1950, and the invoices were accepted until the beginning of 1951. The Soviet transports arrived at the border railway station in Zurawica, where they were accepted by the Poles and then transferred onto Polish trains that used the European standard railway gauge. Some of the equipment (ammunition and other minor items) was loaded onto military trucks, or trucks belonging to the Polish Railway System, and then transported to warehouses. Together, during the stated time period, 61 transports unloaded in Zurawica. Their size varied from single cars all the way to 56–car combinations. A special commission, led by Colonel Kostromitin, of the Ministry of National Defence accepted the equipment for the Poles. Major Mazurek had the responsibility of accepting transports that contained armored equipment.

The first to arrive in Zurawica were BM–13s, the legendary Katyushas. On 16 August, 16 of them arrived in transport 300/13767. After a 5–day break, an avalanche of transports started to arrive. On 22 August, a transport of 12 JS–2s arrived, and then, among others:

- ✓ 20 August — transport 300/13815 — 20 T–34s (406651, 816325, 816248, 815898, 815936, 816361, 815829, 815945, 816264, 406572, 816337, 816720, 815760, 525655, 525557, 815828, 816043[157], 406505, 406478, 816291[158])
- ✓ 26 August — transport 300/6661 — 85mm ammunition and T–5 fuses (17 rail cars, total weight 320 tons)
- ✓ 27 August[159] — transport 300/13816 — 20 T–34s (816011[160], 816703[161], 816351, 815981, 815858, 815975, 816009, 816367, 816312, 525600, 815910, 815689, 816339, 406645, 406541, 816118, 815985, 815896, 816023, 406490[162])
- ✓ 27 August[163] — transport 300/13817[164] — 11 T–34s (502954, 502956, 502960, 502961, 502963, 502965, 502966, 502969, 502974, 525707, 816288)

The invoices for the T–34 transports listed below were made out on 26 October, and confirmed at the Headquarters of the GIBP on 21 November:

Invoice No.	*Ordered on*	*Qty*	*Cost*
15895	1–20/28 VIII	20 T–34	816,011 US $ (transport of 27 August)
15894	1–11/28	11 T–34	465,976 US $ (transport of 27 August)
15892	1–20/23	20 T–34	847,230 US $ (transport of 20–23 August)
15893	12/28	2 ZIPs	2,130 US $

In the first days of November, 6 more transports that included tanks were received by the Poles. They were delivered on the basis of agreement Nr. 0482 of 1 March 1950, which concerned the conditions and organization of the equipment deliveries — including the last of the IV purchasing phase. All were delivered as part of one delivery — marked with the code 80/315408.

- ✓ 2 October — 25 T–34s (44402, 502834, 525219, 525272, 525280, 525346, 525427, 525490[165], 525504, 525532, 525548, 525568, 525603, 525611,

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[157] Another document mentions a vehicle with the number 816873 as part of the shipment.

[158] The entire transport was directed on 23 August to unit Nr. 1745 (the 9th Tank Regiment in Malbork). Additionally, vehicle Nr. 502956 was also sent there later.

[159] According to other sources, on 28 August. It is possible that, in such cases, meant are: the day of the arrival of the transport from the USSR, and the day when the transport was transferred onto Polish transports in Zurawica and sent to the interior of Poland.

[160] According to another document, 810011, but this was probably wrong.

[161] According to two other documents, 861703.

[162] The entire transport, including 502966, was sent on 28 August to unit Nr. 1657.

[163] According to other sources, on 29 August.

[164] According to other sources, 13813.

[165] According to other sources, 525480.

525627, 525635, 815849, 815866, 815930, 815950, 815964, 815972, 816008, 816085, 816093)
- ✓ 3 October — 15 T–34s (211547, 211556, 211568, 26771, 26772, 26775, 26787, 26794, 26795, 525450, 525484, 525514, 525536, 525567, 525575)
- ✓ 3 October — 12 T–34s (882982, 883009, 883063, 883073, 883087, 883095, 883117, 883130, 883169, 883216, 162885, 525471) — 27 Armored Regiment, 40 Motorized Infantry Regiment
- ✓ 4 October — 20 T–34s (406582, 406639, 502910, 706640, 406676, 406622, 406619, 406592, 406644, 456612, 406588, 502891, 502911, 502924, 502908, 502906, 502849, 502909, 502902, 502921) — 29 Motorized Infantry Regiment
- ✓ 5 October — 18 T–34s (502861, 502864, 502865, 502866, 502868, 502869, 502871[166], 502929, 502980, 511558, 511559, 511572, 511574, 511575, 861596, 861597, 861598, 861599)

The Soviets made out invoices for all of the transports on 4 December 1950, which were accepted on 30 December by General Suchow of the GIBP.

Invoice No.	*Ordered on*	*Qty*	*Cost*
15947	1–15/3.X	15 T–34	635,422 US $
15948	1–18/30.IX	18 T–34	762,507 US $
15949	1–13/3.X	12 T–34	502,911 US $
15950[167]	1–21/20.IX	20 T–34	849,360 US $ or 883,073 US $
15951[168]	1–26/2.X	25 T–34	1,061,167.50 US $
15960			Spare parts 373,868 US $

Each of the tanks delivered with a ZIP theoretically cost 45,550 US $, that is 182,200 rubles or 18.2 million zloty. Actually the cost of those vehicles was 7% lower (just over 42,300 US $) due to their previous use. The Polish side accepted such a solution with the condition that the use of the vehicles had to be limited; none of them could have gone through a medium-level overhaul.

Along with the tanks, the transports to Poland also included 12 85 mm tank guns with ZIPs, at 5,560 US $ per piece, which almost completely satisfied the needs of the Polish Army for that type of equipment. As a result, it was planned to order only two more guns in 1951. In order to ensure the maximization of that armament, 53 ZIPs were purchased for the guns in the USSR, at a cost of 253 US $ each, as well as 5 regimental ZIPs at 1,071 US $ each. Delivered were also 29,500 85 mm rounds, at a cost of 26,646 US $, of which 4,500 were taken by the Ministry of Public Defence (26 August transport). Additionally, 2 transports arrived on 29 August, one containing only the tank ZIPs (2 cars weighing 53 tons), and the other carrying the technical documentation for the armament (1 car containing 221 items, a total weight of 7,500 kilograms).

In 1951, after a summation of the expenses associated with the IV purchasing phase, it became evident that in the previous year the Armed Forces had spent almost 350 million rubles, or almost 87 million US $, on purchases of equipment from the USSR. Most of that sum went to meet the needs of the armored force and the air force. Initially, the invoices came from the military attaché at the Polish embassy in Moscow, which were then forwarded by the Headquarters to the Polish National Bank for settlement.

The outlays grew year after year, most certainly due to the growing tensions in the world. As a result, in 1951, based on an agreement signed on 29 June 1950, it was decided to settle the invoices in a different manner. A small amount of the equipment (likely the most urgent items and the remainder from previous orders) was bought on previous terms, but the main part of the purchases was acquired on credit; as was covered in the document, 2/3 was on credit and 1/3 on a *"clearing principle"*. On this basis was bought the next batch of T–34s, covered by the order from 9 August 1950 and to be delivered in 1951. An analysis from 29 August shows that the GIBP foresaw, by the terms of the order, a purchase of 291 T–34–85s at a price of 53,020,000 rubles (the total of the purchases came to 77 million rubles). According to the forecasts of the armor specialists, after the receipt of those tanks the armor strength of the Polish units was to increase to 591 T–34–85s and 49 T–34–76s, a total of 11 vehicles above the peace-time establishment. Further purchases of T–34s were planned for the following years. A lack of data makes it impossible to precisely reflect the situation, but the initial plans foresaw the following T–34 deliveries:

	1951	*1952*	*1953*	*1954*	*1955*	*Total*
T–34	276	180	143	186	192	977

According to another aggregate plan (prepared in April at the General Headquarters), the importation of T–34s from the USSR was to look in the following way:

	1951	*1952*	*1953*	*1954*	*1955*	*1956*	*1957*	*Total*
T–34	291	100	95	110	54	120	265	1,035

[166] According to another document, 502861.
[167] According to other sources, 15250 or 15256.
[168] According to other sources, 15251 or 15257.



A T–34–85, a Sormovo-produced tank, crosses a trench defended by an officer wearing a Model 44 British helmet.

- *ADM* -



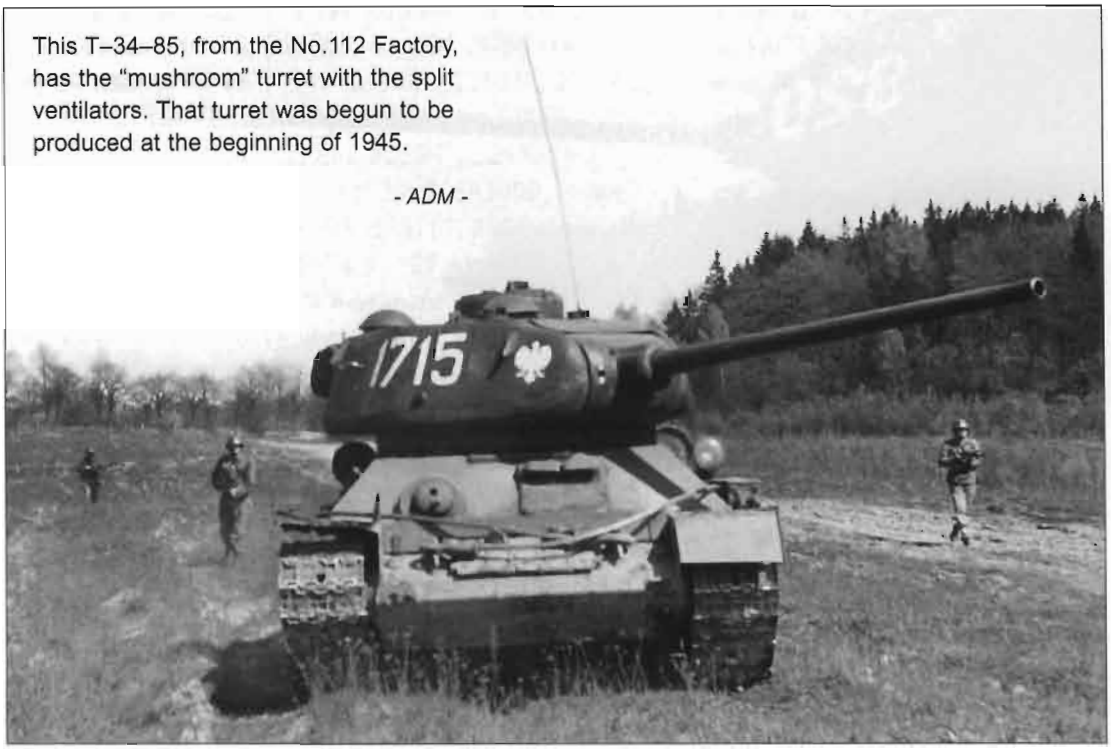
This T–34–85, most probably a war-time product of the No.112 Factory, has the tactical code "?873".

- *ADM* -

There is only one known delivery from all of these orders; the arrival of 18 new vehicles from the USSR to the 8th Tank Regiment at the end of 1951. These vehicles had the following serial numbers: 6876363, 22263, 4121801[169], 687793, 149158, 687724, 406455, 4120303[170], 861710, 288025, 467020, 457368, 411351, 26831, 603–G–420, 288080, 406462, and 502876. At the same time 9th Tank Regiment received 16 tanks: 288084, 687678, 687226, 457221, 687467, 861637, 687538, 457432, 601B101, 687580, 450788, 687553, 687631, 687632, 687586, 687624.

All of these desired vehicles were considered as indispensable for the equipping of the newly-formed armor and motorised (shortly after designated as mechanised) divisions. These, for the first time since the end of the war, were to give the Polish Army the ability to field formations fully capable of carrying out combat missions. To reach the desired standard, divisions were created using the independent regimental units. The divisions were then grouped to form corps. The entire structure was adapt-

[169] This appears to be a war-time production tank.
[170] As above.



This T–34–85, from the No.112 Factory, has the "mushroom" turret with the split ventilators. That turret was begun to be produced at the beginning of 1945.

- ADM -

ed to the existing conditions, which created some very specific relationships. Theoretically, during war, the armor corps (there were two) were to have the following composition (structure at end of February 1950):

- ✓ Headquarters, with subordinate units:
  Communications battalion, flight of aircraft, headquarters company, engineer battalion, information section, defence platoon;
- ✓ An armor division:
  – Two regiments of tanks, two motorised regiments, light artillery regiment, communications battalion, engineer battalion, antiaircraft section, armored car company, chemical defence company, medical company, supply depot, uniform repair workshop, bakery, field post, paymaster, information section, defence platoon.
- ✓ A motorised division:
  – Three motorised regiments, tank regiment, light artillery regiment, 120 mm mortar regiment, anti-tank regiment, reconnaissance battalion, engineer battalion, communications battalion, antiaircraft section, armoured car company, chemical defence company, medical company, dressing station, supply depot, uniform repair workshop, bakery, field post, paymaster, information section and defence platoon.
  – independent armor brigade, composed of:
  headquarters, 3 battalions of tanks, antitank battalion, fusilier battalion, antiaircraft battery, maintenance company, medical platoon, information section and defence platoon.

In practice, however, at the beginning the establishment was not filled, and during formation it changed, staying fluid for a number of months (summer of 1948 — winter of 1950). The same applied to the armament. All tank regiments were mixed (T–34s and JSU or SU–85 assault guns), thus increasing their combat strength (from approximately 40 T–34s to approximately 55 vehicles). On 1 January 1950, in the just created corps there were 70 T–34s (of the 94 intended for the 1st Armor Corps) and 107 (of the 133 intended for the 2nd Armor Corps).

On 1 February 1950, the following were part of the just created 1st Armor Corps:

- ✓ 16th Armored Division — 1st Tank Regiment and 4th Heavy Tank Regiment, plus 6th Reconnaisance Battalion, 35th and 55th Infantry Regiments, 43rd Communications Battalion[171], 47th Engineer Battalion, 41st Light Artillery Regiment, 42nd Armored Car Company, 14th Antiaircraft Detachment, Tank Mobile Repair Workshop No.4, Artillery Mobile Repair Workshop No.5, Automobile Mobile Repair Workshop No.6.
- ✓ 8th Motorised Division — 9th Tank Regiment, plus 32nd, 34th and 3th9 Infantry Regiments, 34th Light Artillery Reriment, 91st Antitank Artillery Regiment, 15th Mortar Regiment (added in 1950), 5th Reconnaisance Battalion, 2th8 Communications Battalion, 19th Engineer Battalion, 12th Antiaircraft Detachment, 41st Armored Car Company, Tank Mobile Repair Workshop No.1, Artillery Mobile Repair Workshop No.2, Automobile Mobile Repair Workshop No.3.

The 2nd Armor Corps was composed of (including the 52nd Communications Battalion) the following units:

- ✓ 10th Armored Division — 2nd Tank Regiment, 6th Tank Regiment, plus 27th Infantry Regiment, 39th Light Artillery Regiment, 7th Reconnaisance Battalion, 41st Communications Battalion (initially,

[171] Or 73rd Communications Battalion.

the 31st), 91st Engineer Battalion (initially, the 21st), 14th Antiaircraft Detachment, 43rd Armored Car Company, Tank Mobile Repair Workshop No.7, Artillery Mobile Repair Workshop No.8, Automobile Mobile Repair Workshop No.9.

✓ 11th Motorised Division — 8th Tank Regiment, plus 29th, 40th and 42nd Infantry Regiments, 33rd Light Artillery Regiment, 17th Mortar Regiment, 92nd Antitank Artillery Regiment, 9th Reconnaisance Battalion, 34th Communications Battalion, 16th Engineer Battalion, 15th Antiaircraft Detachment, 44th Armored Car Company, Tank Mobile Repair Workshop No.10, Tank Mobile Repair Workshop No.11, Automobile Mobile Repair Workshop No.12.

On 1 February 1950, the 10th Armored Division counted 5,612 soldiers, the 16th Armor Division had 5,278 soldiers, and the 8th and 11th Motorised Divisions each had 8,844 soldiers.

In June 1950, orders were given again for new organizational establishments, mainly linked with renaming the motorised infantry divisions into mechanised divisions; establishments 5/41 – 5/60 were replaced by 5/64 – 5/76. At the same time, another unit relocation was carried out. As an example, the 1st, 8th and 9th Tank Regiments, stationed in Slupsk and Malbork respectively, converted during the whole second part of the year from the 5/43 establishment (9th regiment) and from the 5/57 establishment (1st regiment) to the 5/66 establishment; this involved converting from: one battalion of tanks, 1 battalion of armor artillery and 1 training battalion with a strength of 784 soldiers (including 133 officers) to: 2 battalions of tanks, 1 battalion of armored artillery and one training battalion with a strength of 1,146 soldiers (including 140 officers).

It was planned to form the first companies during 1951 (by 1 December) and bring the battalions up to a strength of 1,199 soldiers (including 145 officers). The 2nd and 8th regiments were to be reorganized in the same way, the first from 5/57 and the second from 5/43.

Eventually, according with the plans for the end of 1950, the war-time units were to look as in the table below.

In the final form, each battalion was to consist of a headquarters and 3 companies, each of which was to have 3 platoons of 3 T–34s and 15 soldiers each. A company's full complement was to have 10 tanks and 54 soldiers (6 officers and 48 NCOs). The company headquarters had 1 T–34 and 10 soldiers (3 officers and 7 NCOs). The battalion headquarters had another 3 T–34s and 15 soldiers (one officer and 14 NCOs). One other T–34 was with the communications platoon attached to the battalion headquarters. The new, standard at the beginning of the 1950s, battalion was composed of a headquarters, 3 line companies and a training company, in which there were 22 soldiers (7 officers and 15 NCOs). All together, the battalion was to have 37 T–34–85s, not counting the training tanks.

In 1952, it was planned to form an armor brigade, which was to be the army reserve. It was composed of 3 battalions with the standard establishment. To achieve

	Soldiers	*T–34s*	*Armored cars*	*APCs*	*Recovery tanks*	*Cars*
HQ Company	109	2	4	–	–	22
Mechanised Regiment	2,370	31	5	–	1	266
Tank Regiment	1,099	64	–	3	–	174
Reconnaisance Battalion	436	10	5	15	–	31
Tank Mobile Repair Workshop	98	–	–	–	1	22
Tank Brigade	1,635	95	1	3	4	305
Training Battalion	1,059	32	5	2	3	33



This T–34–85 from the No.183 Factory has a 4 numeral tactical number (top half of the front of the turret side, and bottom half of the turret rear).

- ADM -



the specified establishments, equipment was needed, and it had to be brought in from the USSR. It was already known in 1949 that it would not be possible to fill all needs with imports. This led to the decision to begin the production of tanks in Poland.

Above: A T–34–85 (tactical number "0578") passes a ZiS–3 gun during maneuvers. The rhombus insignia on the back rear of the turret side is certainly duplicated on the glacis plate.

- ADM -

A joint exercise between Polish tanks and Russian infantry in the 1950s. Note the tactical insignia on the glacis plate and at the back of the turret side.

- ADM -



POLISH T–34

Polish authorities, despite the serious lack of resources and the weaknesses of Polish industry, pushed determinedly for the start of arms production in the country. At one time, the Poles even contemplated producing tanks in cooperation with Czechoslovakia (with the permission from the Russians, of course). According to information which the GIBP had, their southern neighbors were at that time working on the prototype of a new heavy tank. Its characteristics were;

- ✓ Weight — 35 tons
- ✓ Main Armament — semi-automatic 100 mm gun
- ✓ Frontal Armor — 65 mm
- ✓ Maximum Speed — 55 km/h
- ✓ Engine — 700–1,000 HP. The Polish government considered such a design as inadequate and decided to produce the T–34. In November 1948, it was planned at the GIBP to start the production of spare parts already in 1949, and the tank itself in 1952.

Discussions regarding the licensed production of tanks in Poland were started, at the latest, in the summer of 1948, and the official order for the license for the T–34–85 was sent in communication # 00493 on 14 September 1948. The deadline for delivering the appropriate documentation was set as 1 March the following year, which was confirmed by communication # 0324 on 15 November 1948. Later, however, there were some unspecified problems due to the fact that the Polish side was unprepared for the cooperation. Due to this, on 24 June 1950, the deadline for delivering the appropriate documentation was moved to 1953, which was confirmed by documentation # 00683 on 22 August 1951, and then confirmed once more on 14 October of that year.

Soon after the agreement on the terms of the license cooperation, the Poles, in documentation # 00020, asked the Soviets for a license to produce the V–2–34 engine. The deadline for delivering the license documentation was set for the second quarter of the same year, but they arrived together with documents # 00683 (from 9 March 1951) # 0090 (from 10 December 1951[172]). Four years later, with document # 00193 of 25 January 1955, a license was secured from the Soviets for the manufacture

T–34–85s being produced in Poland.

- ADM -



[172] Another date appears in the column, 9 May 1953. It is not possible to explain this entry.



T–34–85s being produced in Poland.

- ADM -

of the improved V–34M–II engine. That was the engine which supplied power to the Polish-built T–34s during the 60s and 70s. Interestingly, the Poles secured a license to build the V–54 engine for the T–54, which was to be built in the fall of 1954, at exactly the same time that the production of the T–34 started. Meanwhile, in 1951, a license for the production of the TPM–A–O and TPM–B–O workshops for overhauling tanks was secured. At the same time, a license for producing a 10–15 ton crane (to be installed on a T–34) for removing and installing turrets, engines and other heavy parts was also arranged. In February 1951, the matter of licensing the production of the 85 mm gun was finally resolved by document # 00020 of 22 February, which foresaw the delivery of the pertinent documentation in the fourth quarter of 1951. In reality, the license was received already in the summer, along with the accompanying documentation # 00683 from 22 August 1951. With documentation # 00020 from February, the license for the production of the 10–RT radio was secured (last series production), as was a bit earlier (with documentation # 00683 from 6 February) the license for the TPU–bis "f" internal communication system. That, however, was later replaced (documentation from 24 May) by the TPU–47.

As was noted in the introduction to this section, the will to produce by license and theoretical stipulations were one thing, while their realization was something different altogether. While in 1949 the Poles already had some experience with producing equipment under license, it was mostly minor in nature. After the "liberation" of Polish territory, arms production, which in those conditions meant small infantry weapons only, was begun there immediately. This meant the version 43 machine pistol, the TT pistol, ammunition for them and grenades. The Soviets handed over to the Poles part of the technical drawings for these weapons in the period end 1944/beginning 1945 but, as one of the sections of the General Staff determined *"in essence the Weapons Department does not have (for them, author) a license"*.

Initially (immediately after the war), the expectations regarding the obtaining of licenses were rather limited and, up to the spring of 1949, focused on equipping and arming the infantry forces; arms for the infantry and artillery, ammunition and binoculars. After that was accomplished, serious deliberations began to acquire larger items such as the Yak–15, Il–10, T–34, Su–85, heavy ordnance etc. And only then, the individual pawns in the country's decision-making system faced the fact that the



Above and below: This Polish-produced T–34–85 undergoes trials on an obstacle course in Poland. The tank's turret serial number ("103") and tactical number ("945") can be seen on the turret.

- ADM -




754



This and facing page:
This series of photographs shows Polish-produced T–34–85s undergoing tests on obstacle courses for a cadre of officers. The tanks have large tactical numbers, painted on the sides and the rear of the turret according to regulations.

- ADM -

problem had outgrown their abilities to manage it. It is almost certain that in many ministries, especially the Ministry of Industry and Trade (MPiH) and the Ministry of National Defence (MON), there was no appreciation for the amount of preparatory work that was necessary to in-





T–34–85s race through a village during one of the numerous exercises that were often held during the 50s and 60s.

- *ADM* -

corporate the production of tanks or aircraft into the economy. Already in February 1947, the MPiH stated that the industry was ready to carry out the licensed production; sent out was *"a document regarding the readiness of the national industry to produce equipment for the Ministry of Defence on the base of granted Soviet licences"* and only asked *"for the undertaking of the necessary steps aiming to speed up the reception of the technical documentation."* The passage of time proved that such a view bordered on nad've optimism. Besides, at that time the Soviets had not even told the Poles which licences were available. The list and the attached conditions were only given out by the Soviets at a conference that took place in Moscow on 19 January 1948.

The Soviet commission was led by General A.I. Antonov, while the Polish delegation was led by Rozanski from MPiH and Grabinski from MON (both engineers). The conference began with General Antonov asking the Polish side to explain their understanding of the "licence". Rozanski explained that the Poles understood the licence to be a permission to produce Soviet equipment in Poland based on received technical documentation. Later, basing their position on a memorandum from the Polish government from 19 December 1947, the Polish delegation briefly presented the matter at hand. Poland wanted to produce its own equipment for its army, but, since it was in the *"People's Democracy"* camp, the Polish equipment and arms had to conform to that of the Soviet. It was pointed out that it was necessary to receive technical assistance from the Soviets, as Polish industry could not independently produce the equipment. The Polish delegation also explained that it understood "assistance" as the *"use of experts over a longer period of time"*. It was also desirable to reach agreement for Polish engineers to gain experience in the arms industry of the USSR. Marshall Pieresypkin considered that request as completely understandable, since such arrangements were very useful to the Soviets in the 1930s, when their tank industry was developed. In addition, *"Antonov stated that he would positively refer the wishes of the Polish government to receive licences and technical assistance, and, after receiving a decision from the Soviet government, an agreement for the granting of licences and technical assistance will be drafted."* Subsequently, a detailed discussion took place regarding the individual licences.

When the armored forces were discussed, *"Vice-Minister Eng. Rozanski pointed out that the Polish industry may have difficulties with the production of armor plates, due to the small production of the rolling-mills and the difficulties with the welding of thick armor plates"*. The Soviet tank expert stated that it was not possible to assist the Poles due to the fact that the production of the T–34 in the USSR had ended. The same was said about the production of the JSU–122, and so the Polish delegation replaced that vehicle by the Su–85/100, which was

still produced. The delivery of the licence contract was set for 3 months after the signing of the agreement.

At the end of the conference it was decided to immediately start drafting the agreement. The Polish delegation stated that by 20 january it would send to Antonov its draft of such an agreement. The entire delegation agreed that *"The Polish side declares that the Polish government delegation received a fundamental agreement from the Soviet Premier and Generallisimo, Josef Stalin, to grant to Poland a licence to produce arms and military equipment at no cost."*

Barely three months later, Bulganin sent Zymierski a communication (No.136978 dated 10 march 1948), which reached the chancellery of the Polish Marshall on

A column of Polish-production T–34–85Ms photographed in the 1960s. It appears, by the different colored patch, that the number "409" was painted over a previous number. Note the short star antennas.

- ADM -





A transport of T–34–85s is returning to base from the training grounds. The BDSz smoke-generating equipment is clearly visible on the back of the tank hulls.

- M. Jaroszyński-Wolfram's collection -


3400

This platoon of T–34–85s was photographed during an "attack". The crew of the closest tank has removed the pistol plug for better ventilation.

- ADM -





A T–34–85 of Polish production; the hull front has no linking girder, the fenders fold and the tank has the polish turret. Note the tactical number painted on the front of the fuel tank.

- ADM -

15 March 1948. The letter, beginning with *"Highly Respected Sir!"*, touched on the main conditions for the cooperation, which were stated in the following way:

"1. The handing over of the licence and technical documentation, crucial for the organization of the production in Poland of the listed types of equipment, will be done gradually, depending on the readiness of the Polish industry to begin production, about which the Polish government will inform currently the authorities of the USSR.

2. The production of the Soviet types of arms and equipment, in accordance with the granted licences, should be organized in the factories in such a way that it will not require in the future the Soviet industry to deliver any parts, elements or details for these types of equipment".

After obligating the Poles to pledge to keep the documentation secret, Point 5 concluded:

"The licence and technical documentation is passed to the government of the Polish Republic at no cost, but all expenses incurred by the ministries of the USSR that are connected to the passing of the licence and technical documentation, as well as the sending to Poland of Soviet specialists to help with the production, should be settled by the authorities of the Polish Republic. The dealings will be carried out according to the standard operating procedures in the Soviet Socialist Republic, after converting all sums to dollars at the official exchange rate (1$ = 5 rubles and 30 kopeks)."

A list of the licences that the agreement concerned was added to the communication. Among them was the licence for the T–34 and the Su–85. However, later the Poles dropped the requirement for the latter vehicle.

Marshall Zymierski agreed to the terms of Poland's Soviet ally in communication No.00493 from 14 September 1948, which was addressed to *"Mr. Bulganin"* In it can be read *"In the name of the Polish Republic, I have the honor to inform you that the authorities of the Polish Republic accept all terms on whose condition the authorities of the USSR grant the listed licences. At the same time, I request the sending of those licences which will be the first to be used for production in Poland."* According to the stipulations, the Soviets agreed to send the technical documentation three months after the signing of the agreement, which foresaw:



Above: Post-war production T–34–85s attack the "enemy" during the 1960s. The hull is typical of post-war production, no linking girder, folding fenders and a turret with a smooth surface (although cast in the form of the war-time moulds from the No.183 Factory).

- ADM -

Below: As a comparison, this post-war production T–34–85 has a turret from the No.183 Factory, still with a fairly rough finish, indicating that it was produced during the war or just after it ended.

- ADM -




409



Left and above: Two T–34–85s ("404" and "409") practice their beach landings from a landing craft and then cross beach obstacles. Note that tank "409" (war-time production) even has its tactical number painted on its wooden beam (used for extracting tank when bogged down in soft terrain).

- ADM -

"

-I-

... The right to produce, specified in this paragraph, as well as all the technical documentation, crucial to the production of the armament and military equipment specified in Schedule No.1, is granted to the government of the Polish Republic gratis.

-II-

The authorities of the USSR will extend to the Polish government technical assistance to master the production of armaments and military equipment [...] *through the sending of Soviet specialists to the Polish armament factories, and through the stationing of Polish specialists in the factories of the USSR* [...] *The living expenses of the Soviet specialists during their work in Poland, and of the Polish specialists during their stationing in the factories of the USSR, will be borne by the Polish government."*

In the III paragraph the Soviets agreed to supply *"at reasonable prices" samples of the armament and equipment, as well as separate parts and elements for production".* In the IV paragraph, the Polish government received the right to start production three months after the signing of the agreement. The fifth paragraph stated that the Polish side agreed to refrain from allowing third parties to have access to the technical documentation. The sale of equipment produced in Poland to third parties was only possible with the knowledge of and agreement to by the authorities of the USSR. This had to be done in writing.

It quickly became evident that the second point was very important. The representatives of the Polish authorities finally understood that in Poland there was a lack of specialists who could start up and manage the production of heavy military equipment in the country. A similar situation existed in the Polish Armed Forces. As a consequence, replying for a plea for assistance from the spring of 1949, the Soviets agreed to staff many (23 in total) of the decision-making positions in Poland with their specialists. This even included the General Staff, where, as an example, there was no *"national commander of anti-aircraft forces".*

In the fall of 1948, it was estimated (probably due to assurances from the Poles) that *"the expected date for handing over the licences would be 1 March 1949".* That is why, on 10 February, Zymierski wrote to Bulganin that the handing over of the licences was being delayed (already then!) and asked him to intervene and speed up

the process. Simultaneously, he asked for new licences at the same terms. To the communication was attached a detailed report outlining the state of development of the Polish arms industry, and also bemoaning that is was in stagnation due to the lack of the promised technical documentation. To additionally speed up the process, Bierut (Polish President) wrote to Stalin. Addressing his letter to the *"Highly Esteemed Mister Generallisimo Sta-*



These two photos of a unit armed with Polish-produced T–34–85swere taken during an exercise. The unit's tactical sign was painted at the rear part of the turret sides and on the glacis plate.





Two photos of tanks from a unit that used a 6–field checkerboard (whose alternating fields were filled with white paint). Tank "0713" has one and a half fields filled.

- ADM -



lin", he elaborated *"The authorities of the Polish Republic are turning to the Soviet authorities with a request to grant the right (licences) for 11 types of armament* [...]. *At the same time, the Polish authorities are informing of the readiness of Polish industry to produce these types of armament* [...]." Stalin probably knew that this was not the truth. The tone of the communication signed by Vice-President Cyrankiewicz seemed to have two mean-



Excellent photograph of a column of Polish postwar produced T–34–85s.

- ADM -



Above: This crew is receiving a briefing in front of a Polish-produced T–34–85 ("3567").

- ADM -



Below: Barrel cleaning after firing on the range. Note the large tactical number and strange turret's shape of No.112 production. Of ipesial interest is the old tube-bearing portion of the gun mantle (for S–53 gun).

- ADM -

ings. The communication stated that *"the military armament factories are, in principle, ready to start production."* [173] while at the same time it said that *"... any further progress in the armaments industry is impossible without a quick granting of the technical documentation."* Despite these facts, Stalin reacted positively to Bierut's communication. To this, Bierut responded *"I ask YOU, comrade generalissimo, to accept cordial and extraordinary thanks from me personally, and from the authorities of the Polish Republic, for the agreement by the Soviet government to grant licences for the right to produce military equipment and for agreeing to send groups of Soviet military specialists to serve in the Polish Armed Forces."*

The Soviet government (that is, Stalin) ordered that a specialist be appointed to finalize the matter. This turned out to be General Maslow. He asked what kind of specialists the Polish government needed to start production. On 15 September 1949, the Polish side answered that the specialist was to help with the production of spare parts for the T–34. When was he needed? — Immediately!

Meanwhile, in the summer of 1949, the Polish side began preparations for accepting the documentation. However, as it happened, unexpected problems appeared. On 1 August, the National Commission for Economic Planning stated that the economic plan was in danger. The Commission had put together a group of experts that was

[173] Author's emphasis.



Two photos of T–34–85s during a river crossing. The first photo shows the snorkel tube attached to the tank's fender. In the second photo, the tube, with the antenna on top, is installed upright on the turret. The gun mantle is secured against water leaks.

- P. Kubiak's collection (left), ADM (bottom) -





Since the bridge is too weak to hold the T–34–85, the tank fords the stream. The tank has the Polish-made turret and the new type of exhaust covers.

- ADM -



Two 200 liter fuel drums have been installed on the back of the tank. Special brackets were installed there to hold the drums and the BDSz smoke-generating equipment.

- *ADM* -

to travel to Moscow to accept the technical documentation, but for a month there were no directives regarding its trip. The Comission then pointed out that the original plan to begin production in 1950 depended on the documents being delivered in July 1949 at the latest.

The Polish side began to admit, ever more strongly, that the lack of a technical cadre was one of the biggest problems. Just how serious was this problem, is attested to by the following example. During the planning for the production of the 122 mm howitzer (model 38), problems were discovered in the production process of the wheels. It was not possible to solve them for some time. In August 1950, the Soviet military attaché in Poland, during a conversation with General Korczyc, found out that Poland would not be in a position to produce the 57 mm anti-tank gun. Meanwhile, on 25 May 1949, Bierut, writing for the first time to Stalin regarding the licences, asked him to send 7 specialists and 15 scientists to the Polish General Staff Military-Sciences Institute. However, after the Poles became familiar with the licensed technical documentation, it became apparent that more advisors were necessary. As a result, Bierut, in his next communication on 11 October, asked for 11 specialists in the fields of producing aircraft, radio-locating equipment, artillery (only 122 mm howitzers) and even rifles. As time went on, these numbers grew constantly.

At the same time (10 September 1949), transport No. 100/5070 (along with other trains) arrived in Zurawica. It was carrying a load of samples of T–34 spare parts, which were to be used in the production of equipment by the Polish industry. Of every three samples of a part, the Ministry of National Defence sent two for *"testing and trials linked with the future production of spare parts"*, while one made its way to the CSSP. On 19 September, transport No.100/2212 left the USSR. It contained complete sets of technical drawings, of which one (*"production copy No.2"*) was taken by the GIBP by order No. 0047 (7 October 1949) of the Ministry of National Defence. The documentation essential for the production was taken over on 11 January 1950; it was composed of a total of 10,892 sheets of drawings. In order to transport the drawings in their entirety, 2 rail cars were needed, at a cost of $2,300.00 US.

According to the plans set out in February 1950, the production of spare parts was to start only in 1952. It was expected that it would take 10 months to become familiar with the technical documents, 18 months to prepare for the production and 4 months to complete a test series. At the same time, it was expected that the beginning of the production of the T–34 would be possible sometime during the period 1952–1954. It was also confirmed once more that the factory chosen (now the Bumar-Labedy factory) was *"essentially ready for production"*[174]. It was expected that the production of the tank would begin with the production of the ZIPs for the tanks. It was also expected that the production of the 85 mm ammunition would take place in Skarzysk-Kamienna and at the "Pionki" facility in Legionow. The final decision to produce the tank was taken in May 1951. In total 685 pieces were made, including 10 pre-production vehicles used for tests. In 1952 5 tanks were assembled, in 1953 — 310 and in 1954 370 vehicles left factory.

[174] Author's emphasis.

CAMOUFLAGE AND MARKINGS

All T–34s were painted in one and the same way; the entire tank was painted with the basic dark olive green 4BO oil paint. Absolutely all vehicles were painted with that color, but that did not mean that all of them went into the field with the same shade. It is a known fact that the paints were manufactured in several locations (among others, in Stalingrad and at least two places in the Urals) on a massive scale. As a result, it was impossible to maintain a consistent shade of the color. It is therefore necessary to understand that although theoretically all of the T–34s were painted in the dark olive green color, in practice various batches varied a lot; from the brighter green shades to the really dark olive green.

In the field, the vehicles sometimes received one or two additional camouflage colors. The "protective" paints 6K, a dark brown, and 7K, a light brown (almost a dark sand color), were used for that purpose. These paints were used during the entire war and on all fronts, but their use on the vehicles was rather rare. As an example, in the second half of 1944, the paints 6K and 7K were in stock at the depots of the Polish Army but, as is known from photos, the Polish units did not have the spring-fall camouflage patterns on their tanks. It can be concluded that, when considering the Soviet units, this was because there was a lack of fuel supplies. The fuel was necessary for thinning the paint paste before it could be applied to the vehicles with a paint brush or a scrubbing brush. When the supply of fuel in a unit was sufficient, the adding of camouflage splotches was not a problem.

The most common pattern involved adding one of the two colors, 6K or 7K, on top of the 4B0 base. In that case, the base was to account for 75% of the visible surface. When a three-color camouflage was created, the 4B0 remained as the base color, but it accounted for 50% of the surface. The size and shape of the splotches was not defined, and they remained for the units to determine. That is why there are known examples of tanks with splotches or stripes.

A special paint was used to camouflage the tanks in winter. It was composed of 50% plaster of Paris and 50% of chalk, to which was also added glue (5%) and lime (2%). The entire mixture was kept in powder form

The two smoke generators can be clearly seen on the back of this tank.

- ADM -





This series of photographs shows a night firing exercise.

- ADM -

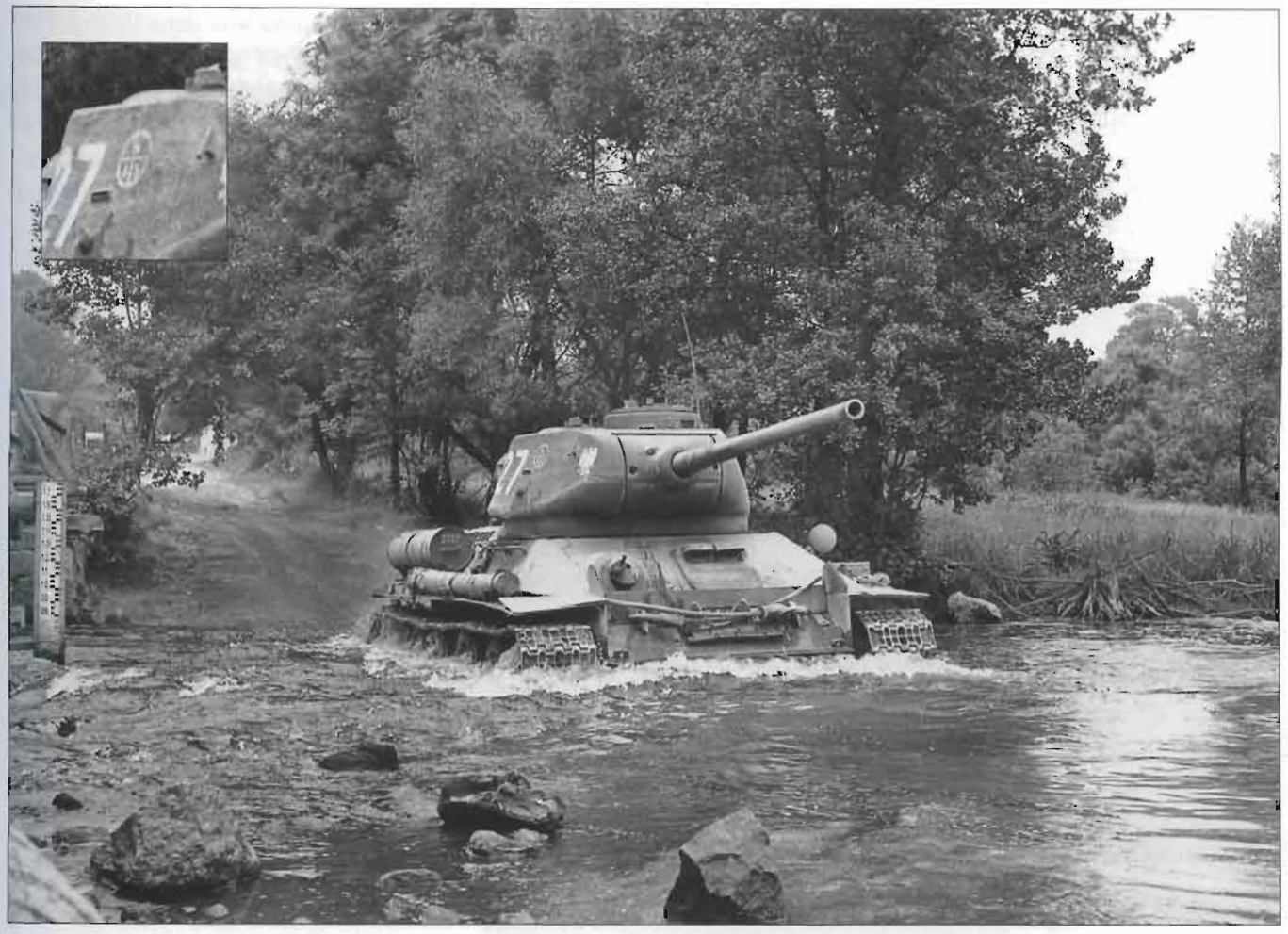




A Polish-produced T–34–85 grinds its way through the mud in the 1960s.

- ADM -





A T–34–85 of the Polish Army fords a river next to a bridge. The tactical sign on its turret (a circle divided into three segments, which were filled with letter and/or numbers) is similar to the ones used in Russian Army. The photo clearly shows the purpose of the wooden mud/water guard mounted on the glacis plate under the driver's hatch. It stopped water from entering the driver's compartment.

- ADM -

in bags or tins. When it was needed, the powder was mixed into half a pail of warm water. It was then brushed on with a brush or broom. The best effect was achieved when the paint was applied in one thick coat onto a clean tank. However, it dirtied and came off rather quickly. There was also a paint used that was similar to the 6K/7K, as well as a gluey paint, but both were very rare.

The winter camouflage was applied inconsistently. There are many photos which show very neatly and completely painted vehicles. Many other tanks were covered hurriedly and haphazardly. During the period late 1941/early 1942, a specially designed camouflage was applied in the factories. The pattern was composed of wide stripes of white paint, partially covered with a screen painted with the 4B0 paint.

Obviously, the paints produced by the Soviets were also used by Polish forces, and that lasted until 1950. In the fall of 1943, several transports with equipment and spare parts were received from the USSR. Among that were also lacquers, nitro lacquers and enamel paints. The fact that in one of the first transports (September) paints were included with spare parts for the Po–2 and UT–2 aircraft, may have suggested that they were aircraft paints. However, later these kinds of paints were also a part of shipments which included metallic colors, suggesting that these were all sorts of paints for different uses by the army. This would indicate that overhauled tanks were painted with these paints, and that the armored equipment retained the Soviet colors after the war.

It appears that only in 1949 were paints produced in Poland used on the vehicles. An order from 21 July 1949 listed the following colors for use on tanks: khaki, white, blue, yellow and steel grey. The most important color was the khaki (matte enamel), which at that time was brighter and more green than the color from the 1970s and 80s. It was specially produced for the army at the Paint and Lacquer Factory Nr. 2 in Radom under the designation FO/c/1821/m.

The listed paint colors were to be used in the following way:

- ✓ Khaki — the tank interior, as well as the oil conduits and artillery equipment;

- ✓ White — interior of the crew compartment;
- ✓ Red — engine compartment, all greasing points, transmission compartment and tanks;
- ✓ Black — steering rods and levers, transmission, driver's gauges panel;
- ✓ Blue — all air and cooling lines;
- ✓ Steel grey — transmission compartment and tanks on JS–2 tanks.

The marking of Soviet units was done through the use of a tactical code that varied in the widest possible way. While the 2, 3 or 4 element codes were standard, there also existed much more complicated ones. Very often, a special system of markings with numbers, and letters and figures, (based on filling the fields of squares, rhomboids, triangles and other figures with numerals and letters) was used. This widely used system was almost the standard. Such combinations were used to denote battalions, brigades and corps.

The tactical markings were augmented by unit insignia, unit names, patriotic slogans and individual tank names. A separate marking system, almost exclusively utilised on the turrets, existed for the purpose of identification by friendly aircraft. Such markings were a com-

This company of tanks, with the hexagonal turret, was funded by an Azerbajdzani organization. The money collected by its members allowed for the purchase of 10 tanks in the spring of 1943. The tanks were then turned over to one of the tank units.

- Planeta -



bination of circles, triangles, stripes, crosses, etc., painted in white (red in winter time). Until the second half of 1943, when commander cupolas made an appearance, the painting of such markings did not pose any problems.

When considering the Polish units, it appears that they retained the old war-time system of numbering until 1947. How strange it could be is best illustrated by the 1st Armor Brigade on 1 September 1945: the T–34–85s were numbered — 1, 2, 3, 4, 1000, 1001, 200, 210–217, and the T–34–76s were numbered — 218–229. It is true that the unit was at half-strength (the other tanks had been destroyed during the war), but this does not change the fact that at that time the unit had two systems of numbering. To prevent such situations, a gradual change came about in many units. Regarding the unit above, the numbering system was as follows: the T–34–85s were num-



Right: This tank named "Bojevaja Podruga" was funded by Maria Oktiabrskuju (in the photo), who, after her husband's death, joined the army as a T–34 driver.

- Planeta -



serial no. – tactical no. CO vehicles	*serial no. – tactical no. line vehicles*	*serial no. – tactical no. line vehicles*	*serial no. – tactical no. line vehicles*
?[175]–001			
412418–002			
412285–100	?–111	4120371–121	4120400–131
	4120324–112	4120308–122	4120270–132
	4120821–113	412369–123	4120375–133
4120386–200	412760–211	4120416–221	4120321–231
	412758–212	4120359–222	4110131–232
	4120364–213	412744–223	4120356–233
412635–300	412716–311	412748–321	?–331
	412664–312	4090611–322	412785–332
	412764–313	310171–323	412762–333





Two photographs of T–34–85s of the 1st Armor Brigade in the tri-city area, March 1945.

The top photo shows the tank of Col. Malutin, the brigade's commanding officer, with the tactical number "1000". The tank has an "alternate" turret from the No.112 Factory. The brigade received its first T–34–85s in September 1944 from the Sormovo Factory of the August/September series. This proves that this type of turret was made not only in the spring of 1944 but also during the summer of that year.

[175] Question marks denote vehicles that were not with the unit at that particular time.

bered — 101, 102, 110–119, 130–134, and the T–34–76s were numbered — 120–129 and 135–139.

Meanwhile, in the IV Military District, Colonel Molokanow from the Inspectorate of Armored Forces gave the following order in March 1947: *"Due to the variations in the tactical numbering of our vehicles, from 10 March 1947 the following numbering arrangement will come into effect:*

- ✓ *6th Tank Regiment* *400–433*
- ✓ *24th Armored Artillery Regiment* *434–456*
- ✓ *25th Armored Artillery Regiment* *457–478*

The size of the numerals and their location are to be painted according to regulations."

On the other hand, in the 2nd Sudecki Tank Regiment, in May 1947, the situation was as in the table to the left.

In the summer of 1947, the higher levels of the military structure tried to tidy up the marking situation in all of the districts and units. The painting of tactical and registration numbers was dealt with in Instruction 375. In October 1947, the commander of the Armored and Automobile Forces Officers School, ordering a change in the tactical numbering, quoted the instruction in his order Nr. 226. Point #7 of his order listed the following number allocation for a company of T–34 tanks:

serial no./hull no.[176]	*engine no.*	*tactical no.*
412758	4111724	200
4020350	210248	211
44225	30794	212
4110131	408523	213
4120573	3050702	214
0309801	408685	215
3020401	303177	216
52209	3407830	217
45415	306742	218
46125	404879	219
420815	40164	220
36607	714424	221
8978	4021201	222
420937	103618	223
4010025	3057	224
31297	406033	225

[176] In this case, as with most other vehicles used since the war, the serial number was automatically considered to be the registration number.

Another view of Col. Malutin's tank. The mould seams divided its "alternate" turret into eight elements.

- ex-WIH -





This tank carries the slogan "Za Rodinu", which appeared on thousands of Soviet tanks and other pieces of equipment.

- *Planeta* -

The Russian slogan "Za Zinu Tycholobov" appears on the hexagonal turret, which is probably painted with a 2 color camouflage (see gun mantle).



At the same time, 2 new T–34s in the 6th Tank Regiment were given numbers 400 (608D0957) and 1 (611D1074)[177], and similar vehicles in the 9th Tank Regiment received the following numbers:

Hull serial number	*Tactical number*
610D1084	0101
610D1047	0201
610D1050	0200
609D1020	0100

In contrast to the units illustrated above, the vehicles from the 3rd Training Regiment had a wide variety of numbers, arranged in a chaotic manner. The instructions from the top, being put into practice at that time, obviously did not pertain to this unit. As a result, in September 1947 its T–34s carried the following numbers: 001, 27, 58, 65, 67, 71, 72, 73, 111, 114, 126 and 331.

During the 1960s the Command of the Engineer Troops of the Ministry of National Defence began to carry out tests on applying camouflage. From the documents now accessible, it appears that in 1963 in the "Instructions for Camouflaging Troops. Part II — Materials and Means for Camouflaging" (pamphlet Inz. 150/63), the following types of camouflage application were emphasized:

- ✓ Protective camouflage (single color — khaki and white)
- ✓ Simulating camouflage (multi-color imitating, used mainly on static objects)
- ✓ Deforming camouflage (two- and multi-color camouflage, shape-altering, used depending on the season)

Two years later appeared the publication "Temporary Instructions for Applying Camouflage to Basic Military Equipment". It gave instructions regarding the objectives of camouflage use, and the manner in which various types of equipment were to be painted, depend-

[177] It is interesting to note that the Polish owners wrote in the documents that the registration numbers of the new T–34–85s were the same as their serial numbers.

ing on what material the equipment was made of (steel, wood, canvas). It also detailed the proportion and arrangement of the colors on equipment surfaces, as well as the normal rate of use.

On 14 January 1967, the Main Inspector for Training, vice-minister of National Defence, General Jerzy Bordzilowski, approved and brought into effect the "Instructions for the Camouflage Painting of Basic Military Equipment", Pamphlet Nr. 218/67. The material in this pamphlet did not vary much from what was in the "Temporary Instructions for Applying Camouflage to Basic Military Equipment", but the type of camouflage did change basically.

From late spring to early fall, the painting of T–34 tanks was carried out in the combat units, based on the instructions and color tables (showing the tanks from all sides) enclosed in the "Temporary Instructions for Applying Camouflage to Basic Military Equipment" pamphlet. The instructions laid out the application of the camouflage in a specific order. Initially, the vehicles were cleaned mechanically or by hand. This was done by removing the paint by sandblasting, or by using scrubbers



Tank founded by Estonian party leaders and workers evacuated in 1941. It appears that slogans were painted in red only on the left side of the turret, probably exclusively on the hexagonal ones.



Very interesting photo of a T–34–85 in 3 color camouflage, which was very unusual in the Polish Army. The tactical number was painted as a series of dots.

- ADM -





T-34-85 tanks inside a unit workshop. The first tank, in a 3 color camouflage, appears to have just been repainted. It has no tactical number, and its fuel tanks and accessories have been removed.

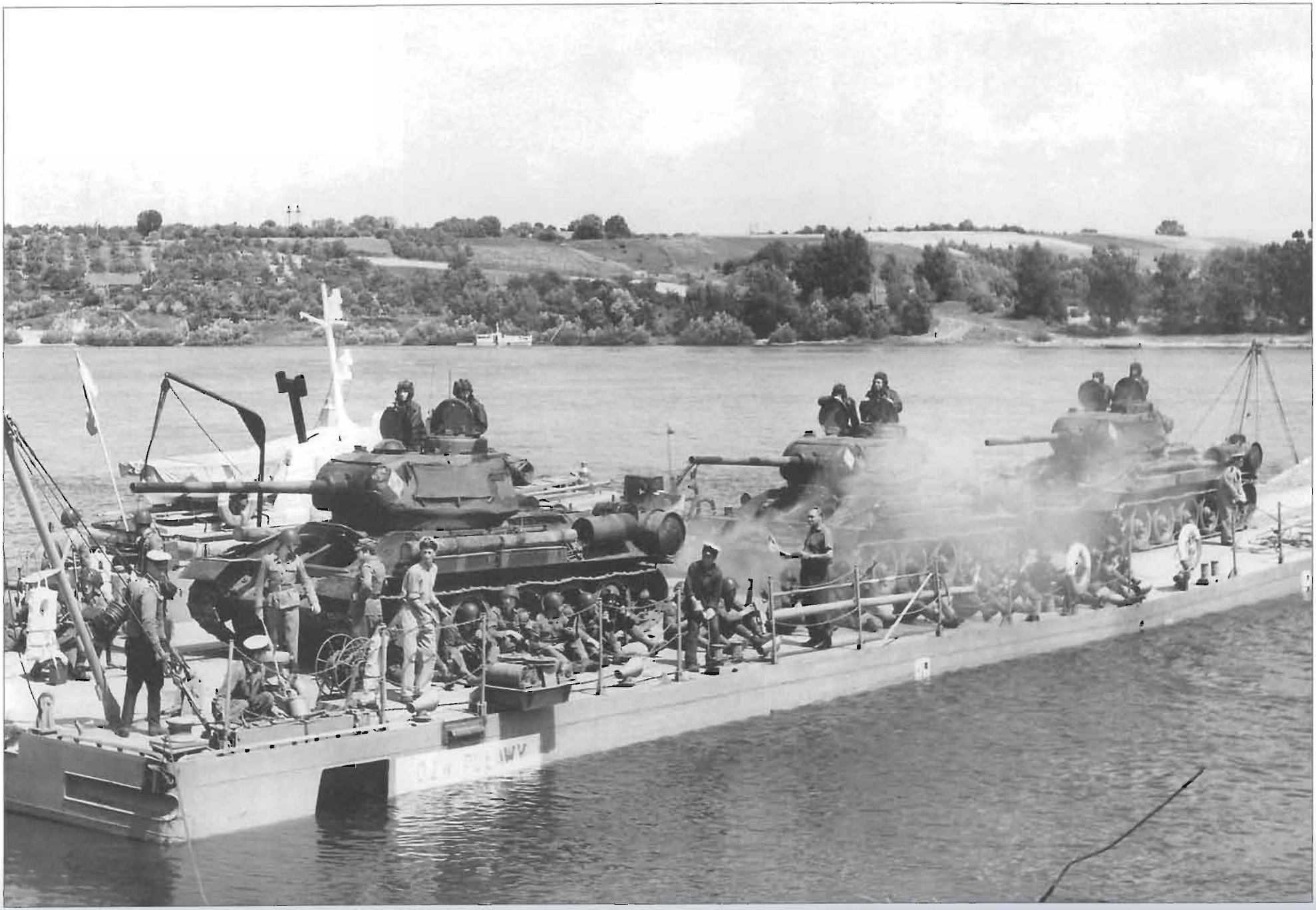
- *ADM* -

or wire brushes. The cleaned tank was then coated with a primer (red-brown color), using an air brush or paint brushes. The next step was the marking with lines of the shapes of the camouflage splotches, and the colors they were to be. The tank was then ready for applying the camouflage. Whether it was a 3-color or 4-color scheme was up to the unit, but it was the norm that all vehicles of the unit were painted with the same camouflage. The following colors were used when painting the 3-color scheme: yellow — khaki — F–134 oil (FN–134 — nitro with factory designation FN–60), dark green — F–136 (FN–136 — FN–31) and black — F–137 (FN–137 — FN–55). When applying the 4 color scheme, to the colors listed above was added a light green color — F–125 (FN–125 — FN–95).

When using the nitro paints, it was recommended to use spray guns, while paint brushes were used to apply oil paints. On average, it took 10–11 kilograms of paint to cover one T–34. Unfortunately, I was not able to find the corresponding modern paints to the 4 colors mentioned above.

For the 3–color camouflage, during the period from early spring to late fall, the proportion of colors was:

- ✓ F–134 (FN–134) 25%
- ✓ F–136 (FN–136) 45%
- ✓ F–137 (FN–137) 30%



These three T–34–85 tanks are being ferried during the period 1960/70s. Note the camouflage on all three tanks, the lightest is light green and the darkest is black. All tanks have their tactical numbers covered with (blue or red) canvas sheets. The first tank (produced at the No.112 Factory) has the "mushroom" turret with the split ventilators, and the second tank is probably a product of the No.183 Factory.

- Author's collection -

The proportion of colors for the 4-color camouflage for the period spring/summer was:

✓ F–125 (FN–125)	40%
✓ F–134 (FN–134)	15%
✓ F–136 (FN–136)	20%
✓ F–137 (FN–137)	25%

During a winter without snow, the camouflage was applied in the same way as the spring/summer one, except that the light green F–125 was replaced by a color that was obtained by mixing the yellow/khaki F–134 with the black F–137 in a ratio of 3:1. On vehicles that already had the spring/summer camouflage, only the light green F–125 was covered. The instructions do not specify if there were to be any changes in camouflage on equipment which carried the 3–color spring/summer scheme, where there was no light green color. It can be inferred that such scheme fulfilled the requirements of camouflage during winters without snow.

During winters with snow, the vehicles were covered with a white casein (gluey) paint, covering the 3- or 4- color camouflage. The instructions do not specify in detail the proportions of the colors during falling or melting of snow, simply stating: *"equipment which had been painted with oil or nitrocellulose paint, is to be covered, as per example provided, with white casein paint, reducing the size of the darker splotches accordingly"*. It should be assumed that the intentions of the instructions' writers was to have the entire vehicle painted completely white, which would have followed best the principles of proper camouflage during periods of existing snow cover.

"If, as a result of atmospheric conditions, the snow has partially melted and above it are sticking out small hillocks, ridges or dark objects, the vehicles should have the white paint covering the black or black/yellow splotches (yellow/khaki F–134, or FN–134) removed...

With small amounts of fallen snow, not providing a complete white cover, the equipment should be covered with white casein paint, but leaving the black or black/yellow splotches (yellow/khaki). In case the previously-painted equipment has not been camouflaged, and is in one color (khaki), the camouflage should be applied as given above, leaving khaki-color splotches."

Summing up the directions of painting equipment during a winter with snow, it should also be noted that when the snow started to melt the white casein paint was gradually washed off, revealing the original camouflage. This was done by unmasking only the black F–137 or black/yellow-khaki F–134 colors.

Unfortunately, the above instructions do not agree with the sample illustration shown later in the instruction. The shown tank is in a 4-color camouflage, prescribed, as the caption states, for a winter with snow. The arrangement of the splotches does not correspond to either the 3-color or 4-color schemes for painting tanks during spring/summer or the camouflage applied during a winter without snow with added camouflage for a winter with snow. Consequently, it is not possible to understand the reasons why the authors of the instructions included the illustration in that publication.

The successful preparation of the white paint depended on dissolving the white powder in the correct amount of water. The time needed for the paint to acquire its desired properties depended on the temperature of the surroundings. The colder the temperature was, the longer it took to prepare the paint. The amount of water needed to dissolve the paint powder also depended on the temperature. The lower the temperature, the more water was needed to dissolve the powder. The amount of water needed for mixing 1 kilogram of paint, depending on the temperature, and the time needed to prepare the paint is given below:

Temperature range (degrees Celsius)	18–12	11–6	5–1
Amount of water needed for 1 kilogram of paint	0.75	.85	.95
Time needed to dissolve paint (in minutes)	20–25	25–30	30–40

After the paint powder was dissolved, the resulting mixture was filtered and then applied with paint brushes or air brushes. The surfaces of the equipment to be painted with casein paints were first cleaned (dust and other pollutants were removed), de-greased and dried. To cover 1 square meter of surface, it was estimated that 120 grams of dried paint would be needed when applied with a brush, and 189 grams would be necessary when applied with an air brush. The drying process took about 12 hours. The washing off of the casein paints was done with brushes and rags, which did not damage the underlying oil or nitro-cellulose paints. Before this was done, the vehicles were left out in the rain or soaked well for about an hour.



This T–34–85 has been completely covered with white paint.

- ADM -

Brought out in 1967, the new instructions for camouflaging military equipment (Pamphlet 218/67) did not substantially differ from the previous texts where the camouflage colors and their proportions were concerned. The main difference lay in the way the camouflage looked. The oval splotches were dropped in favour of stripes .6–1.5 meters wide. They were painted asymmetrically on the tanks at angles of 30–60 degrees from the horizontal axis of the tank.

During the period late spring/early fall, the tanks were painted in the same 3 or 4 colors that the instructions from 1965 specified. During a winter without snow the tanks painted in 4 colors were repainted, also according to the instructions from 1965.A new wrinkle was the order to replace the dark green F–136 with a paint obtained by mixing the yellow/khaki F–134 with the black F–137 in a 3:1 proportion.

During a winter with snow, the tanks were painted in white, and then the casein paint was washed off so that the yellow/khaki F–134 and black F–137 were uncovered first. The proportions of the paints used in the 3-color camouflage for a winter without snow were (proportions for the period early spring/late fall are according to instructions from 1965):

- ✓ F–134 (FN–134) 25%
- ✓ F–134/137 (FN–134/137) 45%
- ✓ F–137 (FN–137) 30%

Proportions of paints used in 4-color camouflage during winter without snow:

- ✓ F–134 (FN–134) 15%
- ✓ F–134/137 (FN–134/137) 40%
- ✓ F–136 (FN–136) 20%
- ✓ F–137 (FN–137) 25%

The established camouflage schemes were not universally applied by the armor units of the Polish Army. Not many surviving photos exist today, showing that the camouflage instructions were followed. The tanks shown in the photos also confirm that there was a wide variety in applying the splotches, many of them straying far from the example drawings included in the instructions.

WHAT THE T–34 IS, EVERYONE CAN SEE

The T–34 tank was really a simple tank. The hull was assembled from rolled plates, just like the first version of the flat turret. Later on, cast turrets were produced, as well as the flat hexagonal turrets, and finally the turrets for the 85 mm gun. A stamped turret was also used.

At the front part of the hull were the stations of the driver and hull machinegunner, and just behind them began the turret compartment for 2 or 3 more crew members (the turret was moved forward of the tank's center of gravity). From 1942, boxes of ammunition were stored on the floor of the fighting compartment. They were placed around the OUS–VKU–27 rotating mechanism that protected the turret's cables from becoming entangled. At the rear part of the hull was the V–2 engine, under it the oil and water pumps, and behind it the main clutch. Farther and above were the electric starter and air filter ("Multicyclon"; the VTI–3s were moved to the back), and below was the transmission with side clutches that were linked to the side gears.

Initially, the tank was armed with the 76.2 mm L–11 gun, later in 1942 the modified F–34 gun, and in the end the 85 mm D–5 or S–53 (ZIS–S–53) guns which weighed 1,150 kilograms and had a barrel length of 54.6 calibers (4,645 mm). Number of riflings — 24, initial speed of round — 792 m/s. The maximum range of the gun's direct fire was 5,200 meters, while its maximum overall range was 13,730 meters. It carried 77–100 rounds of 76 mm ammunition, and later 57 rounds of 85 mm ammunition. In the case of a vehicle armed with 100 rounds of ammunition, from mid-1943 75 UOF–355P high explosive rounds, 21 UBR–354B armor piercing rounds and 4 UBR–354P subcaliber rounds were carried in the hull. The T–34–85 tanks carried BR–365 — "flathead", and BR–365 — "sharp-head" rounds, as well as the BR–365R subcaliber and O–365 high explosive rounds. One firing unit for the T–34–85 was along the same proportions of the earlier T–34–76's unit.

This T–34–76 is from the earliest production series in 1941 from the No.183 Factory. The tank was modified in 1943 and then handed over to the 1st Armor Brigade. It now serves as a monument in Gdansk.

- Author's collection -



Observation and firing were done with the aid of the TOD–6 (gun sight), PT–6 and SPKO panoramic sight (known as the "pop") in 1940, the TOD–7 (main gun sight) and PT–7 in the years 1941–1943, later the TMFD–7 (main sight) and PY–4–7, and, finally, three MK–4 periscopes and the TSh–15 gun sight (later the TSz–15) or the 10T–15 (depending on the type of 85 mm gun). The turret rotated 360 degrees in 12–18 seconds[178] with the use of the MB–20 motor.

The high-pressure V–2 (V–2–34) engine with direct injection, became the V–2–34M (or V–2–34–II and so on) following the war, after being modified. It produced 500 HP (1,800 revolutions/minute), with a maximum output of 2,050 revolutions/minute. It weighed 750 kilograms stripped and "dry" and was cooled by water or a liquid. The engine was lubricated by a DT (Dizelnoje Topliwo) oil or anything comparable. The instructions state that it was possible to fill the vehicle with a gazol E, but in practice any kind of oil was mixed with an automobile or aviation gasoline. In the winter, during colder periods, it was recommended to mix the DT oil with various amounts of naphta from tractors. It was also possible to fill up with a mixture of naphta (80–85%) and engine oil, or even mazut.

The fuel was stored aboard 6 tanks (1940–1941) or 8 tanks (in the T–34–76 from 1942 and later in the T–34–85), which had a total capacity of 545 liters. The fuel tanks were divided into three groups; front left (3 tanks, including 2 in the crew compartment under the turret), front right and rear. The front tanks held 200 liters on each side and the rear ones held 145 liters. All three groups were tanked up through three separate fuel inlets. Almost from the beginning of production, the T–34 had the ability to carry additional fuel tanks mounted on its hull. The first combination involved 4 long rectangular tanks, each with a capacity of 33 liters, fastened to the tank's sides. Toward the end of 1941, up to 5 such tanks could be carried on each side. It is quite certain that this was a factory modification because the attachments for the 4 rear tanks were mounted upright and not flat. In such a case, the tank could carry a total of 330 liters. In 1942 were brought in box-like tanks that were

A T–34–76 "throw-together". Its hull, modified later (as demonstrated by the new type of driver's hatch), is the result of the efforts of the workers of the No.183 Factory. The turret, with the typical 1943 periscope, was most probably cast at the Sormovo Factory and the gun is from the STZ Factory. The spare track links on the glacis plate and the protective wooden board, as well as the square front fenders, are post-war modifications.

- Author's collection -





This T–34–76, produced in the second half of 1943, was brought up to the desired standards with post-war modifications (mudguard on the glacis plate and radio antenna on the turret). On the right side, sits a V–2 engine.

- Author's collection -

mounted on the rear of the hull, each with a capacity of 90 liters. At the end of that year, 2–3 cylindrical tanks made their appearance (also carrying 90 liters each). They were mounted at the rear part of the hull sides. Lastly, during the period end 1943/beginning 1944, it became possible to carry two barrels, with a capacity of 200 liters each, fastened to the rear wall of the hull. Since this was an improvisation, soon standard cylindrical tanks appeared that were attached on special racks. Each such cylinder had a capacity of 50–60 liters. They were used for transporting oil.

The V–2 engine burned 2 liters of fuel per each kilometer when driving approximately 25 km/h along unpaved roads. It used 50 liters for each hour of such driving. When driving along a paved road at a speed of 30 km/h, the tank burned 48 liters each hour. In practice, however, when the units marched behind the front they rarely drove faster than 15 km/h. As a result, they used up much more fuel.

To begin the operation of the engine, the ST–700 starter was used. In the post-war tanks (such as the T–34–85M) this could also be done with the help of an engine starter heater installed on the left wall of the crew compartment.

The tank had a 4-speed ger box and from 1945[179] a 5-speed gear box. The main and side differential gears were of the multiple disk dry type. The side differential gear had a one-step, gradually decreasing reduction. The tank had the GT–4563–A generator, later the G–731 for an electric circuit with a voltage of 24 Volts.

The suspension was composed of 10 road wheels, each suspended on a rocker-arm, and a shock absorber composed of a perpendicular spiral spring. Each "com-

[178] Data from the T–34–85 manual.

[179] It was accepted, due to the available information in the subject literature, that the switch to the 5-speed transmission took place in 1943. However, the documents regarding the T–34–85s delivered during the period end 1944/beginning 1945 (a month after their production) to the Polish forces prove that practically all vehicles had the 4-speed transmission. This applied to tanks produced by the No.183 Factory as much as to the ones produced by the No.112 Factory. The works on the new 5-speed gearbox along with the new main clutch design started in July – August of 1942 and paralleled the development of the T–34S.



This T–34–85 is a product of the No.183 Factory, from a late 1944 production series.

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plete" wheel weighed 125 kilograms and had a diameter of 650 mm. One full track, with 72–74 links, weighed 1,070 kilograms. Initially, the track's width was 550 mm and later it was narrowed to 500 mm. Contrary to the western designs, the drive wheel was placed at the back of the tank and did not have teeth. Consequently, the tracks did not have guide holes for teeth. The track was pulled across the drive wheel by rectangular ridges running perpendicular to, and between, the wheel's 2 edges. The perpendicular ridges grabbed the teeth of every second track link. The hitting of the teeth against the wheel ridges gave off a metallic sound, from which the T–34 received the nickname of "Drake".[180]

As additional equipment for the vehicle, starting during the period end 1943/beginning 1944, the T–34 was to receive two BDSz smoke generators that were to be installed on the rear hull plate. That is why pipes were placed there to carry the electrical cables needed to fire the smoke generators from the inside of the tank. In practice, however, the prepared installation was not used. Instead, 2 small or large tanks for oil were carried there on racks. After the war, the special equipment was augmented by gear necessary for crossing rivers along the bottom and by infra-red equipment necessary for night-time driving and fighting. Both modifications were first developed in the USSR and then installed in Polish T–34s during their production in Bumar-Labedy.

The T–34 carried the 71TK–3 radio (while stationary, and with the engine running at minimum revolutions, it had a range of 18 kilometers) in 1941. Later, it was replaced by the 9R radio and its variants and, finally, the 10–RT–26 radio, with a range of 7–20 kilometers (depending on time of day and season) was installed. Initially, the TPU–2 on-board telephone was used. Later it was replaced by the TPU–ZR and its variants, and these were followed by the TPU–47.

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[180] It is generally accepted that the name comes from a specific batch of the V–2 engine. However, the engine in the T–34 works the same way as in other tanks. The only specific noise that a tank produces during driving is the pulling of the track through the drive wheel.

[181] The length of the hull with mud guards; only the hull: length 5,735 mm.

[182] General data, not exceeded; in actuality, the tank was 2,950 mm wide.

[183] Without turret — 1,680 mm.

	T–34 (L–11)	*T–34 (F–34)*	*T–34–85*
Total length [mm]	6000	6610	8100
Hull length [mm]	5920[181]	6070	6100
Width [mm]	3000[182]	3000	3000
Height [mm]	2400	2604	2700[183]
Weight [t]	28	30	32
Rut width [mm]	2450	2450	2450
Length of track contacting the ground [mm]	3840	3840	3840
Clearance [mm]	400	400	400
Maximum speed [km/h]	48	47	55
Range (unpaved roads) [km] (paved roads)	230 300	~260 ~350	~260 ~350
Ground pressure [kg/cm^2]	0.65	0.80–0.85	0.80–0.85
Maximum slope	+30° / –40°	+30° / –40°	+30° / –40°
Maximum side tilt	25°	25°	25°
Ditch-crossing capability [m]	2.5	2.5	2.5
Wall-climbing capability [m]	0.73	0.73	0.73
Maximum armor thickness: hull front	45 mm/60°	45 mm/60°	45 mm/60°
Maximum armor thickness: hull side	40 mm/40°	40 mm/40°	45 mm/40°
Turret front [mm]	45	52	90
Armament	1 × 76.2 mm, 2 × DTM	1 × 76.2 mm, 2 × DTM	1 × 85 mm, 2 × DTM

This T–34–85, a product of the No.174 Factory, has some similar characteristics to vehicles from the No.183 Factory. The characteristics that distinguish it from tanks of the "183" and "112" are the turret and the large hinges on the rear plate.

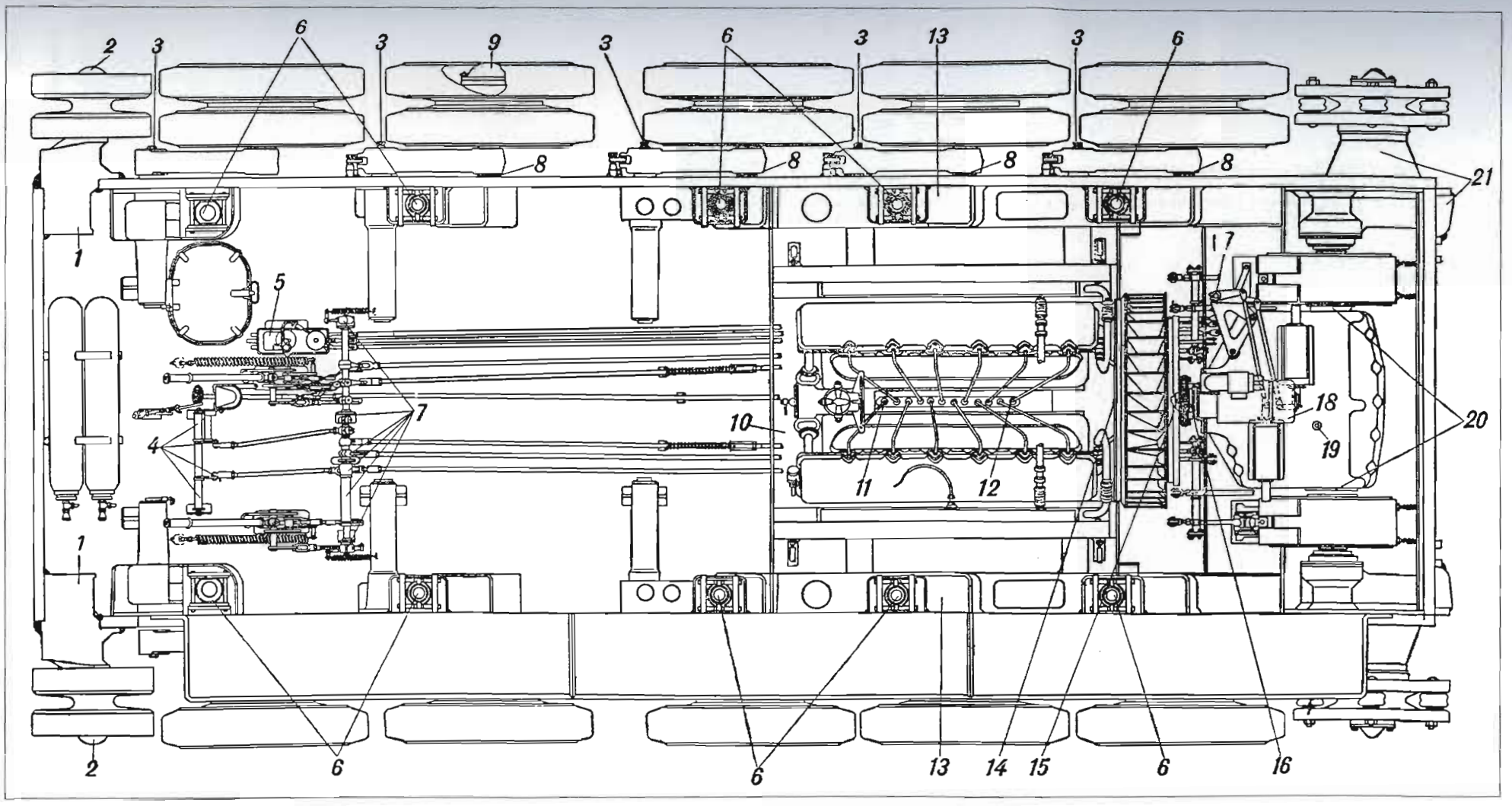
- Author's collection -



The identity of the producer of this T–34 is unknown. The hull is probably from the No.183 Factory (missing middle bolts on the sides of the rear plate), and it and the turret are from a 1942 or 1942/1943 production series, while the wheels are from 1943 or 1944.

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Top view diagram of the hull. At the front are bottles of compressed air.

1 — crank axle of the idler wheel
2 — bearing cover
3 — suspension arm
4,5,7 — driver's steering controls
6 — suspension springs
8 — suspension arm stopper
9 — road wheel bearing cover
10 — engine compartment
11 — fuel injection pump
12 — fuel lines
13 — tanks
14 — fan
15, 16,17, 18 — starter
19 — gear box
20 — clutches
21 — differential gears

THE HULLS



Left:
A view of the gas tank inlet after the removal of the cover.

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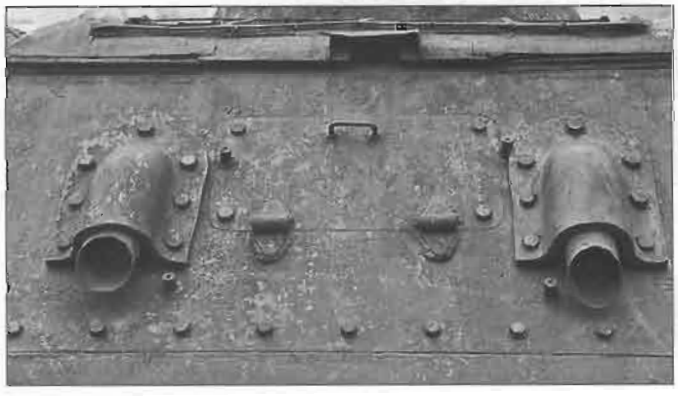
Left:
Close-up view of the bulge on the glacis, note the remains of the initial type hatch.

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Left and below: Access panels to road wheel suspension springs, (left) side and (below) front.

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Above nad right: Rear engine hatch of the No.183 Factory, from 1940 (above) and from 1942 (right) with hooks for box. (starting from the end of 1943).

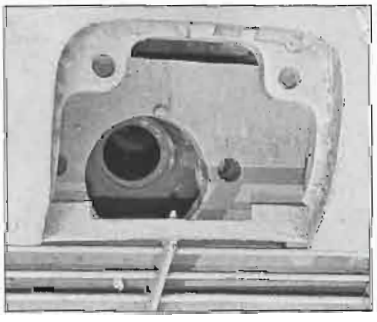
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Above: Close-up view of the weld seam linking the top and side plates.

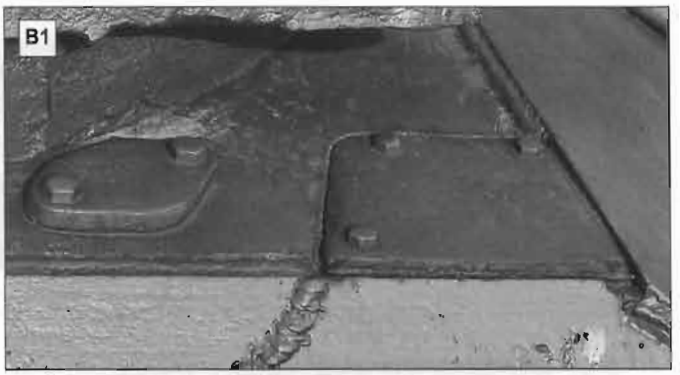
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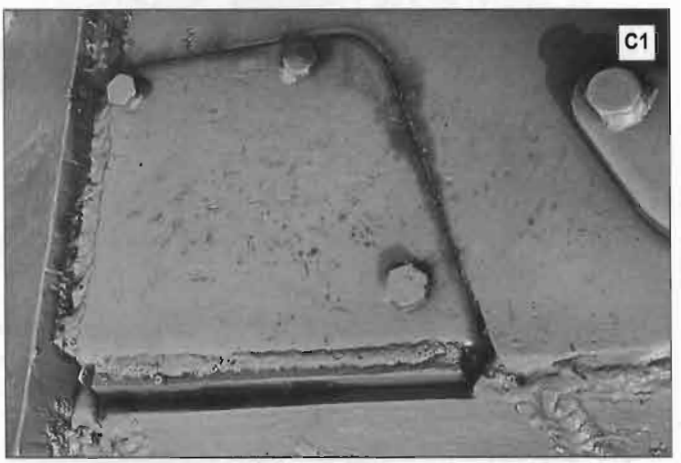
Left: Inlet for the fuel tank, one on each side. They were located on the top cover of the engine.

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Above and right: Photos illustrating various methods of joining armor plates.
A — No.174 Factory, B1/2 and C1/2 — UTZM or CzKZ. These photographs prove that the variance in measurements was large. The producers of the vehicle in photos B1/2 barely fit the turret on the hull. The turret was mounted asymmetrically, in regards to both axes.

- Author's collection -





Left: Headlight and horn installed on the tanks, starting in spring 1943.

- Author's collection -



Above: Front overlap joint of the hull.

- Author's collection -

Below: Close-up of the STZ hull; once more the variance can be seen when compared to earlier photographs.

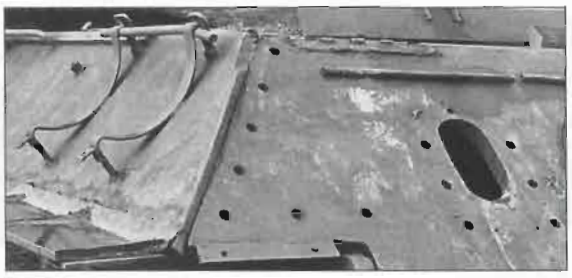
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Above: Rear overlap joint of the hull.

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Left: The bare hull of the T–34–85.

- Author's collection -



Right: Brackets for mounting headlight and horn on tanks from No.112 Factory during spring/summer 1944.

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Below: Arrangement of various glacis plate additions of the last series of the T–34–76 and all T–34–85 series.

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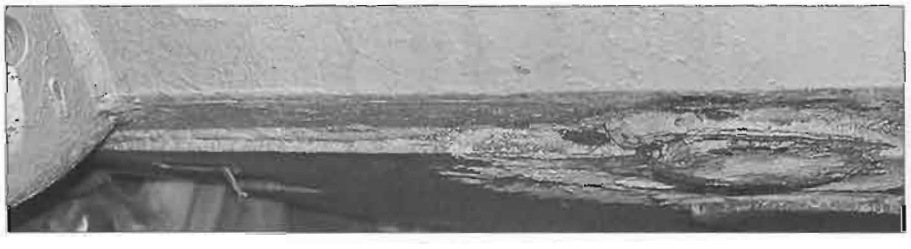
Above: Thicker exhaust cover.

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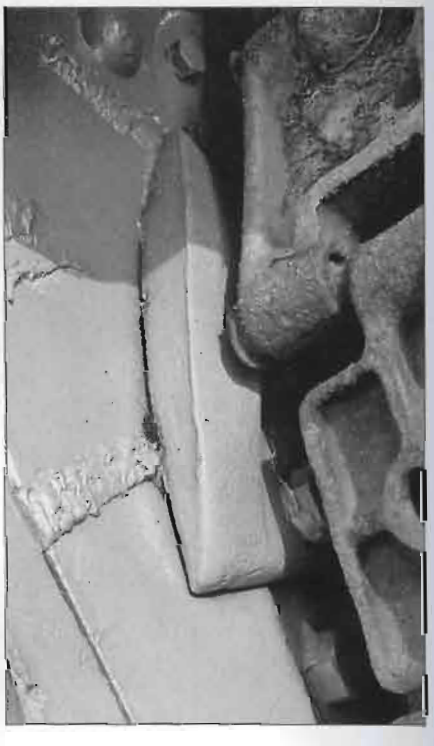
Below: Welding of rear floor and rear wall of the hull from No.174.

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Bottom left: Section of the hull's rear plate from No.174. Note additional bolts for rear fuel tanks.

- Author's collection -







Left and above: Bumpers, early type (above) and late type (left; probably standard for No.183 Factory).

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Above and right: Both sides of a T–34–85 hull from the No.112 Factory; as can be seen, because of the size of the turret, the spring cover had to partially overhang the weld seam.

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Above: Joining of the armor plates at the front of a hull from the No.112 Factory.

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Right: Section of bolted-on engine cover on a T–34–85. On the T–34–76s, this element had 4 bolts.

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Left and below: Open access to fuel tank inlet (left, No.112 Factory), and suspension spring (below, No.183 Factory).

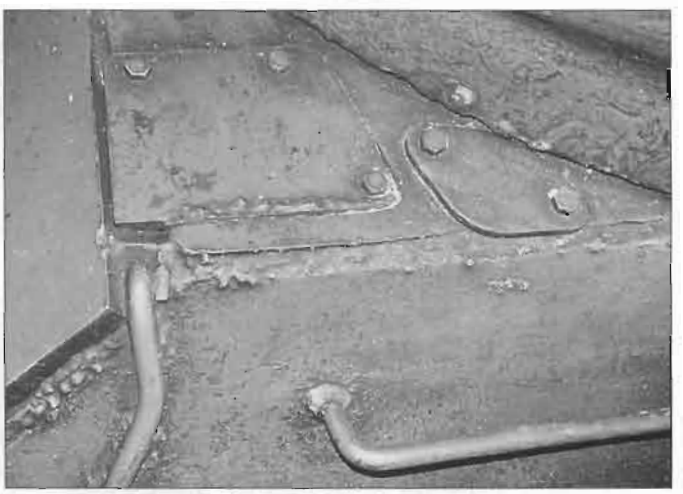
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Left and below: Fragment of a hull from the No.112 Factory, middle of 1944, with an "alternate" turret (left); fragment of a "112" hull, end of 1944, with the "large" turret (below).

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- Author's collection -







The various ways of linking the hull plates testify to the manufacturer and year of production; top left — 1942 production, probably from the CzKZ/UTZM, top middle and right — No.183 Factory, from 1944.

Above: Idler wheel axle cover.

Right and far right: details of the front hull joint, from the No.112 Factory 112, 1944.







- Author's collection -

Different types of side differential gear covers and hull joints; top left — No.183 Factory, above and below — two photos of tank from CzKZ/UTZM from 1942, top right and right — No.183 Factory, from 1941.





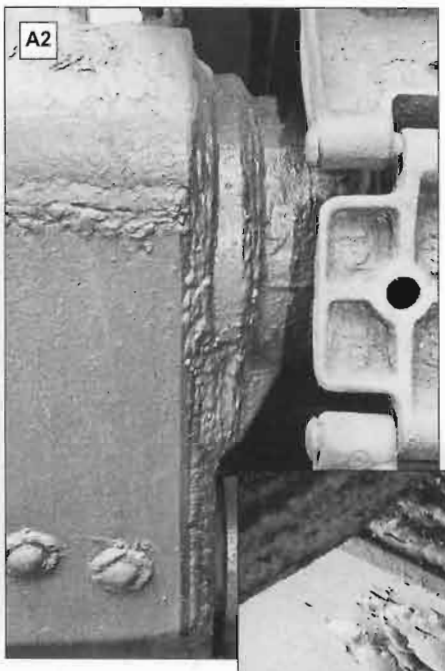




Left: Armor plate joint of a hull (front) on a Polish-made post-war T–34–85.

Right: The joint between the bottom front plate and the floor of a hull from the No.183 Factory.



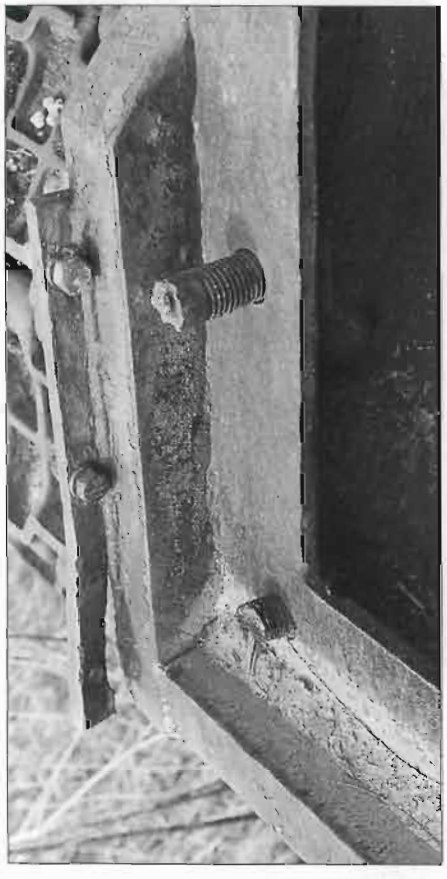


A1, 2, 3: Rear plate joint and side differential gear covers from the earliest No.183 Factory 1941 production.

The three additional bolts (see A3 photo) were used to strengthen the front road wheel suspension. This option was used only at the beginning of the production in the No.183 and STZ factories, and was probably dropped in the fall of 1941.

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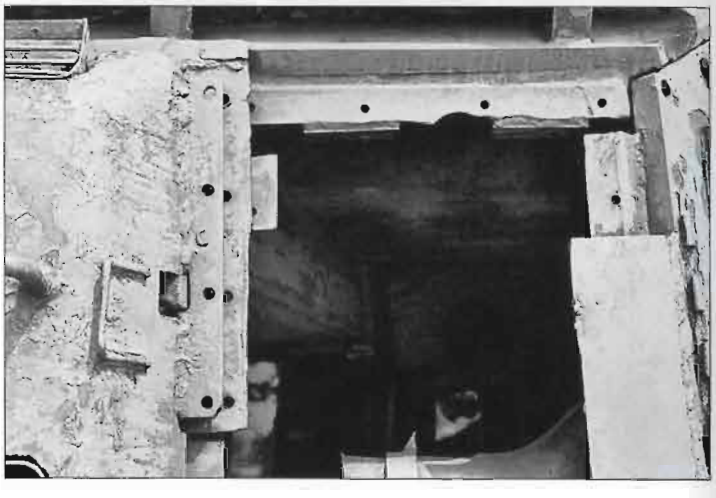


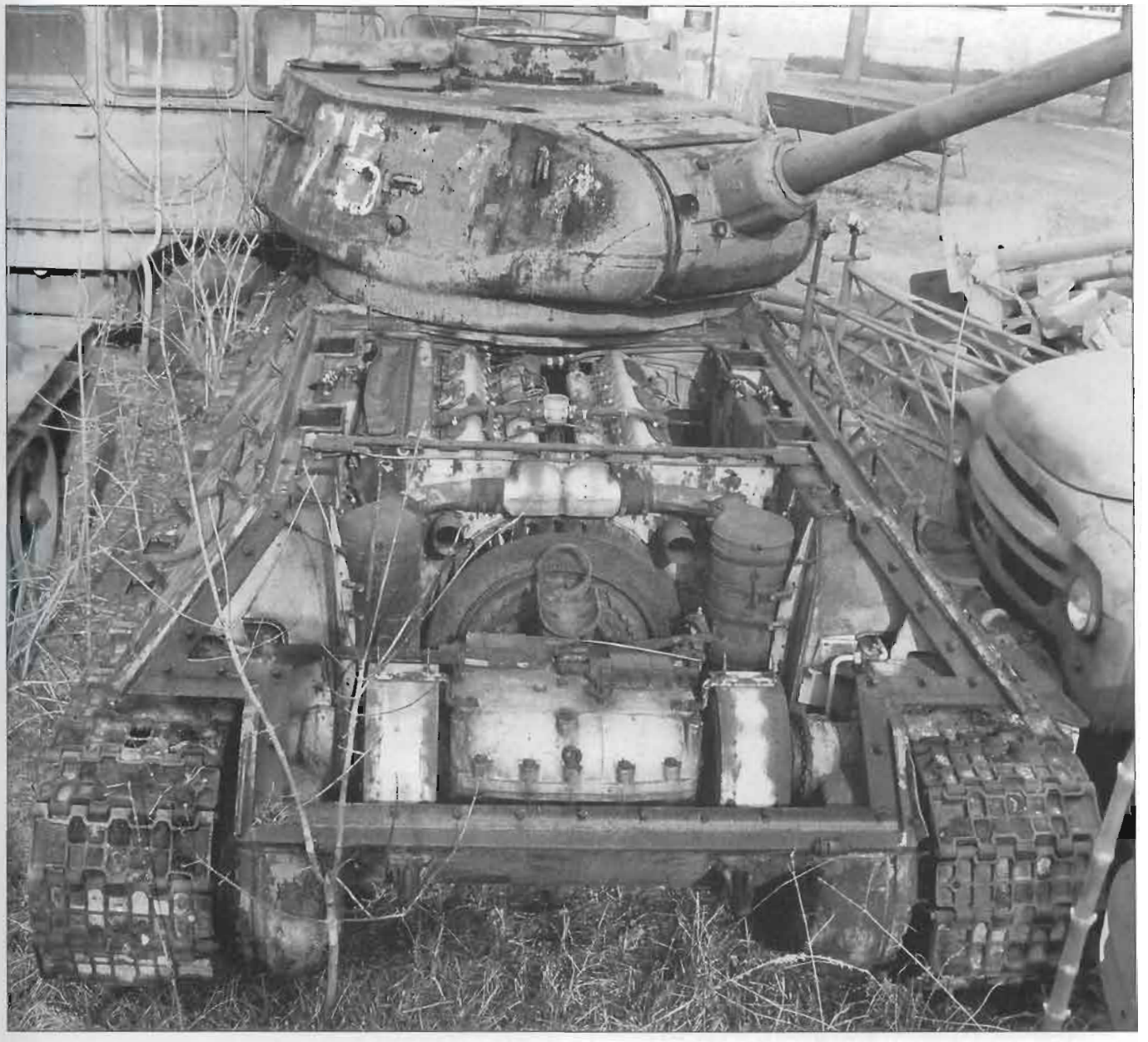


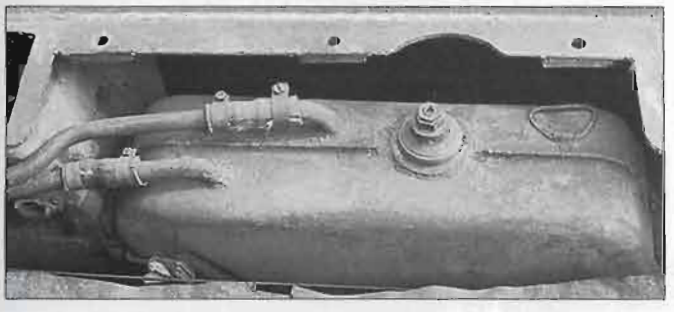


Left, above and bottom: Interior details of the hull joints.

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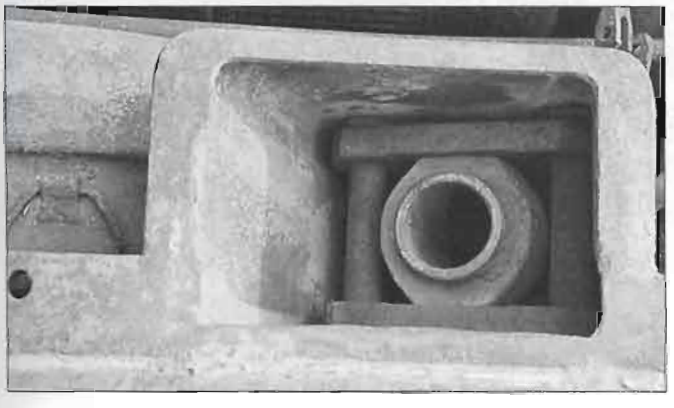


Left: Close-up view of the internal oil tank.

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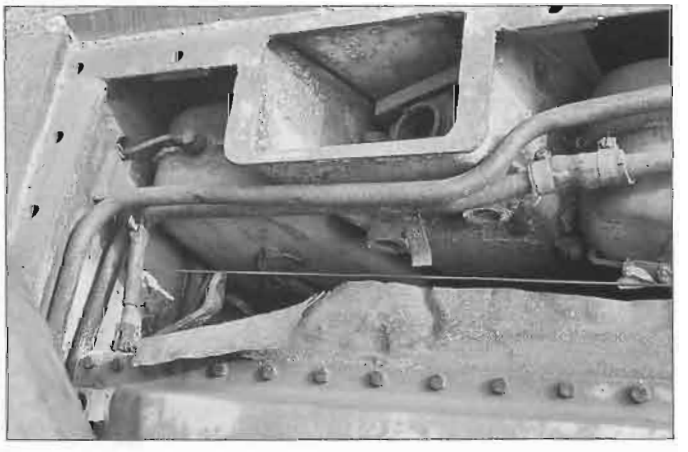
Above: A Polish-made T–34–85, with an exposed engine compartment.

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Left: Suspension spring chamber.

- Author's collection -



Above: Similar element between the fuel (left) and oil (right) tanks.

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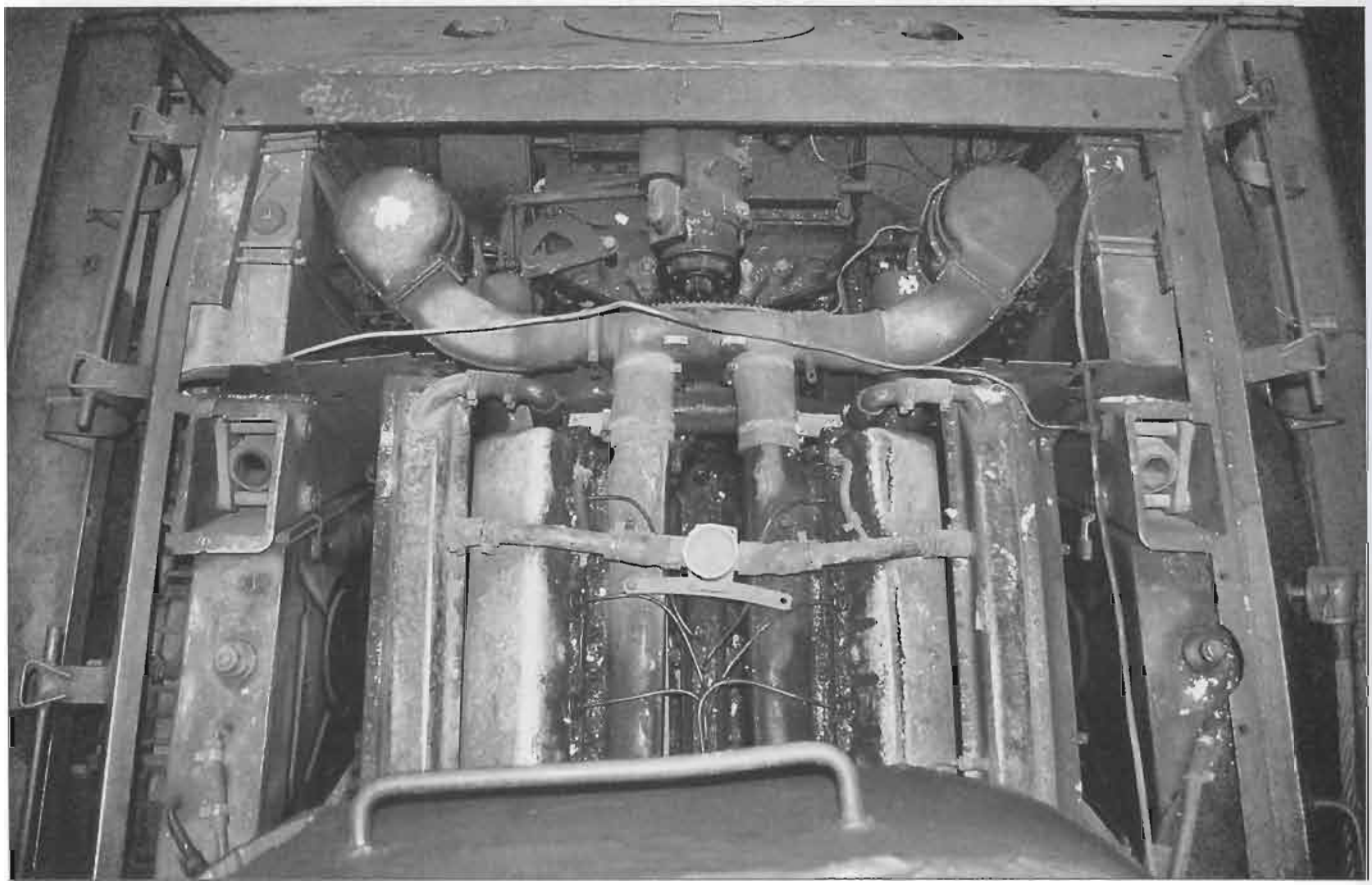


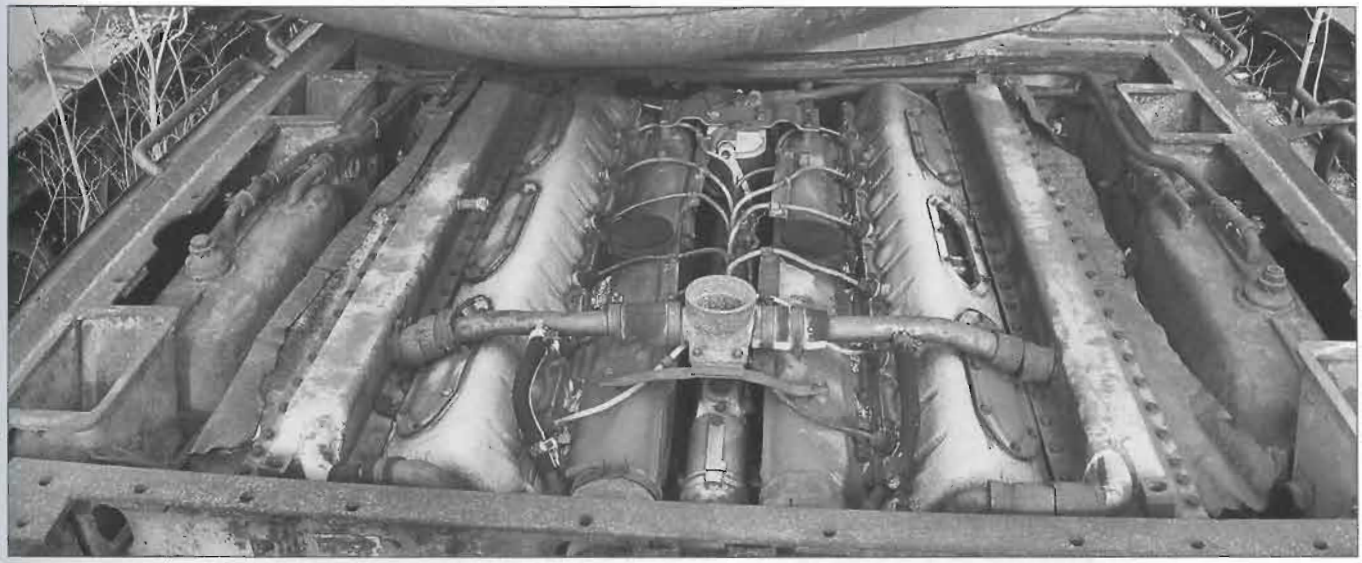
Top; A view of the engine access hatches. This installation of the extra tanks was standard for the No.183 Factory.

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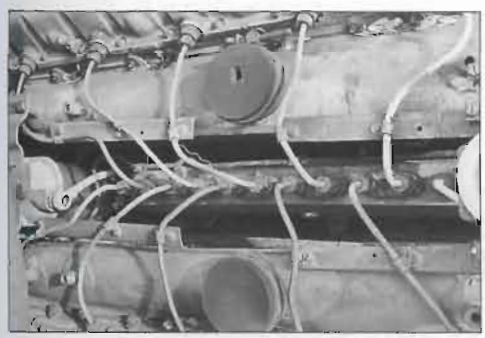
Bottom; Engine compartment without the access hatches. Clearly seen are the engine, tanks, filters with air hoses, transmission and starter.

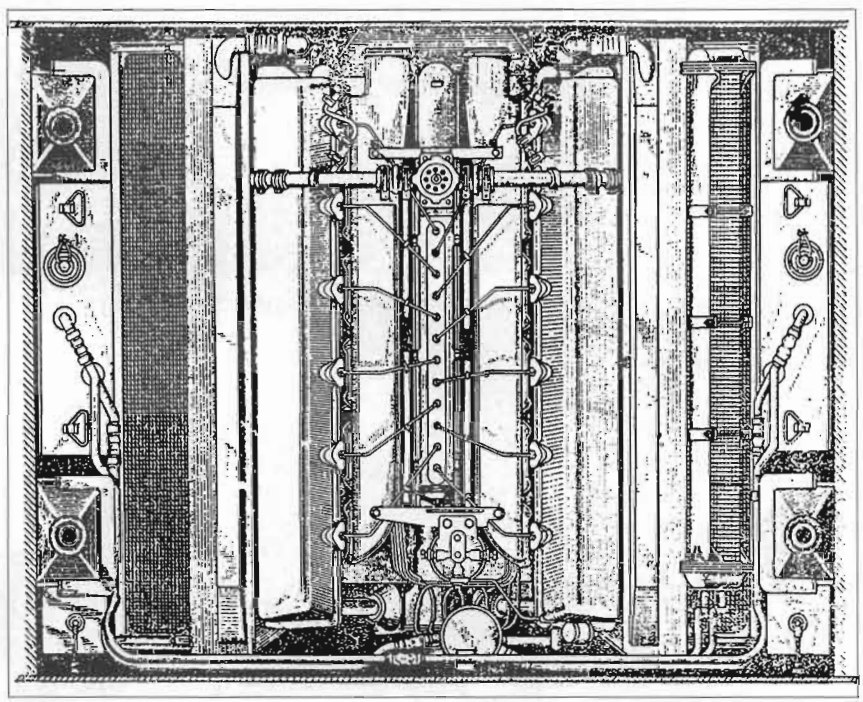
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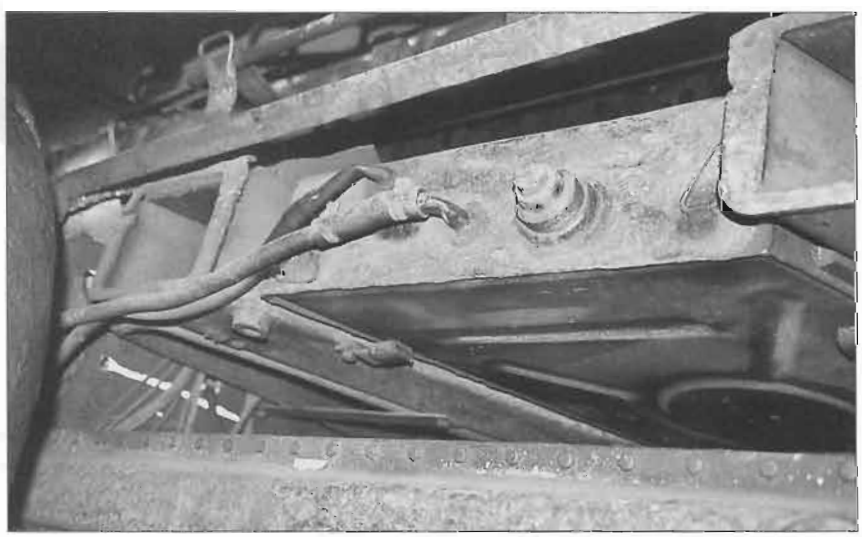


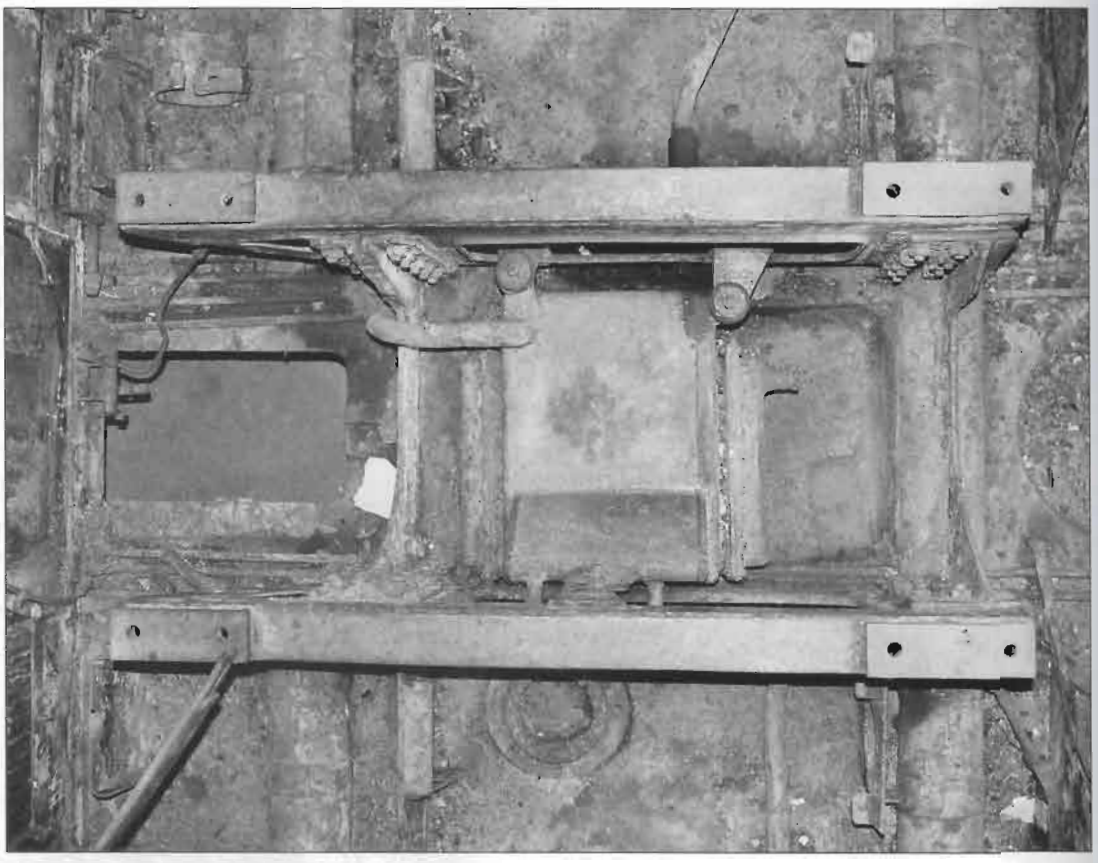


The T–34–85 engine. The engine is of war-time production, recognizable by the sharp edges of the oil tanks (see photo below). On the sides of the engine are the radiators, and further toward the tank's side the fuel tanks and the space for the road wheel suspension.

- Author's collection -









Left, above and below: Engine compartment, and the engine cradle. Between the bars can be seen the opening for access to the engine from the bottom.

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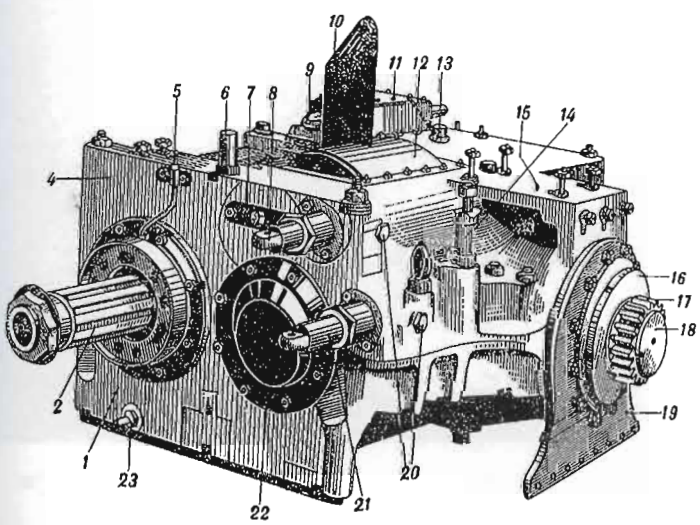


A view of the left side of the engine compartment. On the left is the tank, and to the right of it is a space for another one.

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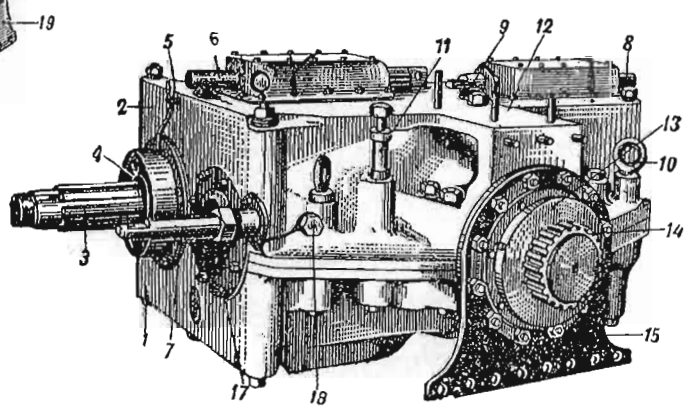
Engine bulkhead between engine compartment and fighting compartment (in background can be seen the gun breech).

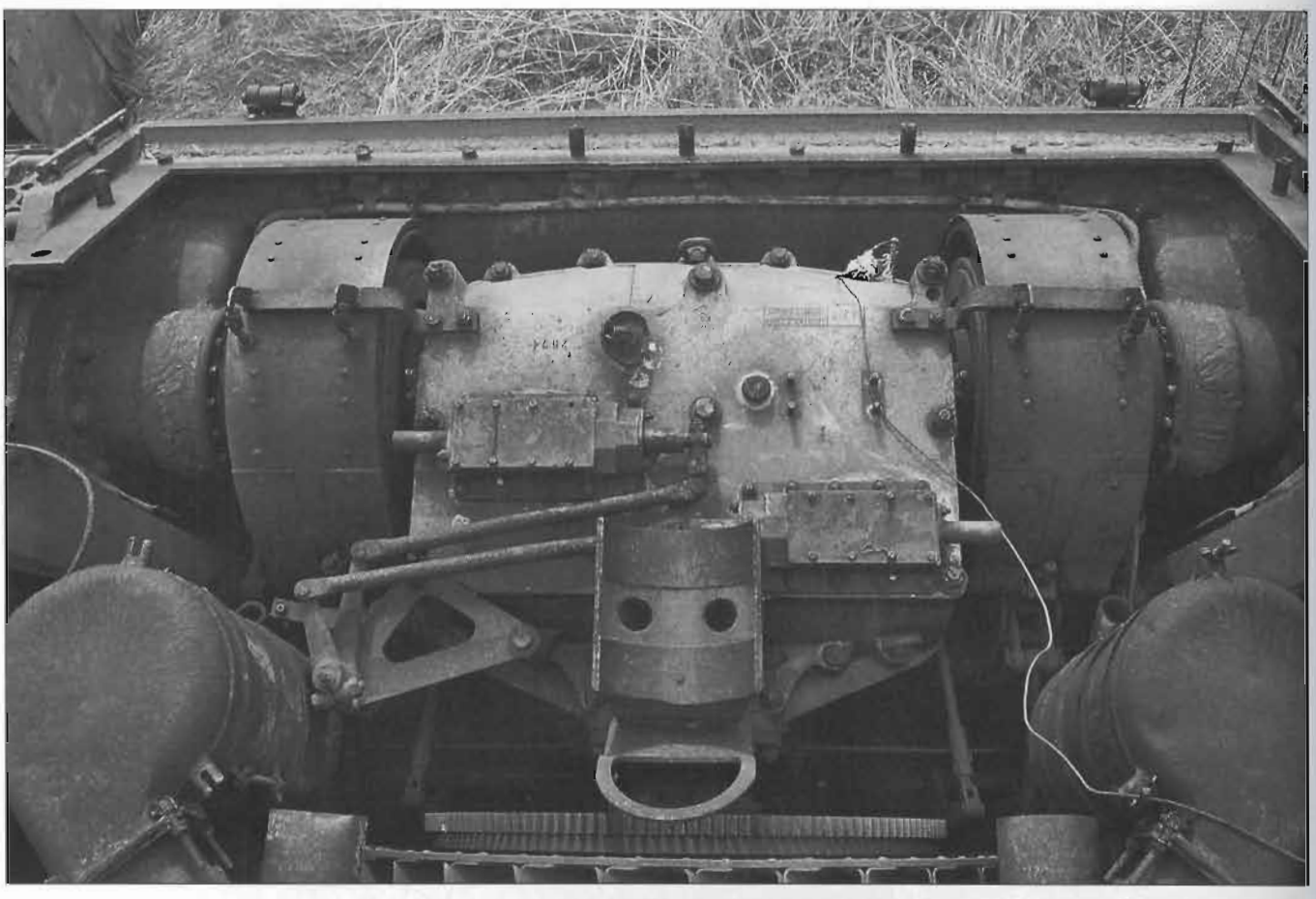
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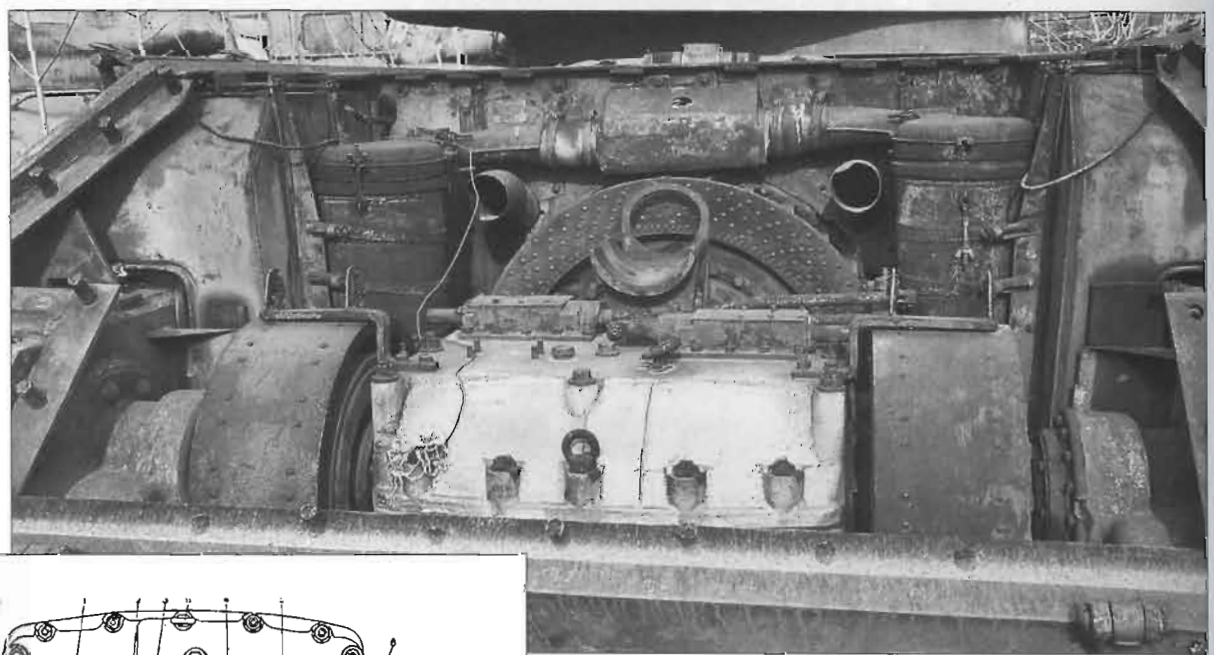


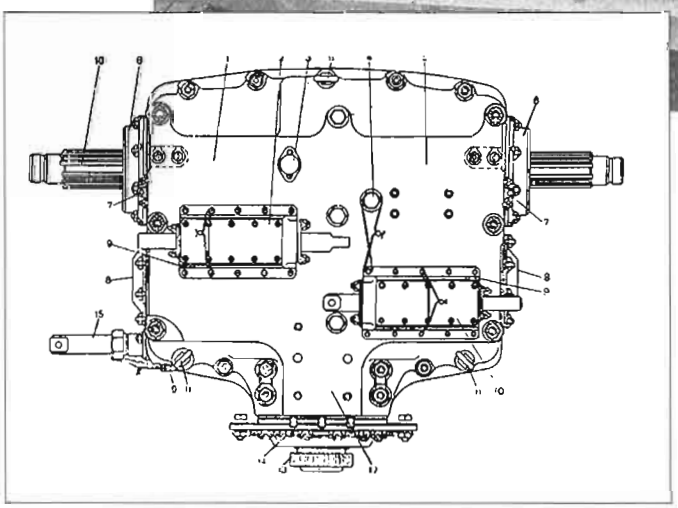
4-speed gear-box

5-speed gear-box



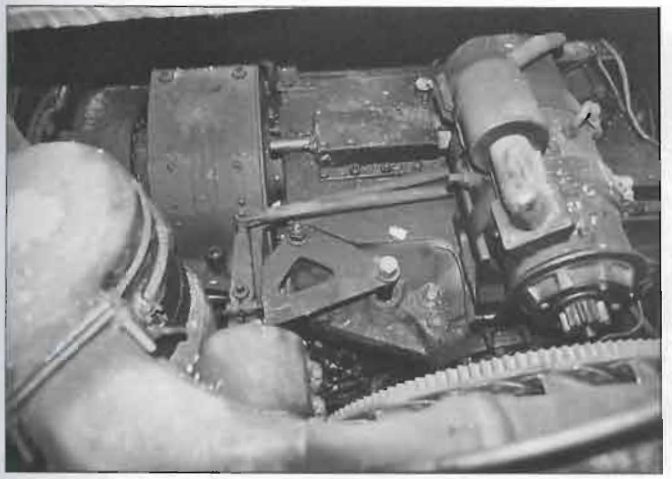


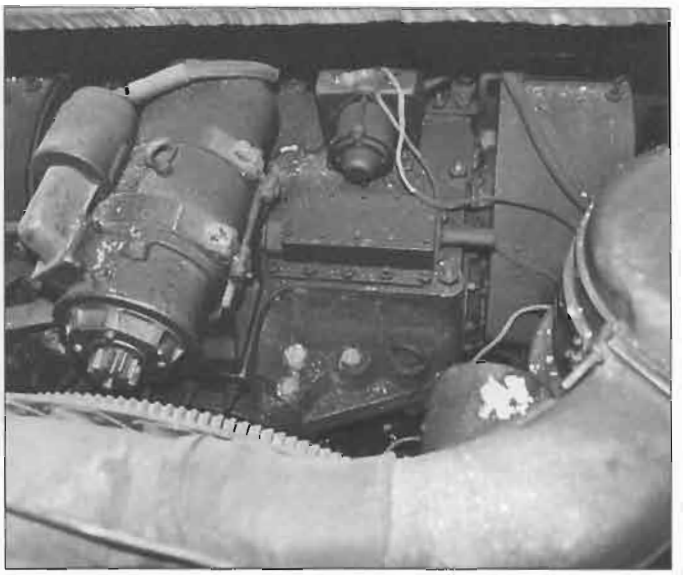




This page: Transmission compartment, without the starter.

- Author's collection -





Above and right: Transmission compartment, with engine starter.

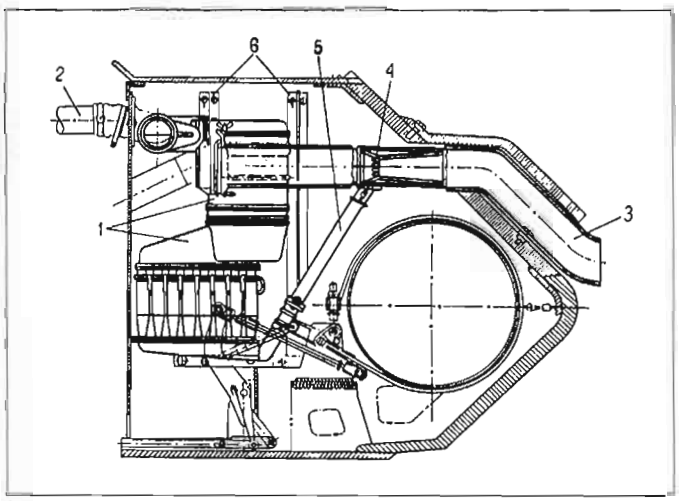
- Author's collection -



Above: Right corner of the transmission compartment.

- Author's collection -

Below: Side view of the transmission compartment.



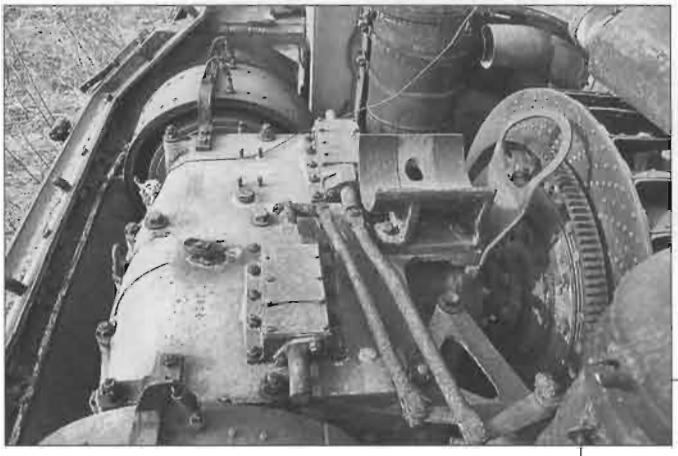


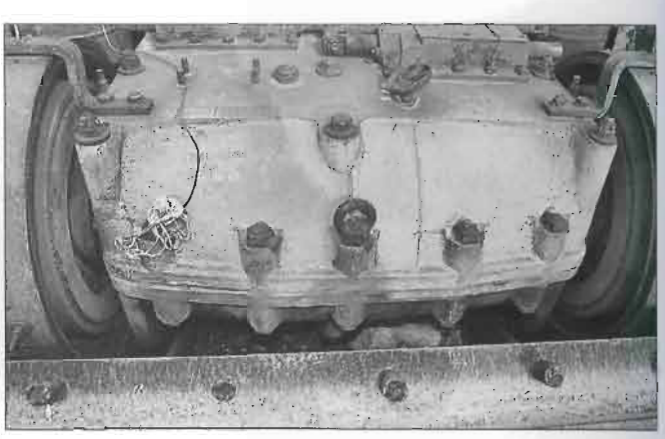
Rear wall of empty transmission compartment, with exhaust pipes.

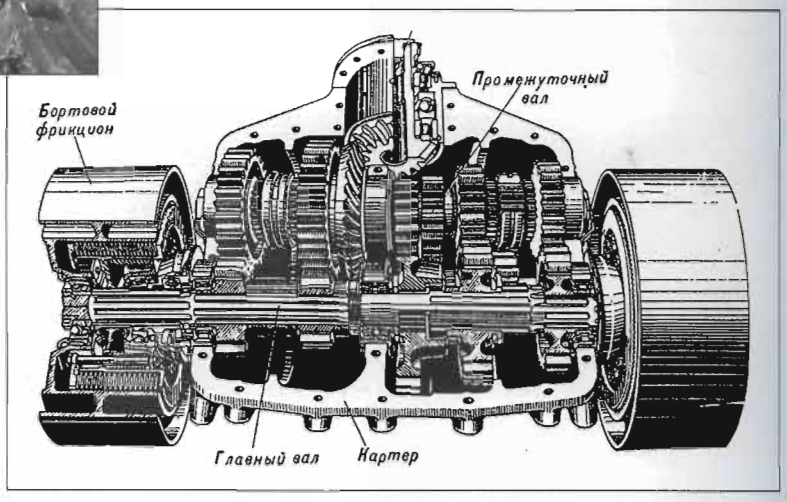
- Author's collection -

Right and below: Once again, the transmission compartment of a Polish-made T–34–85.

- Author's collection -



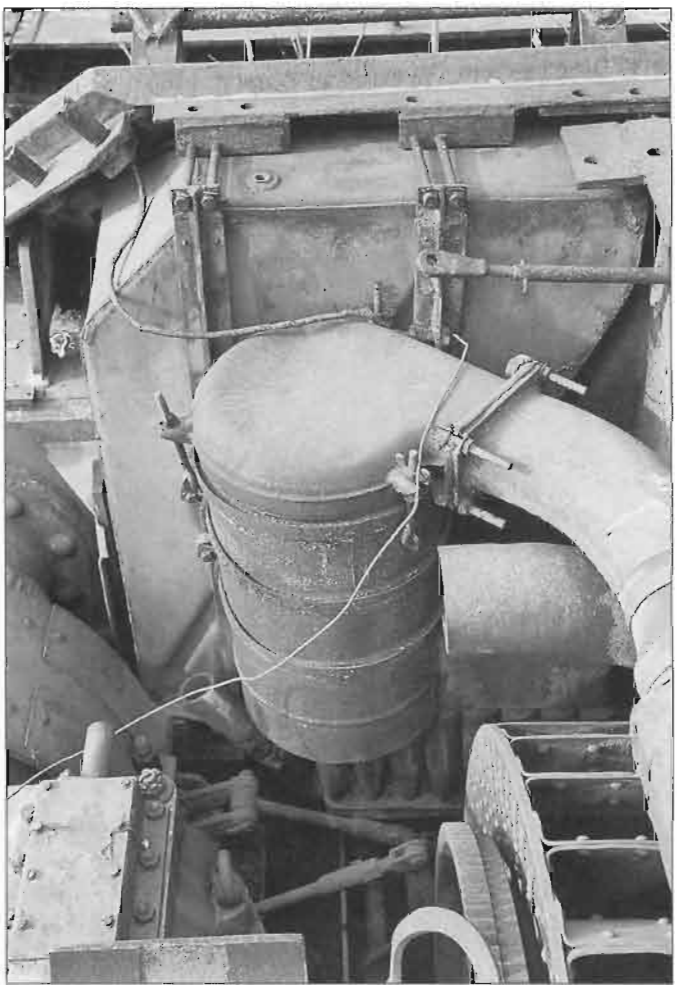




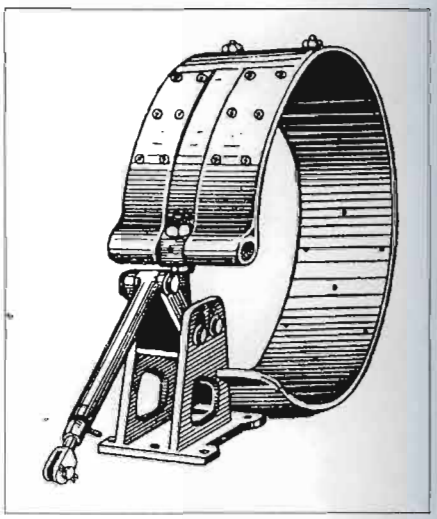
Right: Interior drawing of the gear box with clutches.

Below: Rear fuel tank and the VTI–3 air filter.

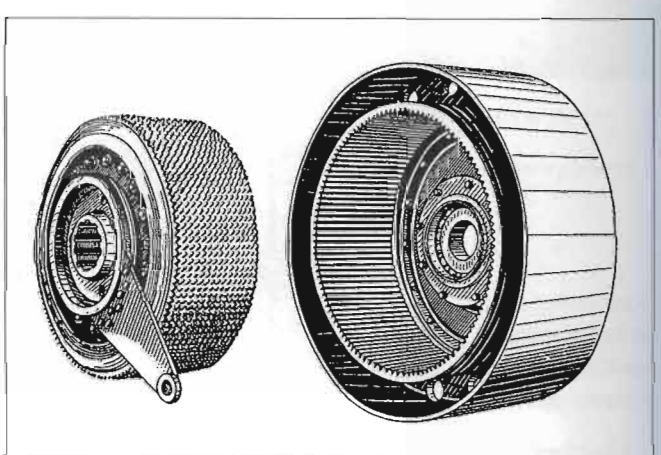
- Author's collection -

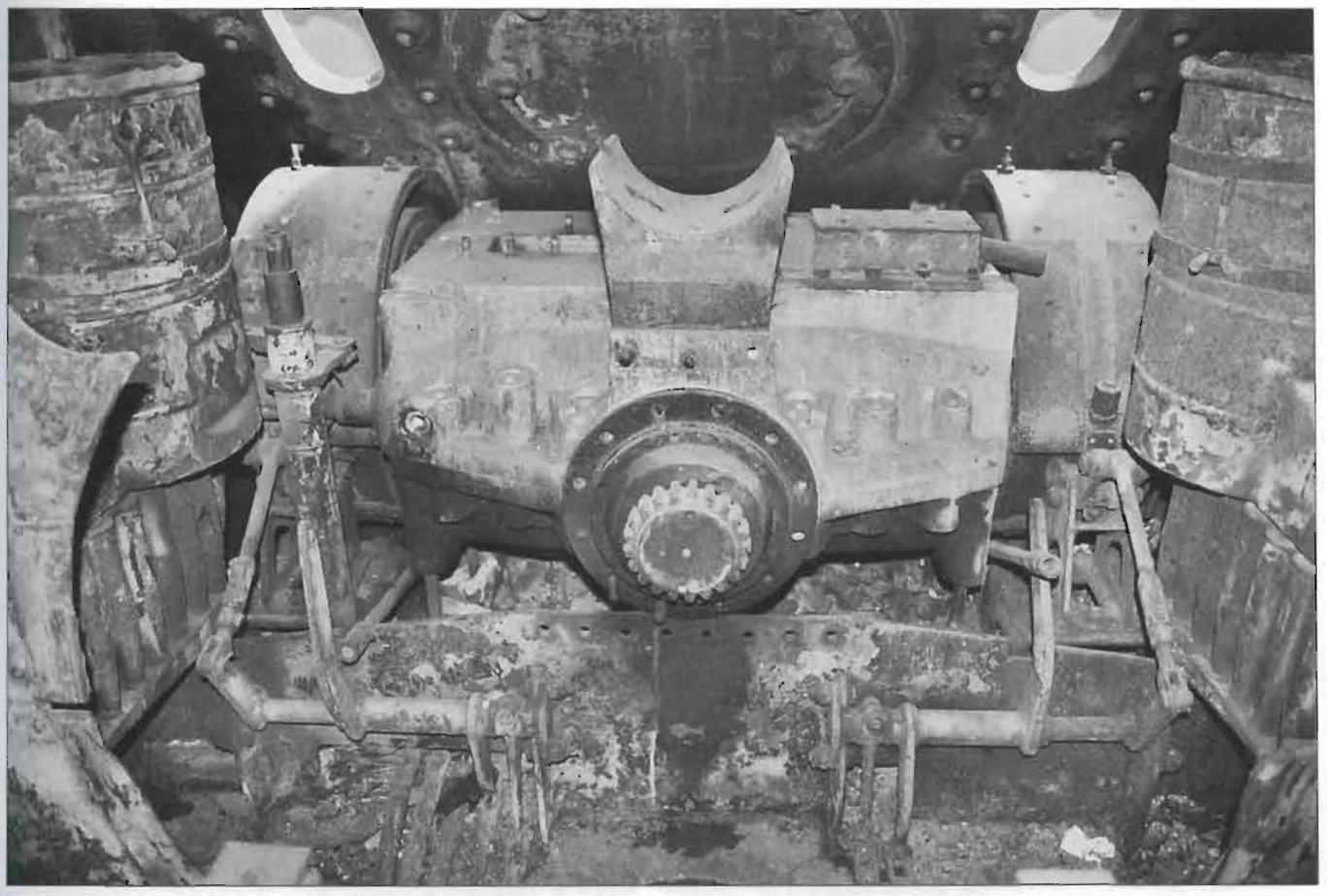


Right: Brake band.



Below: Steering clutch.





Transmission compartment in Polish-made T–34–85 without the main clutch, fan and starter.

- Author's collection -

Below: Main clutch with gear rods.

- Author's collection -





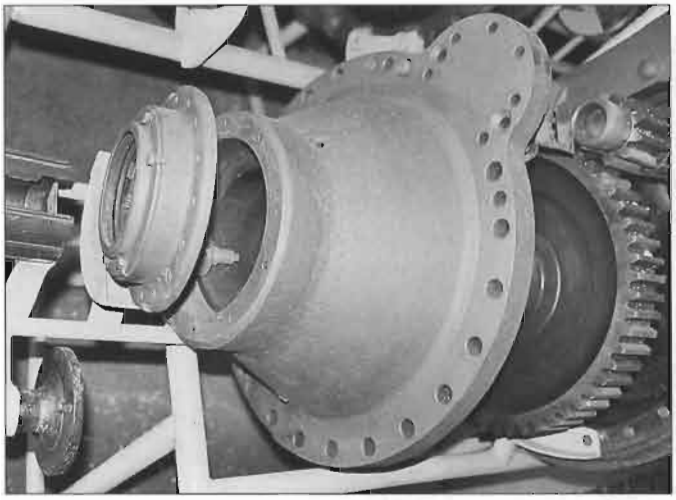
Above: Steering clutch.

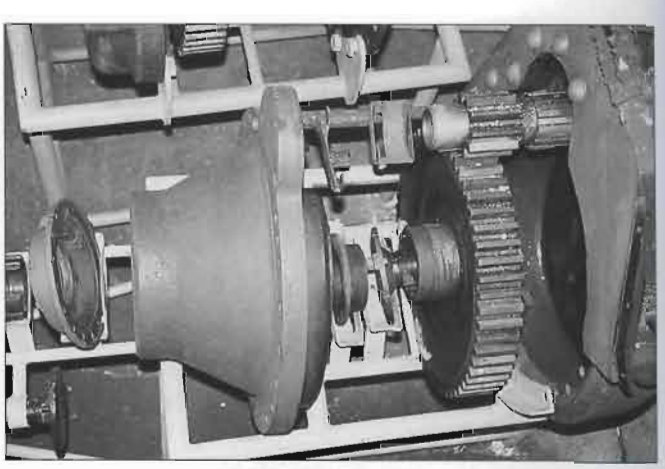
- Author's collection -

Below: Brake.

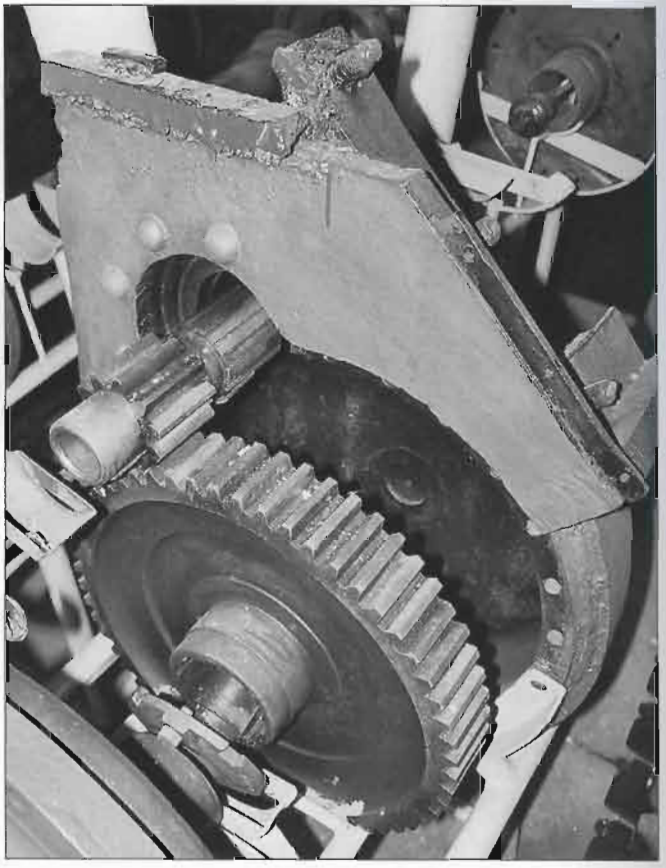
- Author's collection -

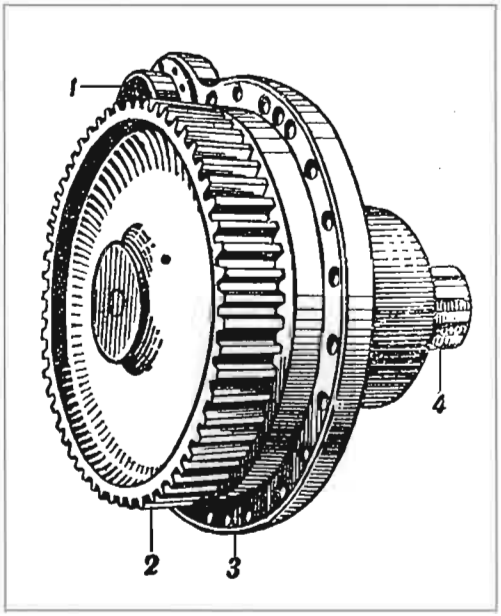






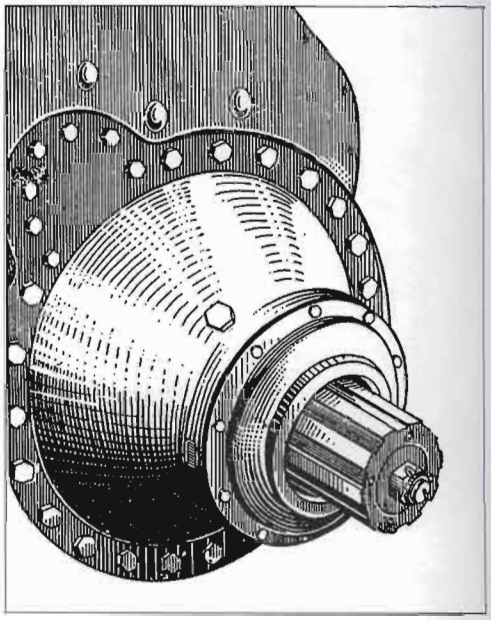


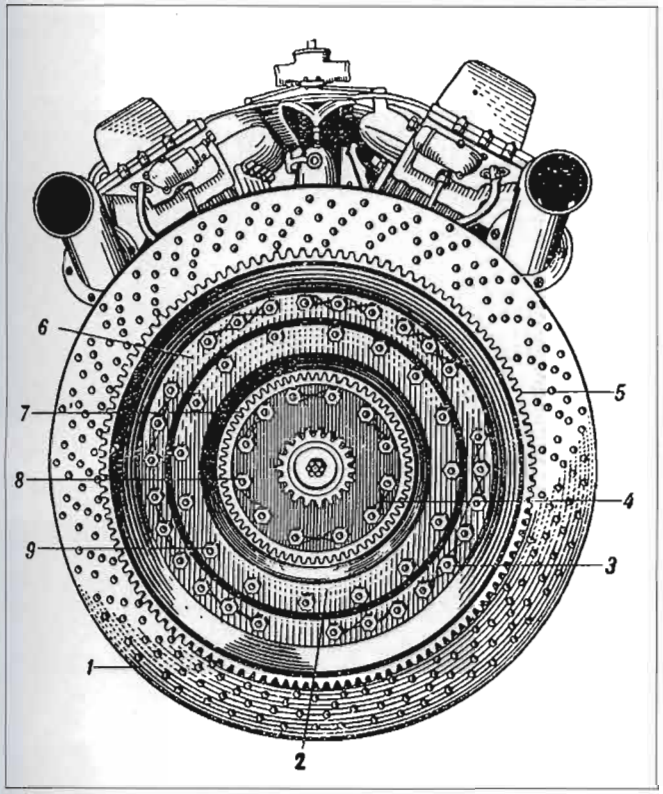




Interior details of the differential gears.

- Author's collection -

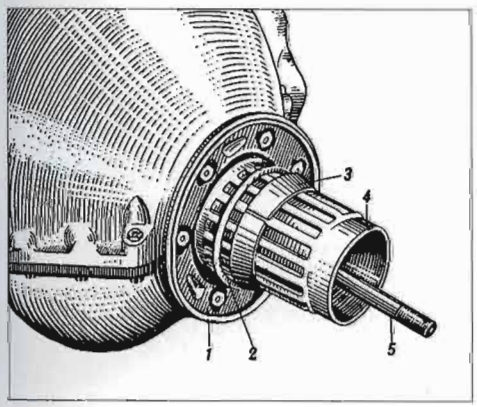






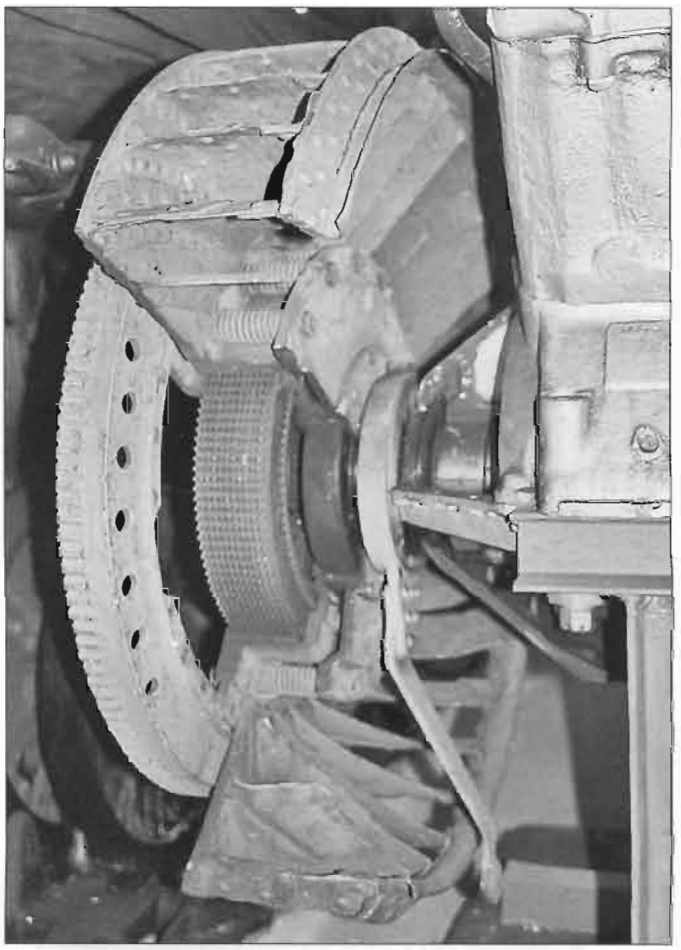
Above: Release valve (along with side guards) of the fuel tank, located on the hull bottom of the T–34–85 tank.

- Author's collection -

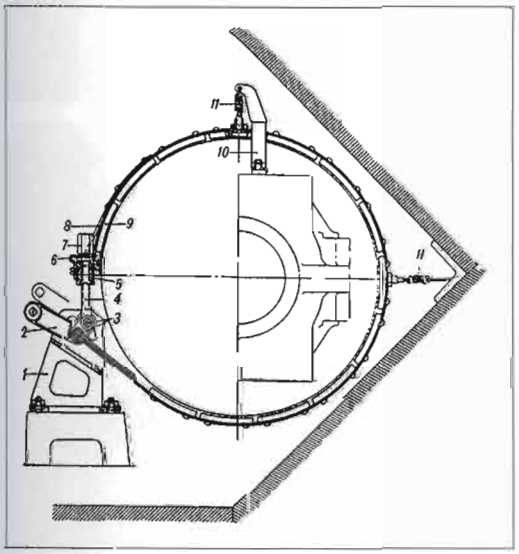


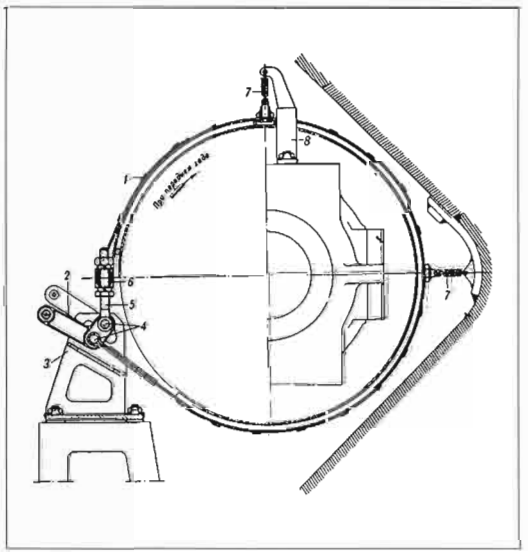
Main clutch and fan with starter elements.

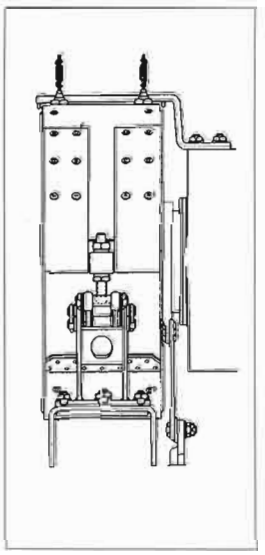
- Author's collection -



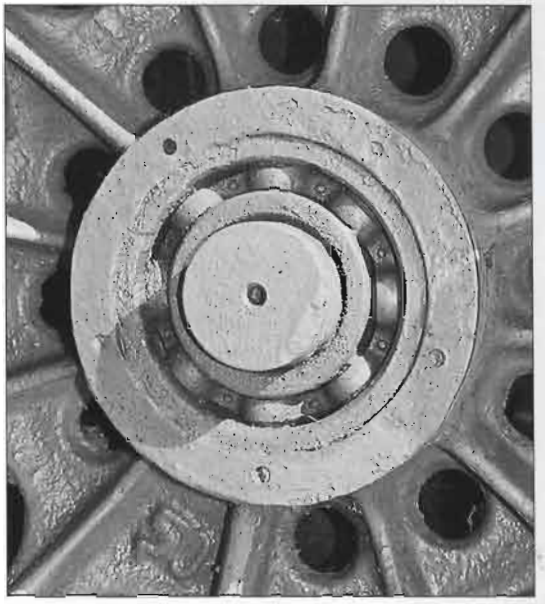
Bottom: Side views of steering clutch with brake band; late (left) and early (right).

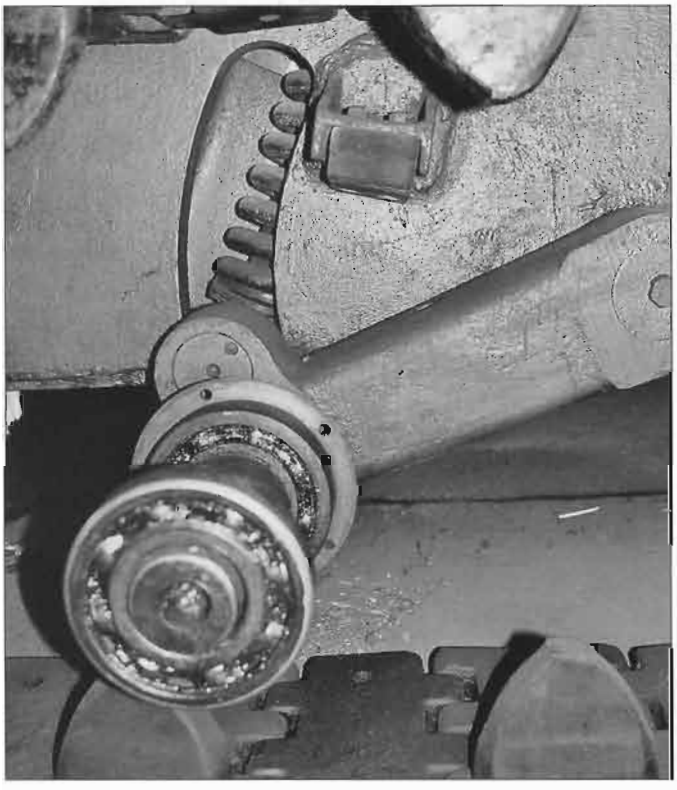






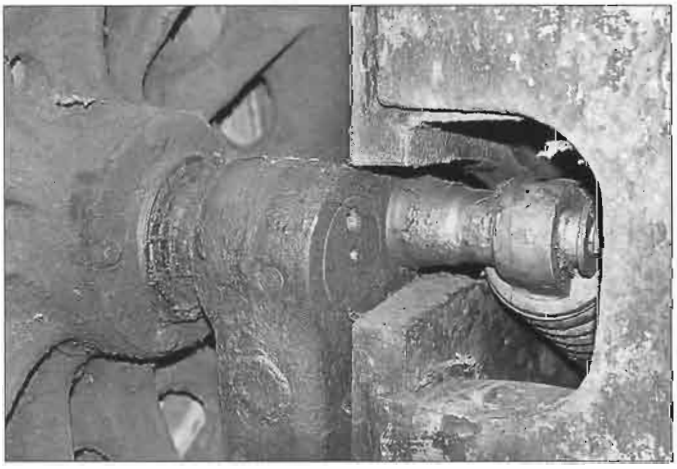














Detailed photos of road wheel axles and bearings.

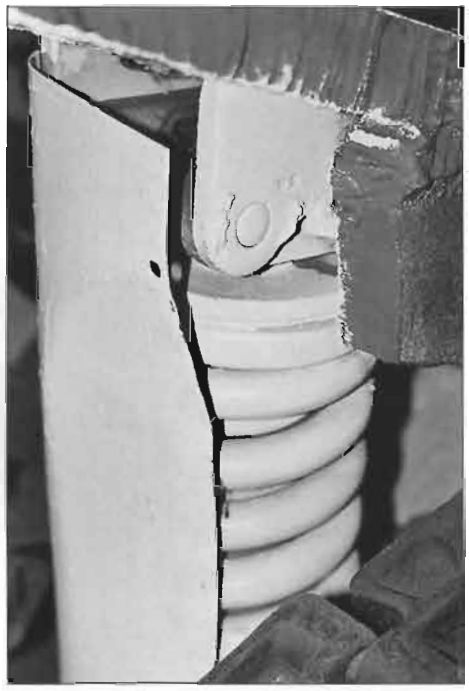
- Author's collection -

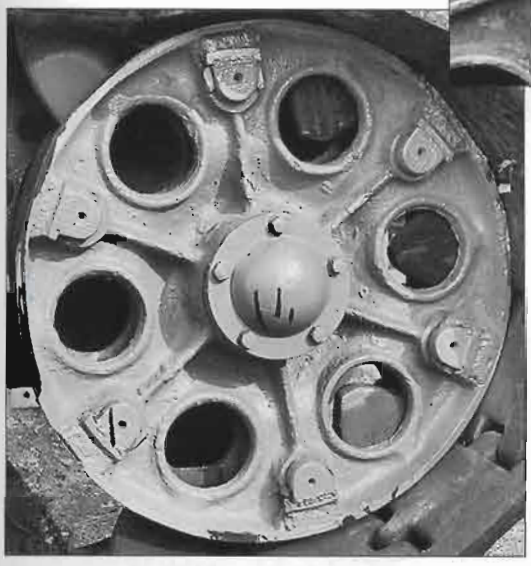


- *Author's collection* -



Detailed view of the drive sprocket, early and latter style.





Photos to the right:
Suspension spring of the road wheel.

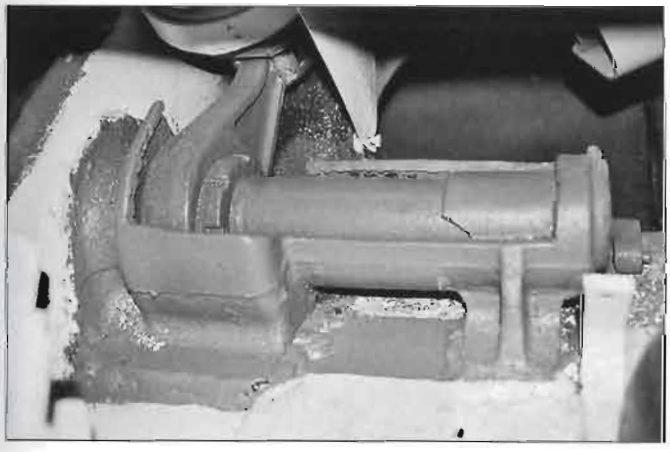
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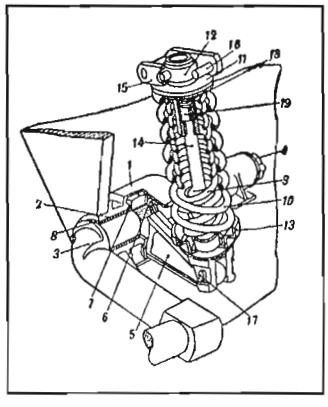


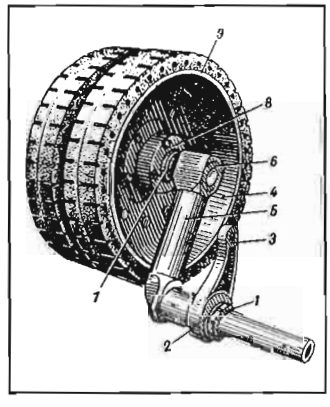


Above and below: Suspension arm's axle.

- *Author's collection* -







Above and above right: Suspension of the front road wheel. It was stronger as it bore a heavier load due to the track turning on it. That is why, at the No.183 Factory in 1942, the front and rear road wheels had rubber rims. That is also why it had a double suspension spring.

Various types of road wheels.



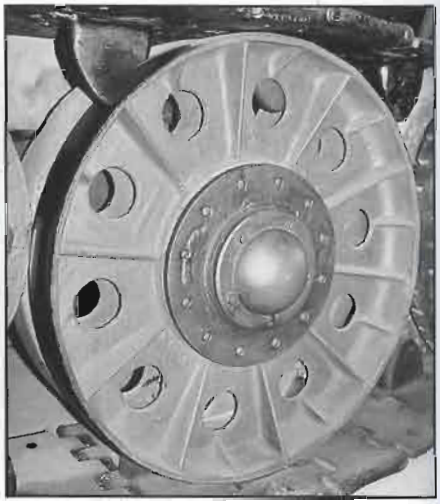
Above: Stamped, first series.

- Author's collection -



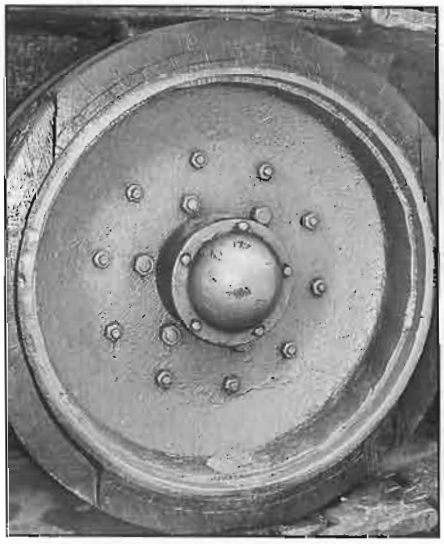
Above: Second variant of 'half spider', introduced in 1942.

- Author's collection -



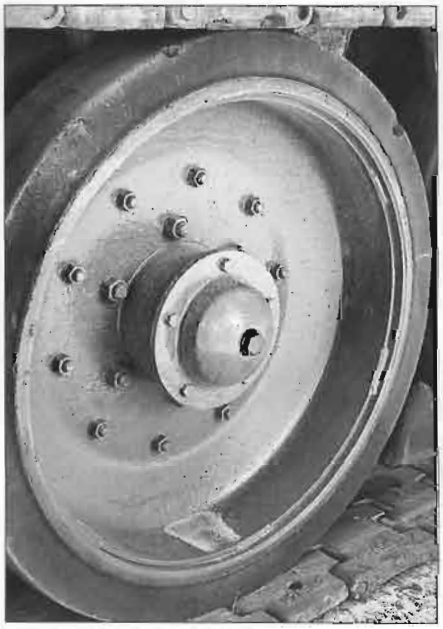
Above: Cast, with internal suspension. These wheels were slightly narrower than all the others.

- Author's collection -



Above and right: Stamped wheels, war style (above) and end of war style (right), with different rubber rim. Above No.183, to the right No.112.

- Author's collection -



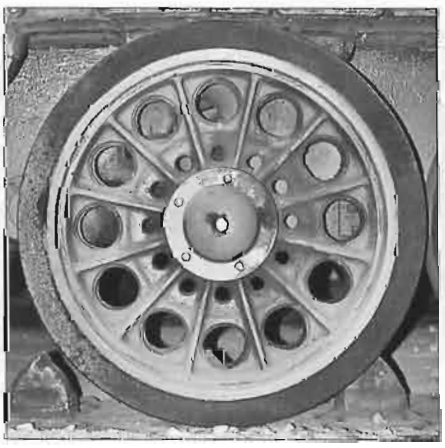


Above: Photo of a 'full spider' wheel, showing the profiling of the ribs.

- Author's collection -



Above: 'Half spider' wheel, early variant without small relief openings.

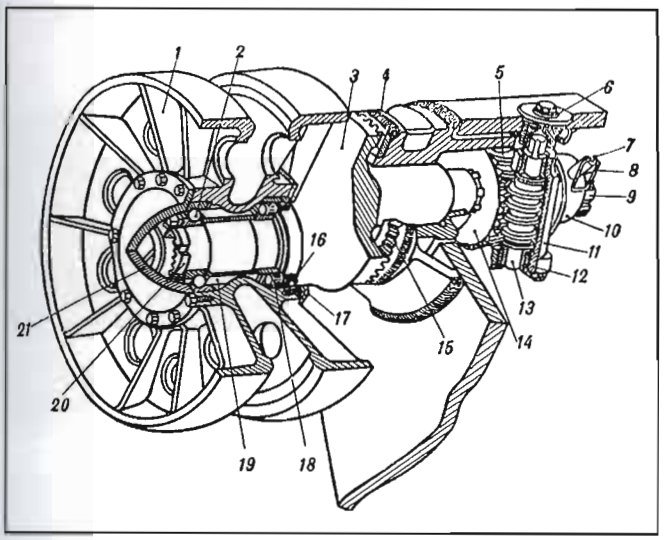


Above: No.112 produced 'full spider' wheel, very late variant with the whole dozen of small relief openings.



Above: Road wheel with the post-war relief openings — 11 ones.

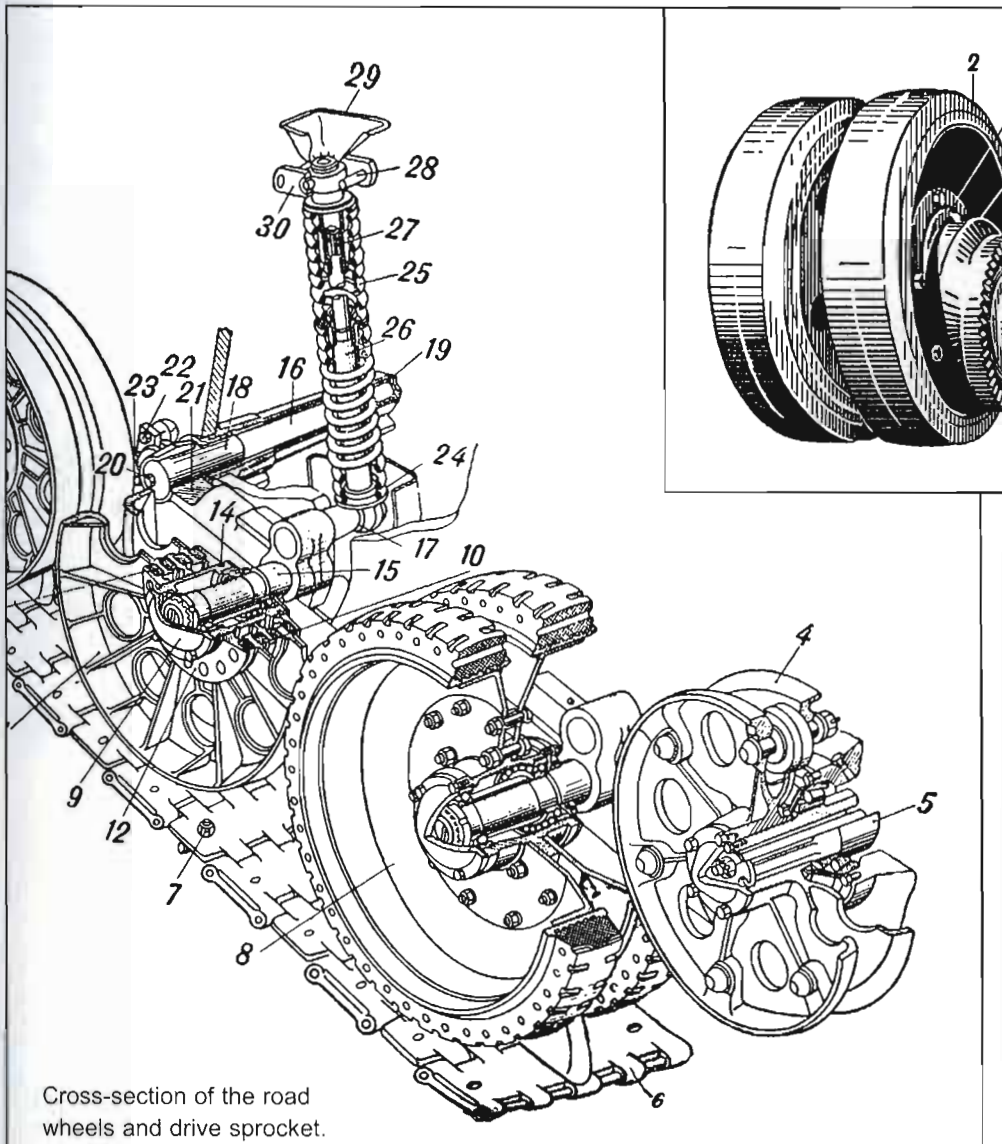
- all photos from Author's collection -



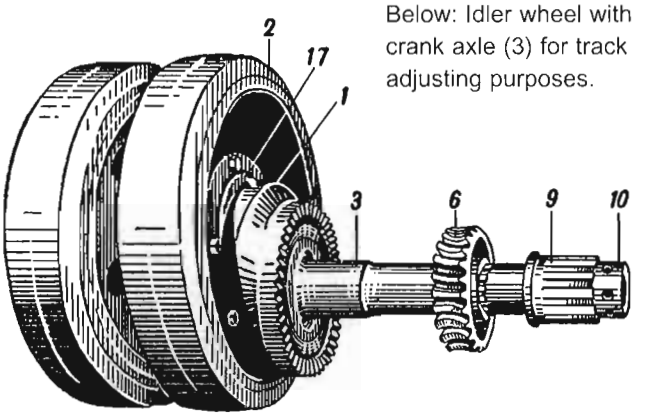


Above and right: Cross-section drawing, and interior view of the track tensioner mechanism.

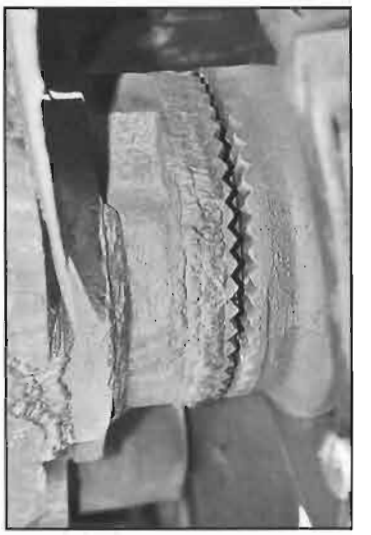
- Author's collection -



Cross-section of the road wheels and drive sprocket.



Below: Idler wheel with crank axle (3) for track adjusting purposes.



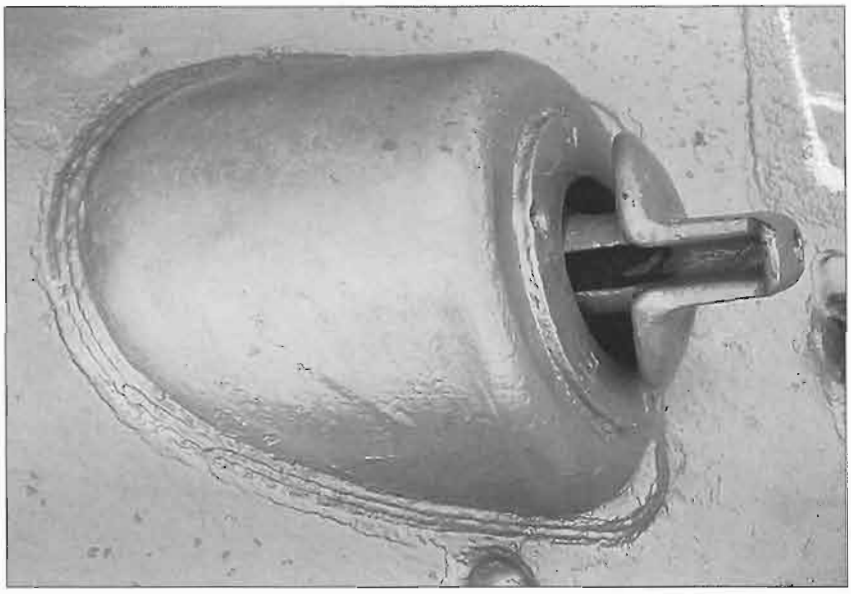
Above: Suspension of remaining road wheels.

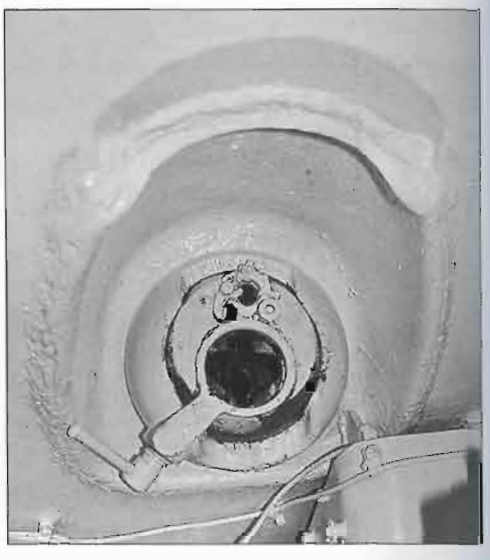
- Author's collection -

ARMAMENT





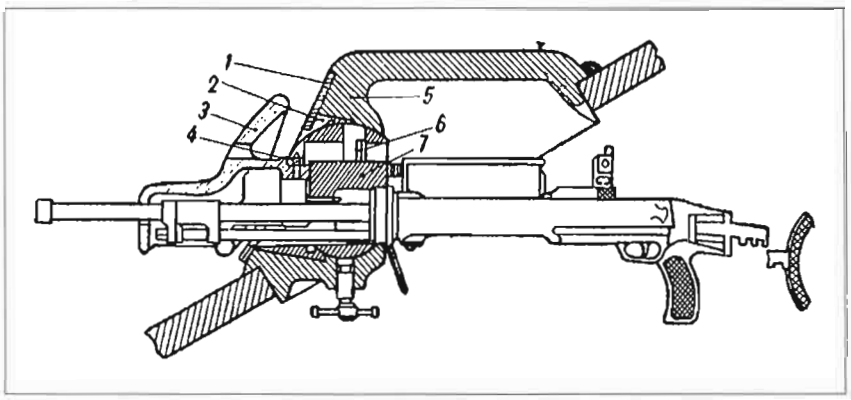






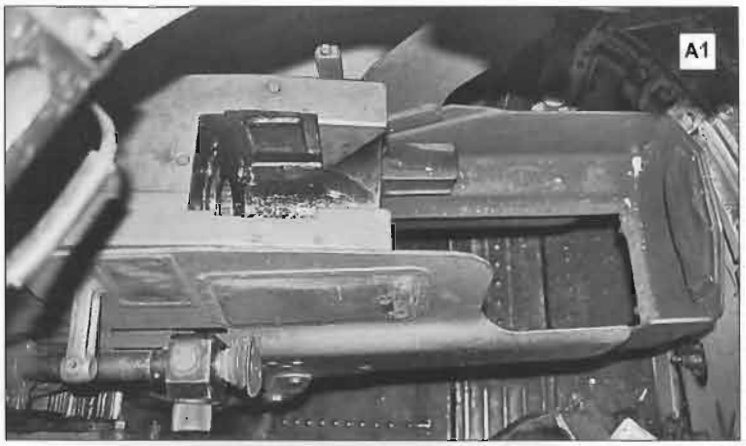
A part of the tank's frontal armament was the 7.62mm DT machinegun, mounted in a ball mount on the right side of the front hull plate. At the bottom there is a drawing of its installation in tanks produced at the No.112 Factory. There was a slight difference in shields produced by different factories. The shield was introduced in 1942. The photographs show exterior and interior details.

- Author's collection -





Detailed photos of the T–34–76 F–34 gun.

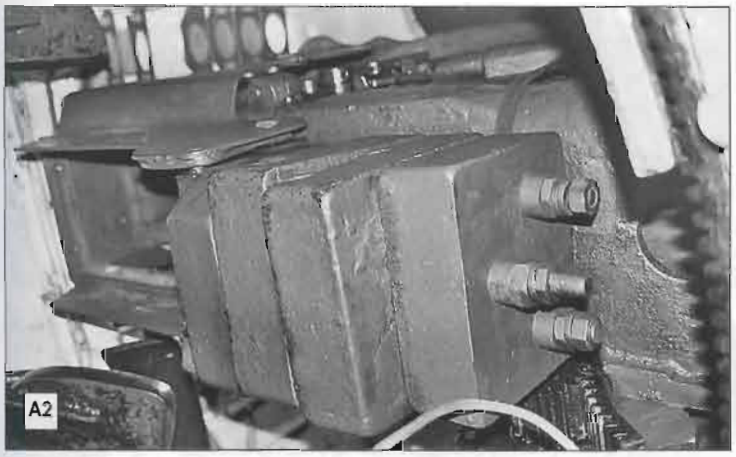


A1 — top view.

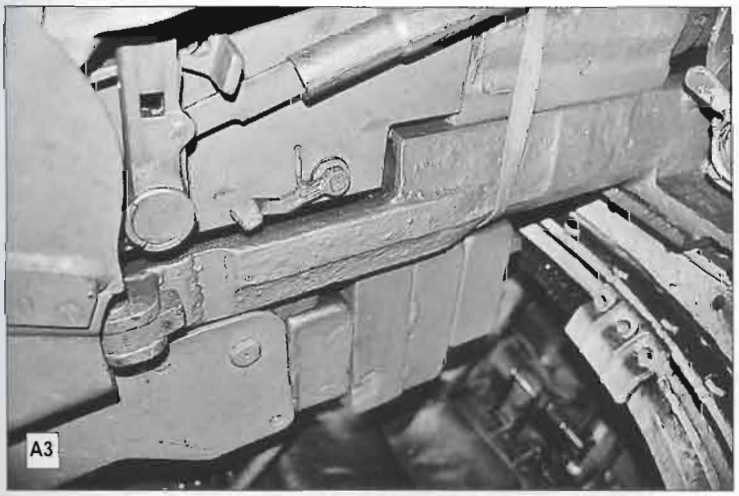
- Author's collection -

A2 — bottom of gun, with attached counterweights (front of gun is on the right).

- Author's collection -







Above: At the top is the periscope, in the middle is the gun elevation mechanism, on the left the turret rotating mechanism and on the right the gun sight.

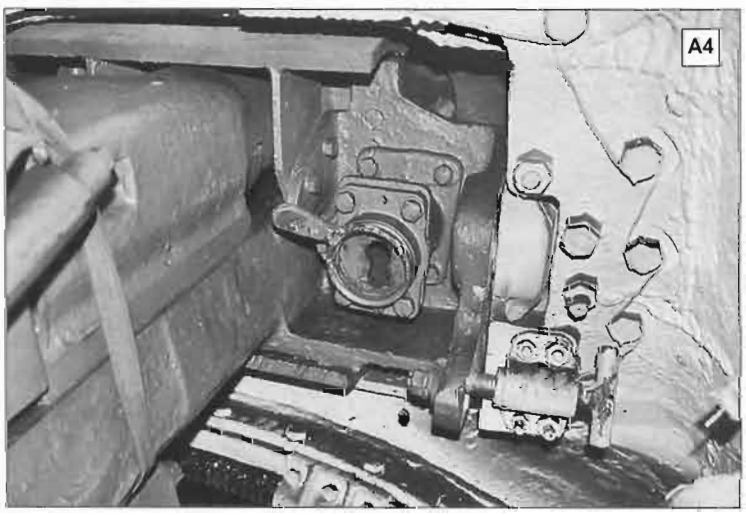
- Author's collection -

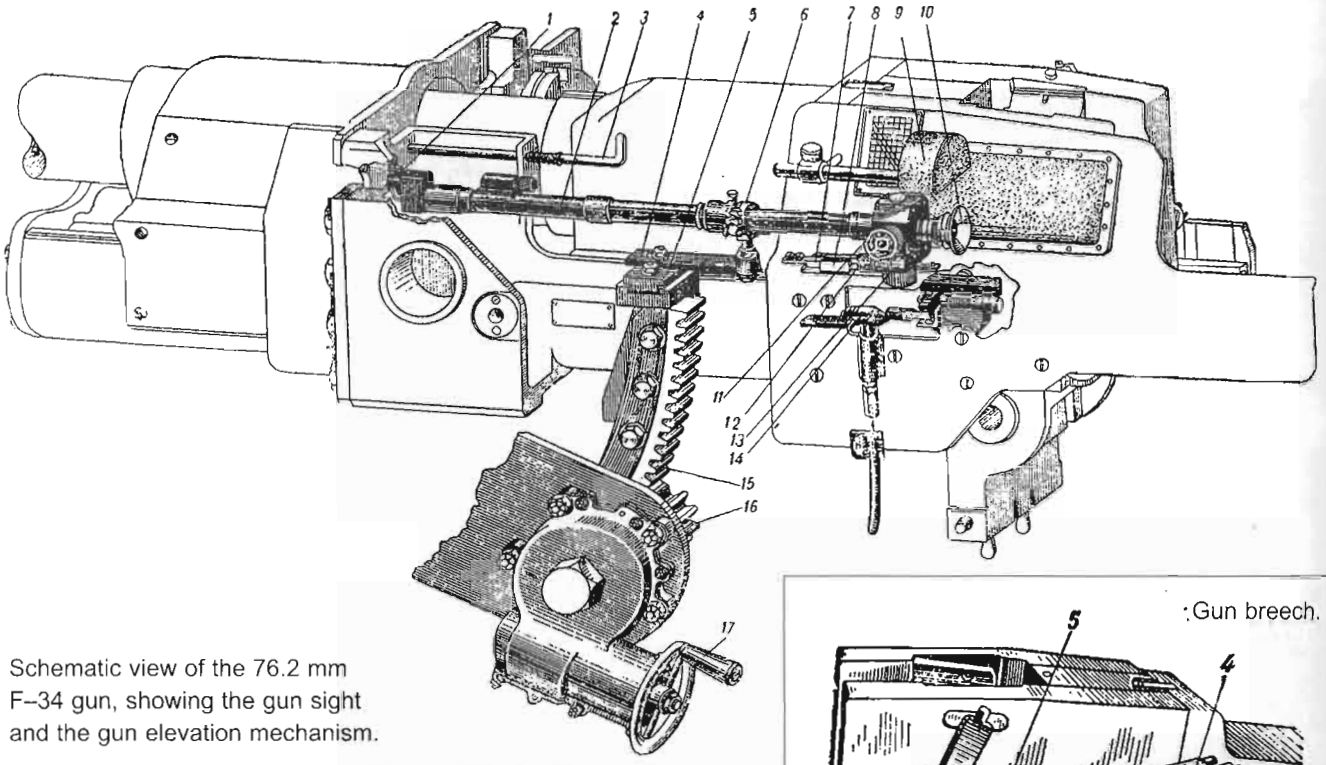
A3 — right side of gun breech.

- Author's collection -

A4 — machinegun mount and front plate of turret.

- Author's collection -



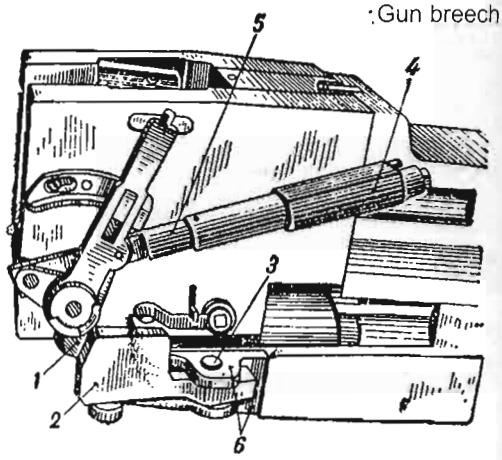


Schematic view of the 76.2 mm F–34 gun, showing the gun sight and the gun elevation mechanism.

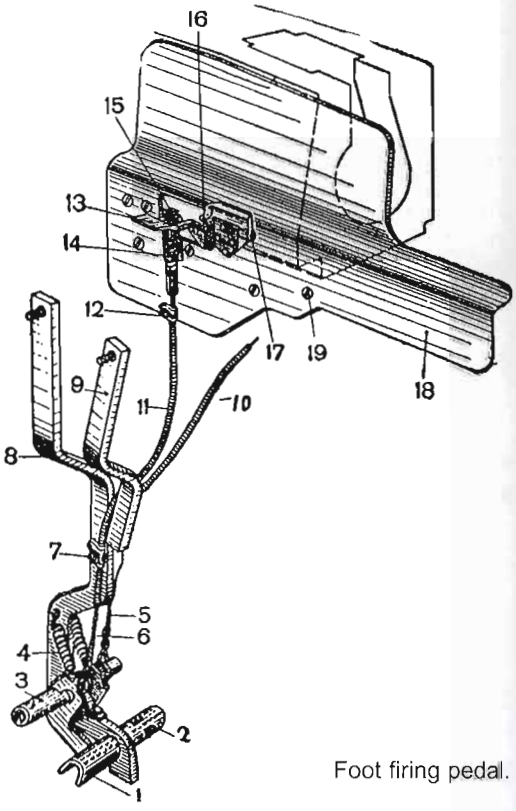
Below: Rear of 85 mm S–53 gun.

- Author's collection -





Gun breech.



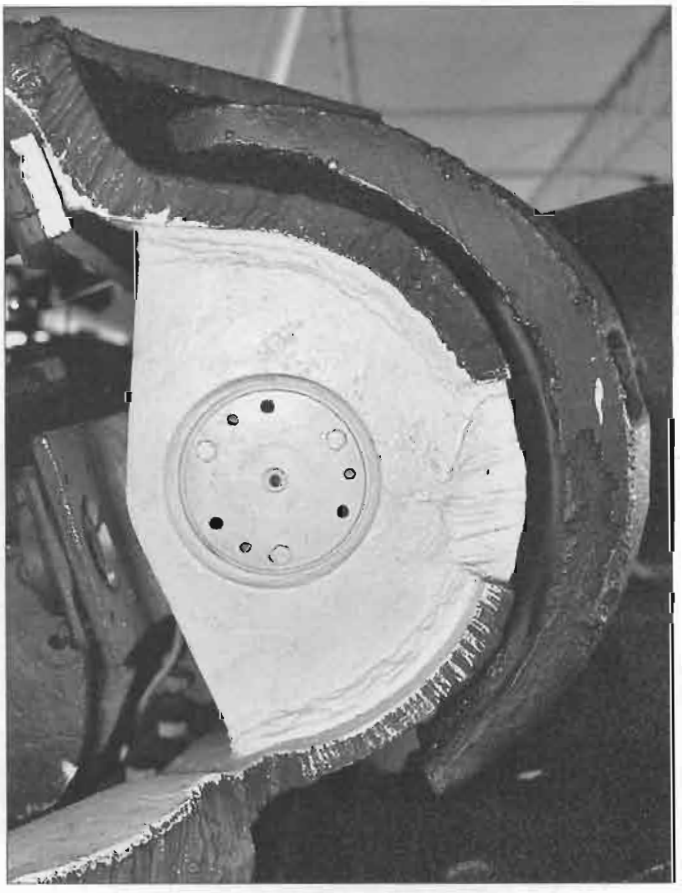
Foot firing pedal.



Above and below: Top view of 85 mm S–53 gun.

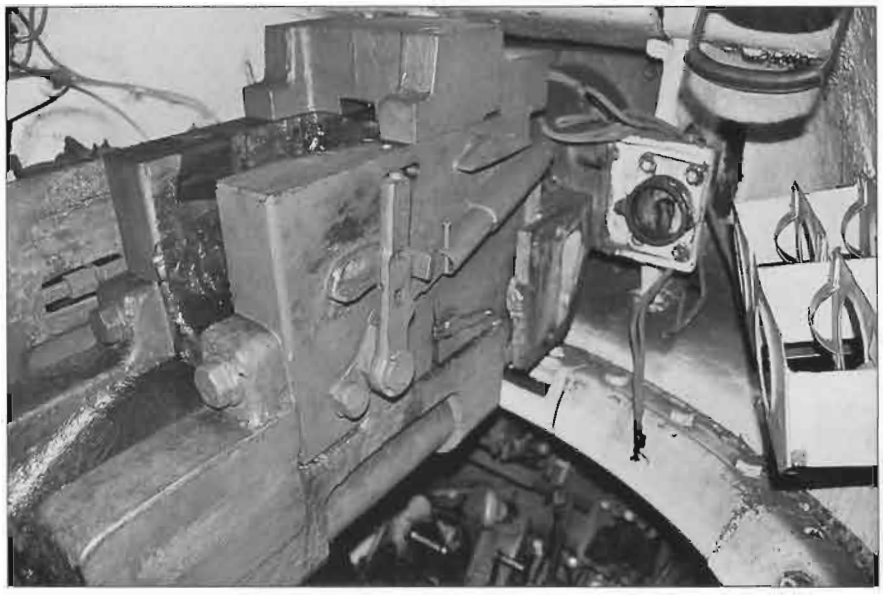
- Author's collection -





Above: Cross-section of the 85 mm gun mantle.

- Author's collection -

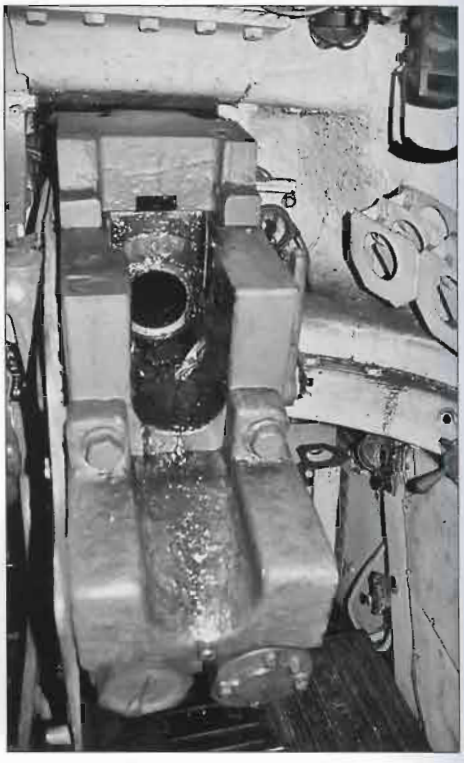


Left: Right side of the S–53 gun.

- Author's collection -

Below: Rear view.

- Author's collection -



Note that all guns ware painted in the exterior color, without any primer.

Below: S–53 gun with atypical gun jacket.

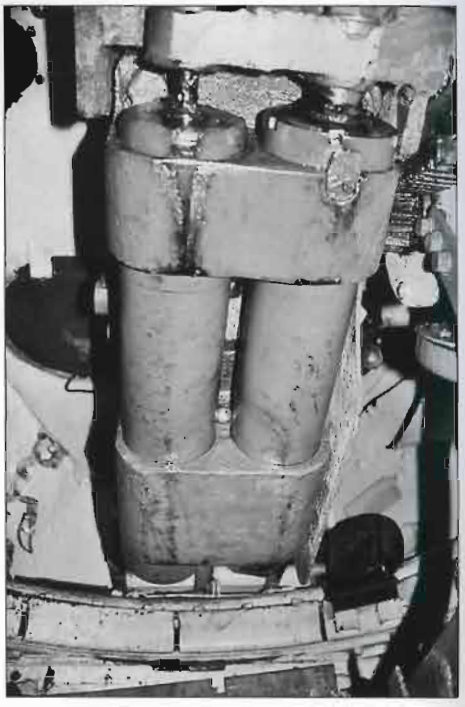
- Author's collection -

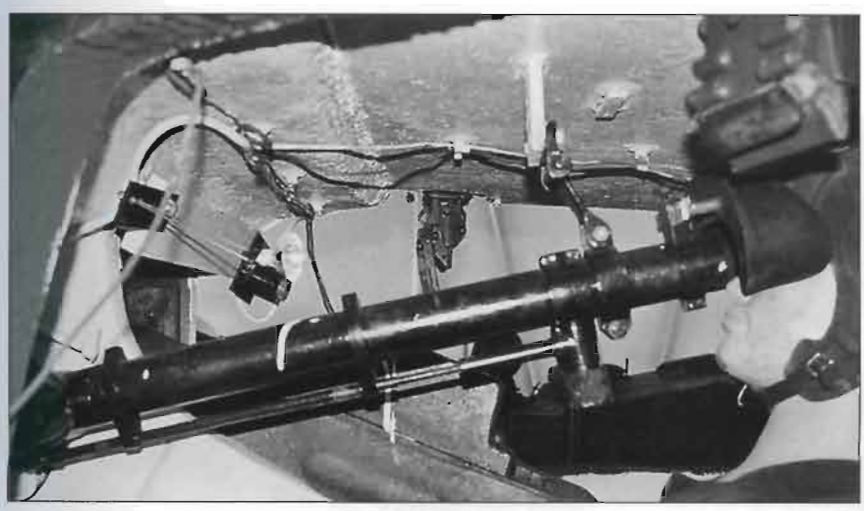


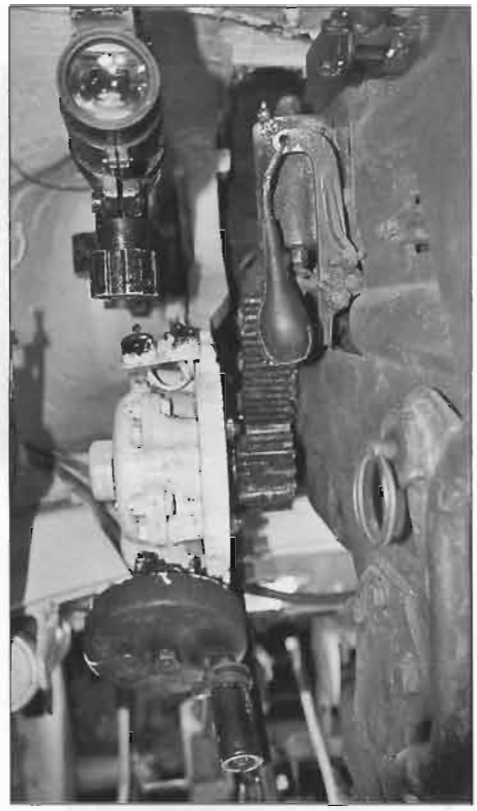


Below: Bottom view.

- Author's collection -

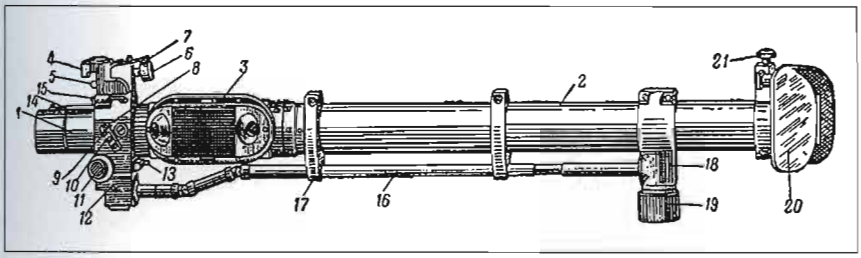


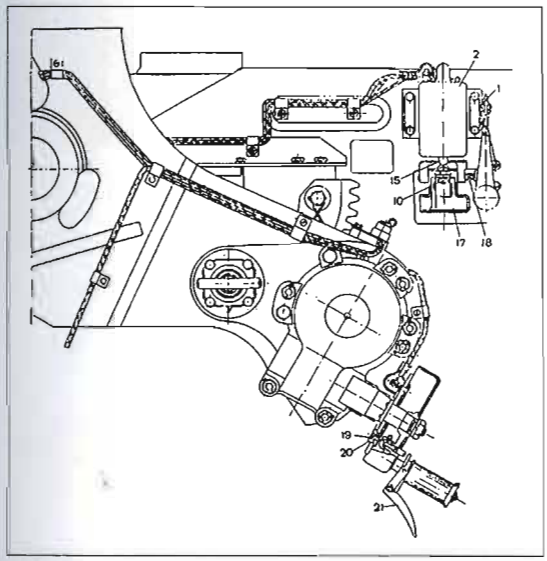




Above, below and right: Detailed views of the TSz–15/16 gun sight.

- Author's collection -

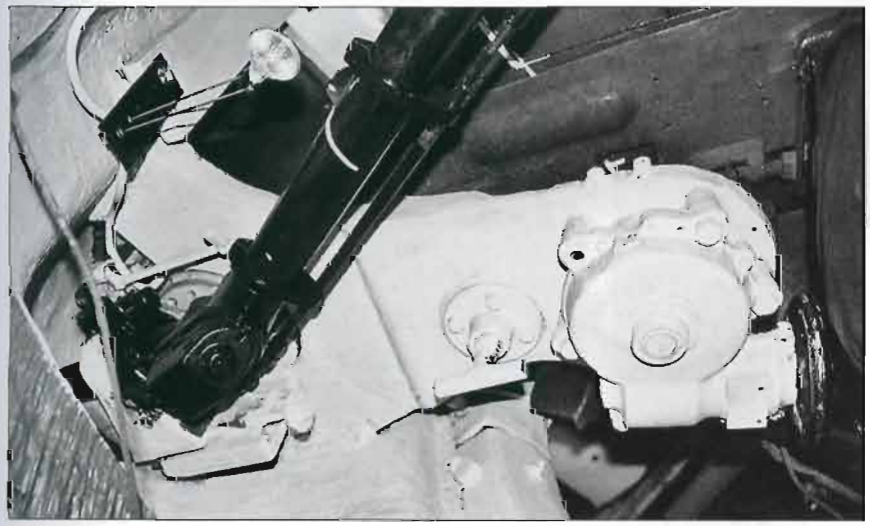




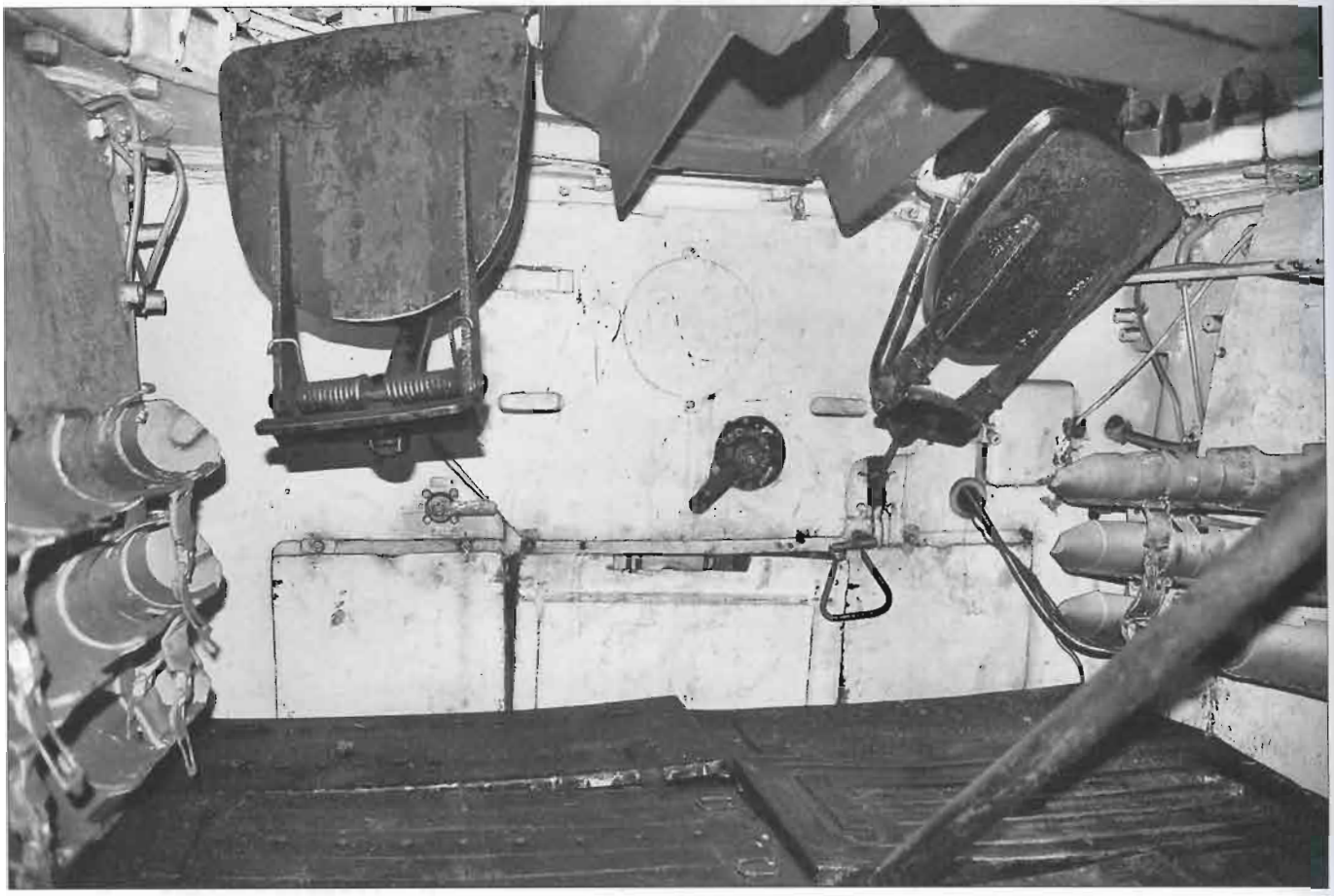
Left, right and below: Close-ups of the gun sight and the gun elevation mechanism.

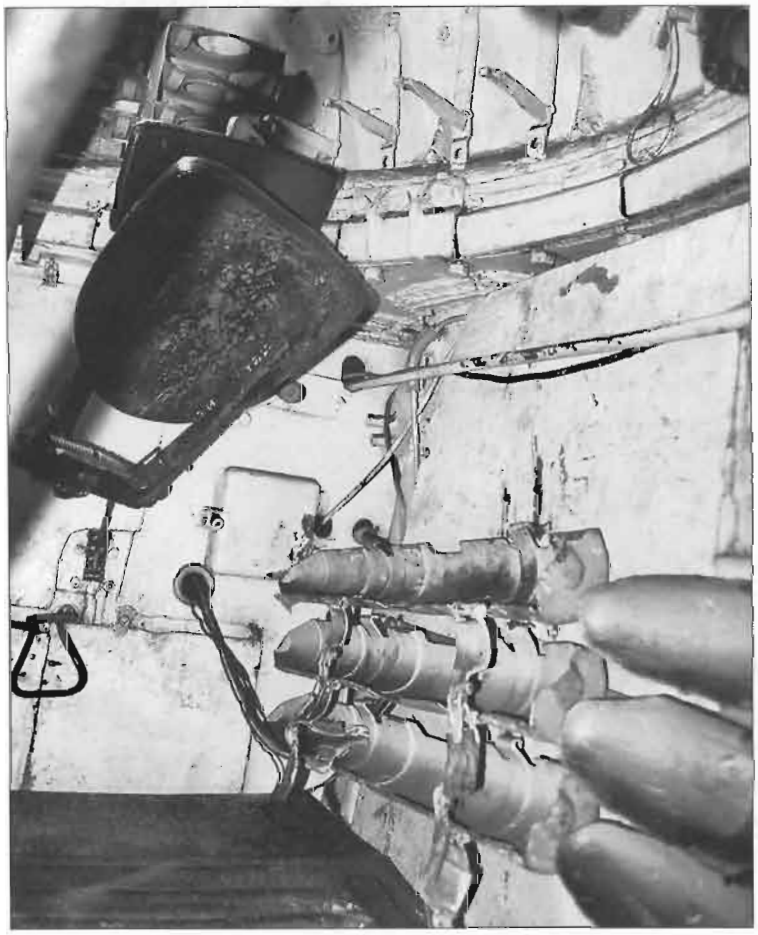
- Author's collection -





INTERIORS





Above: Looking at the rear of the fighting compartment of the T–34–76 1943.

- Author's collection -

Below: Open ammo box; the black boxes contained grey rubber bands.

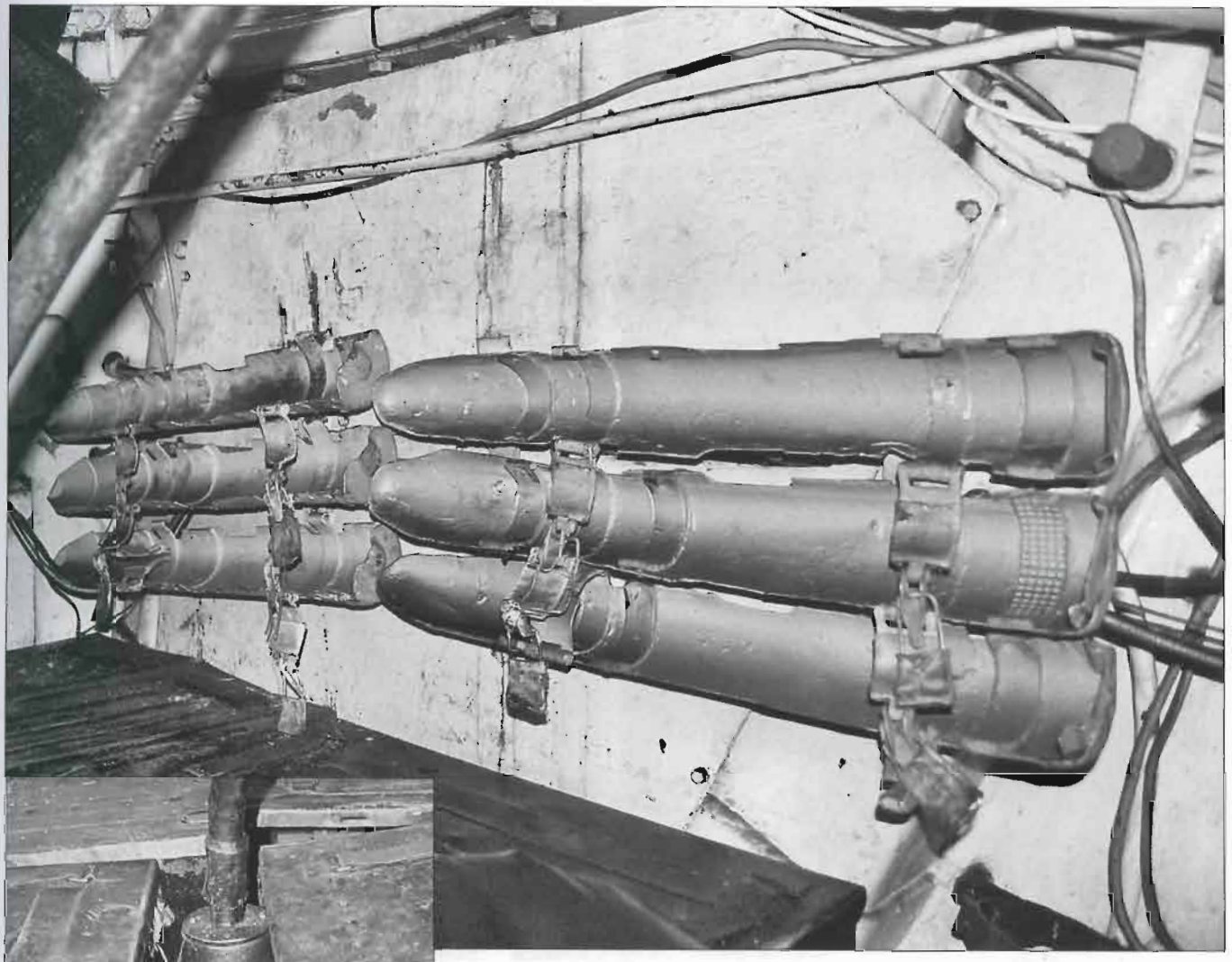
- Author's collection -



Left: Left rear corner of the fighting compartment.

- Author's collection -

ALL PHOTOS ON PAGES 382–385 SHOW INTERIOR DETAILS OF THE T–34–76 HEXAGONAL TURRET



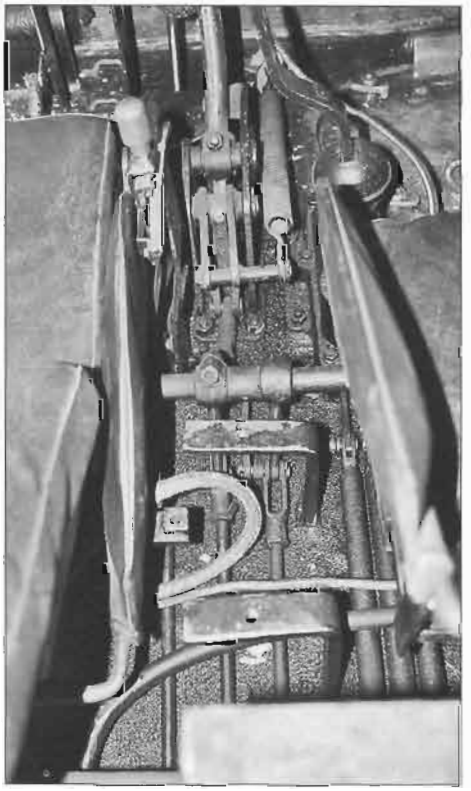


Above: Ammunition storage, an identical setup was on the other side of the fighting compartment.

- Author's collection -

Left: Junction box with wiring for the electrical turret traverse mechanism, with ammo boxes on each side.

- Author's collection -

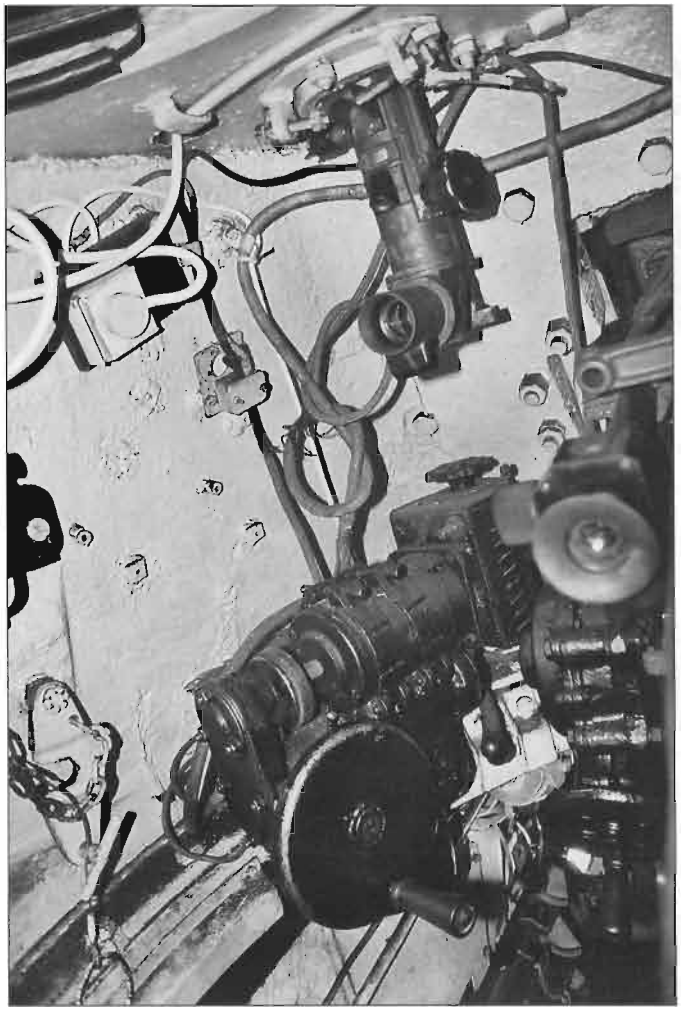


Right: Steering and brake control ties.

- Author's collection -

Below: Turret traversing mechanism.

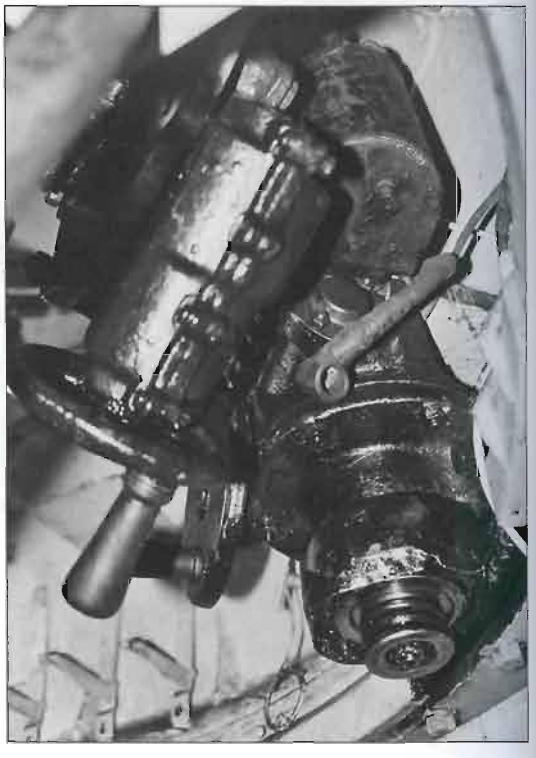
- Author's collection -





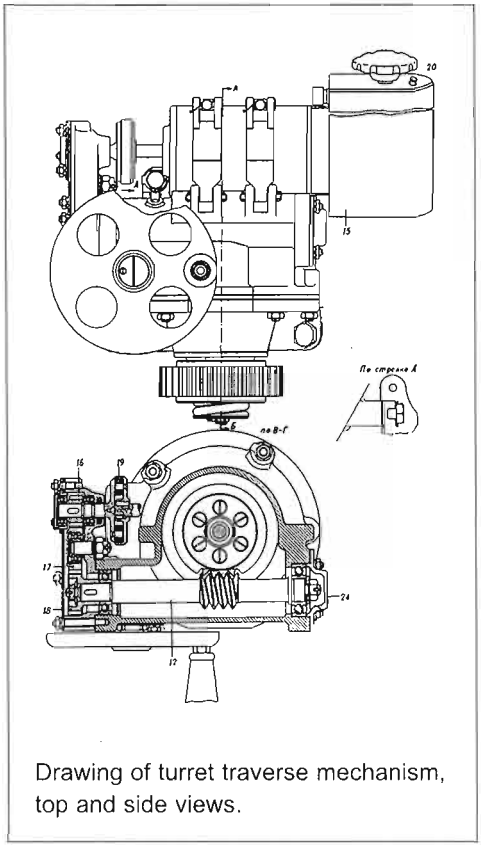
Above: With periscope.

- Author's collection -



Right: Viewed from below.

- Author's collection -

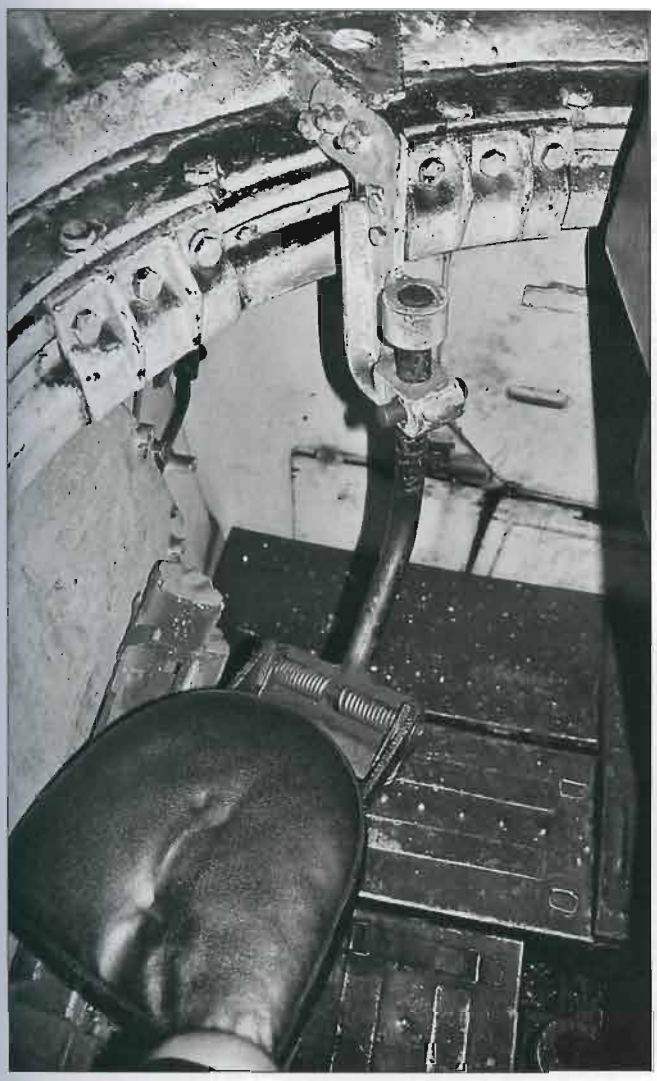


Drawing of turret traverse mechanism, top and side views.

Below and bottom left opposite page: Partial views of the roof in the softedge hexagonal turret.

- Author's collection -





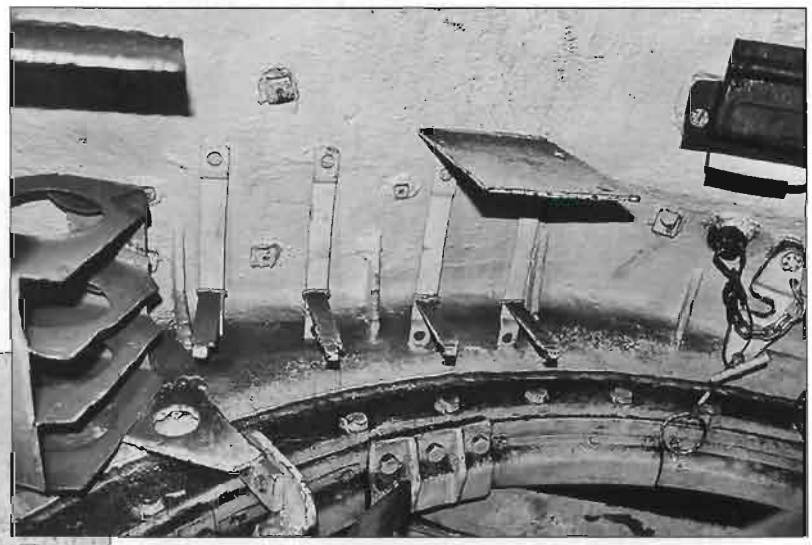
Above: Folding commander's seat and part of the turret ring. Note ammo boxes under the seat.

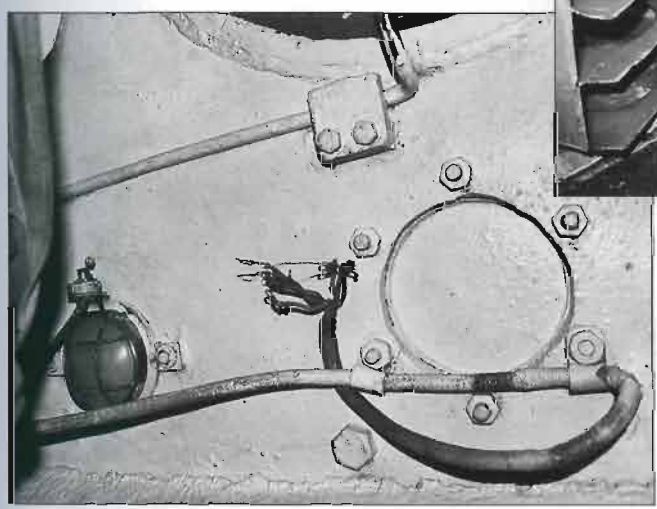
- Author's collection -

Below: Machinegun ammunition racks near the main gun.

- Author's collection -



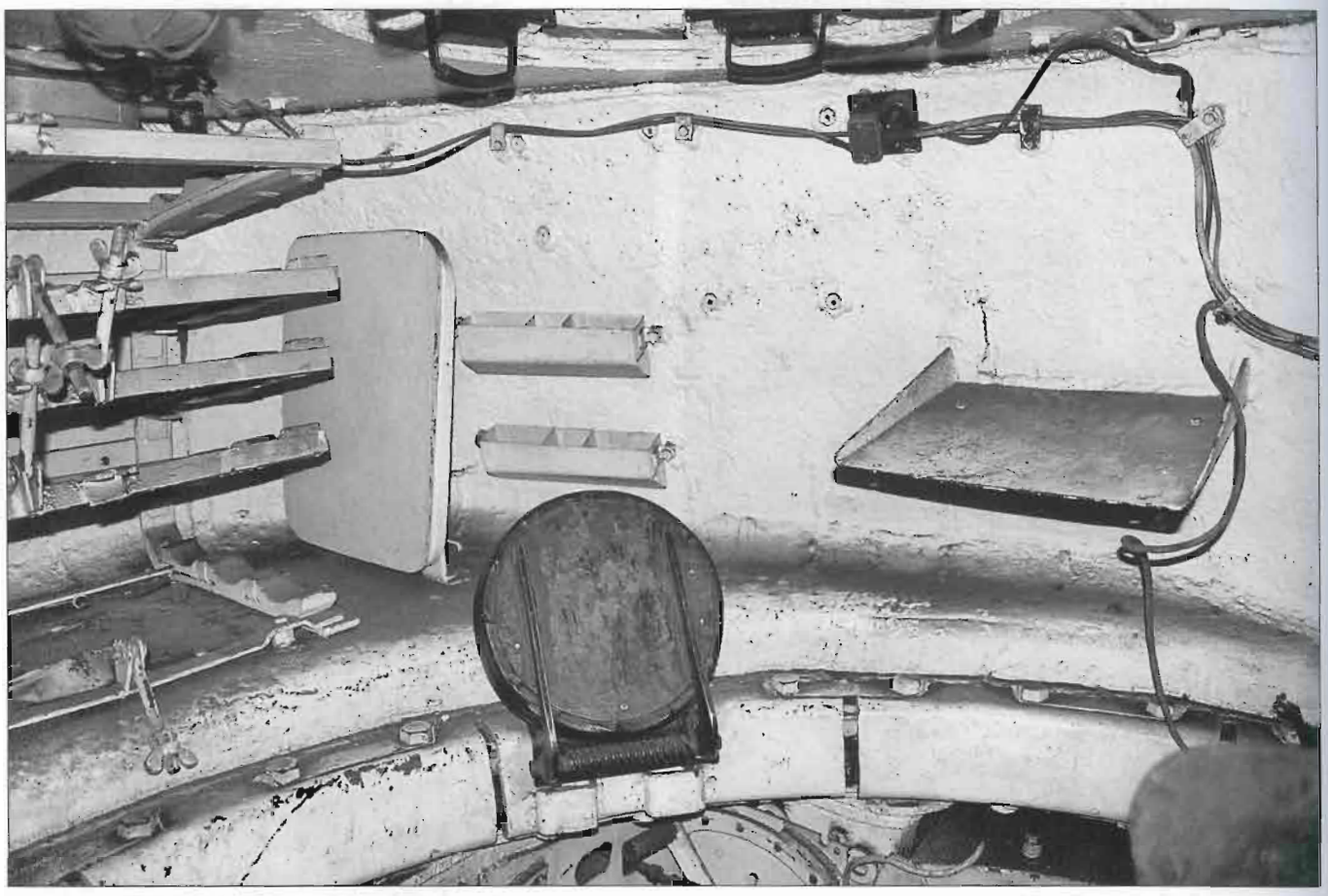


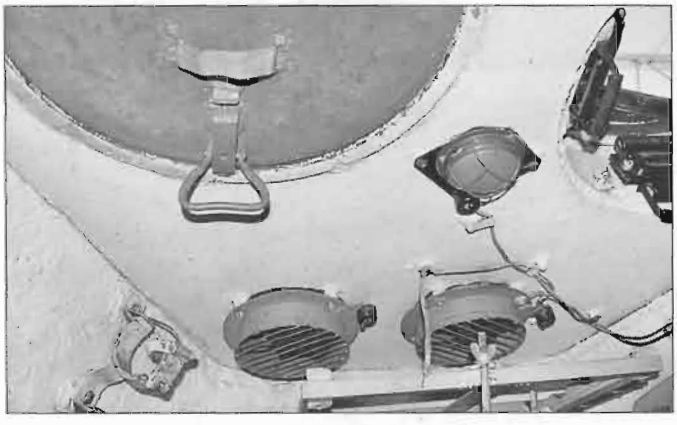


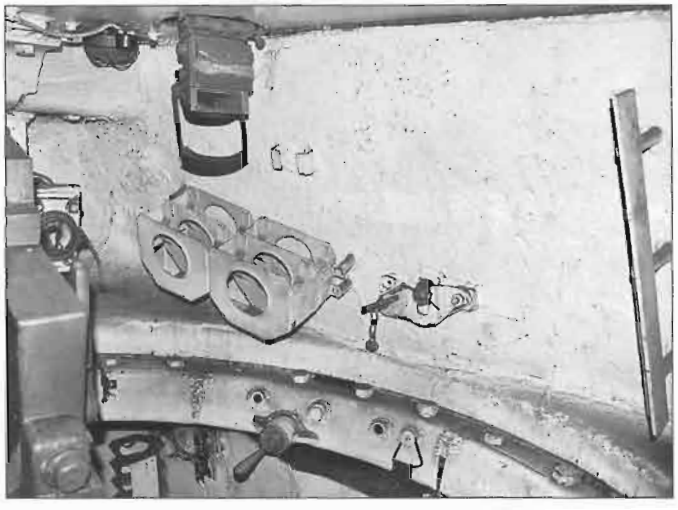
Above: Left wall of the turret with a shelf for the radio (this is the T–34K variant).

- Author's collection -

ALL PHOTOS ON PAGES 386–411 SHOW INTERIOR DETAILS OF THE T–34–85 (except when noted otherwise).

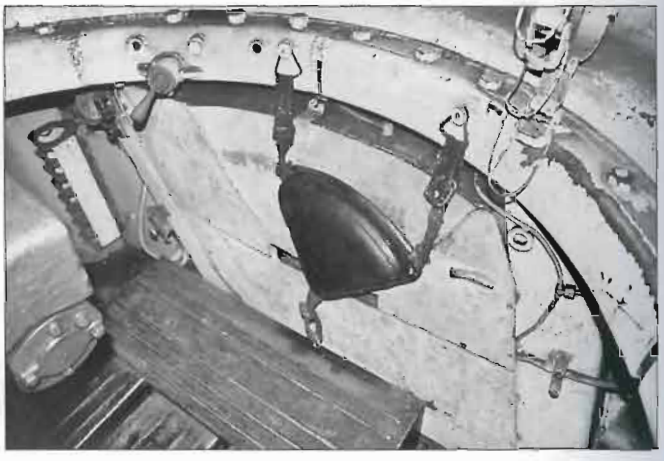


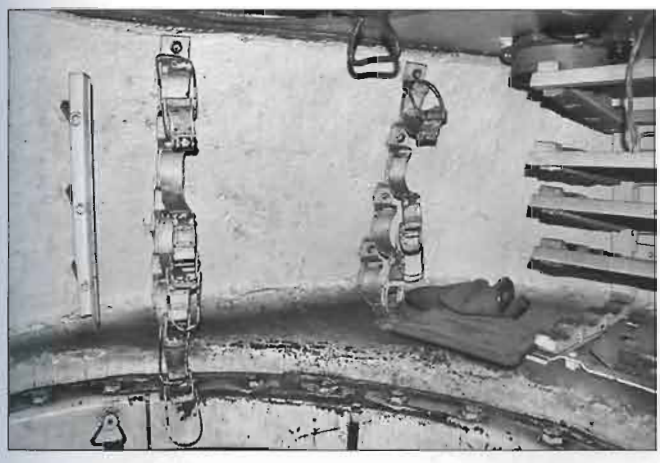




Interior details of a "large" turret (for the ZIS–S–53 85 mm gun) from the No.112 Factory.

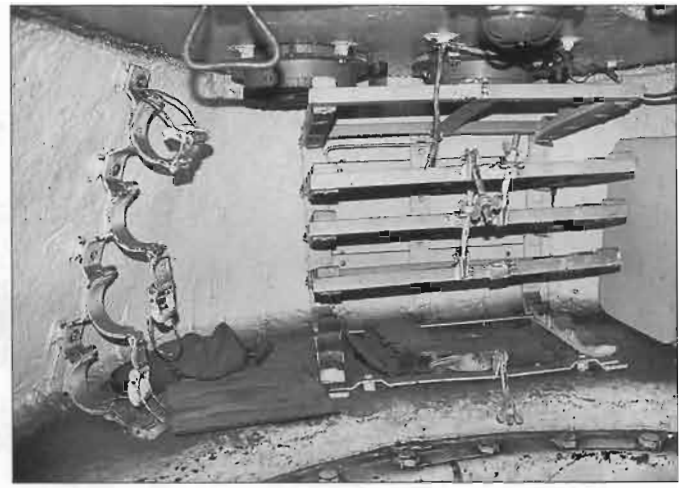
- Author's collection -

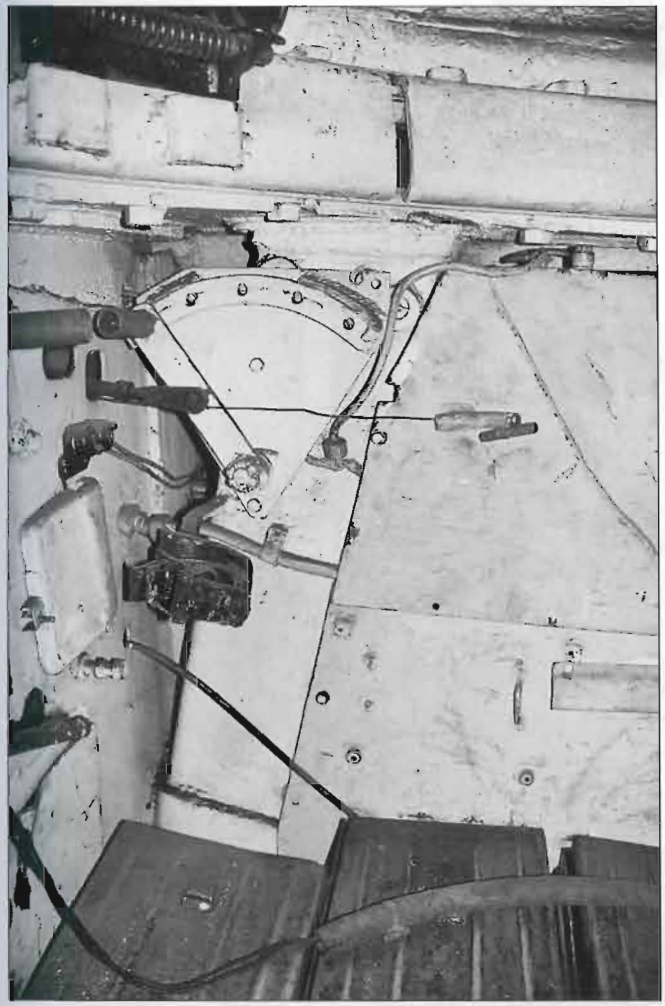




Left and below: 85 mm ammunition racks, on the right and rear wall of the turret.

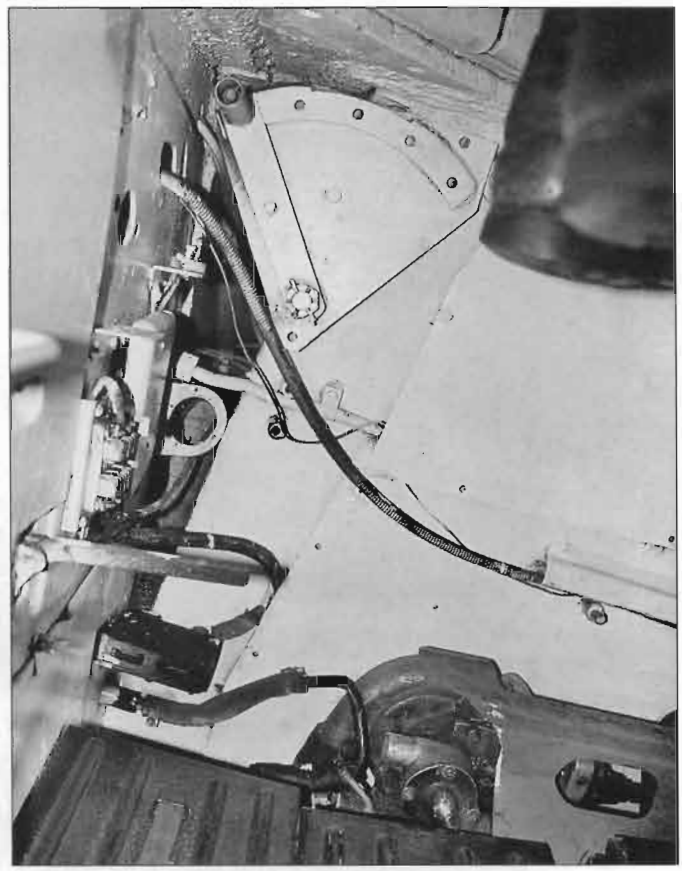
- Author's collection -





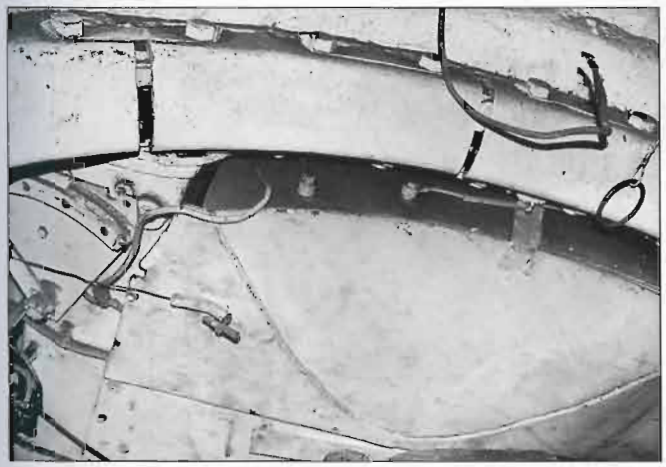
Left: Left rear corner of the fighting compartment, from the No.112 Factory.

- Author's collection -



Above: Left rear corner of the fighting compartment, from the No.183 Factory, produced after the war since it has a starter heater.

- Author's collection -

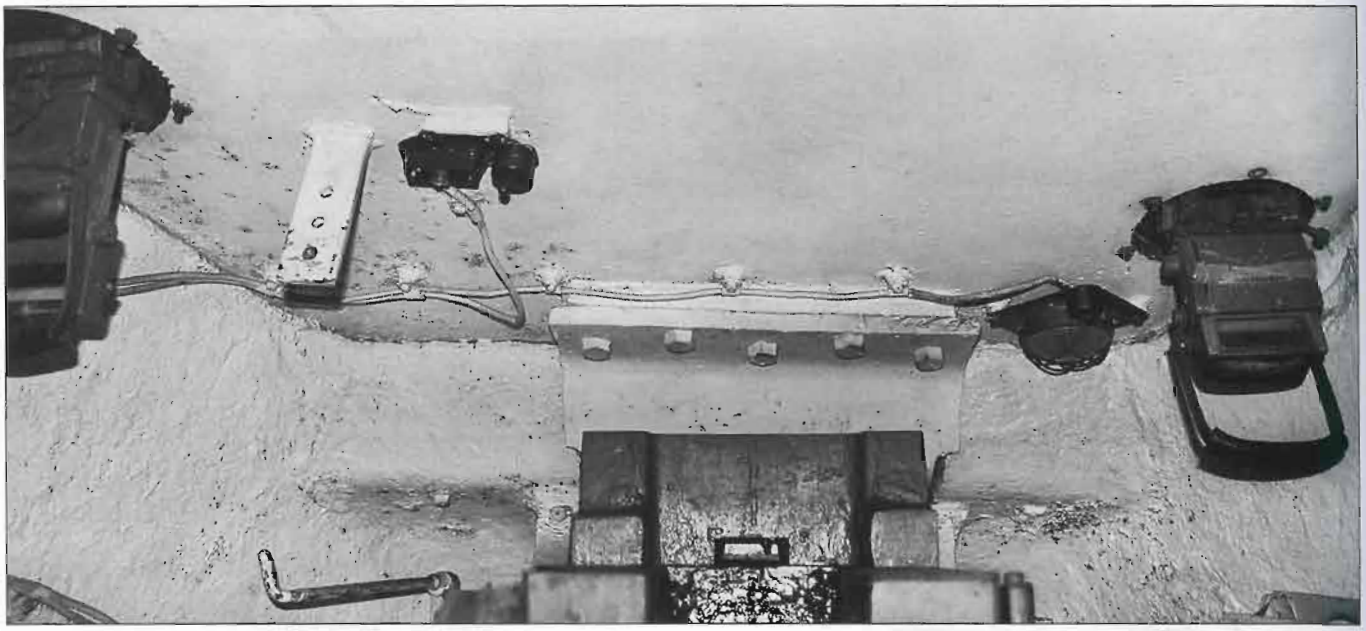


Left: Interior fuel tank cover on the left side of a "Sormovo" tank.

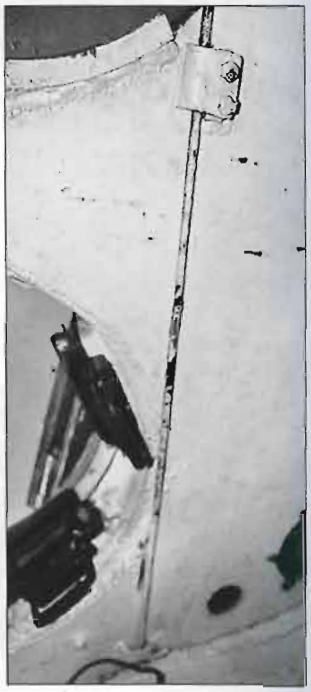
- Author's collection -

This page: Interior details of a turret from the No.112 Factory.

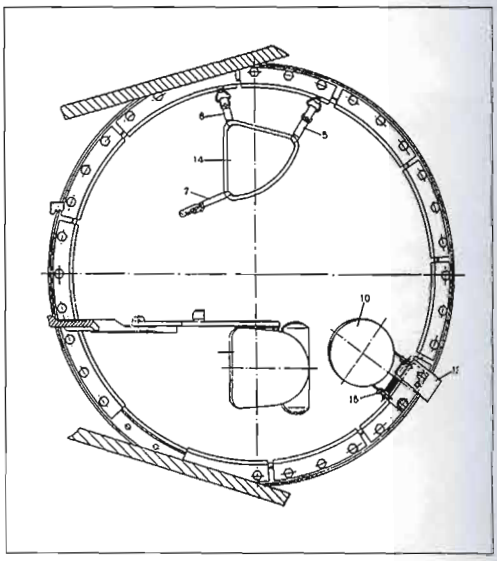
- Author's collection -

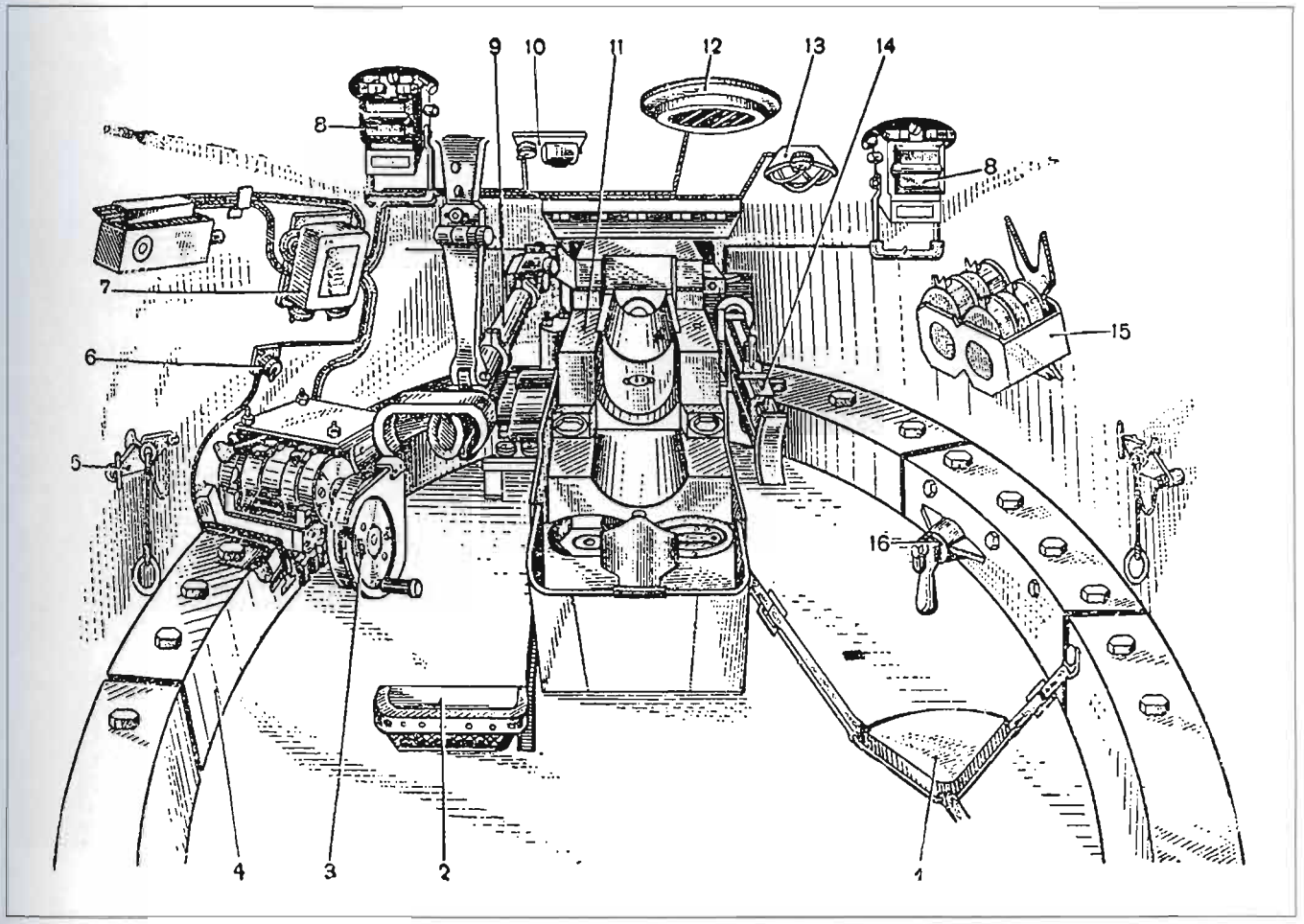












Above: Perspective drawing of the interior of a "Sormovo" T-34-85 turret.

- Author's collection -

Below: Driver's seat of a No.183 Factory tank, with post-war modifications.

- Author's collection -

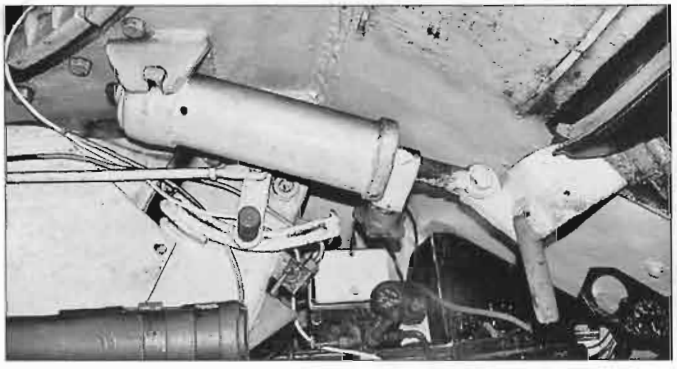




Above and below: Driver's seat and gauges in a No.112 Factory tank.

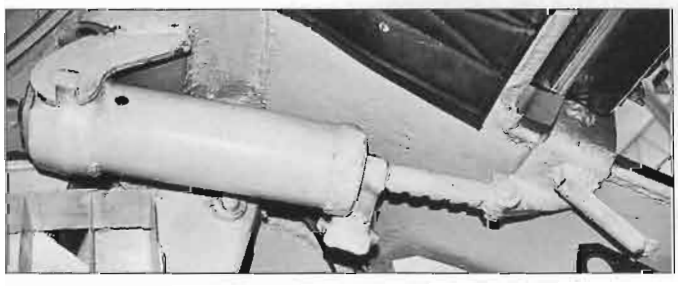
- Author's collection -





Above and below: Two photographs show the differences between the balancing mechanisms of the driver's hatches; upper T–34–76, lower T–34–85.

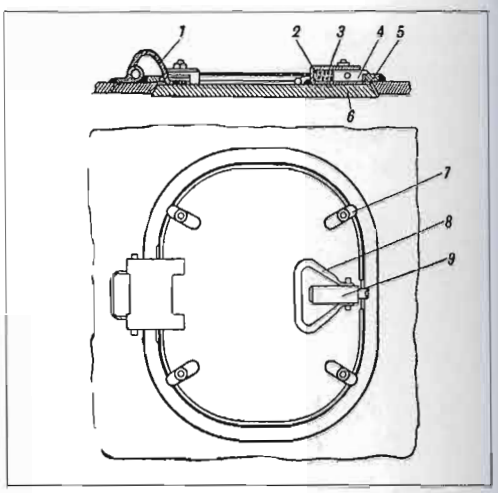
- Author's collection -



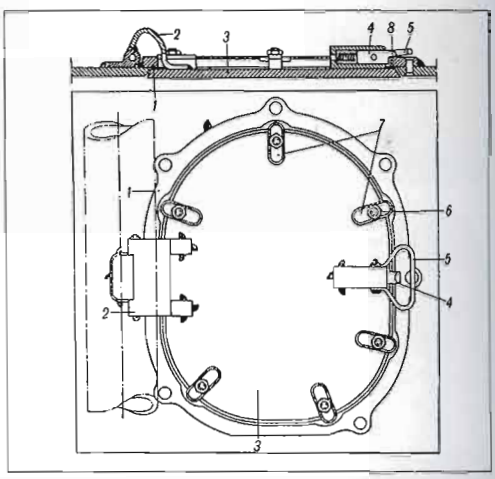
Right: Gunner's seat.

- Author's collection -

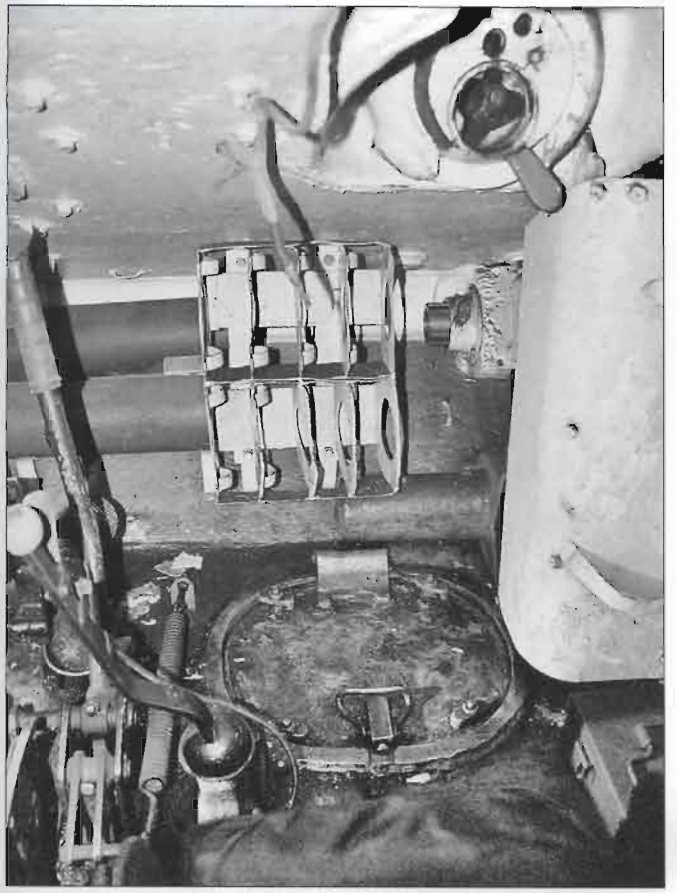
Right: Drawing of the floor escape hatch, 1943–1945.

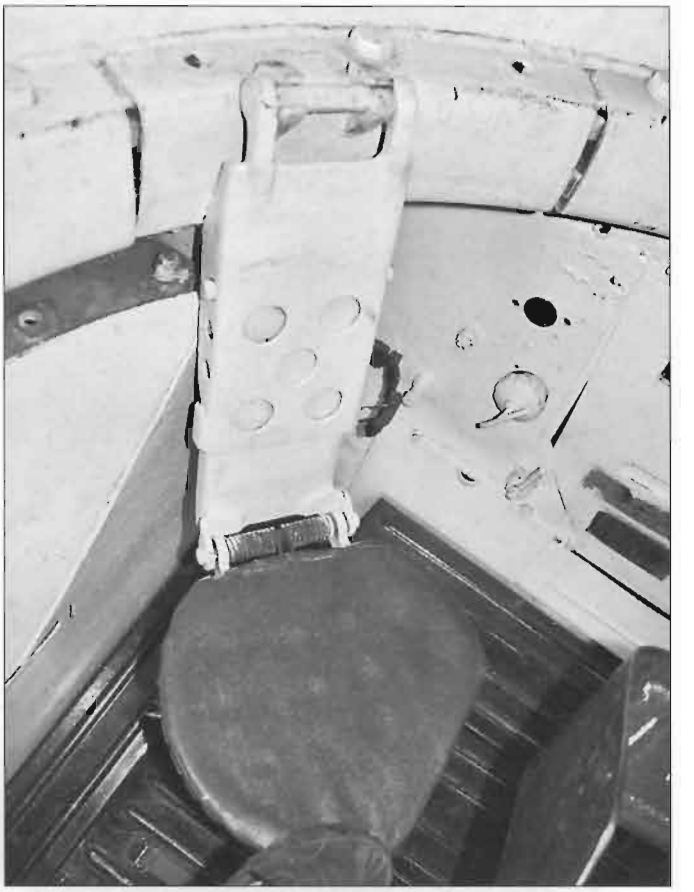


Right: Drawing of the floor escape hatch, 1940–1941.



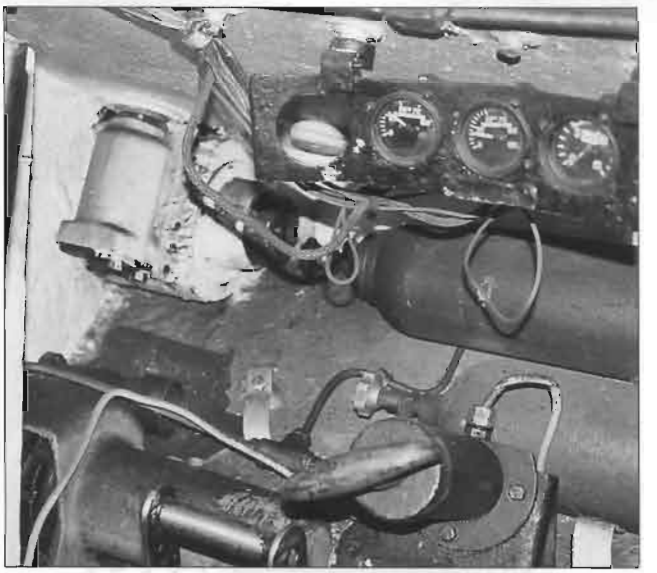






This page:
Interior details of the tank from different factories. There might be slight differences between components used for production but the general view and layout was always the same.

- Author's collection -

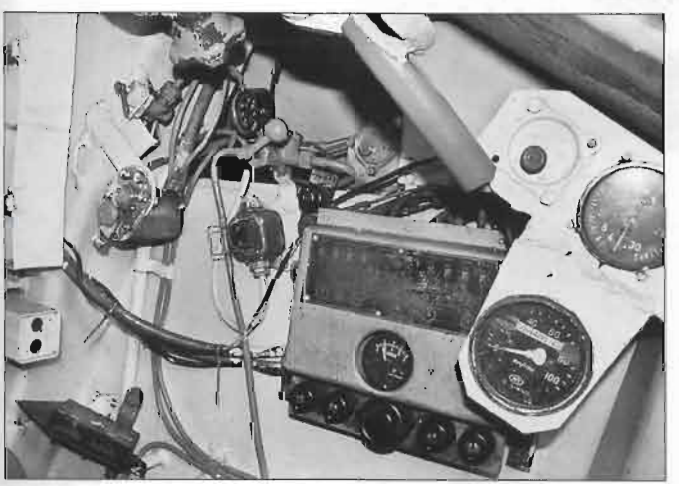


Above: The loader's seat, however it appears to be a post-war production and similar to the one used in the T–54/55.

- Author's collection -

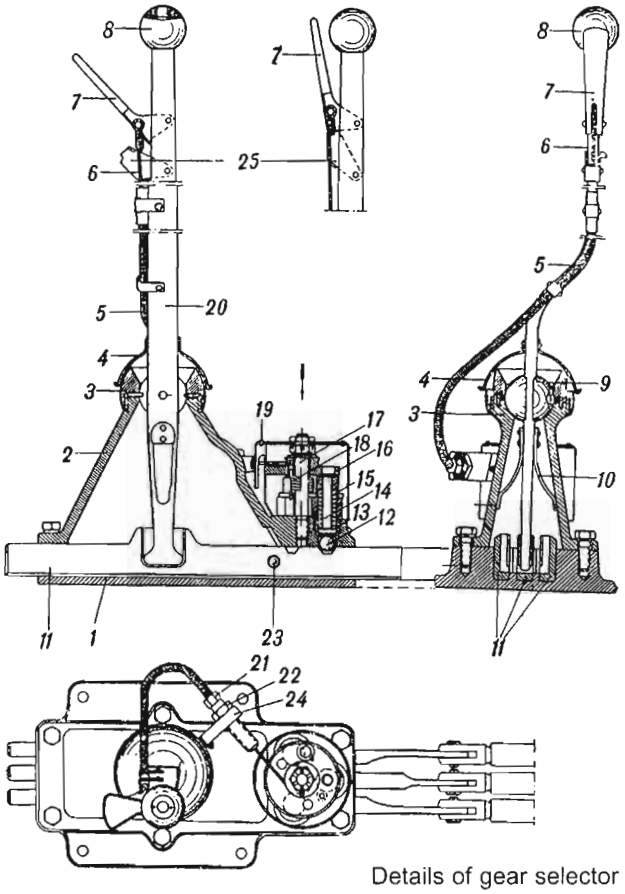
Below: Gauges in Polish-made T–34–85 tank.

- Author's collection -

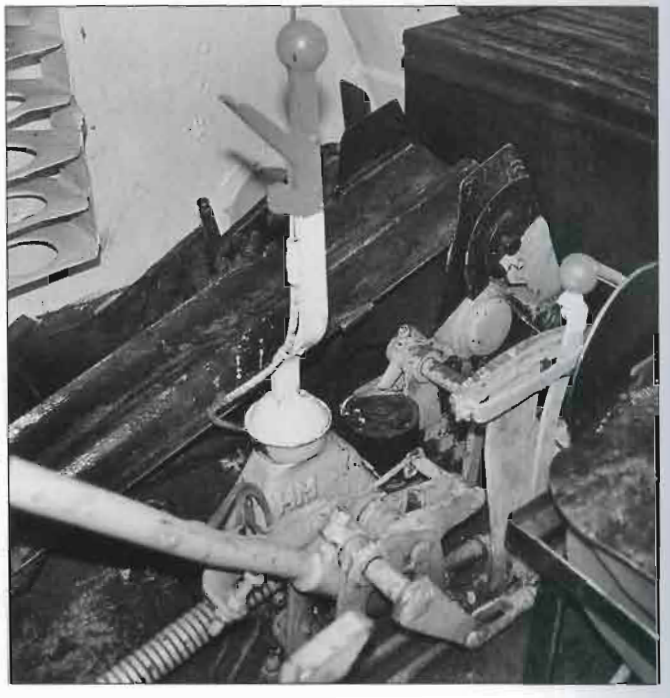


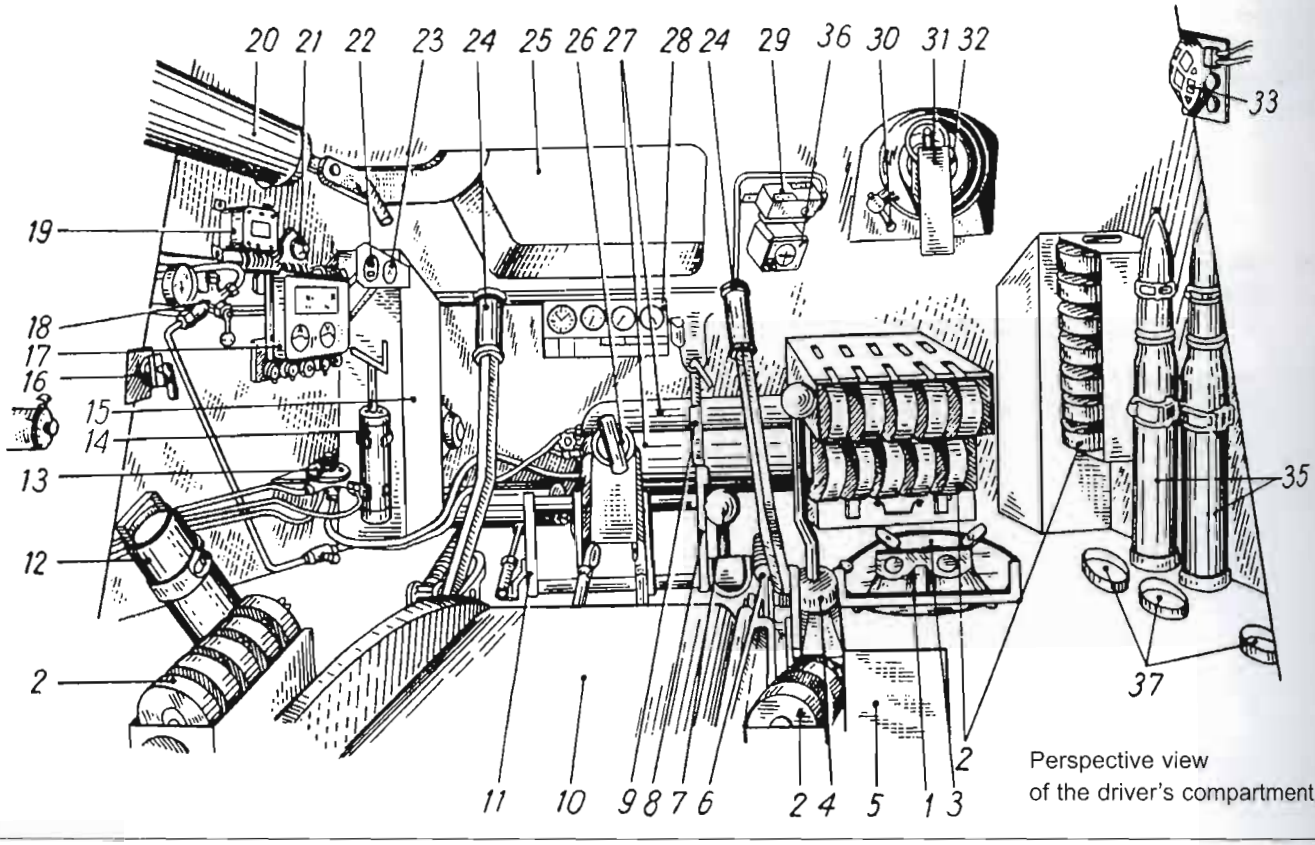


1 — base
2 — casing
3 — nut
4 — cover
5 — cable
6 — wire
7 — locking handle
8 — gear lever knob
9 — ball joint
10 — plate spring
11 — selector rods
12 — locking ball
13 — locking plug
14 — locking catch
15 — locking spring
16 — rotating plate
17 — spindle of rotating plate
18 — return spring
19 — cover
20 — gear lever
21 — cable adjusting nut
22 — check nut
23 — ball
24 — bracket
25 — latch for reverse gear



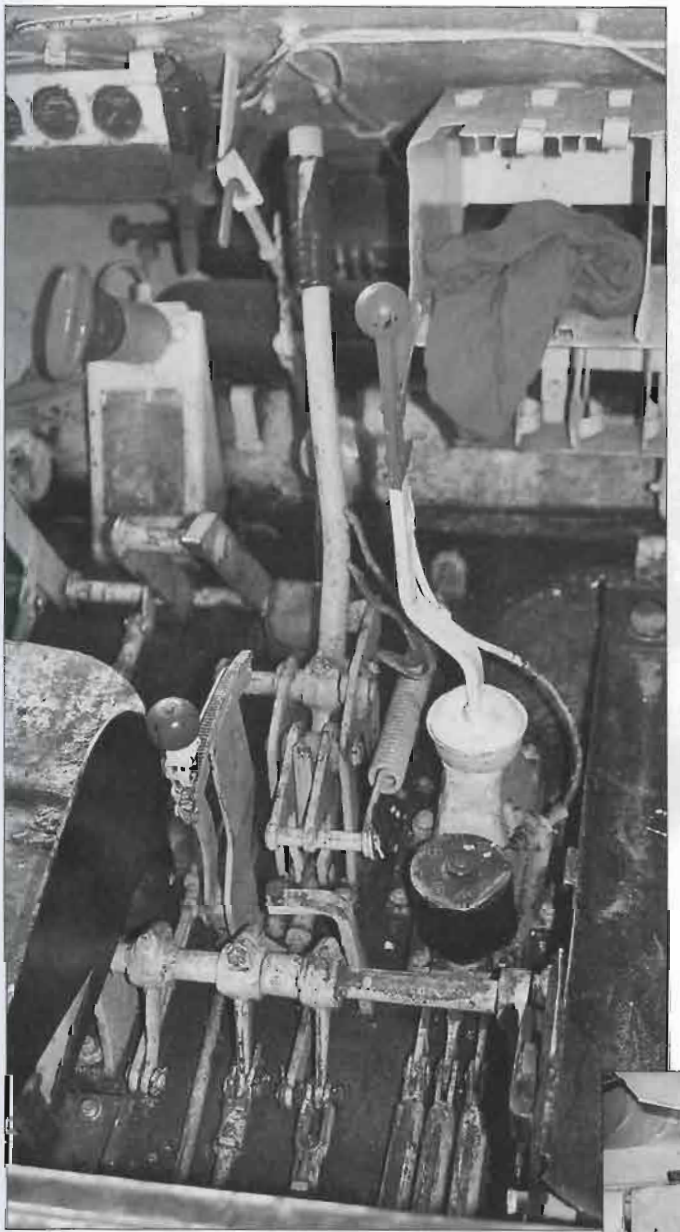
Details of gear selector





Perspective view of the driver's compartment.

Details of the interior of the Polish-made T–34–85 tank.



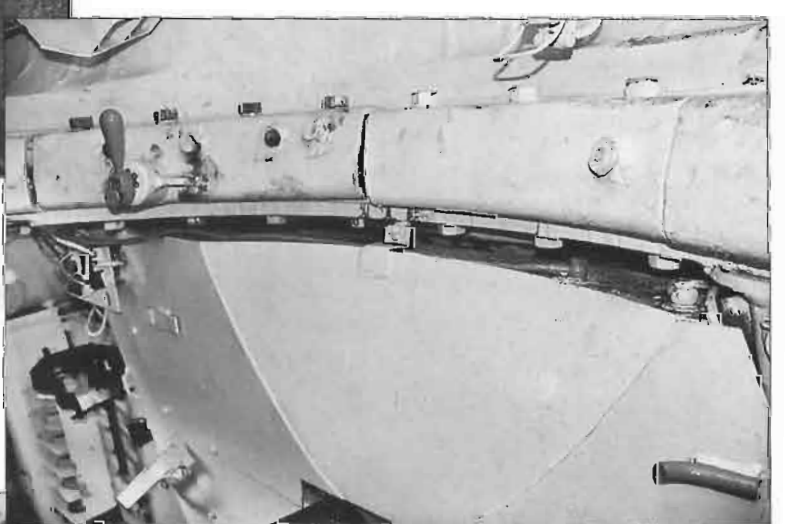
Above: Steering and gear levers.

- Author's collection -



Above: Control levers and driver's seat in Polish-made tank. Note: all seats with hand rests are post-war Polish products.

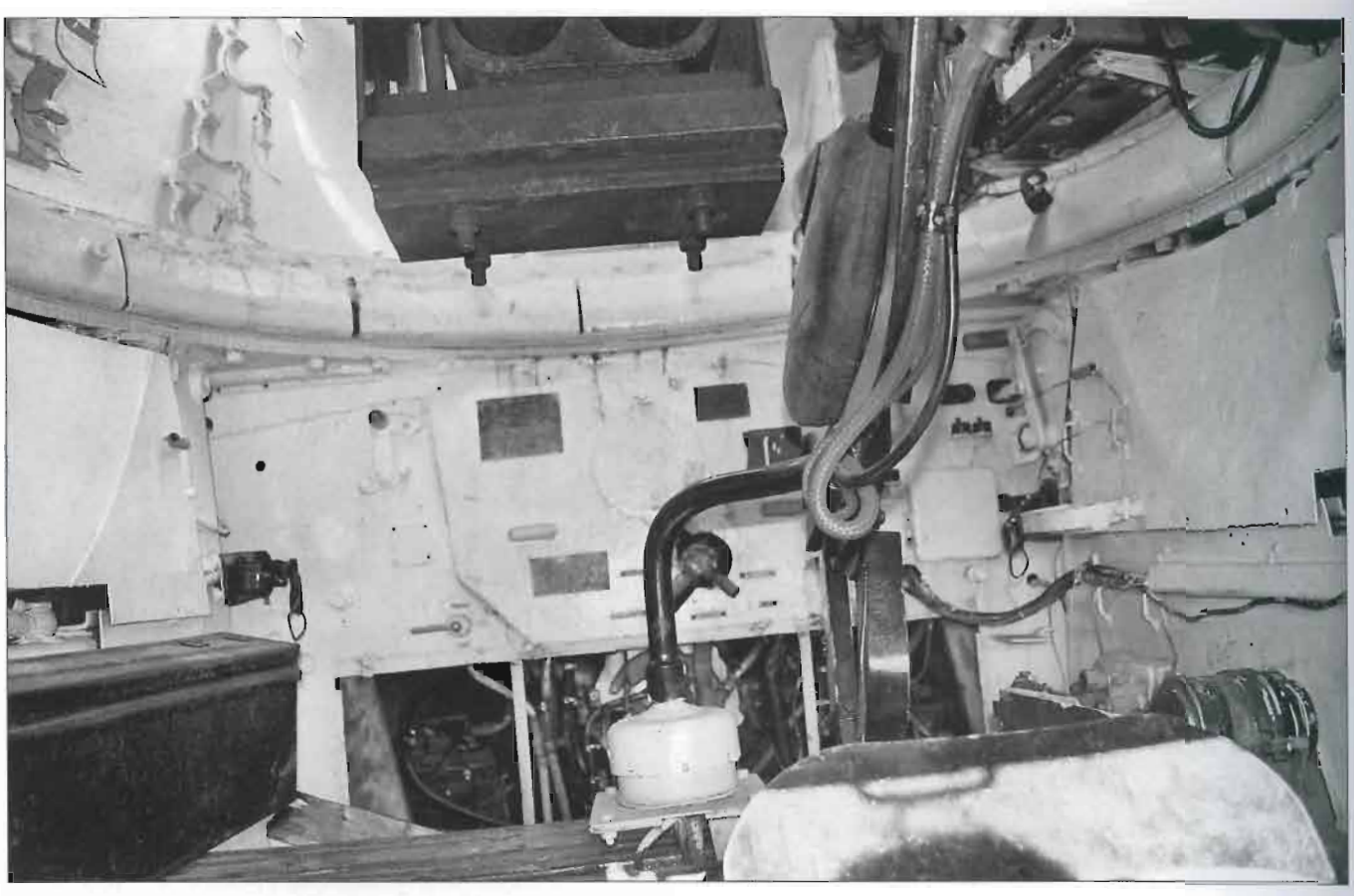
- Author's collection -

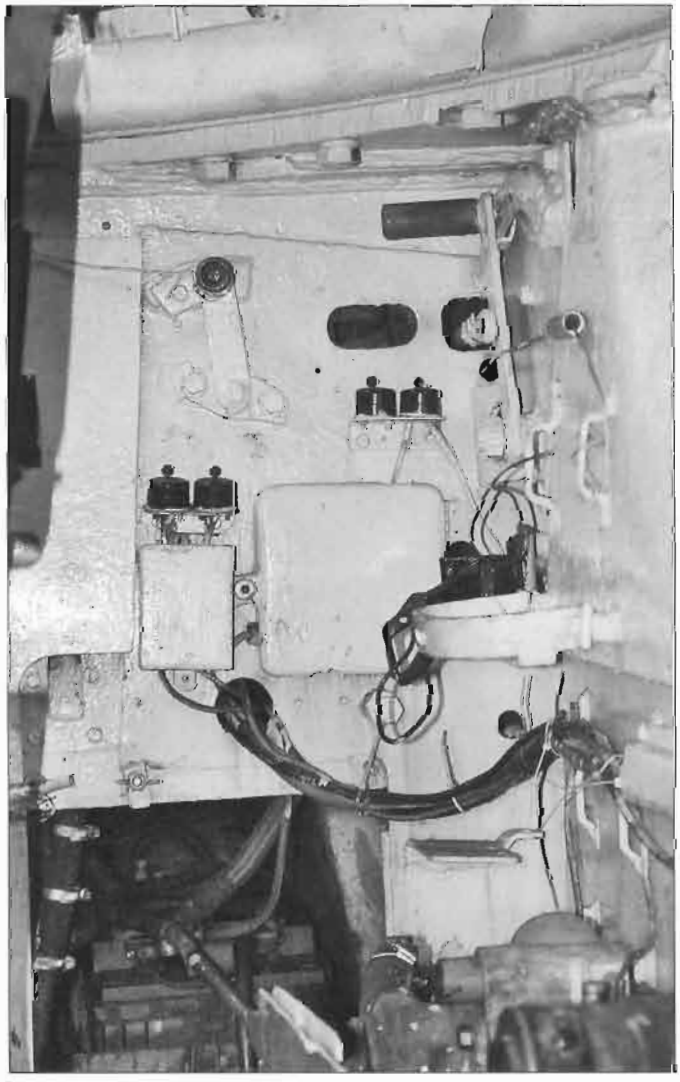




Left and above: Two views of the turret ring and internal fuel tank covers on the right side of the tank. In the photo on the right can be seen the turret traverse lock, which was used when the tank was in motion.

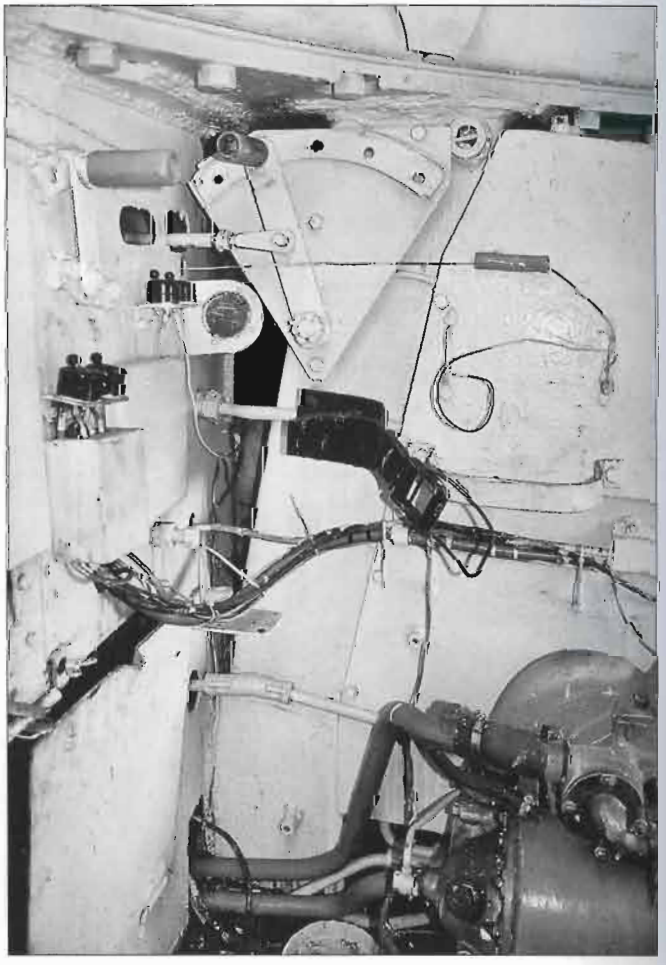
- Author's collection -

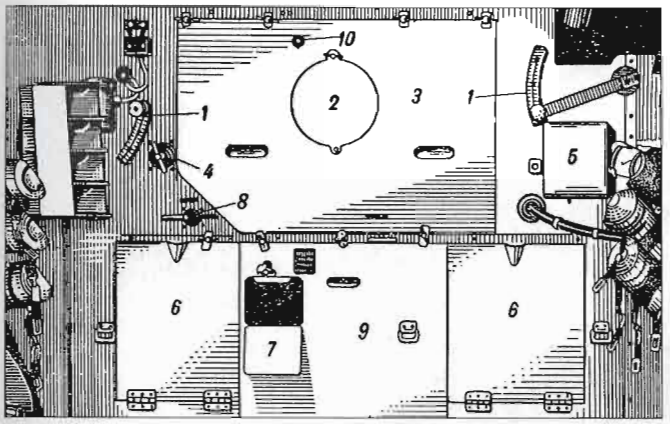




Interior of a Polish-made T–34–85.

- Author's collection -

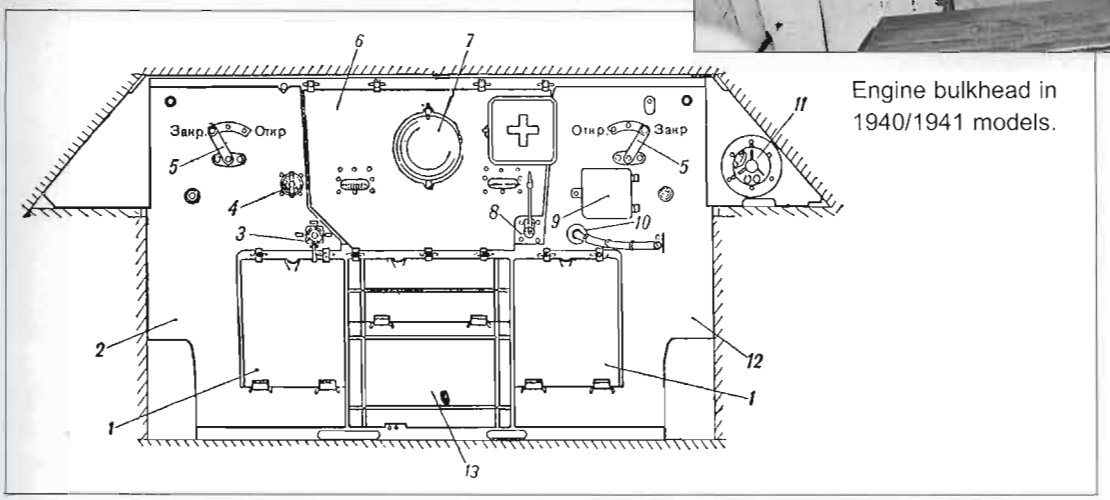




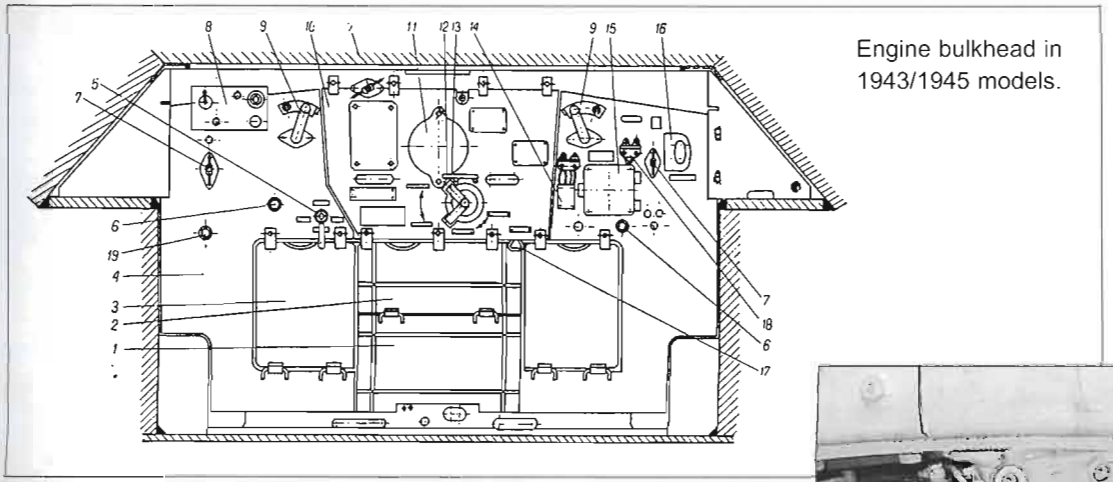
Below: Engine bulkhead in T–34–85 from No.112 Factory.

- Author's collection -





Engine bulkhead in 1940/1941 models.



Engine bulkhead in 1943/1945 models.

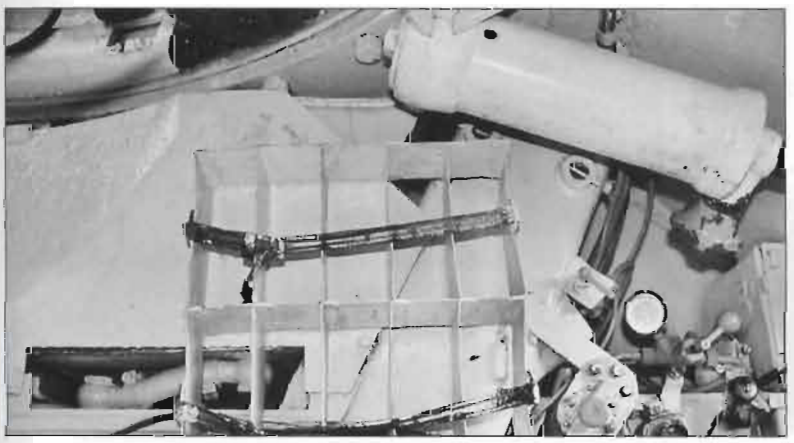
Below: Right rear corner of fighting compartment.

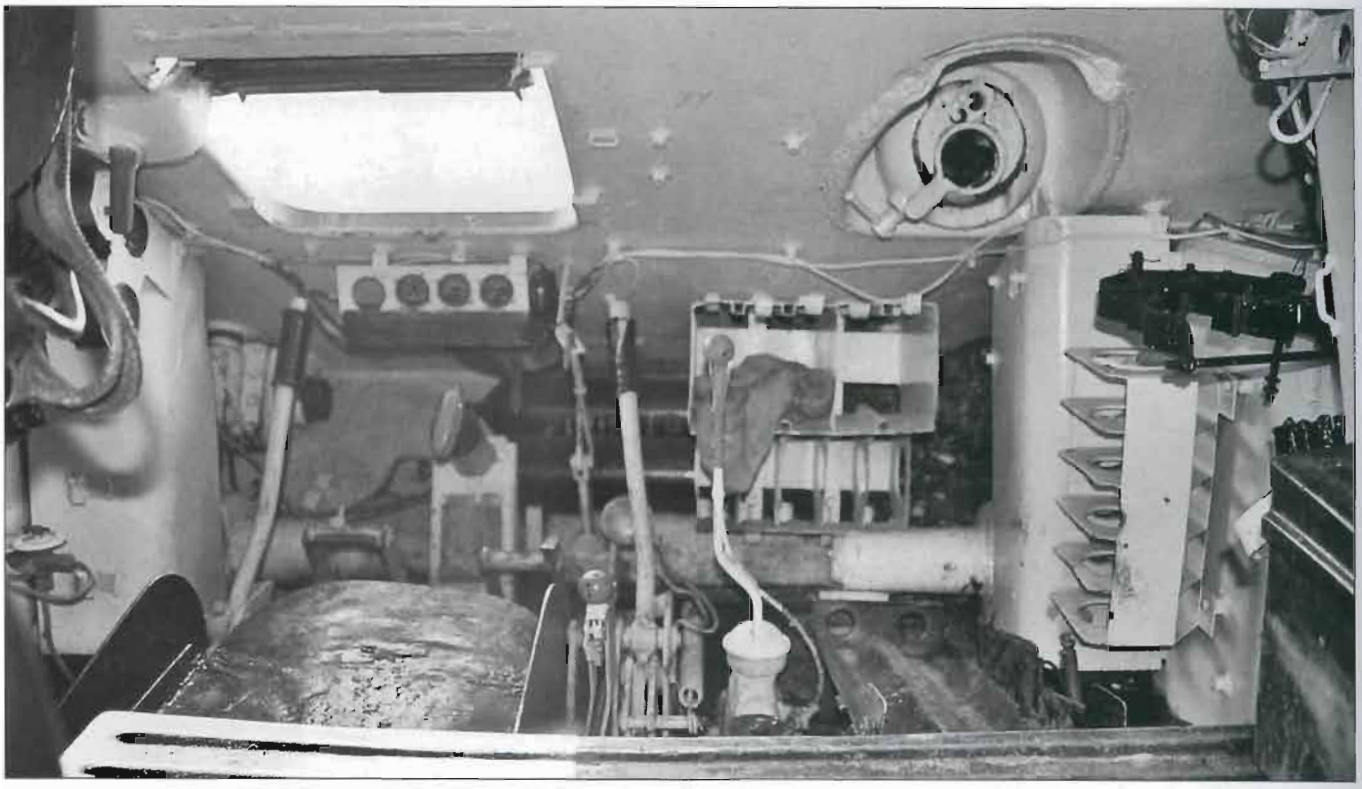
- Author's collection -



Below: Driver's hatch balancing mechanism and MG ammo rack.

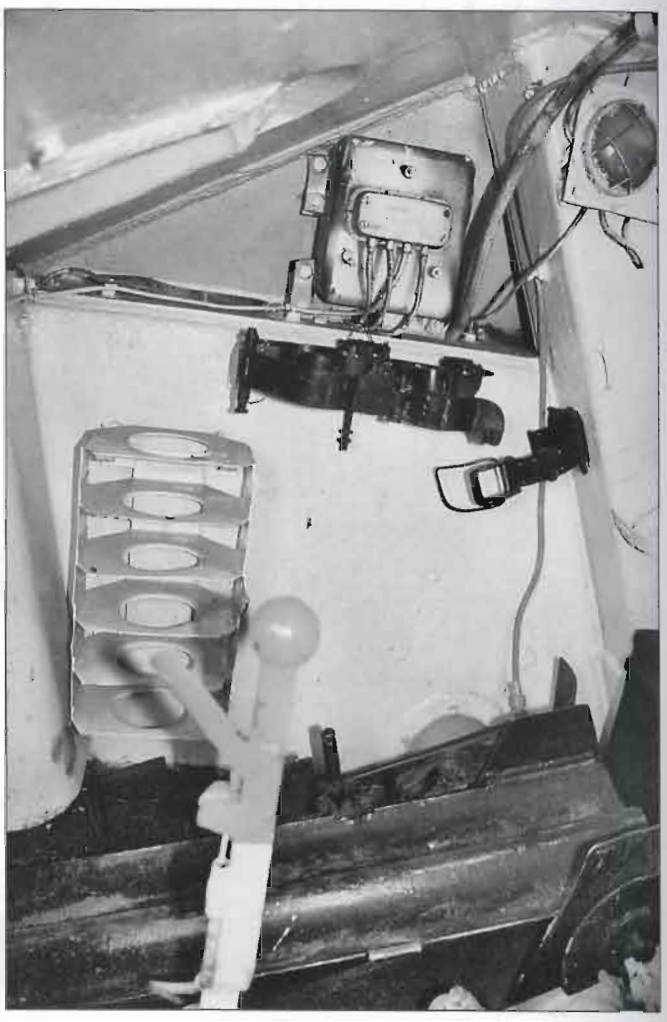
- Author's collection -

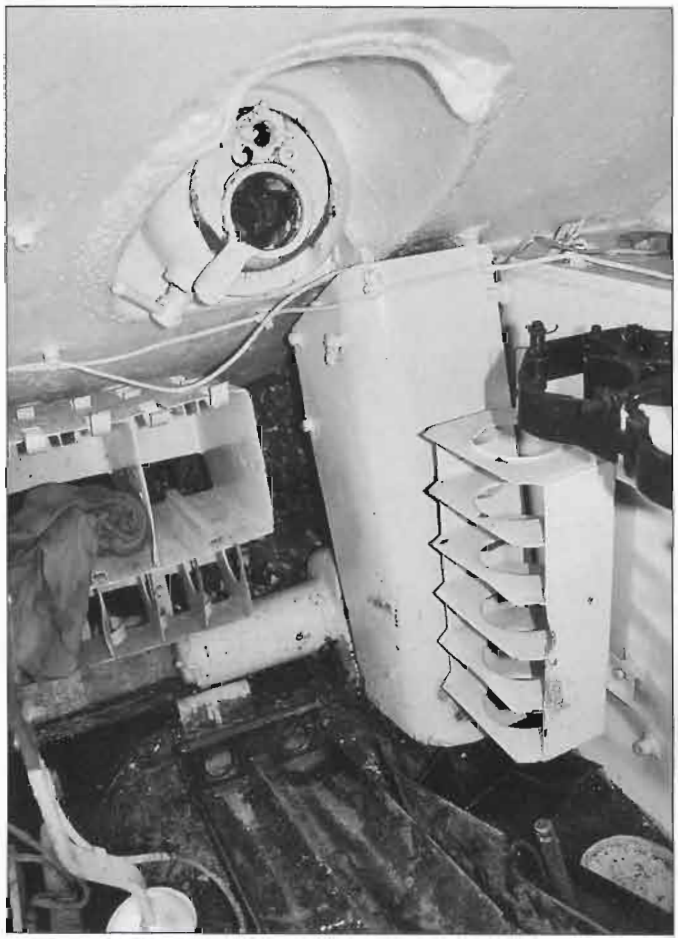


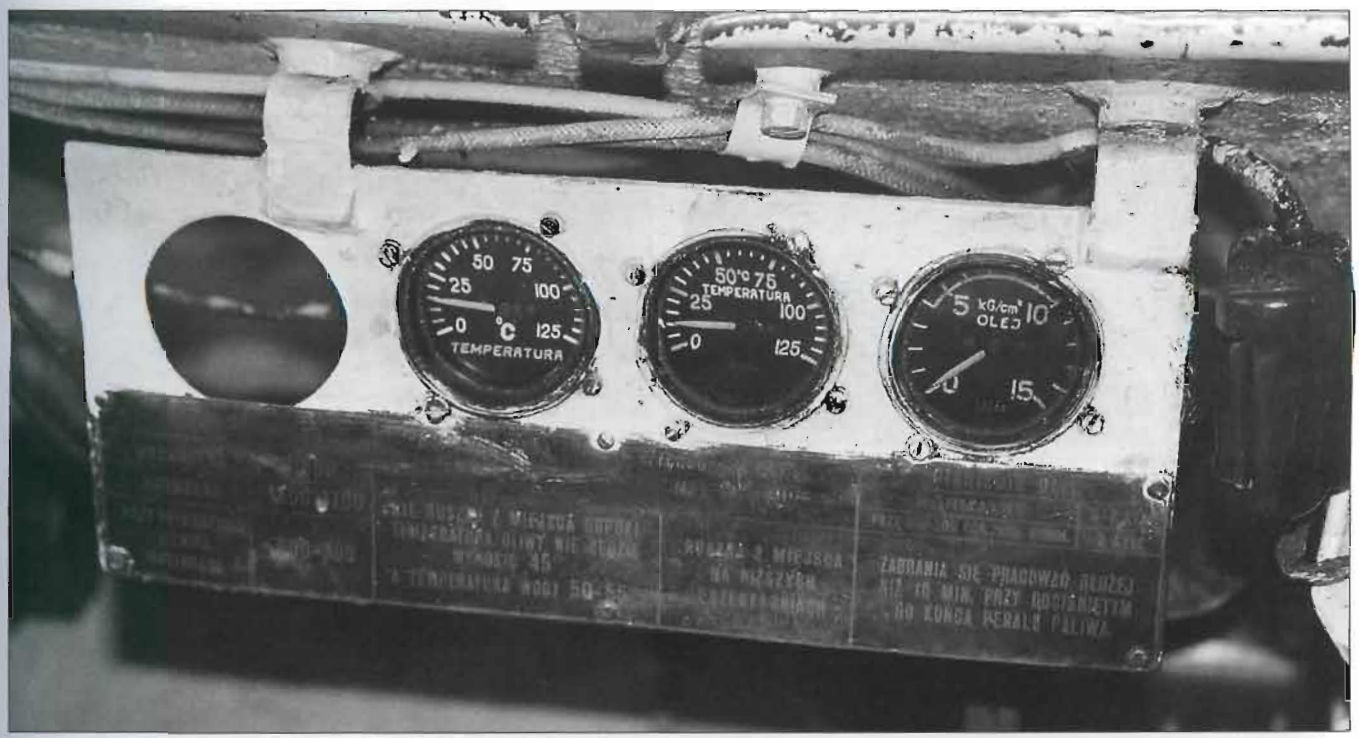


Interior details of Polish-made T–34–85 for a 4-man crew.

- Author's collection -

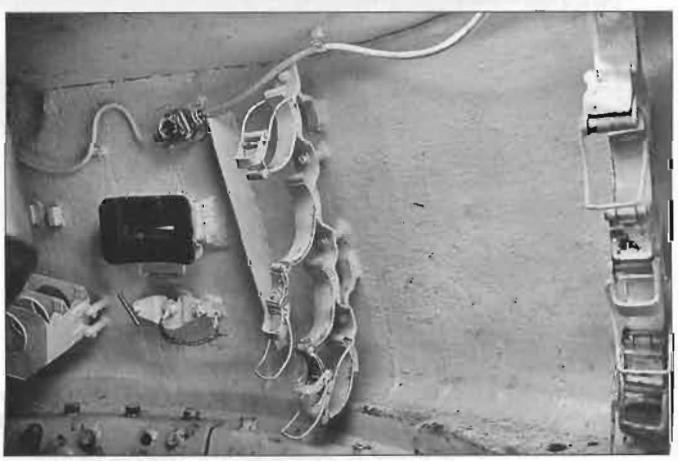






Above: Driver's gauges. Note the missing clock. Originally, it was not painted in white.

- Author's collection -



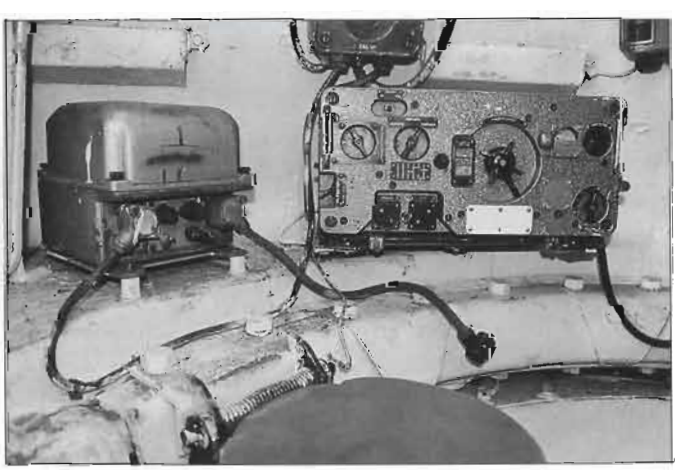
Above: Ammo racks on the right wall of the turret.

- Author's collection -



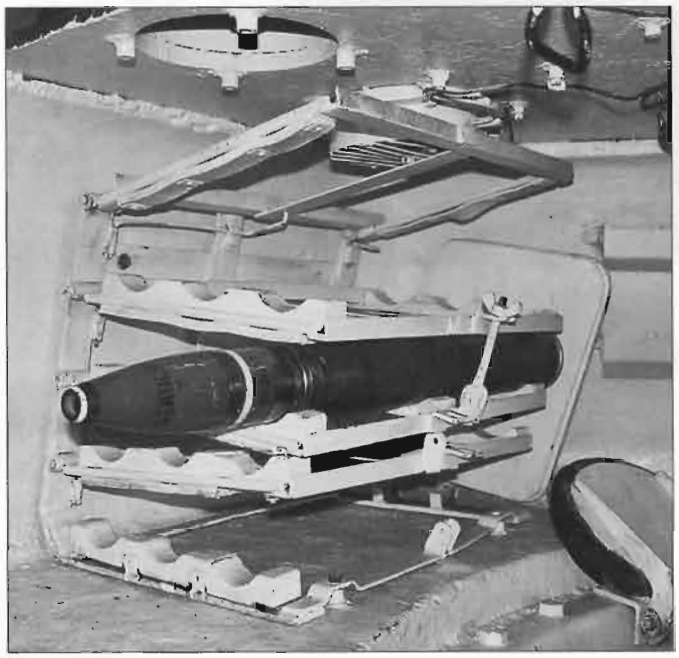
Below: Radio equipment from the 1970s.

- Author's collection -

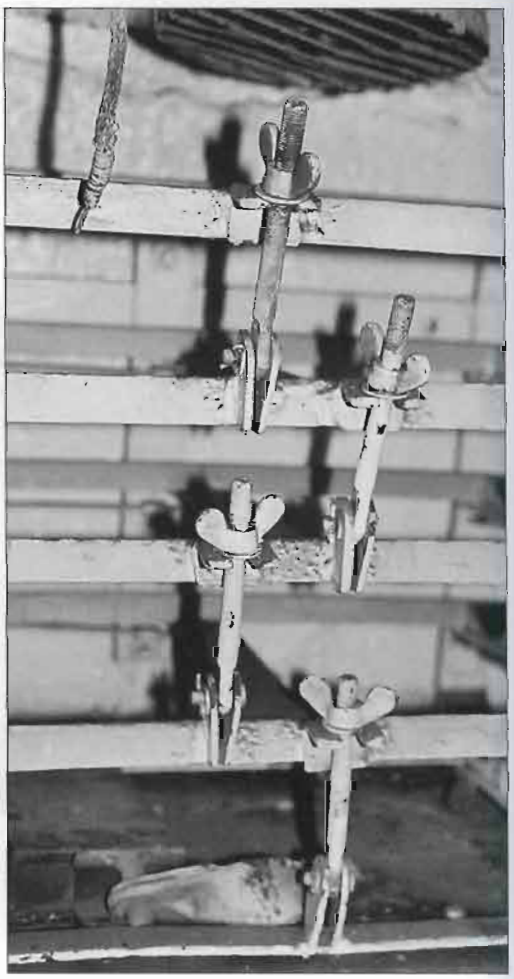






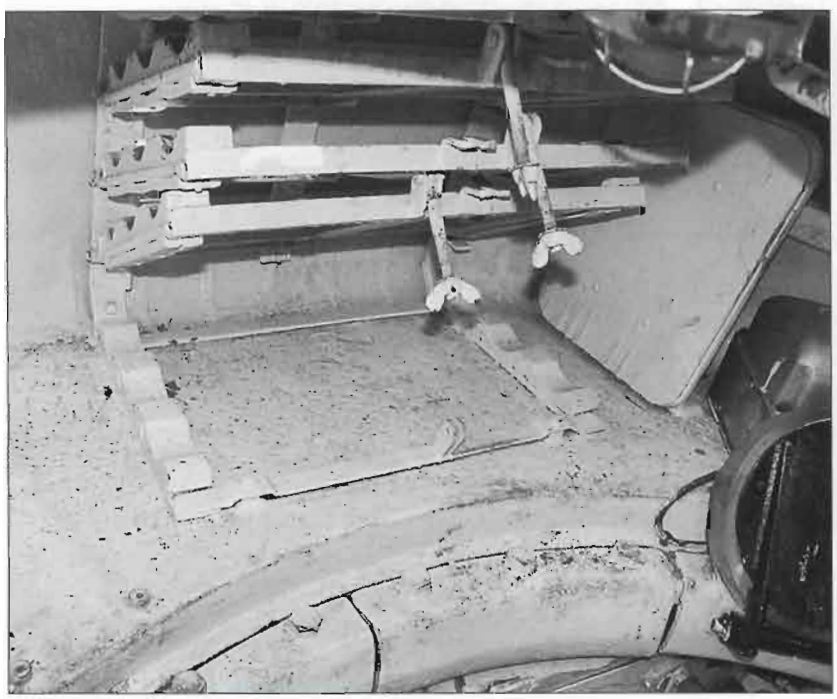


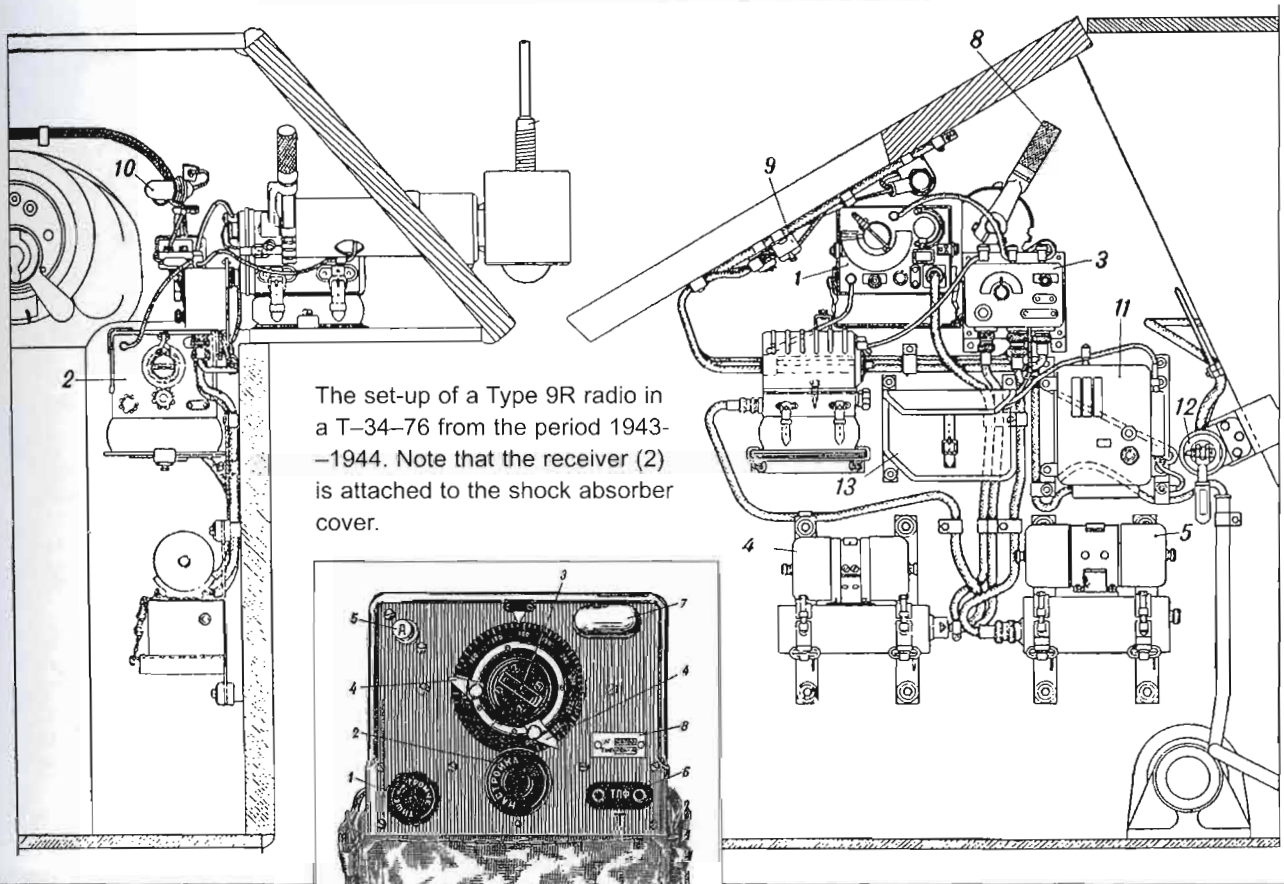




Details of turret rear wall ammo racks from a Polish-made T–34–85 (Except the middle left photo, which is from a tank produced at the No.183 Factory). The ventilator has been removed.

- Author's collection -

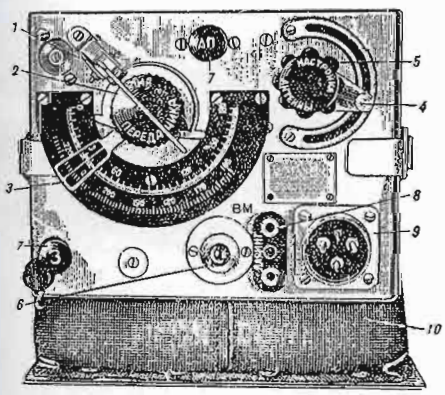


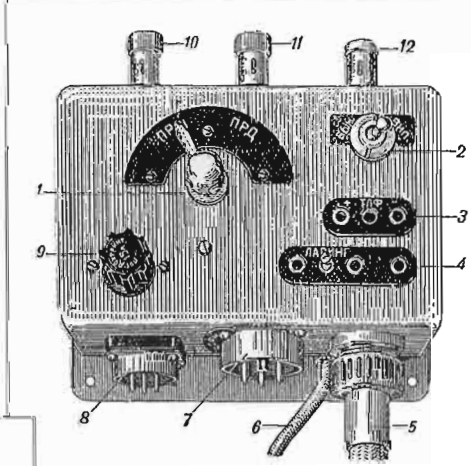


The set-up of a Type 9R radio in a T–34–76 from the period 1943–1944. Note that the receiver (2) is attached to the shock absorber cover.

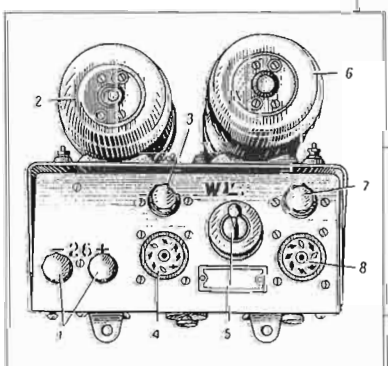
Receiver.

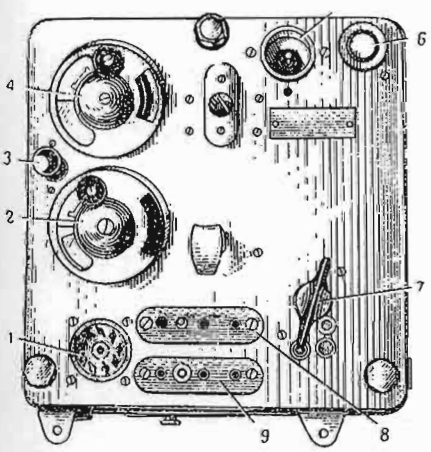
Transmitter



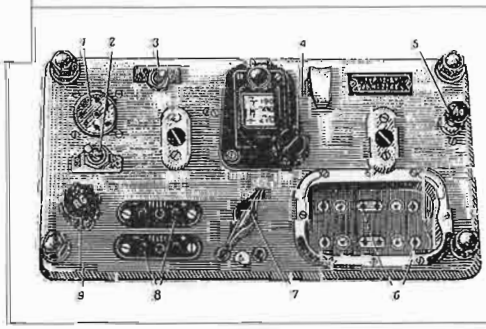


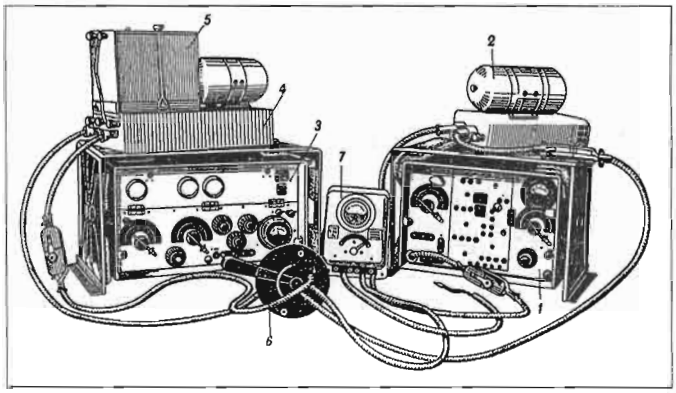
Frequency selector and regulator.



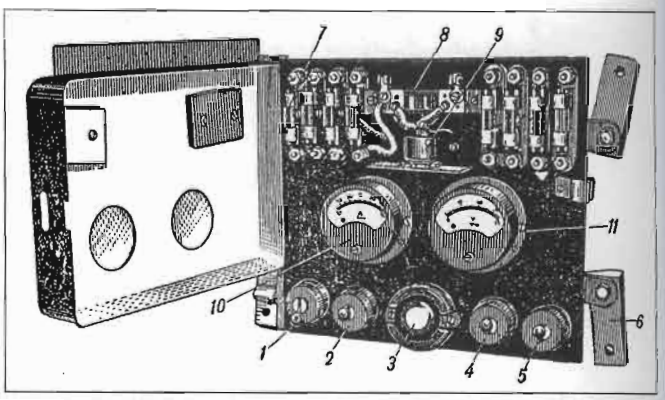


Left, above and right:
A 10RT–26 radio, from left to right: transmitter, power unit, receiver.





Above: Radio Type 71–TK–3 installed in 1940/1941 T–34 models, from the left — receiver, voltage regulator, and transmitter.



Above: Junction box installed on the driver's left, and operated by him.



Right: Commander's cupola on Polish-made tank.

- Author's collection -



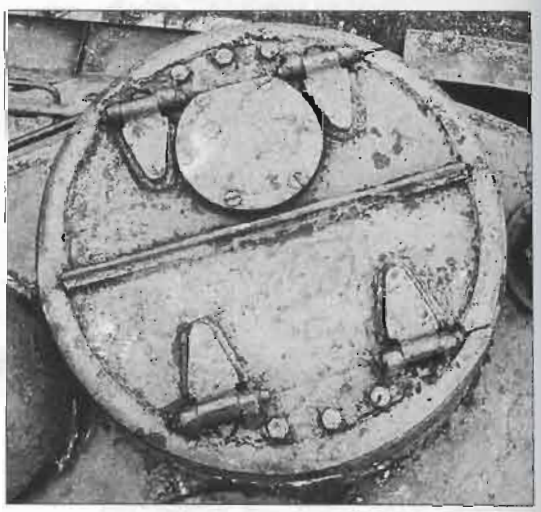


Photos to the right: Commander's cupola from a tank manufactured at the No.174 Factory.

- Author's collection -

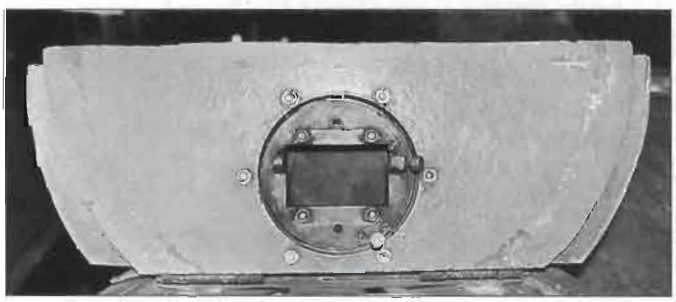


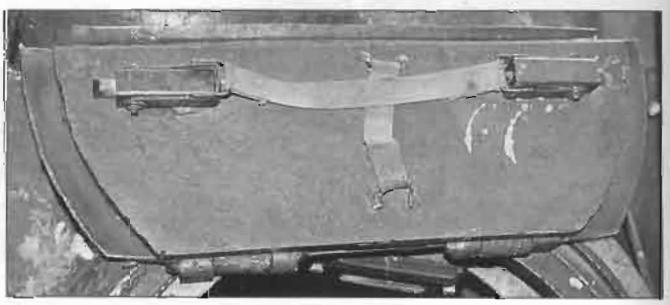


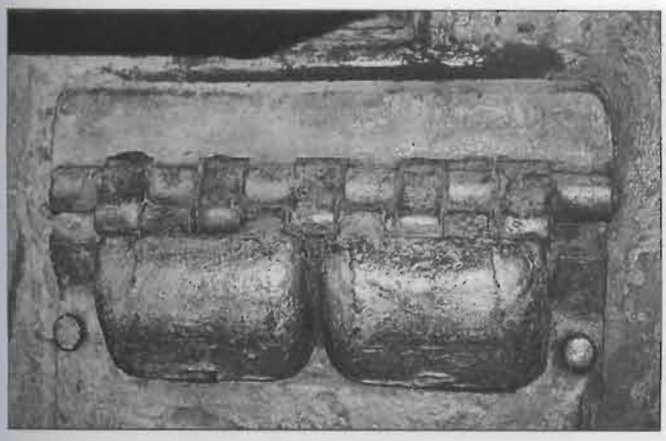


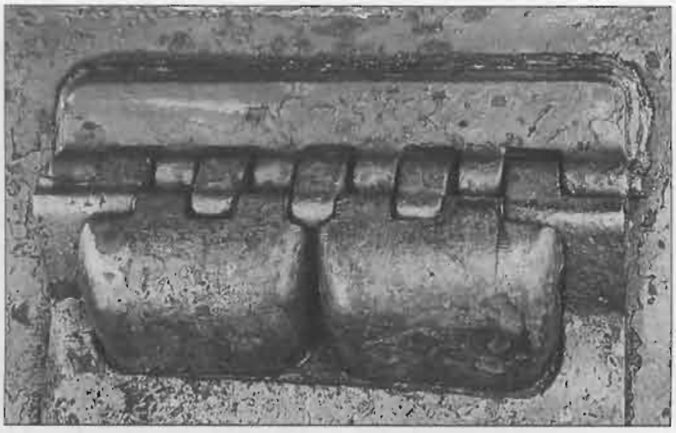
Above and bottom: Inside view of commander's cupola hatches from the No.112 Factory, painted in the exterior color.

- Author's collection -



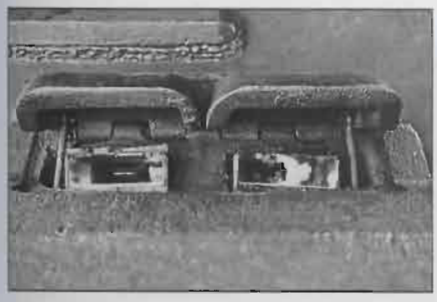






Top: Hinges from driver's hatch, left — No.112 Factory, right — No.183 Factory.

- Author's collection -



Above: Driver's hatch hinges open.

- Author's collection -



Left and below: Commander's cupolas on Polish-made tanks — with different ring brackets to install "chimney" for river crossings.

- Author's collection -







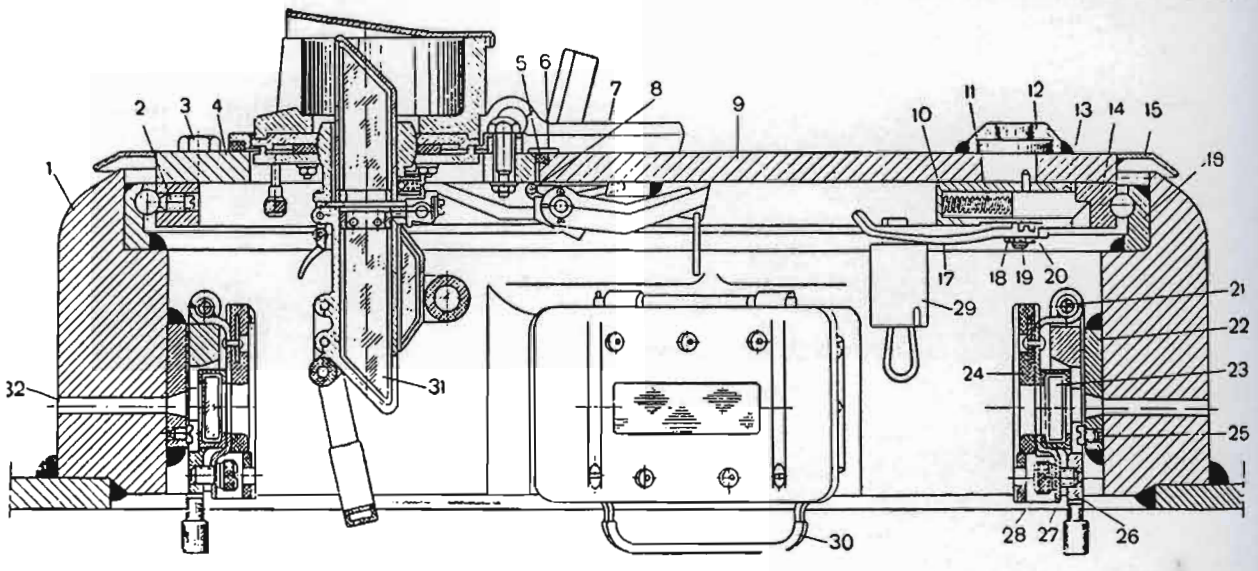
Left and below: Loader's and driver's hatch, also painted in exterior color.

- Author's collection -





Cross-section of commander's cupola.

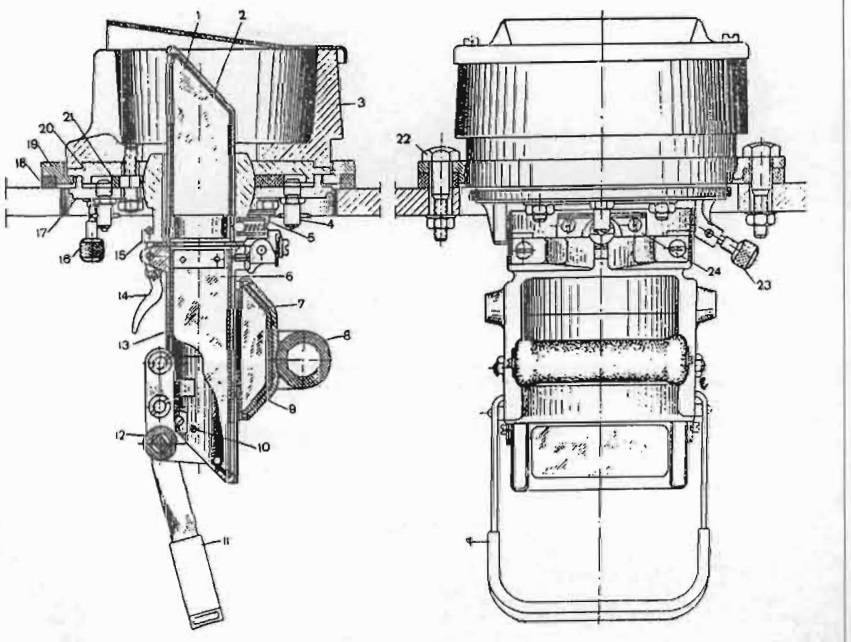






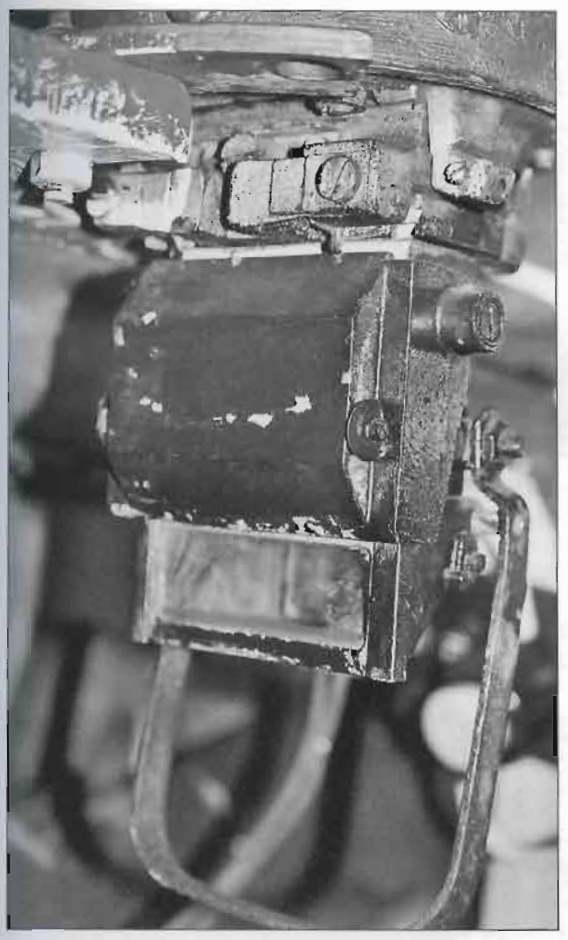
Above: Early type cupola, without periscope cover.

- Author's collection -

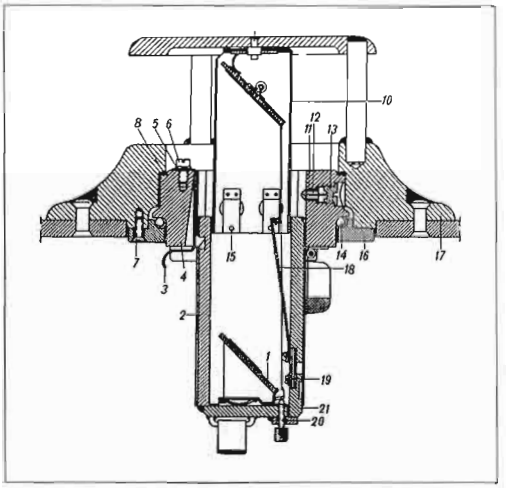


MK–4 periscope, standard equipment for T–34–85.

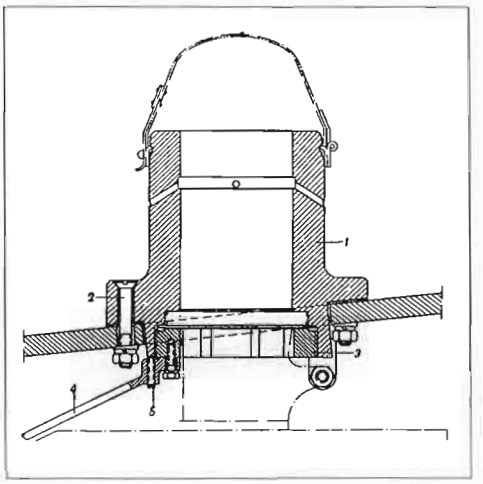




Right:
SPKO periscope.

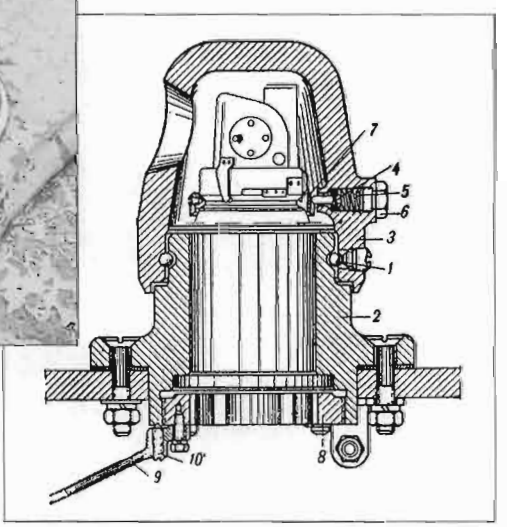


Below: First type of periscope cover, used until beginning of 1942.









Left drawing and all photos below: PT–7 periscope (and later models). It was installed in a new cover, whose top part was screwed on.

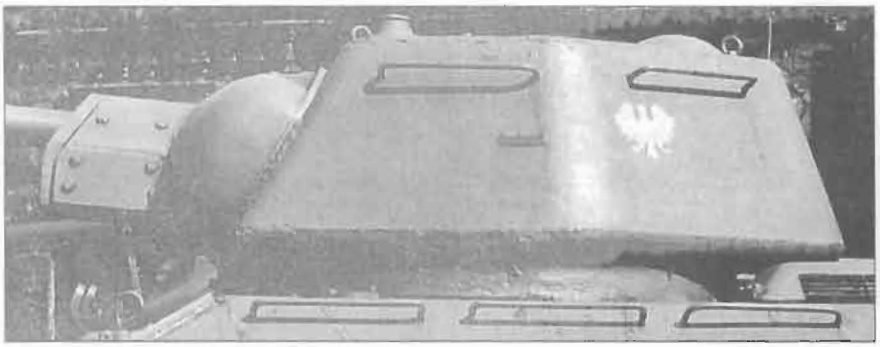
- Author's collection -











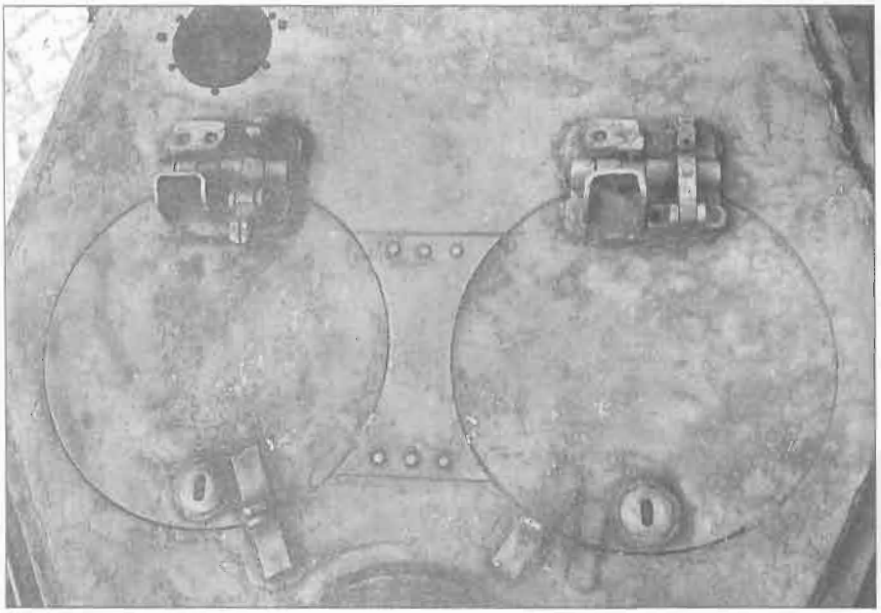
Above and below: Two types of hexagonal turret — softedge and hardedge. Neither has the segment between the hatches, seen in the close-up photo (below).

- Author's collection -









Above: Close view of the separate plate between hatches in turrets produced in 1942.

- Author's collection -



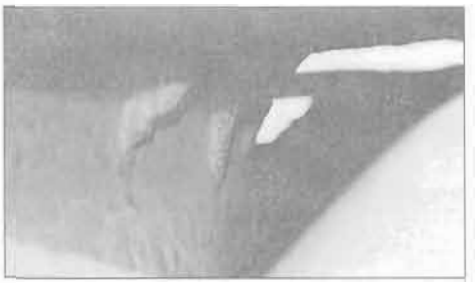
Right: Additional armor plate that appeared on the hexagonal turrets in the summer of 1942.

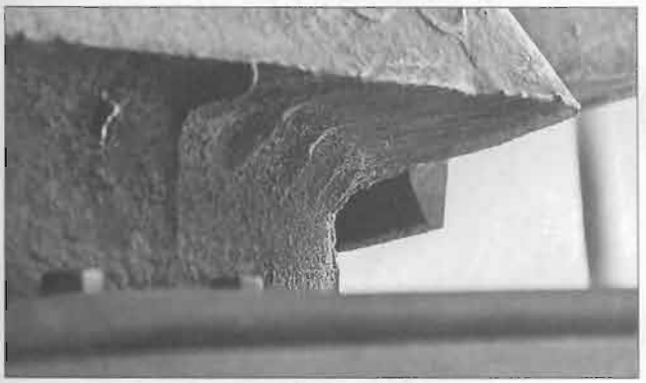
- Author's collection -



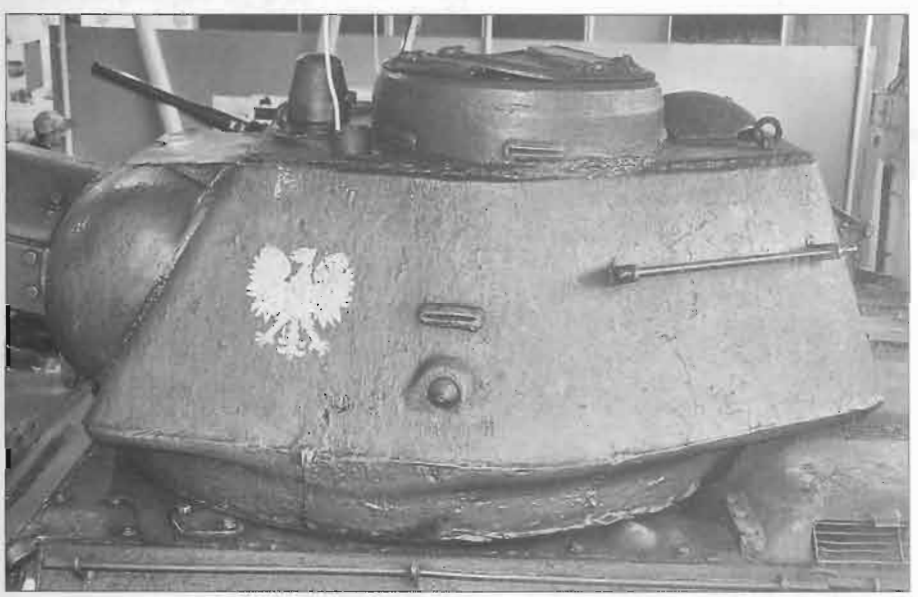
Left, right and lower left: Ribs on the back of the turret ring shielding. They are there, even though not visible.

- Author's collection -



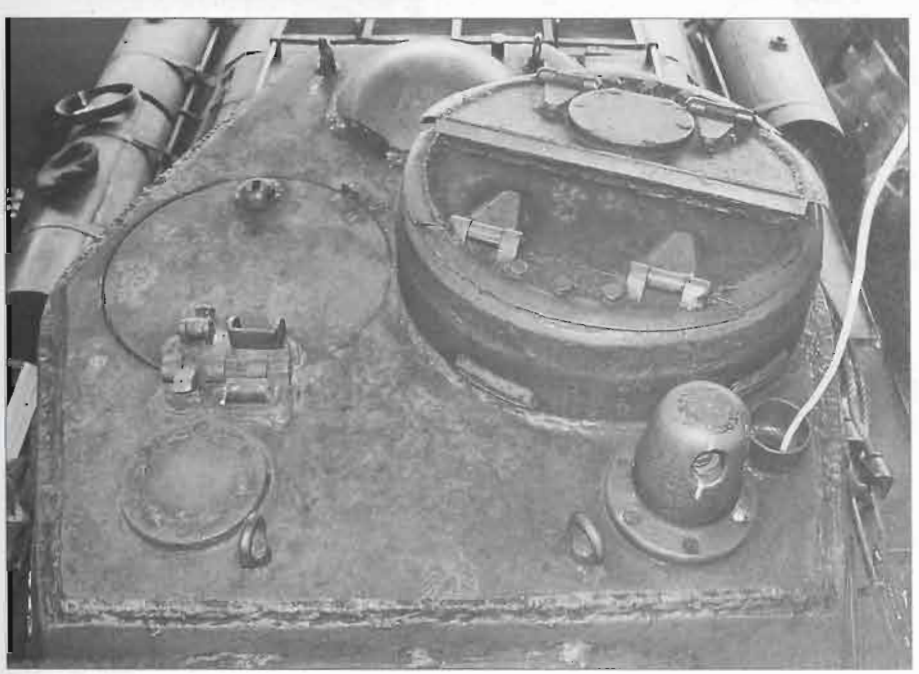






Above: Softedge hexagonal turret with commander's cupola, antenna mount and two periscopes (tank of No.174 Factory). It has a very rough finish.

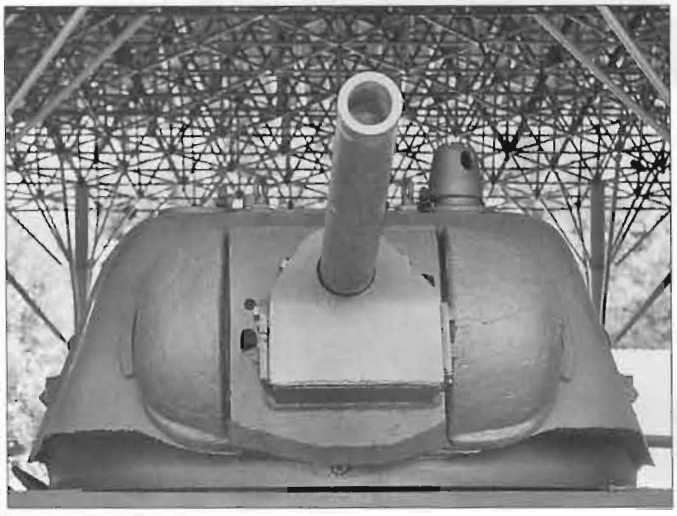
- Author's collection -



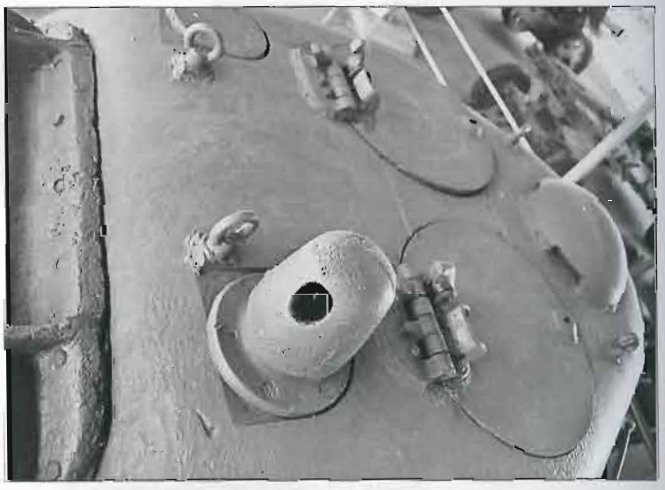
Left and middle: Two photos of softedge hexagonal turret, with commander's cupola, antenna mount, one periscope and a finish smoother than in inset photo. On such turrets, it was extremely rare to see the MK–4 periscope on the commander's hatch. It is interesting that, on T–34K command vehicles with only one periscope (such as in photos on the left), this periscope was installed over the commander's station (who operated the radio and had a telescopic sight) rather than over the loader's station.

- Author's collection -









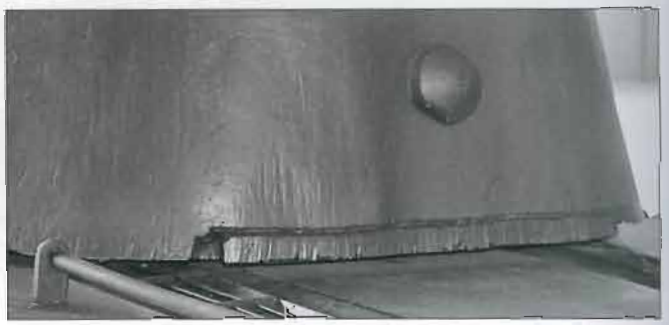
Stamped, hexagonal turret with a 76.2 mm gun. This was one of the rarest versions of the turret and, at this time, there is only one such preserved example (Lesany Museum, Czech Republic). The details seen in the photos from the museum allow to eliminate mistakes often repeated in the line drawings published in other publications.

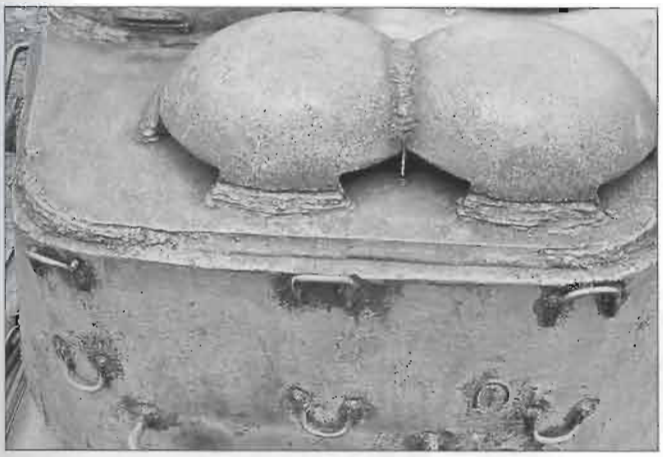
- Author's collection -













Top: Two photos show the differences between the "softedge" (No.183) and "alternate" turrets.

- Author's collection -

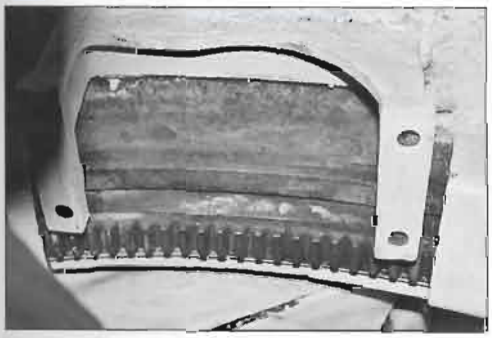


Left, right and below: Details of an "alternative" turret. Note the big gap between gun barrel and its cover (below).

- Author's collection -



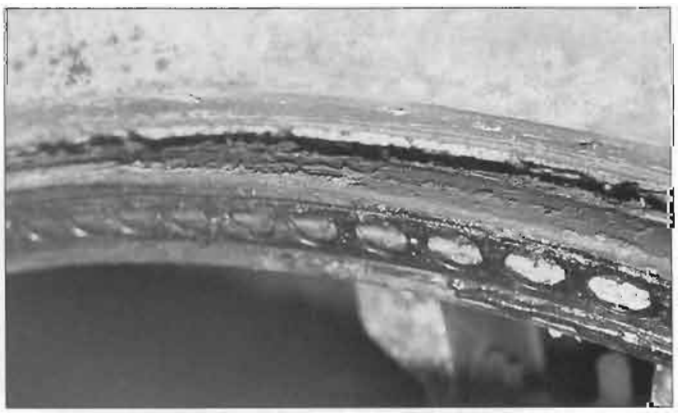




Left and bottom: Details of the turret ring. Note the thin armor protection of the ring.

- Author's collection -









Top and right: Detail of the 2nd version turret produced at the No.112 Factory, starting from spring 1944. This version had a gun mantle for the ZIS–S–53 gun.

- Author's collection -

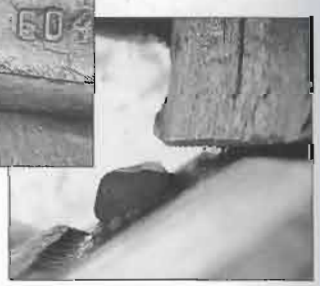


All photos below: Detail photos of the "large" turret from the No.112 Factory. The photo at the top clearly shows how low the turret's rear sat. The bottom photo shows in detail the proportions of the turret and hull.

- Author's collection -



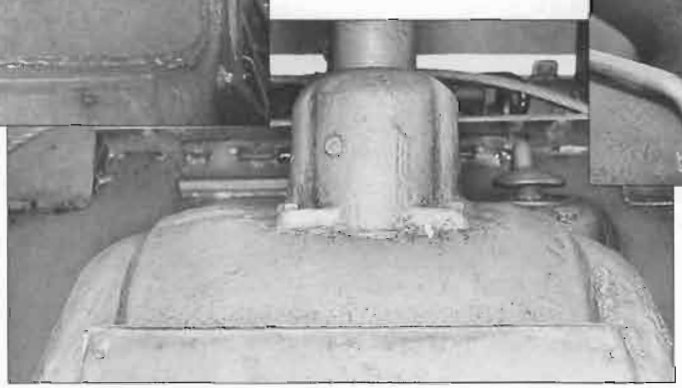


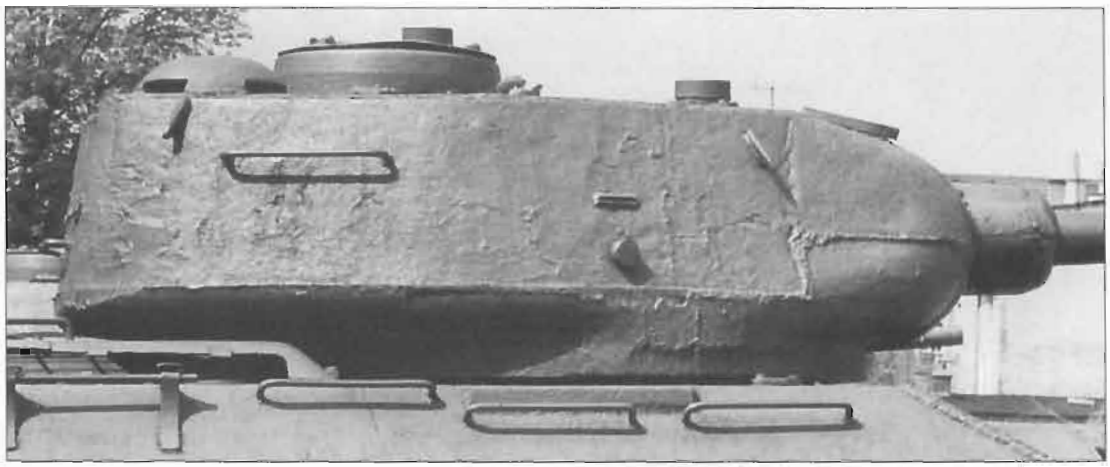








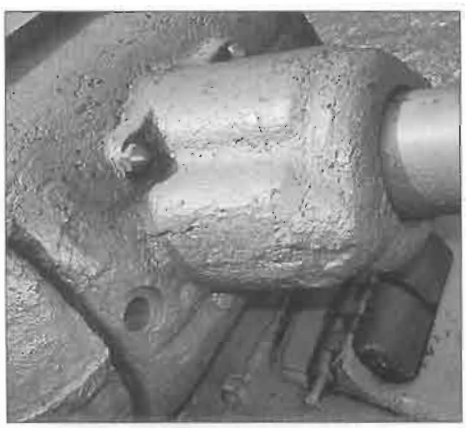


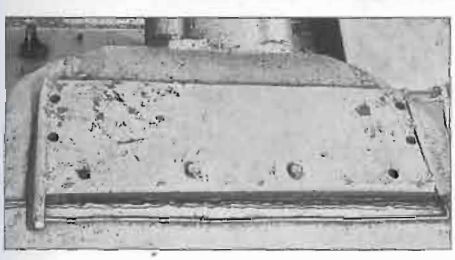




Close-up details of a turret from the No.174 Factory.

- Author's collection -





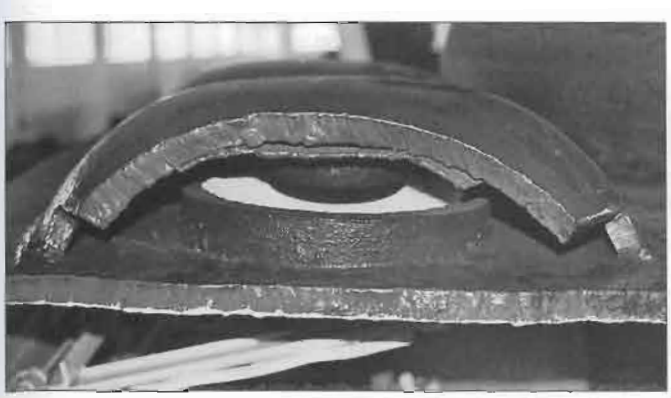


Below: A cut-away of one of the ventilators.

- Author's collection -

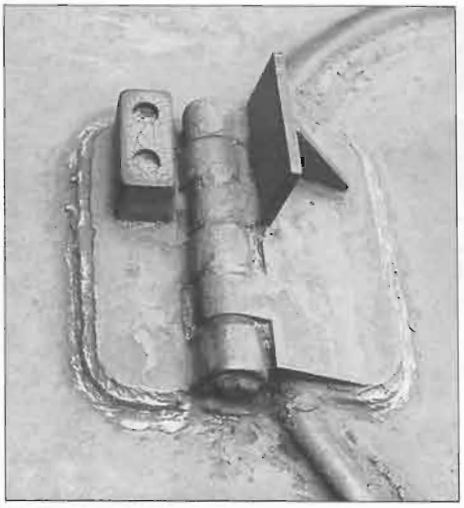
Below: Lower part of the rear of No.112 produced turret.

- Author's collection -









Left and below: Hatch hinges on different turrets.

- Author's collection -





Close-up views of a No.183 Factory turret.





Above: Detail of turrets produced at the No.183 Factory. Above left: initial series production from 1944, above right: produced from end of 1944.

- Author's collection -

Below: the rounding of the front part of the turret body is hard to see.

- Author's collection -









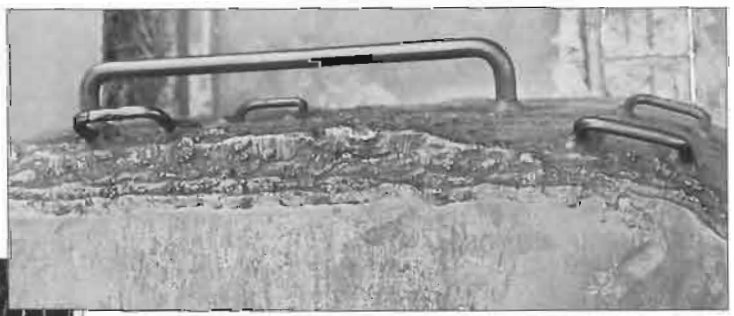
Above: Different turret lifting hooks: left "112", right "183".

- Author's collection -

Above and below: Side and front view of the 2nd version turret from the No.112 Factory.

- Author's collection -

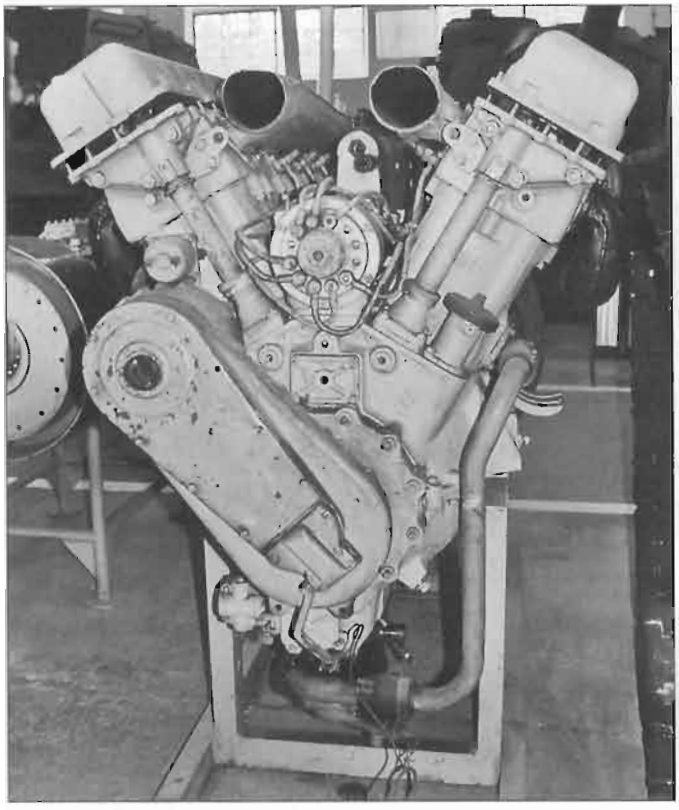


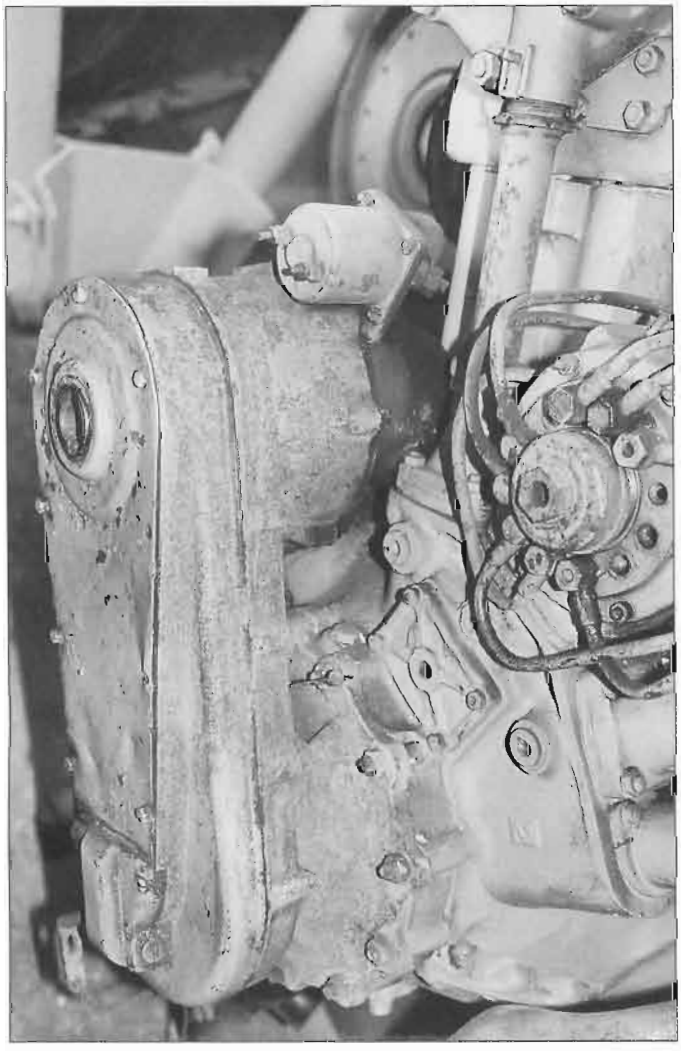


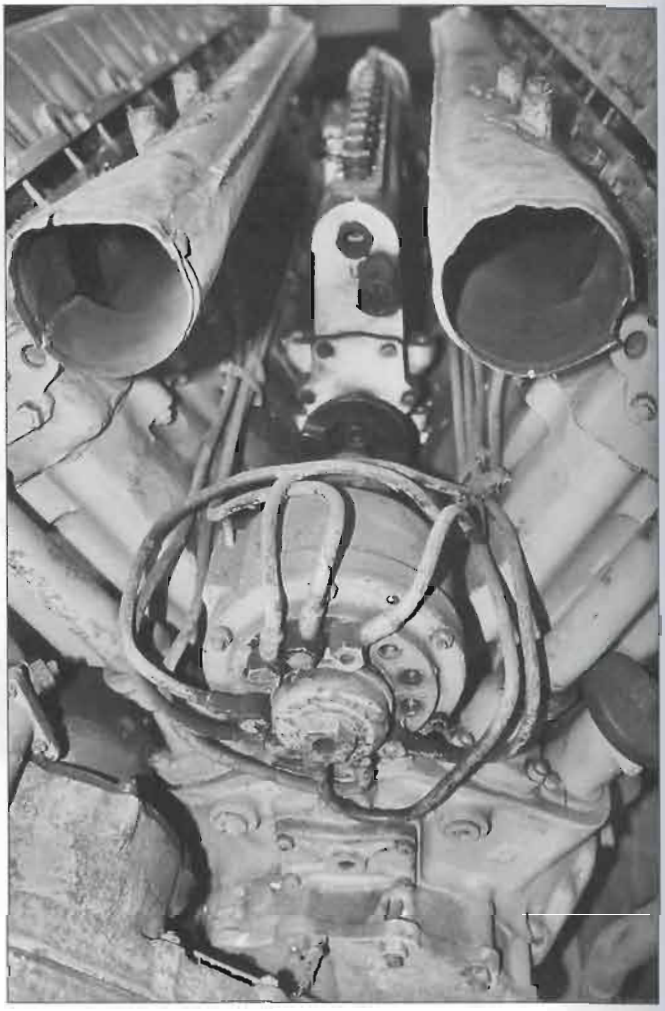


Left and above: Different ways of producing turrets, left — No.183 Factory, above — 2nd version of No.112 Factory production.

- Author's collection -







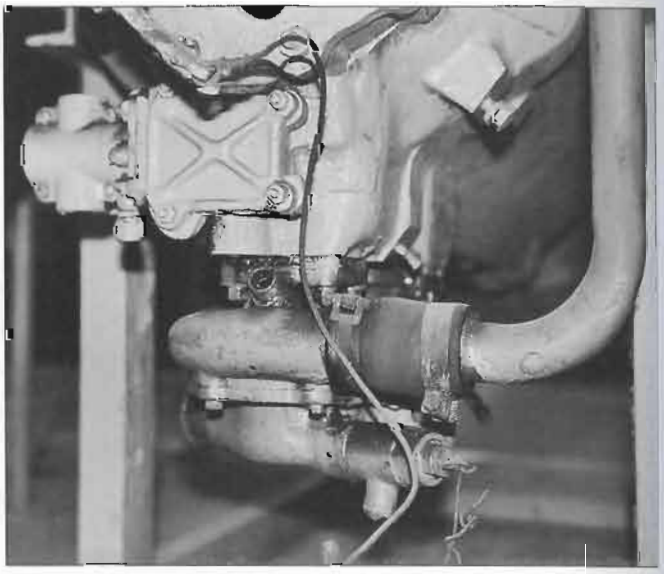
V–2–34 engine and its details.

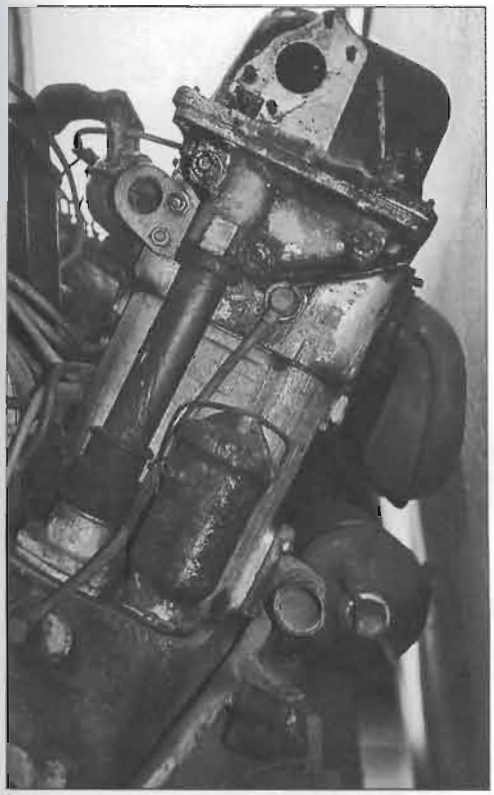
Top: Between the rows of cylinders, is visible the air distributor, behind it the fuel injection pump, and then the exhaust collectors.

- Author's collection -

Bottom: Water pump.

- Author's collection -



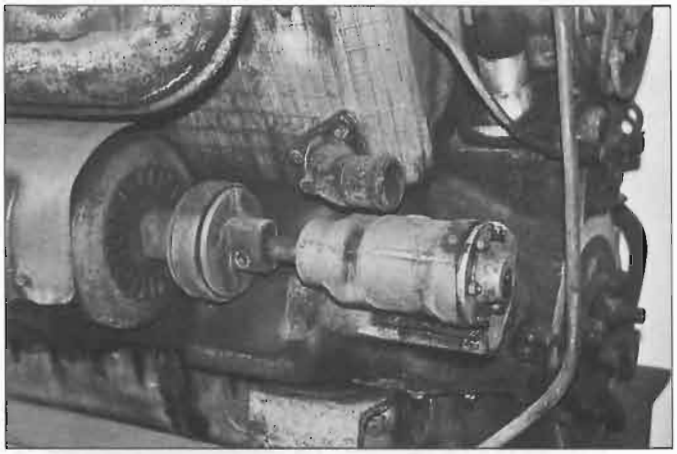


Above: Right cylinder.

- Author's collection -

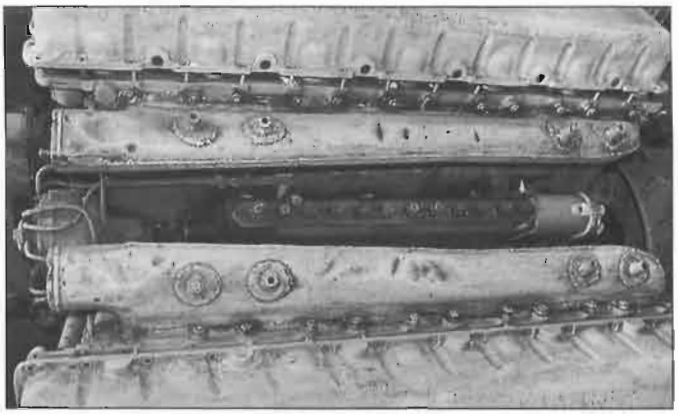
Right:
Alternator.

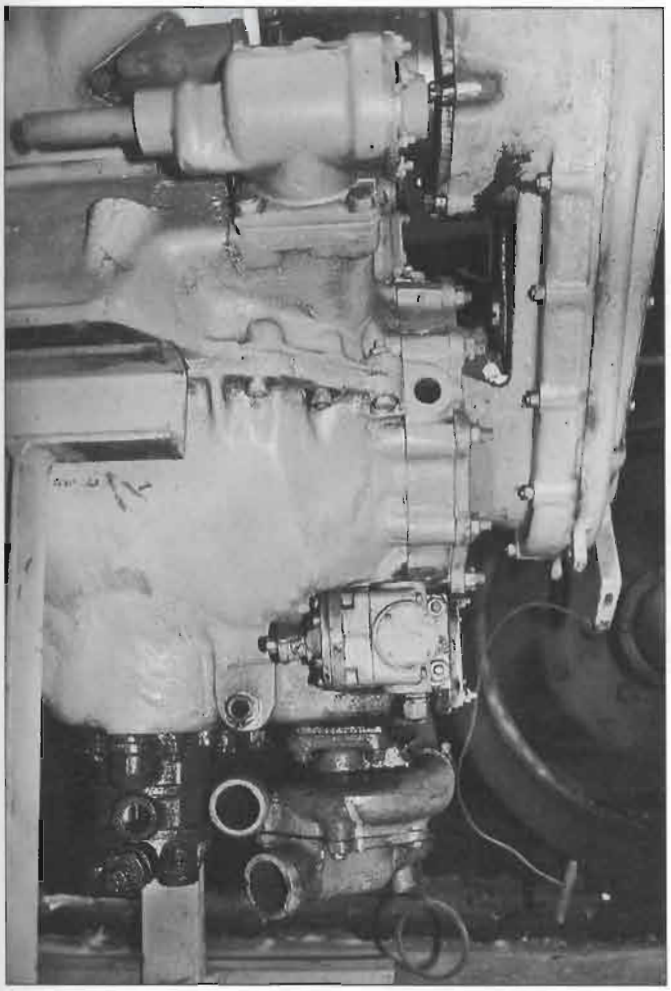
- Author's collection -



Right:
Top view of the engine, with injection pump in the middle.

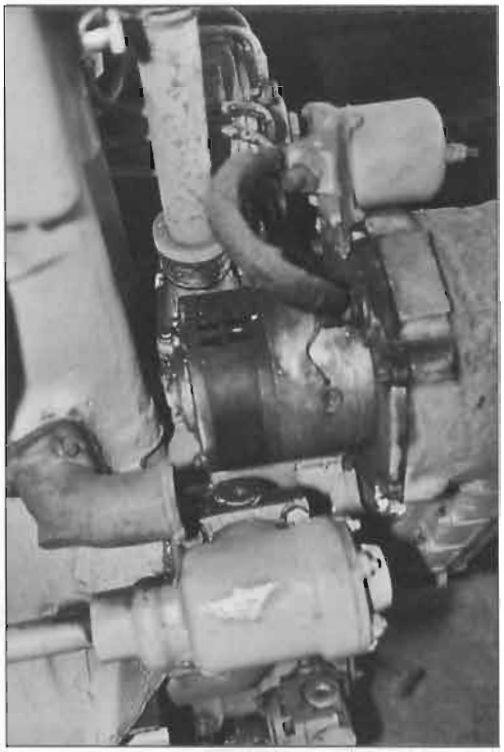
- Author's collection -





Water pump visible at bottom of the engine.

- Author's collection -

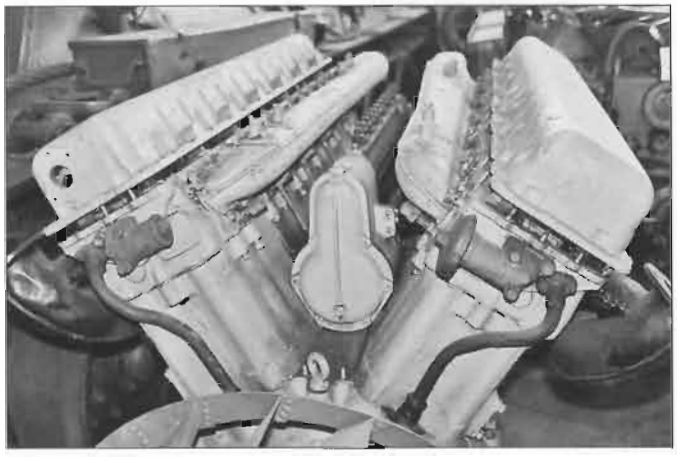


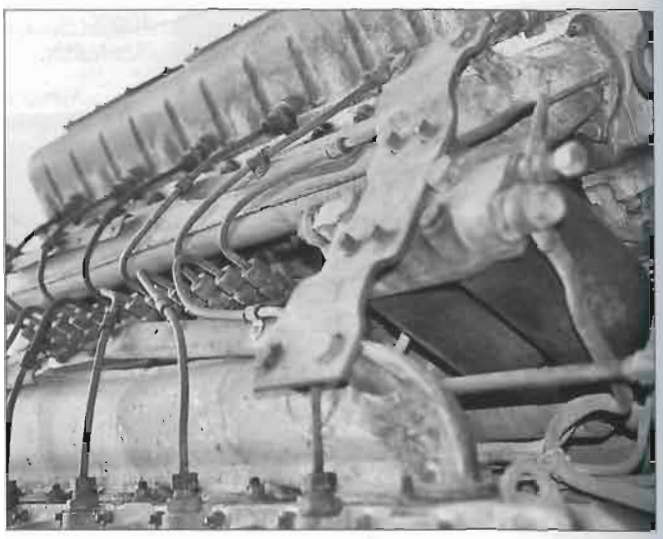
Alternator (bottom of photo).

- Author's collection -

Below: Engine blocks seen from rear of engine.

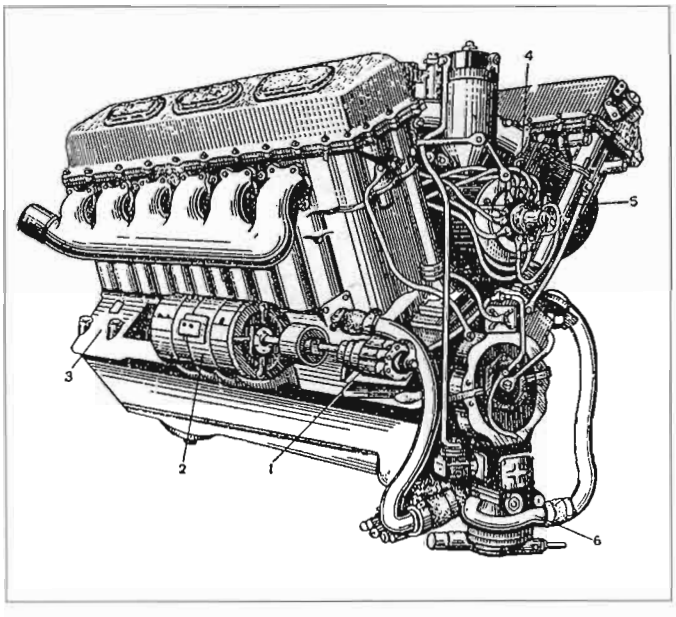
- Author's collection -

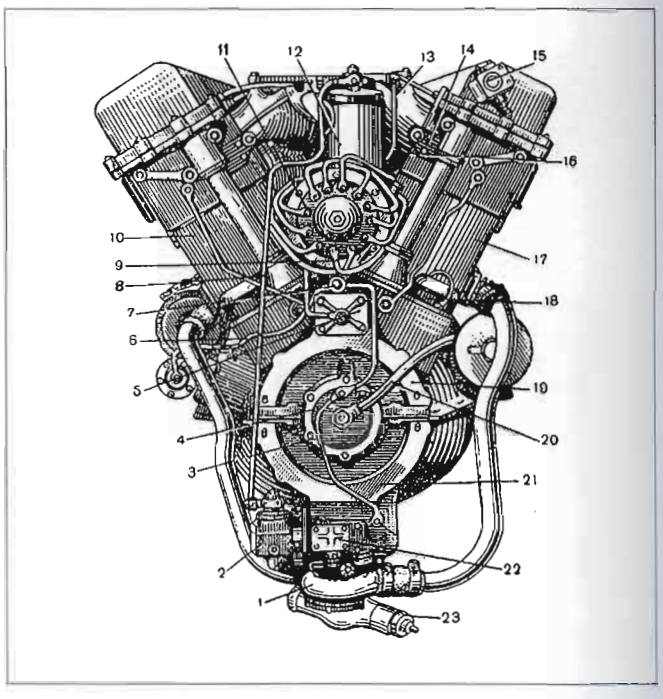




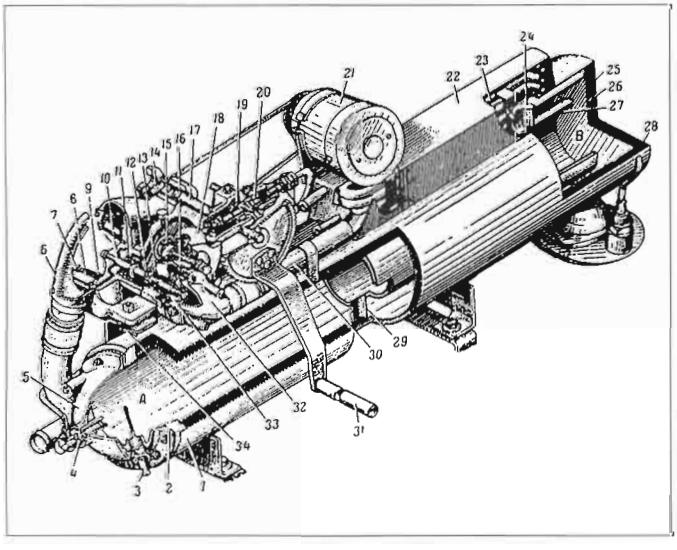
Above: High pressure lines connecting the fuel injection pump to the engine cylinders.

- Author's collection -





Detailed drawings of the engine.



Below: Starter heater (modification of 60s).

- Author's collection -





Engine (V–2–34–II) change in the field.

- Author's collection -



Left and below: Overall view of a T–34 composed of a hull from the No.112 Factory and a cast turret from the No.183 Factory.

- Author's collection -



Below: Engine compartment, showing the fuel tank and the fitting for the air filter; this modification is from the end of the 1950s.

- Author's collection -



The hull plate joints.

Bottom left: Top view of the rear-side corner of the hull (right side and rear).
Bottom middle: Top-side next to the turret.
Bottom right: Front-top-side corner; the wide welds can be seen easily.

- Author's collection -











Left and below: Castings of the machinegun mantle and the driver's hatch — the spots where the casting was cut away from the form can be seen easily — a peculiarity of the No.112 Factory.

- Author's collection -



Above and below: A view and close-up of the driver's hatch, showing its armor bar protecting against infantry firearms splinters.

- Author's collection -



Two photos below: Views of the front and rear of the turret; showing the roughness of the castings and the linking seams.

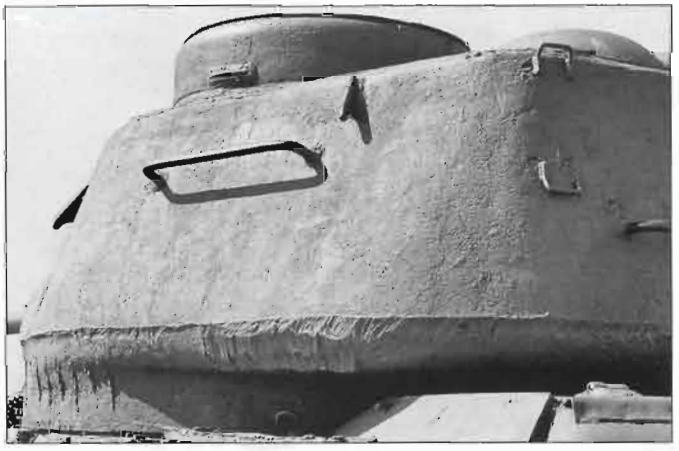
- Author's collection -

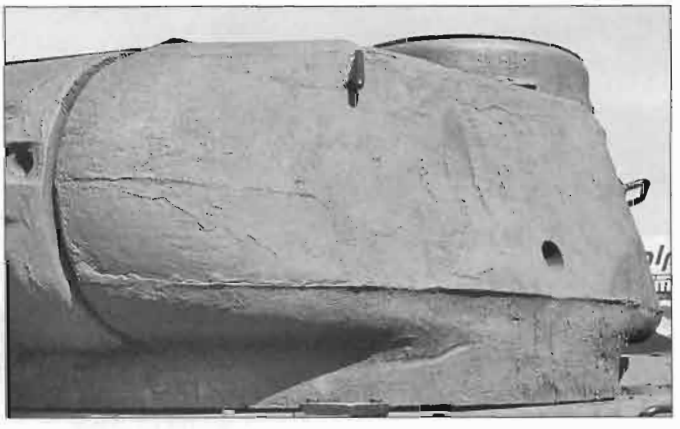




Above, right and below: Views of welded joints of the turret top.

- Author's collection -









Left, below and right: Close-ups of casting overflows on the front of the turret, which overlapped the edge of the frontal part of the turret plate - a characteristic of immediate post-war production.

- Author's collection -







Above and right: Overall view of a T–34 produced at the beginning of 1945 at the No.112 Factory. It has the "mushroom" turret, which was similar to the large turret from the same factory and from the same time period.

- Author's collection -







Left, above and below: Overall view of a T–34 produced at the beginning of 1945 at the No.112 Factory. It has the "mushroom" turret, which was similar to the large turret from the same factory and from the same time period.

- Author's collection -

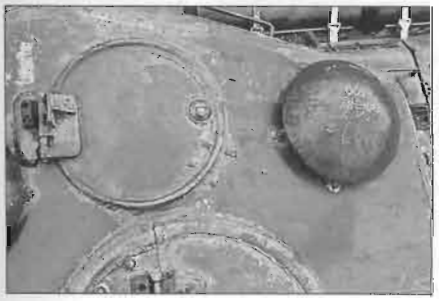




Left, right and bottom: Photographs of the ventilator covers on the turret, which looked like mushroom tops.

- Author's collection -











Photos left, right and below: Photographs of the "mushroom" turret, showing its proportions, texture and details.

- Author's collection -







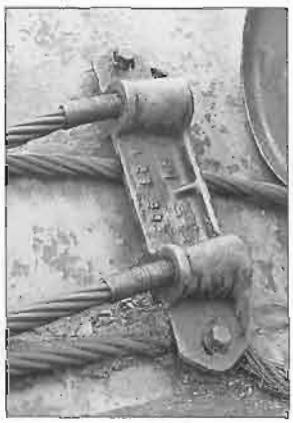




Left and below: These photographs illustrate the welding seams on the turret top and the placement of the commander's cupola.

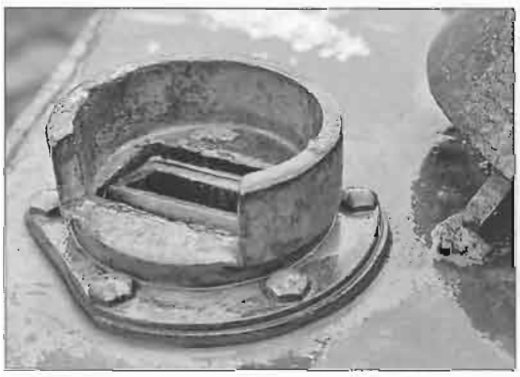
- Author's collection -





Left and below: Details showing the stowage of towing cables on the hull side — this modification was brought in at the beginning of the 1950s.

- Author's collection -



Above: MK-4 periscope.

- Author's collection -







Above: Towing hook.

- Author's collection -



Left and above: The "mushroom" turret was symmetrical; it was a counterpart of the "Great" turret.

- Author's collection -





Above, right and below: Generally turrets had the same size, but their shape varied, especially on the sides and at the front. This is late No.112 Factory produced "mushroom turret" of the "large" series armed with S–53 gun. See p. 195 for comparison.

- Author's collection -











Above and right: The roof of a No.112 Factory "mushroom turret". To the right the two-piece commander's cupola hatch. The No.112 turret roof plate was longer than the No.183's, and extended all the way to the mantle casing (compare to pp. 198–199).

- Author's collection -



T–34–85s produced under license in Czechoslovakia in the 1950s. These tanks are most easily identified by the way the casting forms were linked along the bottom of the turret.

- Author's collection -









Photos showing the details that characterized the vehicles of the Czechoslovakian production. Above, the German Notek headlight characterized the vehicles of the first series. Left, bracket for the BSz smoke generators, bottom, rear position light, installed on the left side of the hull.

- Author's collection -

Post-war Polish production T–34–85M2s, built in the late 1950s, designed for crossing water barriers by driving along their bottoms.

Below — details of the tank.

- Author's collection -

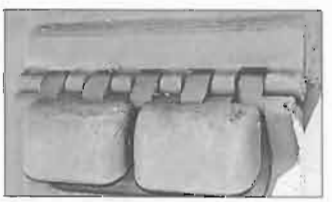








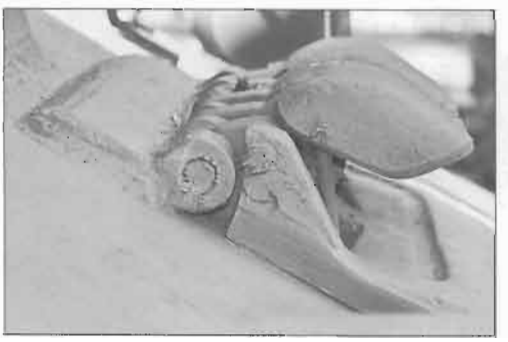




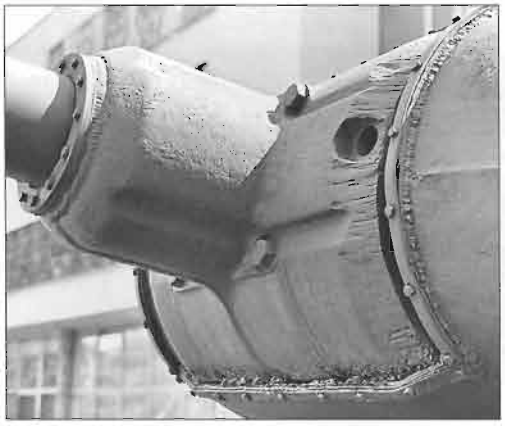




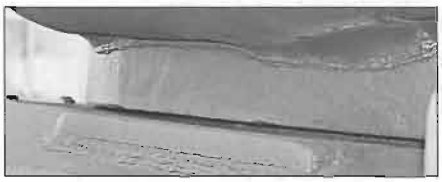




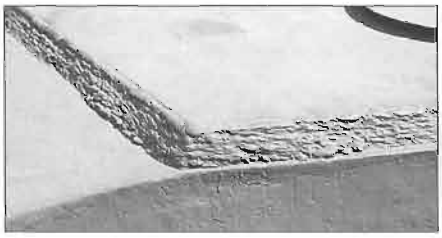










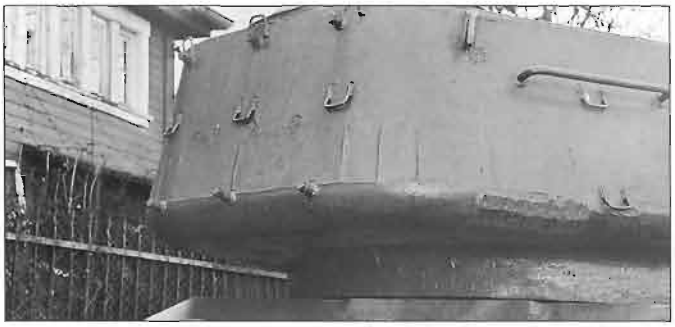






Details of a T–34–85 produced in Poland. Details of the Polish turret are shown below — note the differences compared to the Chech version.

- Author's collection -











Hard to believe, but true. This T–34 in Polish service has a turret from the UTZM Factory. Unfortunately, it is not known if this tank is one of those received by the 1st Armor Brigade in 1943, or if it is one of the wrecks repaired after the war.

- T. Ogrodniczuk's collection -



T–34–85 from the No.112 Factory, with a PT–3 mine roller, in action.

- T. Ogrodniczuk's collection -



This post-war photograph shows a T–34–85 being towed by a T–34T.

- T. Ogrodniczuk's collection -



A burned out wreck of a T–34 from the summer/fall 1941 series production. The headlight, and the inside of the engine cover and its lock, can be seen clearly.

- M. Szapowałow's collection -



Right: This photograph from the summer of 1941 shows the effects of a chaotic tank battle. Charging T–34s collided with each other and turned over. On the hull bottom of the tank on the left can be clearly seen the suspension opening covers of a T-34. During that period, these particular details were eliminated on the production line, proving that these vehicles were from the spring production. On the tank on the right can be clearly seen the early type tracks, which had an additional groove on every second link. It is important to note that, at that time, Factory Nr. 183 still used the pointed screws on the rear hull plate.

- M. Szapowałow's collection -



This overturned T–34 from the summer/autumn production series was probably neutralized by an aircraft bomb near Briansk in October 1941. The details typifying that year's production, high tool box, the riveted linking beam and the eye for the towing cables, are easily visible. However, most important are the new type (550 mm wide) waffle pattern tracks with angled ribs. This is one of the most rare types of tracks. This photograph is proof that these types of tracks were introduced in September 1941 at the latest.

- M. Szapowałow's collection -



Above: This T–34 was abandoned at the beginning of 1942 somewhere in the region of Mariompol/Orel. All details indicate that this vehicle was from the spring/summer 1941 series production, but with the new tracks introduced prior to October 1941. The details are typical of the early production from Factory Nr. 183; two periscopes, driver's hatch with one centered periscope, a mount for the headlight mounted on the front hull plate and the riveted linking beam. The elements added in the fall of 1941 were; attachments for the rectangular fuel tanks that ran along the entire side of the hull and, of course, the tracks. The good condition of the roadwheels (new rubber rims also on the bogey wheel) indicates that they were put on the tank along with the tracks.

- M. Szapowałow's collection -

Below: These T–34 produced in the STZ Factory were destroyed by the Germans on the southern steppes of Russia in the summer of 1942. Details of the Stalingrad production can be seen clearly: the periscope on the cast turret (by then without the rear hatch), teeth on the rear wall of the hull, the use of 8 screws to fasten the exhaust pipe protectors and the sparse spacing of the 6 bottom screws.

- M. Szapowałow's collection -



T–34 SERIAL NUMBERS

1st Brigade

T–34–76 1941 — received fall 1943 – spring 1944

31190*, 30381*, 3030588, 3030736, 3040914, 3040925, 35121*, 35170*, 3051026, 3051086, 3051242, 3051268, 3051302, 3051330, 3051338, 3051346, 3051350, 3051361, 3051366, 3051377, 3051378, 3051379, 3051385, 3051391, 3051394, 3060003, 3060005, 37124*

* — welded turret Factory 183, others cast turret Factory 112.

T–34–76 hexagonal turret — received spring 1944

0308722, 0308741, 0309757, 0309767, 0309778, 0309794, 0309796, 0309798, 0309800, 0309801, 0309802, 0309804, 0309805, 0309807, 0309808, 0309809, 0309811, 0309812, 0309813, 0309814, 0309815, 0309816, 0309817, 0309818, 0309818, 0309820, 0309821, 0309822, 0309824, 0309825, 0309826, 0309829, 0309833, 311224*, 4010017, 4020504, 4020506, 4020513, 4020516, 4020526, 4020529, 4020794[184]

* — Factory 183, others Factory 112.

T–34–85 Factory 112 — received fall 1944

4080220, 4080224, 4080304, 4080305, 4090323, 4090326, 4090327, 4090330, 4090337, 4090326, 4090327, 4090330, 4090337, 4090340, 4090365, 4090390, 4090391, 4090399.

T–34–85 Factory 183 — received spring 1945

407605, 411094, 411517, 412164, 412202, 412202, 412274, 0315010, 0412174, 4020527, 4070945, 4120292, 4120309, 4120368, 4120370, 4120387, 4121151, 4121266, 4121536, 4121714.

T–34–76 & T–34–85 for training units — received summer 1944

8978, 19456, 31297, 41127, 103119, 306607, 420815, 420896, 4010025, 212567.
52209, (4020209), 3497, 6188, 07901, 33426, 33613, 34186, 34468, 35101, 35638, 37718, 121138, 306422, 401003, 420937, 421035, 3020401, 38190, 210052, 240221, 304022, 4010228, 4020286, 4020328, 4020350.



Two photographs with Polish versions of T–34–85.

- Author's collection -



[184] J. Magnuski, op. cit. p. 84, the vehicle's serial number is given as 420794, but most probably this is an error.



Above: Another photograph of Polish versions of T–34–85. The tank in the middle is Russian production with split ventilators of No.112 Factory.

- Author's collection -

Below: Another example of winter camouflage, in this case quite unusual. The turret is camouflaged with white splotches and only the barrel is covered entirely in white. The number on the tank is "3969". The tank is of No.183 war production.

- ADM -





A T–34–85 drives by in its winter camouflage. Only its turret and front are painted white, while the rest of the tank has been left in the original green color, a standard practice. Note the box attached to the hull rear of each tank visible in the photo. Their use by the Soviets started at the end of 1943.

- ADM -

1st Corps

T–34–85 Factory 112
— received September/October 1944
4090341, 4090380, 4090387, 4090392, 4090394.

2nd Brigade

T–34–85 Factory 183 & 112
— received January 1945
41272, 412375, 412491, 412633, 412635, 412664, 412671, 412675, 412683, 412688, 412705, 412716, 412721, 412728, 412734, 412735, 412737, 412748, 412756, 412760, 412762, 412764, 412767.
4111696, 4120311, 4120317, 4120321, 4120324, 4120328, 4120329, 4120356, 4120363, 4120377, 4120381, 4120382, 4120389, 4120396, 4120399, 4120400, 4120405, 4120417, 4120462, 4120500, 4120512, 4120524, 4120529, 4120548, 4120553, 4120554, 4120559, 4120561, 4120572, 4120574, 4120575, 4120576, 4120577, 4120578, 4120581, 4120582, 4120583, 4120584, 4120587.

3rd Brigade

T–34–85 Factory 183 & 112
— received January 1945
411565, 412317, 412368, 412605, 412606, 412666, 412685, 412687, 412706, 412707, 412713, 412715, 412725, 412725, 412729, 412731, 412733, 412747, 412753, 412757, 412759, 412761, 412763, 412765, 412769, 412770, 412783, 412788, 412807, 412820, 412828.
4120101, 4120104, 4120107, 4120116, 4120269, 4120284, 4120333, 4120347, 4120352, 4120367, 4120369, 4120385, 4120387, 4120395, 4120402, 4120410, 4120419, 4120420, 4120421, 4120424, 4120435, 4120767, 4121010, 4121103, 4121105, 4121318, 4121403, 4121413, 4121423, 4121426, 4121431, 4121432, 4121499, 4121808.

4th Brigade

T–34–85 Factory 183

4122, 47538, 411348, 412159, 412199, 412387, 412392, 412429, 412452, 412454, 412519, 412559 412586, 412599, 412601, 412607, 412618, 412662, 412674, 412680, 412702, 412718, 412743, 412745, 412746, 412749, 412750, 412751, 412766, 412774, 412778, 412782, 412786, 412787, 412789, 412790, 412795, 412796, 412801, 412802, 412803, 412804, 412806, 412808, 412813, 412817, 412818, 412825, 412827, 412831, 412832, 412833, 412834, 412835, 412836, 412837, 412838, 412839, 412840, 412841, 412842, 412843, 412844, 412874, 412911.

T–34–85 Factory 183 & 112
— received January/February 1945

412285, 412369, 412615, 412693, 412758, 412809, 412815, 412819, 412821, 412830.
4110131, 4120418, 4120501, 4120516, 4120537.

16th Brigade

T–34–85 Factory 183 & 112
— received January/February 1945

412354, 412531, 412612, 412741, 412754, 412772, 412773, 412805, 412810 (or 840), 412846, 412848, 412850, 412851, 412852, 412854, 412855, 412857, 412858, 412859, 412860, 412861, 412864, 412865, 412866, 412871, 412875, 412876, 412877, 412890, 412891, 412895, 412897, 412901, 412905, 412906, 412910, 412912, 412917, 412932, 412937.
4120530, 4120535, 4120600, 4120625, 4120627, 4120630, 4120631, 4120633, 4120636, 4120638, 4120642, 4120643, 4120645, 4120647, 4120649, 4120650; 4120659 (or 654).

Please note! As already noted in the main text, the full number of a vehicle was interpreted in the following way: 4050677 — 4 year — 5 month — 677 consecutively numbered vehicle in the production of the particular month. Since, in 1941, there arose need to differentiate vehicles from various factories, there was a change in the numbering system. Therefore, in the No.183 Factory the zero was omitted (45677), and most probably in the No.174 Factory a zero was added in front of the other numbers while the internal zero was omitted (045677). Additionally, many vehicle numbers were preceded by letters (B, T or U; in Polish documents there is also a mention of the letter O, but that is most probably a result of the misreading of the zero). While the modification of the main numbers is understood, the meaning of the preceding letters is not.

The consecutive vehicle number (677) signified its place in a factory's monthly production, and also its place in a particular series. Each factory was capable of producing almost 100 vehicles, and that is why the continual numbering usually lasted several months, indicating a vehicle from a particular month in a unique configuration.

Some of the numbers listed in the following table are incorrect, but it is not possible to determine exactly their designation. In places where the error was certain, the number was corrected; in places where there was no certainty the number was left as originally found, which in some cases meant that one number became two. The main problem resulted from the reading of zeroes. The importance of that digit is illustrated by the following example: 4120501 and 0412501. The first number was generated during the war and the second one was on a vehicle retrieved by the Polish Army from a scrap yard. At the end of 1944, the Polish Army had at the same time the following vehicles: 4120387 manufactured by the No.112 Factory and 412387 manufactured by the No.183 Factory. Sometimes a vehicle was identified with the zero included and on other occasions without it. It was possible to identify four such examples, three of which were noted in the 1st Brigade (Regiment). It was assumed that the different numbers referred to the same vehicle.

These problems with the numbers are compounded by the frequent misreading of individual digits, often because the numbers were read off the linking girder on the front of the tank rather than from documents (which, usually, were not present). This caused many errors. Undoubtedly, the table contains vehicle numbers which are "doubles" because someone wrote in the number 7 instead of 1. Since I have not come across any documents which would allow me to correct the error, instead of one vehicle there are two. Let us hope that some day it will be possible to correct these errors.

Table of Serial Numbers

The first column contains the serial numbers of vehicles delivered to the Polish Army during WW II. The following columns contain the acknowledgement that the vehicle existed after the war (*), listing as proof one of the units to which it belonged (O/47 — Officer School in 1947, 8/49 — 8th Tank Regiment in 1949, Si/in — workshop in Siemianowice, and others). The lack of any notation signifies that the vehicle was lost during the war. The notation "-" in the left column, and the vehicle's number in the right column means that the tank was received after the war. A "?" in the left column means that the vehicle may have been used by the Polish Army during the war but there is no confirmation of that in the available documentation. The designation "(P)" after the serial number denotes a vehicle obtained from a scrap yard, and a "T-" indicates that the vehicle was used for towing (that is; it was a T–34T).

Table of serial numbers

	1/46	O/47	3/48	6/49	8/49	9/51
103119					as 10319	
?					12387	
–					121138/670	
–			143180(P)			
19456					*	
210052					*	
?					23245	
240221						
212567					*	
3020401		*				
30381						
31190						
31297[185]		*				
–			32237			
33426	*					
?					33465	
?					33468	
3030588						
33613					*	
3030736						
304022					*	
?					304239	
?		3490				
34186			*			
–						3429906(P)
–		T–34280[186]				
34468						
–					T–34484[187]	
3040914						
3040925						
35101					*	
35121						
35170			*			
35638						
3051026						
3051086						
3051242						
3051268						
3051302						
3051327						
3051330						
3051338						
3051346					*	
3051350						
3051361						
3051366						
3051377						
3051378						
3051379					*	
3051385						
3051391	*					

	1/46	O/47	3/48	6/49	8/49	9/51
3051394						
3060003						
3060005					*	
306422			*			
306607[188]		*				
37124						
–			T–3070215(P)			
37718					*	
–		T–3810[189]				
38190			*			
–						3080319(P)
0308722						
0308741						
0309757						
0309767						
0309778						
0309794						
0309796						
0309798						
0309800						
0309801					*	
0309802						
0309804						
0309805						
0309807						
0309808						
0309809						
0309811						
0309812						
0309813						
0309814						
0309815						
0309816						*
0309817						
0309818						*
0309820						
0309821						
0309822						*
0309824						
0309825						
0309826						
0309829						
0309833						
?						310155

[185] The tank was produced in January, as is hypothesized here, or in December.
[186] On strength from 1949.
[187] On strength, certainly, in 1950 and 1951.
[188] Also as 36607.
[189] On strength from 1949.

- ADM -



- P. Kubiak's collection -



Above: A platoon of T–34–85s attacks during winter maneuvers. The three tanks have the tactical numbers "3550", "3563" and "3564". Visible in the close-up photo is the unit's tactical insignia — an underlined M in a circle.

Left: Close-up look at a turret from the No.183 Factory. It has the Polish eagle and tactical number "0106" on its side. The numerals are not painted evenly, suggesting that they were done by hand.

Below: In this picture a T–34 is pulled out from the trap by an engineering vehicle based on the SU–85 chassis. Note that in the 1950s and 1960s, during the winter tanks ware painted entirely in white, including the roof and engine covers.

- ADM -



	1/46	O/47	3/48	6/49	8/49	9/51
?		310171				
–	T–310336(P)[190]					
311224						
–						T–311391[191]
0315010						
401003						as 4011003
4010017						
4010025				*		
4010228						
–			T–BO–42124(P)			
?	42175[192]					
42265						
4020286						
4020328						
4020350				*		
4020504						
4020506						
4020513						
4020516						
4020526						
4020527						
4020529						
420794						
420815				*		
420896						*
420937			1366			
421035						*
–		T–40357(P)				
4070945						
407605						
411094						
411517						
412164						
4120164						
0412174						
412202						
412274						
4120292						
4120309						
4120368						
4120370						
4120387						
4121151						
4121266						
4121536						
4121714						

T–34–85

	1/46	2/47	O/47	3/48	6/49	8/49	9/51
–		312588(P)					
–			4010025				
–			4020350				
–			420815				
–		43446					
–		43473					
–				44225			
–		44382(P)					
4400644							
–						45132(P)	
–						T–45254	
–			45415				
–		45636(P)					
–			46125				
–					T–46417(P)[193]		
–							406459[194]
47538							
–			T–48145(P)				
4080220							
4080224							
4080304							
4080305							
4090323							
4090326							
4090327							
4090330							
4090337							
4090340							
4090341							
4090365							
4090372							
4090380							
4090387							
4090390							
4090391							
4090392					*		
4090394							
4090399							
–						4090609	
–		4090611					
–	410239(P)						
–		410635(P)					
–		410646(P)					
–							4100757(P)
–			4110131[195]				
411348				*			
411565					*		

[190] Recovered by 1st Tank Regiment, used by the Tank Mobile Repair Workshop No.1

[191] On strength in 1950 and 1951.

[192] During 1949–1951 it is in the 8th Tank Regiment, also as 421755.

[193] Part of unit's complement in 1951.

[194] Almost certainly, it is the same vehicle which is also mentioned with the number 406451.

[195] Probably 4110133, mentioned as being on the complement of the Officer School in December 1948.

1/46	2/47	O/47	3/48	6/49	8/49	9/51
4111696						
4122					*	
4120101						
4120104						
4120107						
4120116						
–				412127(P)[196]		
412159						
412199						
4120269						
–	4120270					
4120284						
412285	*					
–	4120308					
4120311						
4120317						
412317						
4120321	*					
4120324	*					
4120328						
4120329						
4120333						
4120347				*		
–					as 412-348	
4120352						
412354						
4120356	*[197]					
–	4120359					
4120363						
–	4120364					
4120367						
412368				*		
4120369						
412369	*					
41272						
4120371	*					
412375	as 4120375					
4120377						
4120381						
4120382						
4120385						
–	4120386					
4120387						
412387						
4120389						
412392						*
4120395				*		

1/46	2/47	O/47	3/48	6/49	8/49	9/51
4120396						
4120398						
4120399						
4120400	*					
4120402						
4120405						
4120410						
4120414						
4120416	*					
4120417						
4120418	as 412418					
4120419						
4120420						
4120421						
4120424				*		
412429		*				
–					4120430	
4120435						
412452					*[198]	
412454					*	
4120462						
–	4120478(P)					
–	412490					
412491						
–				4120492		
–	412494					
4120500						
4120501					*	
–	0412501(P)					
4120512	*					
4120516	as 412516					
412519			*			
4120524						
–	412525					
4120529						
4120530						
412531						
4120535						
4120537	*					
4120548						
4120553						
4120554						
4120559	*					
412559						
4120561						
–	412563					
–				412565		
–	412567[199]					
4120572						
–			4120573			
4120574						
4120575						
4120576						

[196] Also as T412127.
[197] Also as 412356.
[198] Also as 4122452 in the 9th Tank Regiment in December 1949.
[199] In the original, it is written down as T–34–85 with the serial number 212567.

	1/46	2/47	O/47	3/48	6/49	8/49	9/51
4120577							
4120578							
4120581							
4120582							
4120583							
4120584							
–					4120585		
412586							
4120587		*					
–					4120589		
–					4120597		
412599						*	
4120600							
412601						*	
412605					*		
412606						*[200]	
412607					*		
–					4120609		
–					4120610		
412612					as 4120612		
–					4120614		
412615							
–						412616	
412618							
–					4120619		
4120625							
4120627							*
4120630							*
4120631							
4120633							
412633							
412635		*					
4120636							
4120638							
4120640							
4120642					*		
4120643							
4120645							
4120646							
4120647							
4120649							
4120650							
4120659 (or 654)							
412662							
412664		*					
412666							
412671							
412674						*	
412675							
412680						*	
412683							
412685							
412688							

	1/46	2/47	O/47	3/48	6/49	8/49	9/51
412687							
412693					*		
412702							
412705							
412706							
412707							
412713					*		
412715							
412716		*					
412718							
412721							
–					412724[201]		
412725							
412728							
412729					*		
412734							
412731							
412733							
412735							
–					412736		
412737							
412741							
412743							
412744		*					
412745							
412746						*	
412747							
412748		*					
412749							
412750						*	
412751						*	
412753							
412754							
412756							
412757							
412758							*
412759							
412760		*					
412761							
412762		*					
412763		*					
412764		*					
412765					*		

[196] Also as T412127.
[197] Also as 412356.
[198] Also as 4122452 in the 9th Tank Regiment in December 1949.
[199] In the original, it is written down as T–34–85 with the serial number 212567.
[200] In 1949, it is mentioned as 4120606 on the strength of the 6th Tank Regiment.
[201] According to entry from 1950.



- M. Szapowałow's collection -



Above: This photo shows an immobilized T–34 during the fall of 1941 on the central sector of the Eastern Front.

Left: The wreck of a T–34 abandoned in the Steppe during the summer of 1943, most probably in the Kursk salient. The tank is a composite production — the hull is a product of the No.112 Factory from the first half of 1943 and the turret was produced at the STZ Factory at the beginning of 1942. The unique shape of the recuperator and the angled shape of the turret's bottom front can be seen easily. These characteristics were unique to turrets welded at the STZ Factory.

- M. Szapowałow's collection -

Below: This T–34 was abandoned by its crew in the trenches of the Soviet infantry around Mcensk in early October 1941. The additional applique armor plates on the front of the hull and turret can be seen clearly. This is certainly a vehicle manufactured at the STZ Factory, indicated by the element seen next to the driver's hatch. Because the tanks used by the Soviets at Mcensk were of the latest production, this photograph can serve as evidence that the T–34s produced during September did not yet have the toothed hull linking and that the driver's hatch already had two sights.

- M. Szapowałow's collection -



	1/46	2/47	O/47	3/48	6/49	8/49	9/51
412766							
4120767							
412767							
412769					*		
412770					*202		
412772							
412773							
412774						*	
412778							
412782							
412783					*		
–		412785					
412786							
412787						*	
412788							
412789							
412790							
412795							
412796						*	
412801							
412802							
412803							
412804						*	
412805							
412806						*	
412807					*		
412808							
412809							
412810 (or 840)							
412813						*	
412815						*	
412817						*	
412818							
412819							
412820							
412821		*					
412825						*	
412827							
412828					*		
412830							
412831						*	
412832							
412833						*	
412834							
412835							
412836						*	
412837							
412838							
412839							

	1/46	2/47	O/47	3/48	6/49	8/49	9/51
412840							
412841							
412842							
412843							
412844						*	
412846							*
412848							*
4110131							
412850							
412851							
412852							*
412854							
412855							
412857							
412858							
412859							
412860							
412861							
412864							
412865							*
412866							*
412871							*
412874							
412875							*
412876							*
412877							
412890							*203
412891							*
412895							
412897							*
412901							*
412905							*
412906							*
412910							*
412911							*
412912							
412917							*
412932							*
412937							*
–					4120942		
4121010							
4121103							
4121105							
4121318							
4121403							
4121413							
4121423							
4121426							
4121431							
4121432							
4121499							
–							4121504
4121808							

[202] Converted to a T–34T recovery vehicle.
[203] Written down as 412880.



A T–34–85 is being pulled out of a snow-filled hole by another tank.

- *ADM* -

Additionally, the Polish army used 11 tanks that were refurbished wrecks. However, it was not possible to determine the unit with which they served (during the years 1949–1951 all these vehicles were at the Siemianowice workshop or the various repair facilities, RWN–4 for example, where they were refurbished). These were the following vehicles:
T–3010258(P), 3041070(P), 3070289(P)[204], 307408(P), 311264(P), 410294(P), 411141(P), 412140(P), 412184(P) and 412461(P).

A unit of T–34–85s "attacks" the enemy during maneuvers by the Polish Army. The closest tank has the "mushroom" turret from the No.112 Factory. Note the recognition stripes, used to differentiate "own" and "enemy" tanks, painted around the turret.

- *ADM* -

[204] Also as 3070259.





The end of an era. After making its appearance in the second half of the 1950s, in the 1960s the T–54 began to replace the T–34 in the combat units. The photograph shows the attack of a combined tank platoon, with T–54s and a T–34–85. The hull of the T–34 in this photo is a war-time production, but the turret was produced after the war to the specifications of the No.183 Factory. The gun barrel has four Xs, indicating the destruction of four targets.

- ADM -

Unidentified numbers

Additionally, tank No.3810 was used as a recovery vehicle in the 1st Training Tank Repair Battalion. Vehicle 3020401 was recorded as 1363, which probably indicated its license plate. Vehicle 33426 also appeared as 33426726 (also written down as 33426/726), indicating vehicle with number 33426 and license plate number 726. Likewise for the following numbers: 37718/658, 121138/670, 33613/727, 35101/734 and 421033/566 (appearing above as 421035).

	1/46	*2/47*	*O/47*	*3/48*	*6/49*	*8/49*	*9/51*
07901							
	as 07901/385						
121138		as 121138/670					
–			143180(P)				
3490			*[205]				
3497[206]				*			
–		377-18/658					
400143					*		
400807							
41127							
–						4242[207]	
4487							
46417					as T464/17		
4674							
–							48974
–						5129	
–						5113	
52209[208]						*	
6188[209]						as 06188	
8978				*			

[205] Mentioned as being on the complement of the Officer School in December 1948; this could also be 3497.
[206] Also as 3497/659.
[207] T–34–76.
[208] According to one document, a T–34–76.
[209] T–34–76.

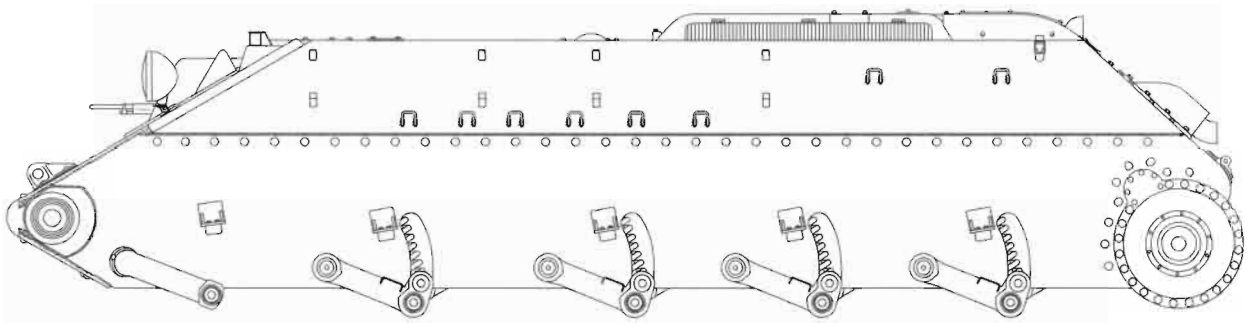
After the War

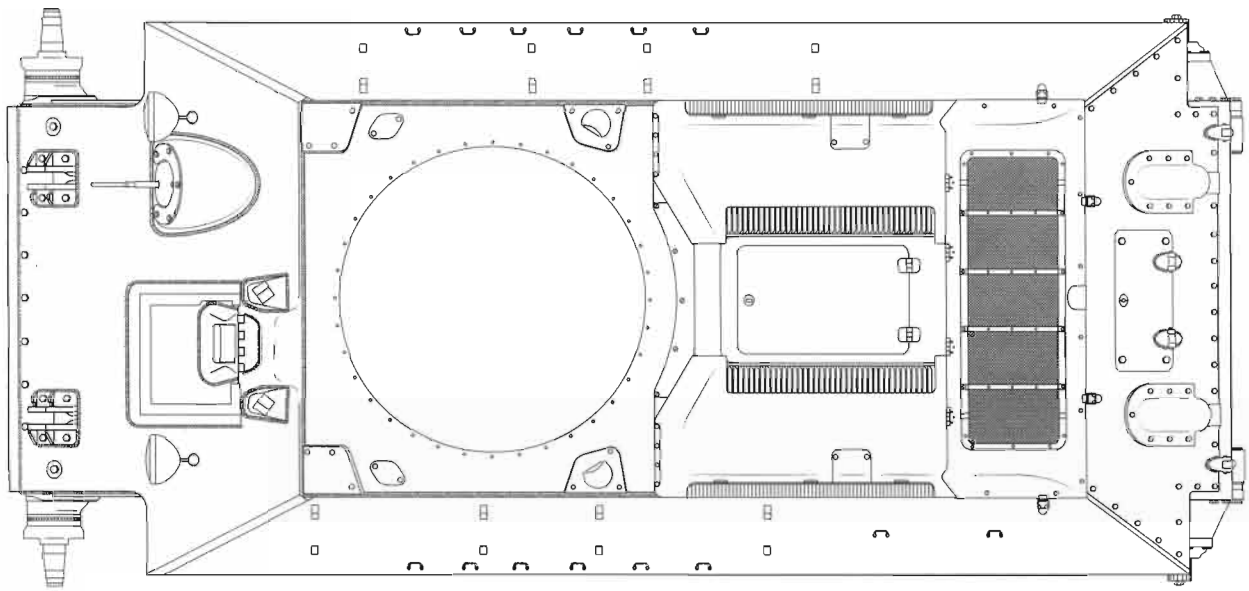
Tanks obtained by Poland after the war had a different numbering system than those produced during the war. Immediately after the end of the war, the numbering system remained the same but the way the numbers were recorded changed. However, for some time after the end of production, vehicles appeared with other numbers completely different from previous ones. The numbers had 6 digits, with the 4 digit consecutive number preceded by 2 other digits. The significance of the first two numbers is still unclear. This manner of reading the numbers is supported by the following serial numbers: 815981, 815985, 816009 and 882982, 883009, 883063. As can be seen, the first two numbers remain the same in each grouping, but the last four numbers transition smoothly from the 5,000s to 6,000s and from 2,000s to 3,000s respectively, signifying a continual numbering sequence.

601B101	406505	502956	525707	816118
603-G-420	406541	502960		816023
	406572	502961	687226	816043
609D0957	406582	502963	687467	816085
609D0970	406588	502965	687538	816093
609D1020	406592	502966	687553	816248
610D1047	406619	502969	687580	816264
610D1050	406622	502974	687586	816288
610D1084	406639	502980	687624	816291
611D1174	406644		687631	816312
	406645	511558	687632	816325
149158	406651	511559	687636,	816337
162885	406676	511572	687678	816339
	467020	511574	687724	816351
211547		511575	687793	816361
211556	411351			816367
211568	4120303	525219	706640	816703
22263	4121801	525272		
26771		525280	815689	861596
26772	502834	525346	815760	861597
26775	502849	525427	815828	861598
26787	502861	525471	815829	861599
26794	502864	525490	815849	861637
26795	502865	525504	815858	861710
26831	502866	525532	815866	861720
288025	502868	525548	815896	
288080	502869	525568	815898	882982
288084	502871	525603	815910	883009
	502876	525611	815930	883063
44402	502891	525627	815936	883073
	502902	525635	815945	883087
456612	502906	525450	815950	883095
450788	502908	525484	815964	883117
457221	502909	525514	815972	883130
457368	502910	525536	815975	883169
457432	502911	525557	815981	883216
406455	502921	525567	815985	
406462	502924	525575	816008	
406478	502929	525600	816009	
406490	502954	525655	816011	

T–34 SCALE PLANS

Hull from the No.183 Factory, from the fall of 1940. At the end of the year, the riveting of the hull sides under the mudguard was stopped.



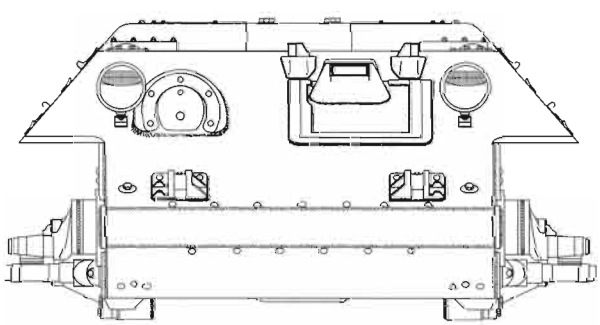


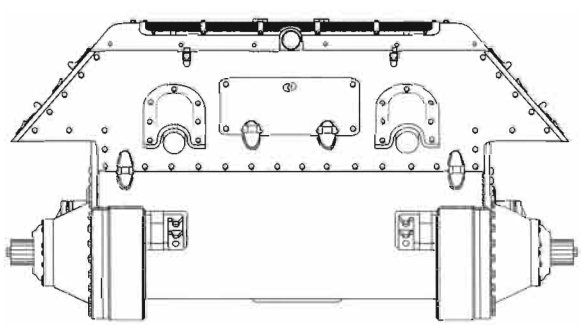


1/35th scale

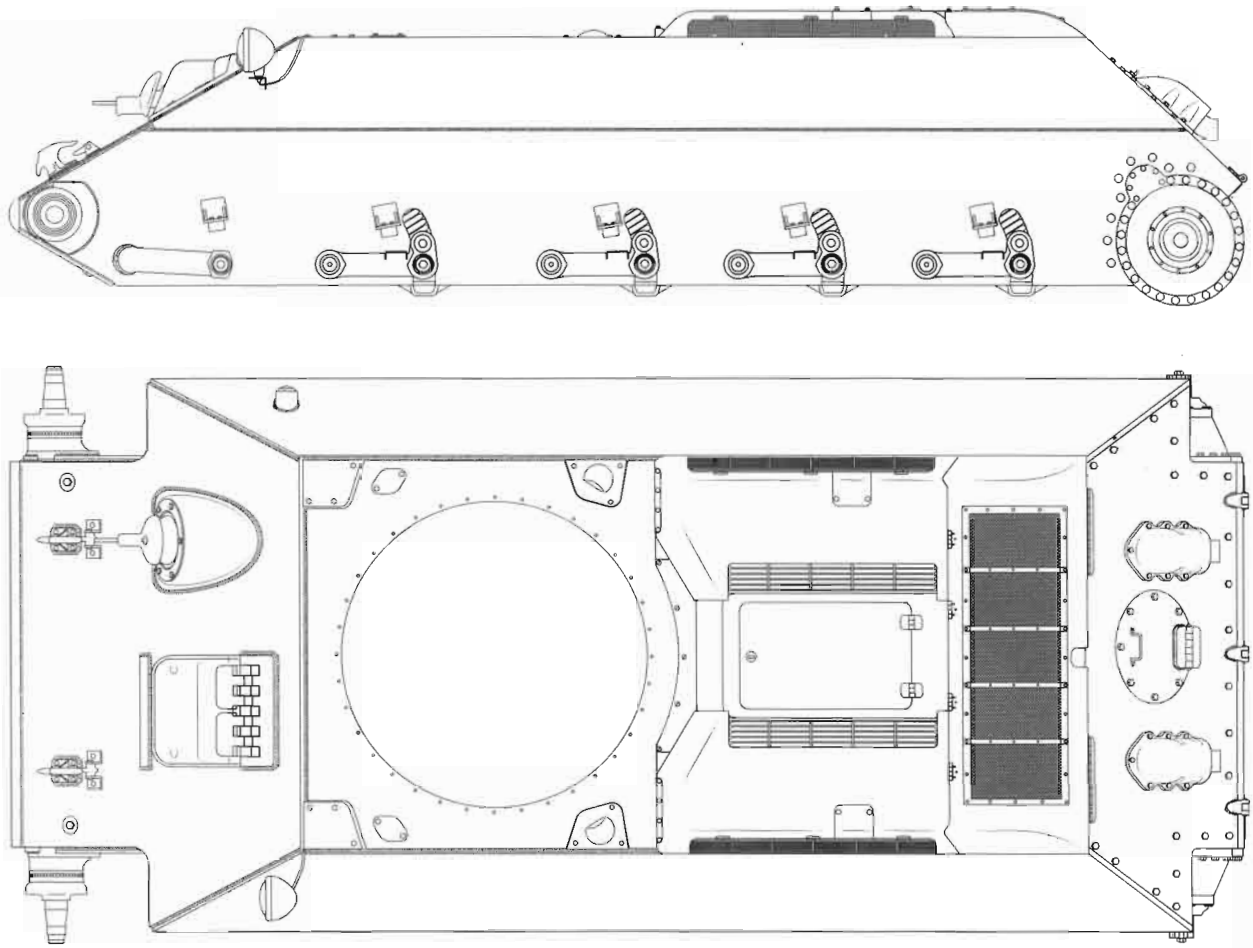
Front and rear of hull from No.183 Factory, 1940. On the first vehicles, there was no screw on the hull rear, just above the mudguards.

© by W. Hazuka





No.183 Factory hull, 1942. In the fall of 1942, the armored gun shield and the strip below the driver's hatch were introduced. Complete series of vehicles produced in the summer did not have the antenna mount. In fact, the openings for them were not even made.

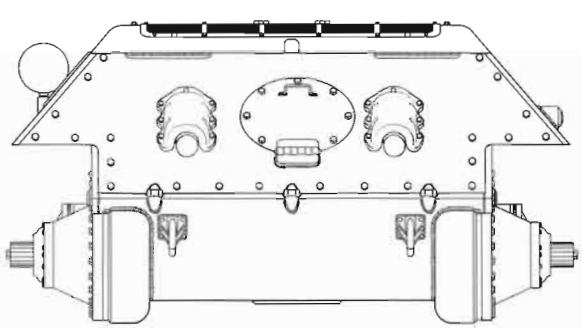


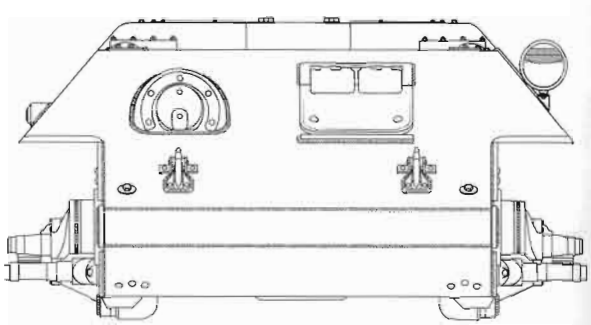
0 1 2 3 m

1/35th scale

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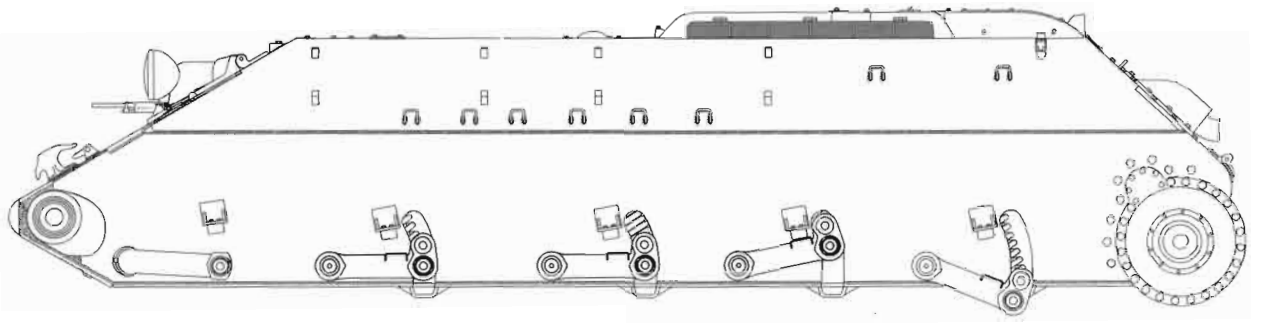
Front and rear view of hull from No.183 Factory, 1942. The tank features 45 mm-thick exhaust covers at the rear. Note the missing middle bolts on both sides of the hull, a characteristic detail of that factory.

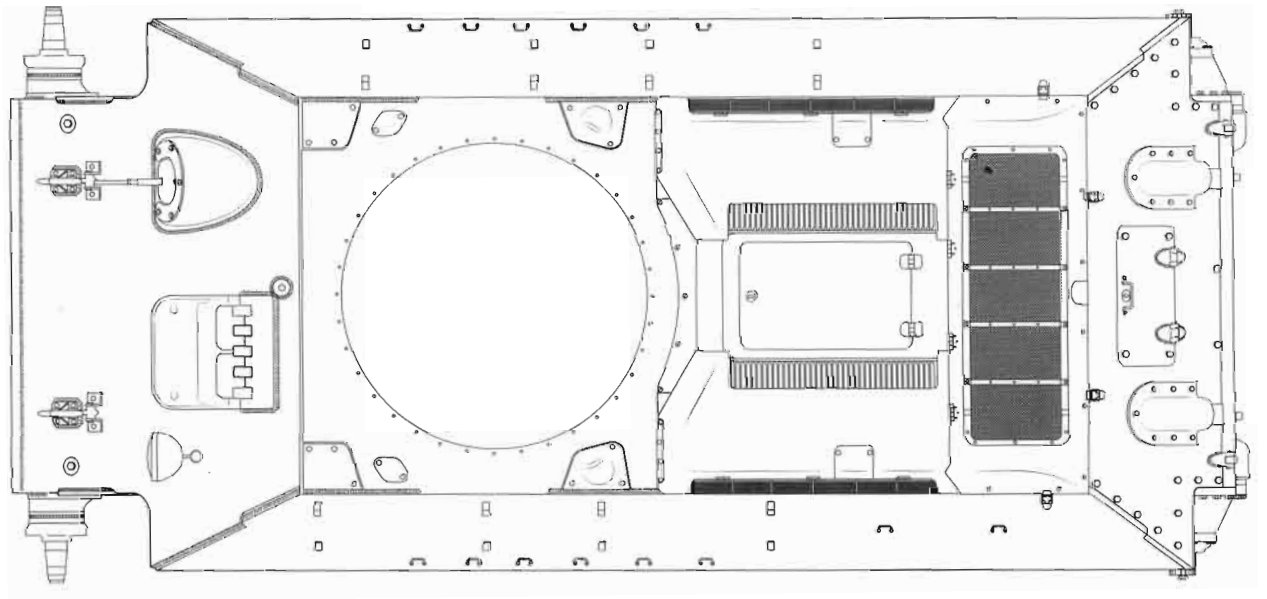




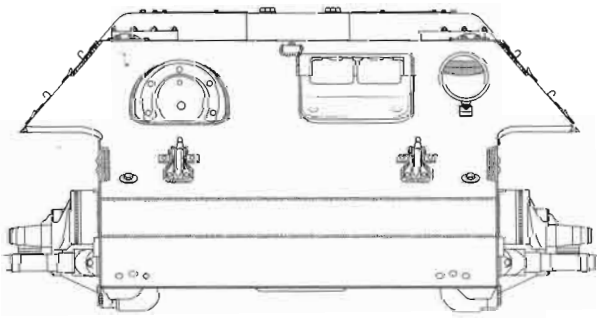
STZ Factory hull, 1942. All indications are that the hulls with the insets on the crew compartment appeared until the beginning (spring?) of 1942 and then were eliminated. Starting in summer of 1942, the hulls from that factory did not have external fuel tank brackets or antennas.

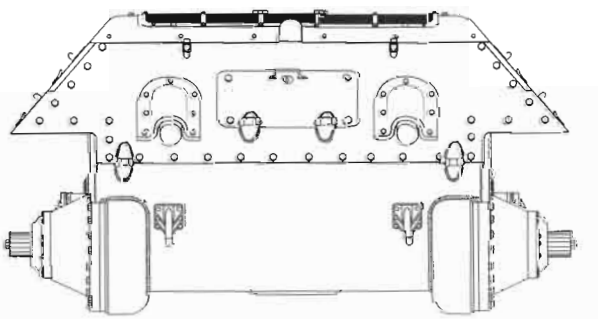
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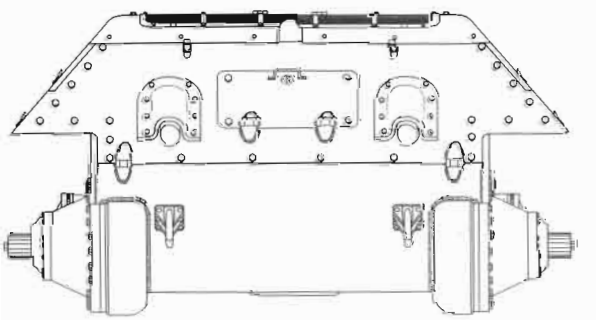
Front and rear of STZ hull, beginning of 1942.





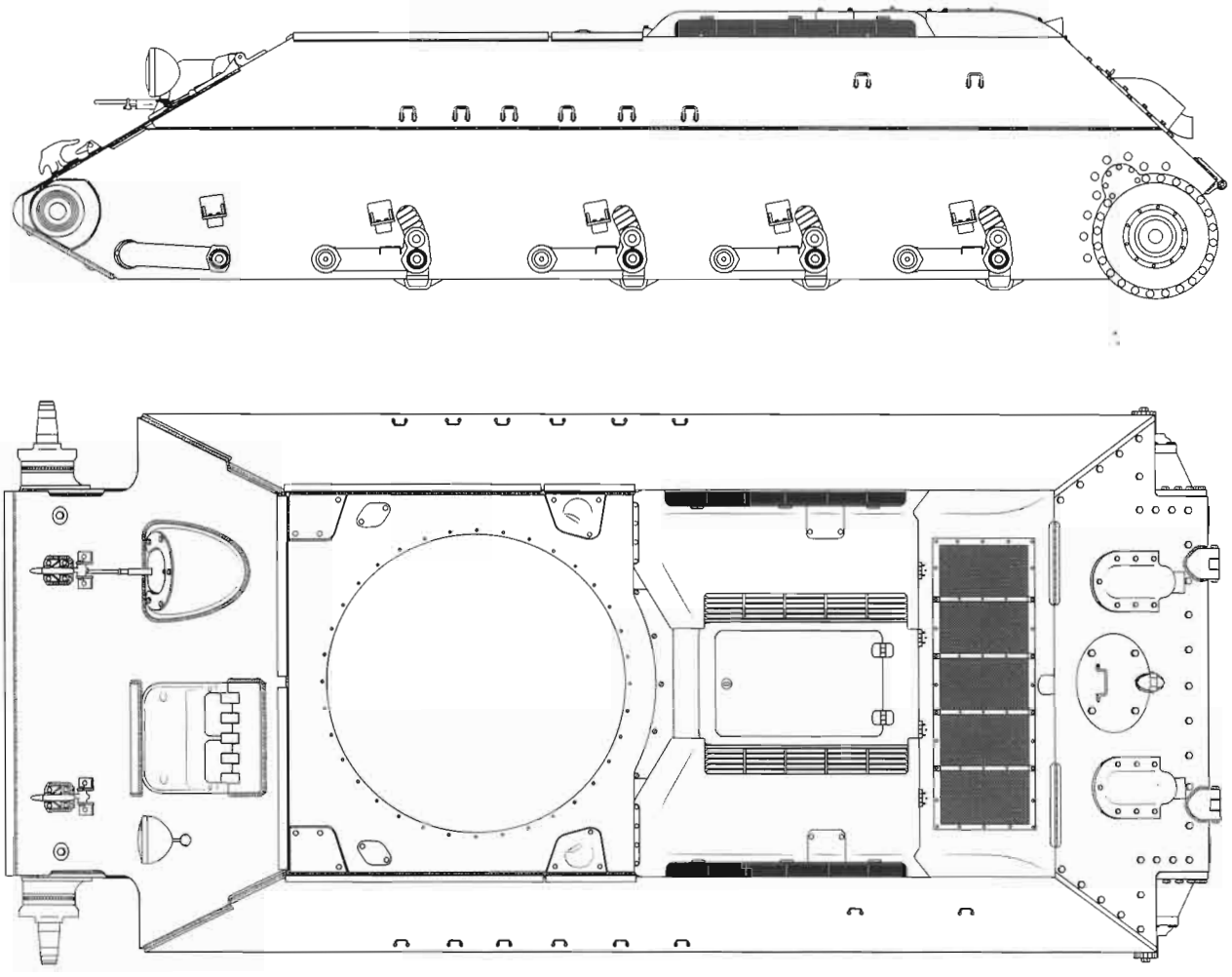


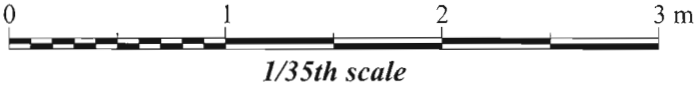
1/35th scale



Right: Rear hull plate, spring/summer 1942 (earliest photo of such hull was taken in May 1942). Actually, in photos from summer 1942, both ways of bolting on the rear plate and the exhaust covers can be seen.

No.112 Factory hull, 1941–42. In the summer, the hooks were replaced by handles. Most of the vehicles (if not whole series) did not have the antenna opening. During 1943, several additional minor changes were made; the access hatch to the starter was modified, the armor protection for the machinegun was added and the headlight was moved to the left side of the hull.

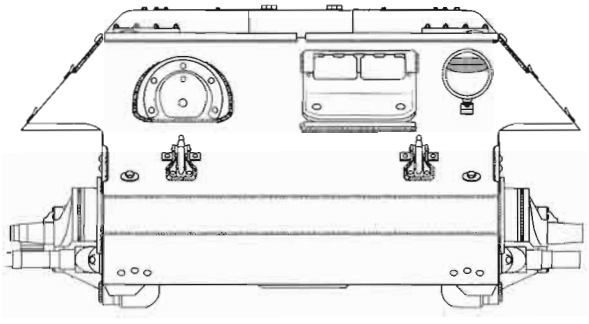


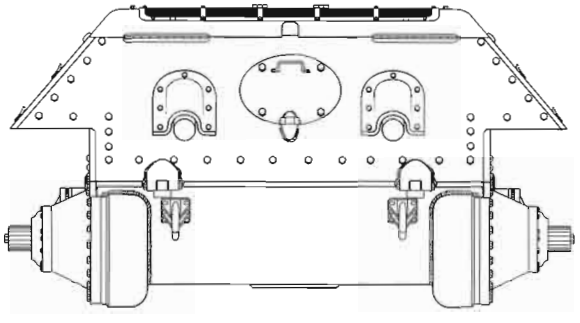


1/35th scale

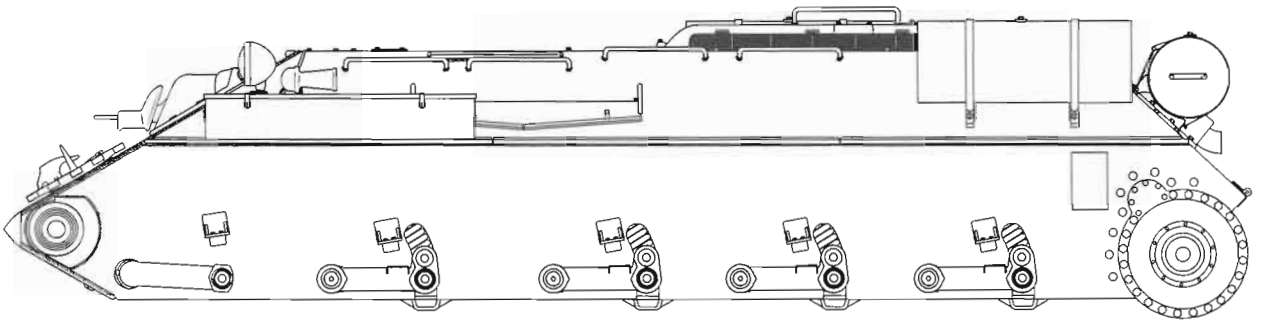
Drawings of the No.112 Factory hull, front and rear, 1941–42.

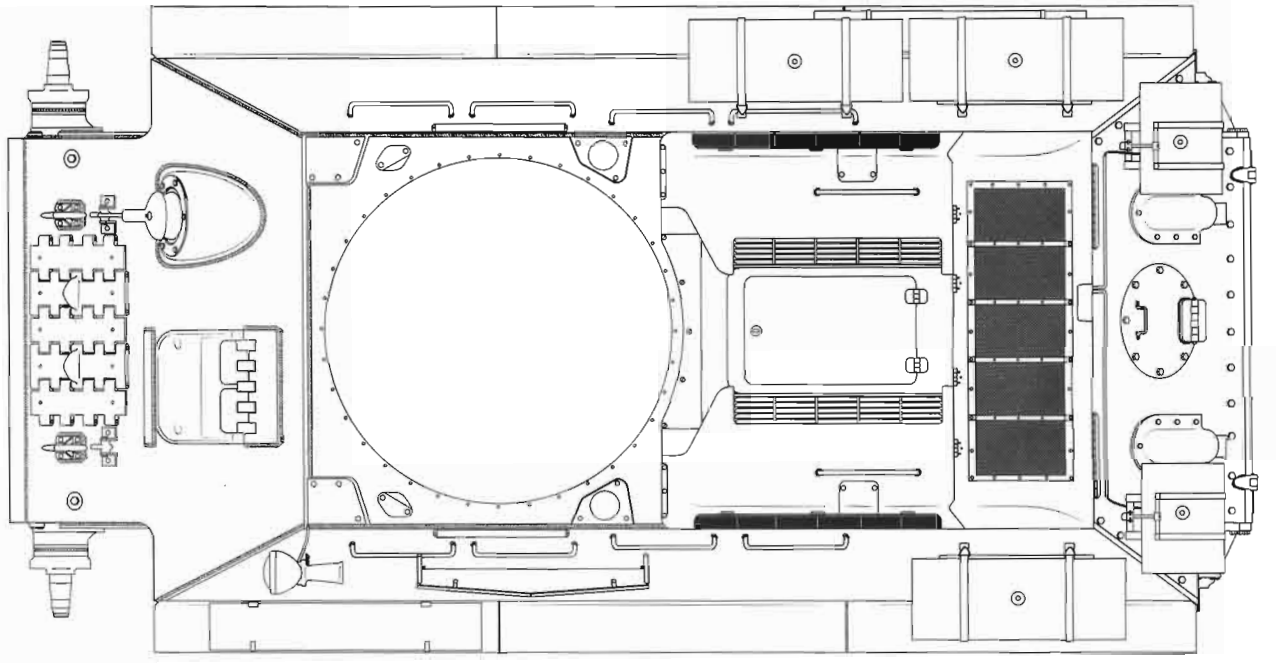
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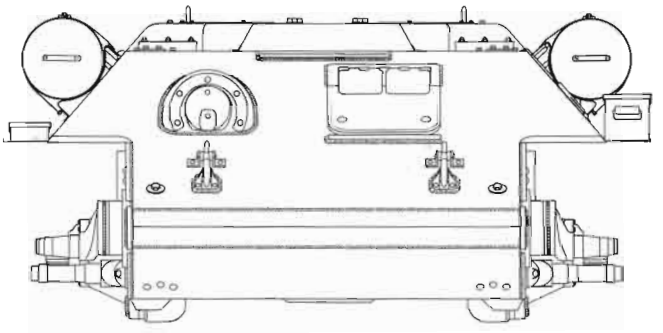




No.183 Factory hull for the 85 mm turret. Standard production type 1944/1945.

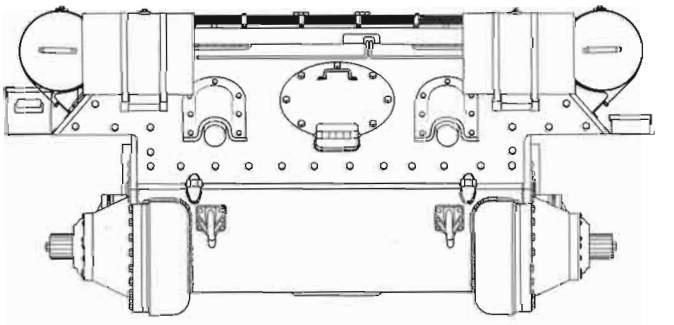






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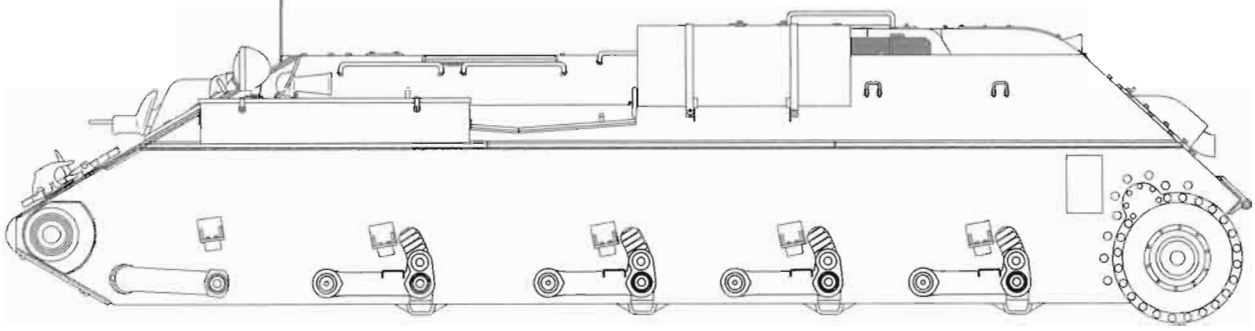
No.183 Factory hull for the 85 mm turret. Standard production type 1944/1945 (Bsh smoke generators of later type.

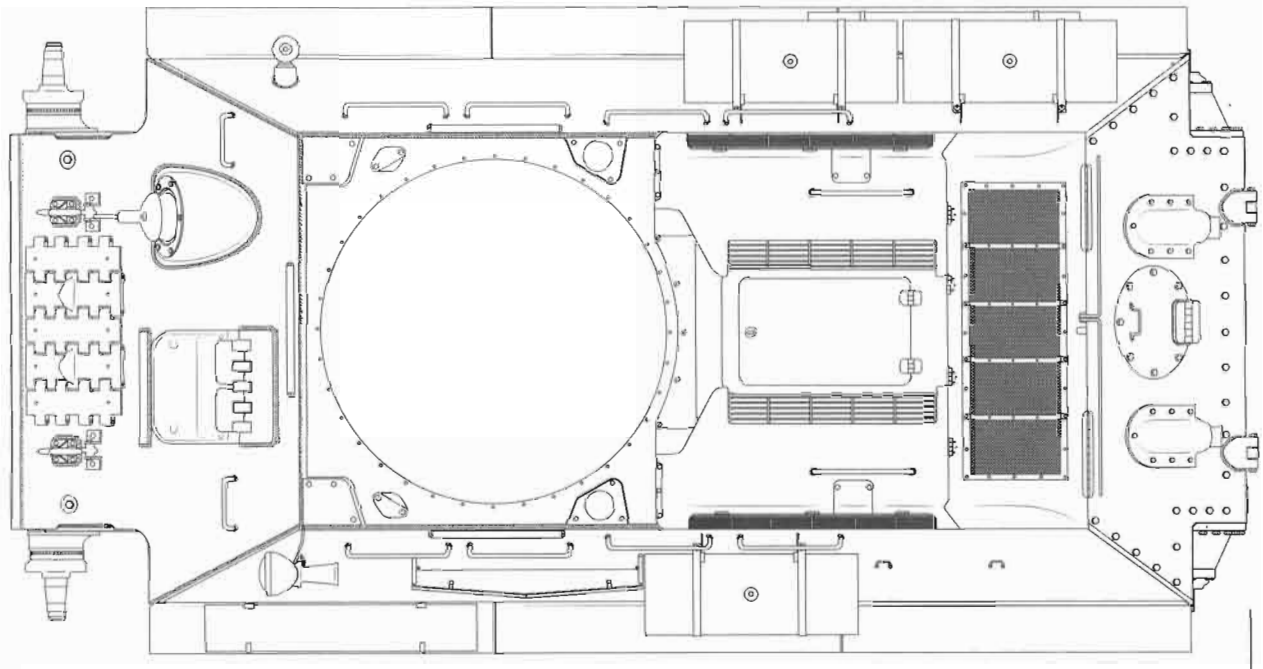


0 1 2 m

1/35th scale

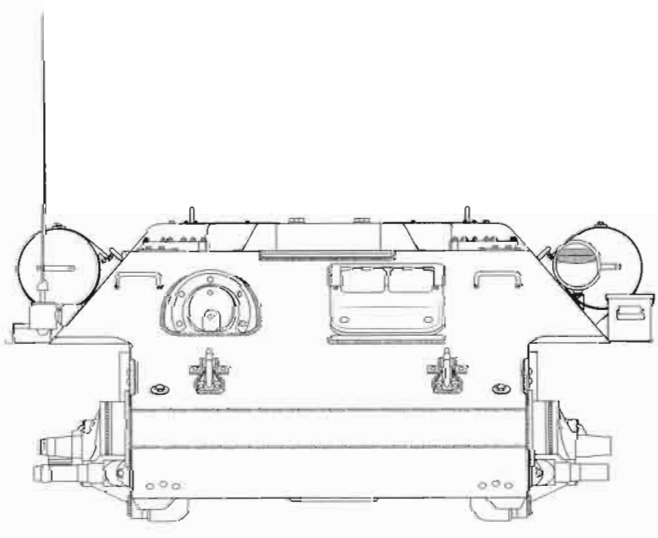
No.112 Factory hull, beginning of 1944. This is the earliest type of hull for the 85 mm turret.

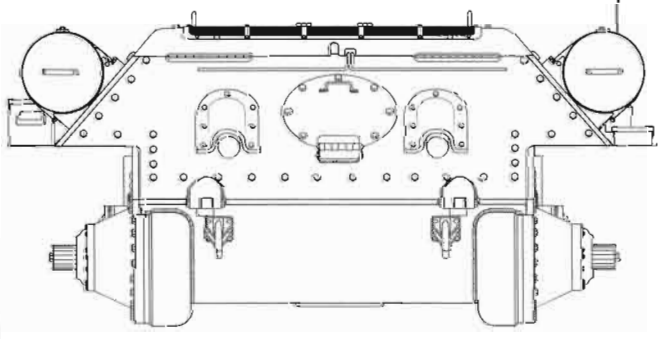




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1/35th scale



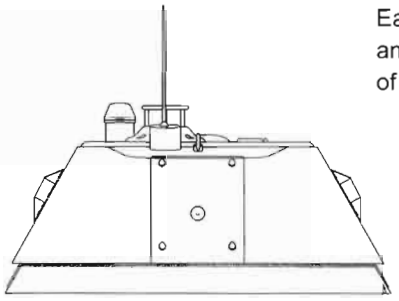


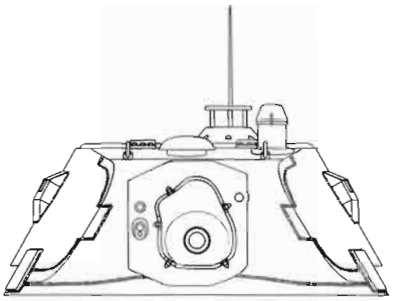
No.112 Factory hull, beginning of 1944. This is the earliest type of hull for the 85 mm turret.

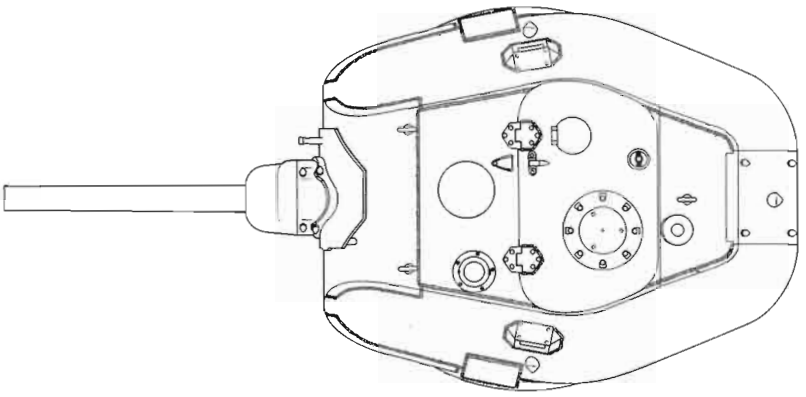
© by W. Hazuka

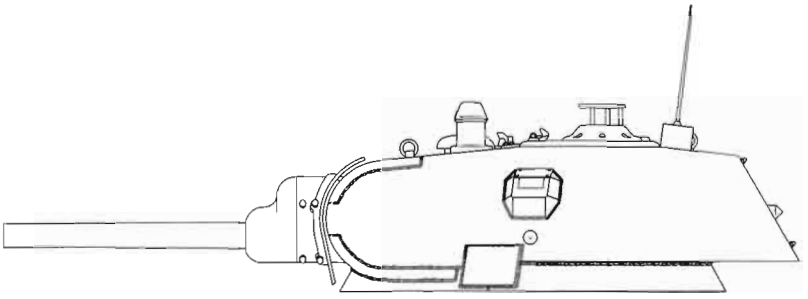
Earliest T–34–76 1940 L–11 turret with antenna mount and the very first type of the SPKO periscope.

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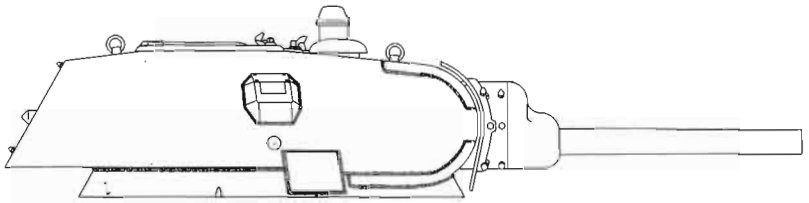




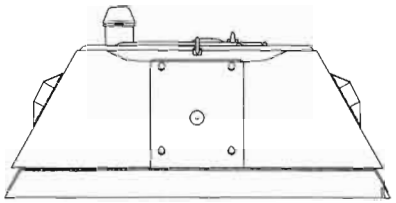


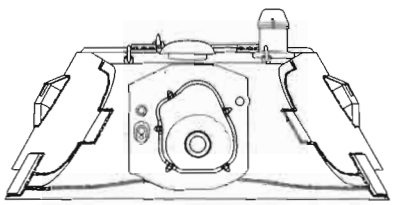


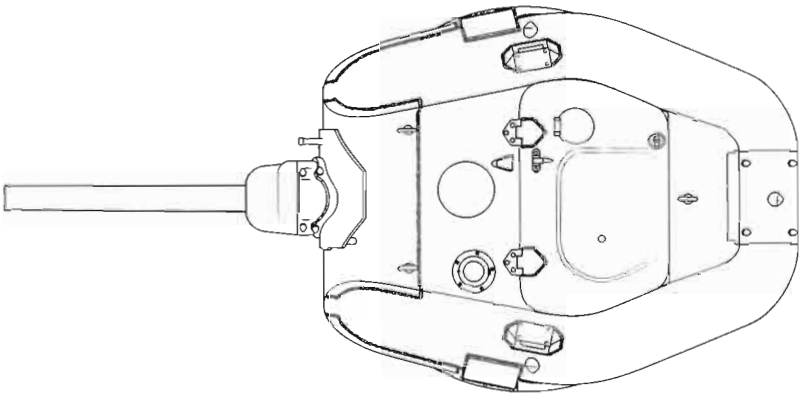
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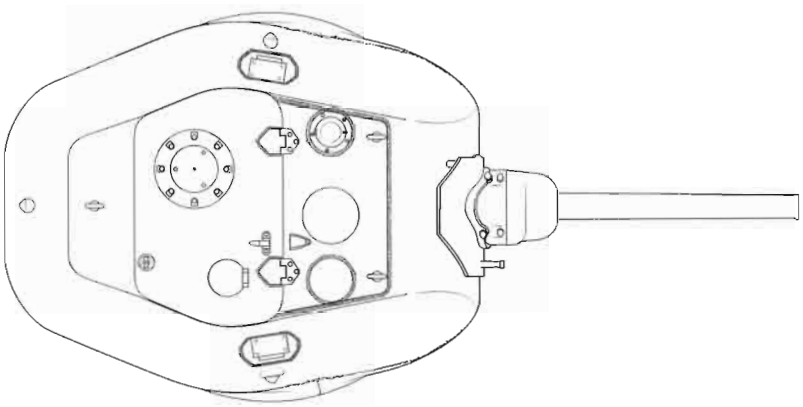
Last versions of the turret with L–11 gun from the beginning of 1941.

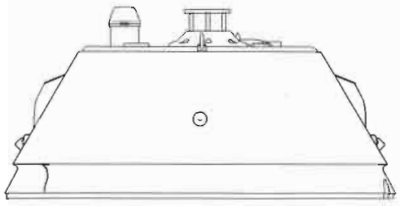


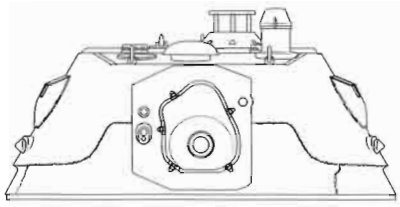




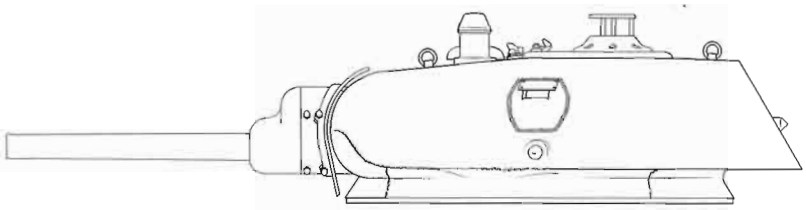
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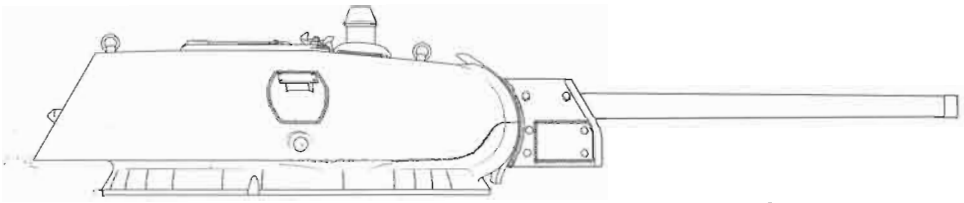


Cast turret with L–11 gun with the very first type of the SPKO periscope, but without antenna, end of 1940.

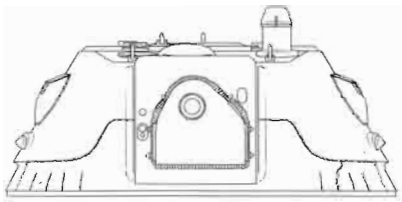


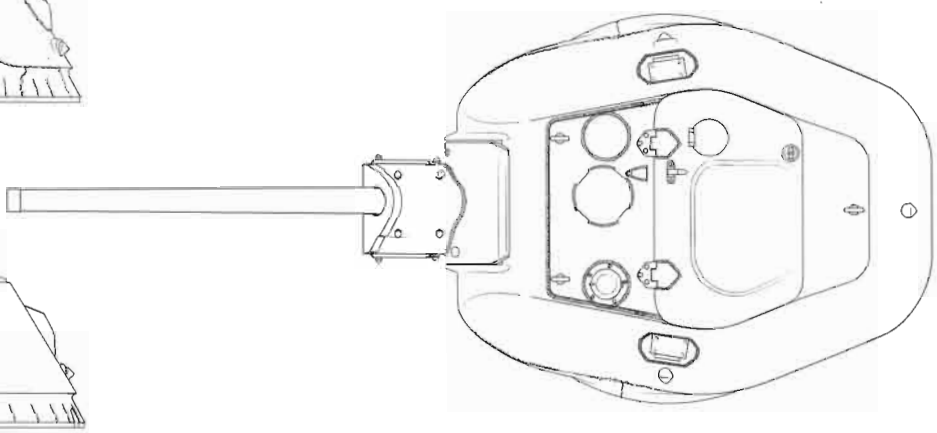
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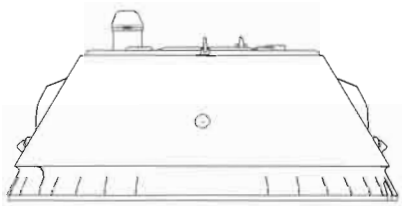
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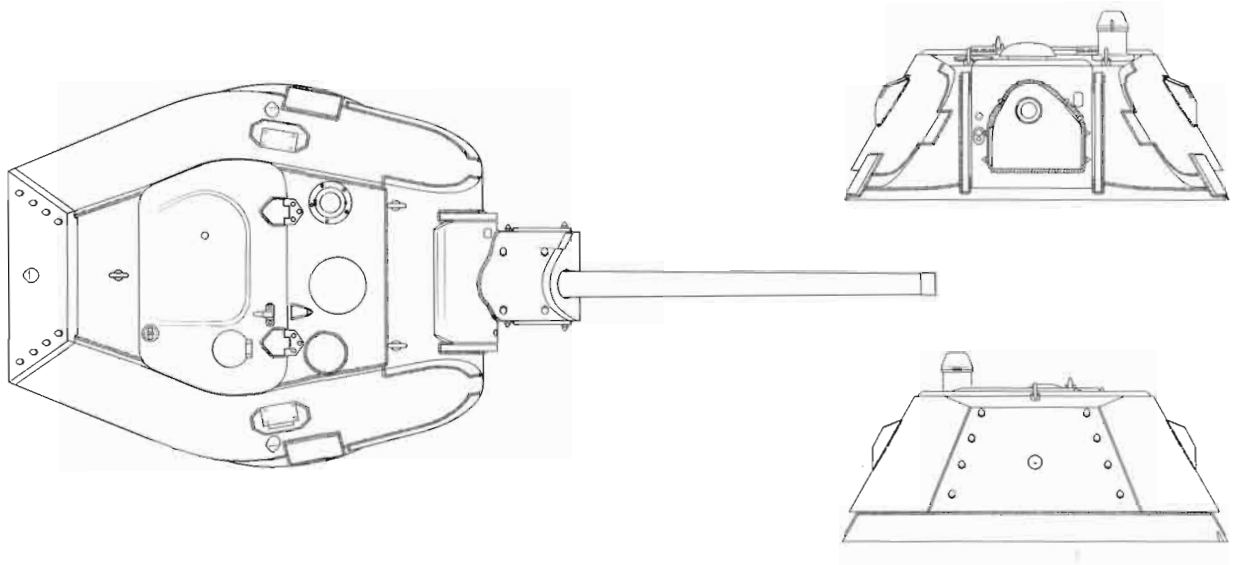


Cast turret with F–34 gun, from fall 1941 till spring 1942. First series of those turrets had also two periscopes and the early ventilator cover.

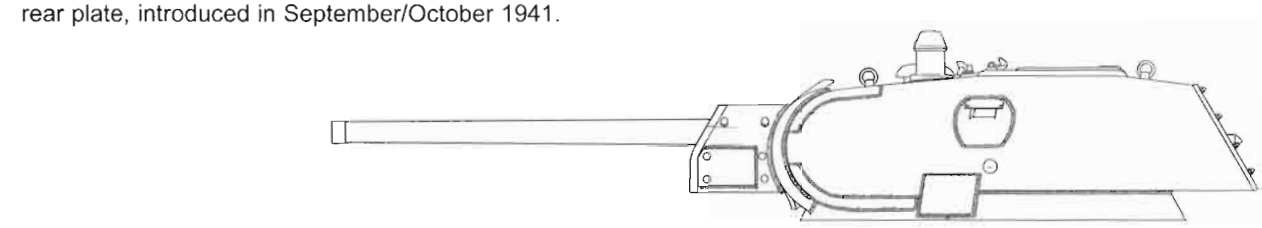






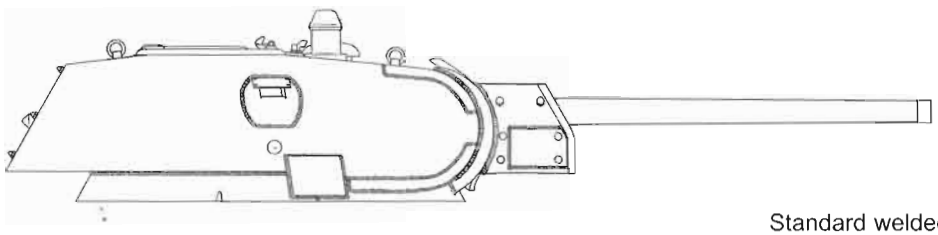


T–34–76 welded turret with F–34 gun, with different rear plate, introduced in September/October 1941.

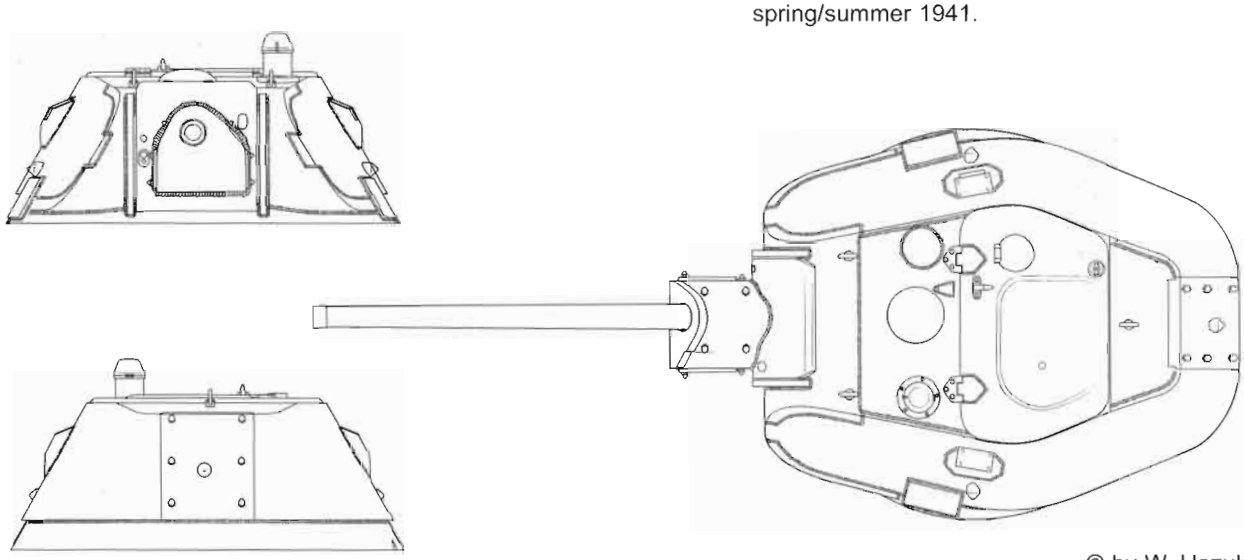




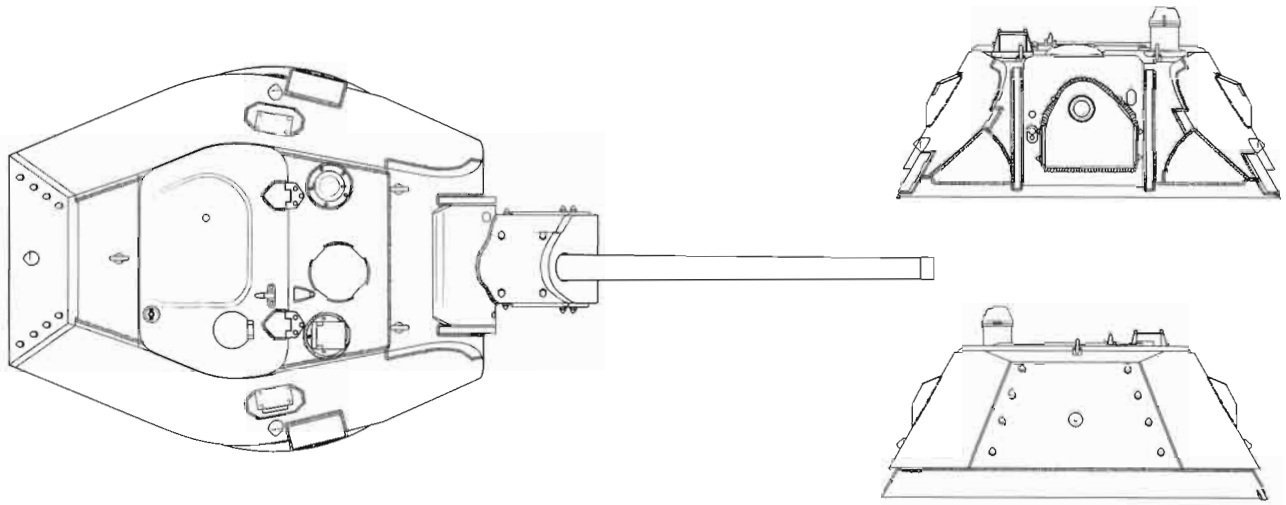
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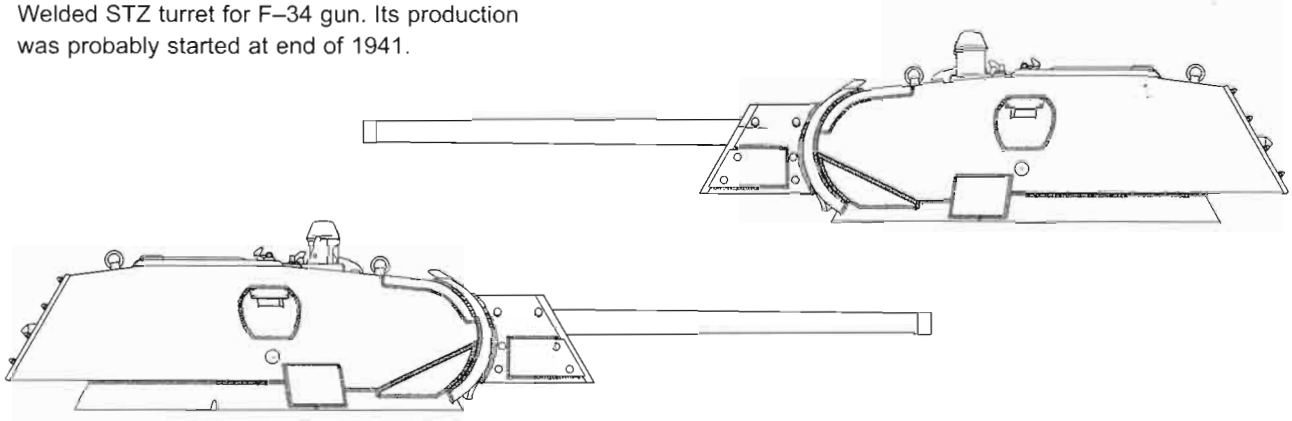
Standard welded turret from No.183 Factory, spring/summer 1941.



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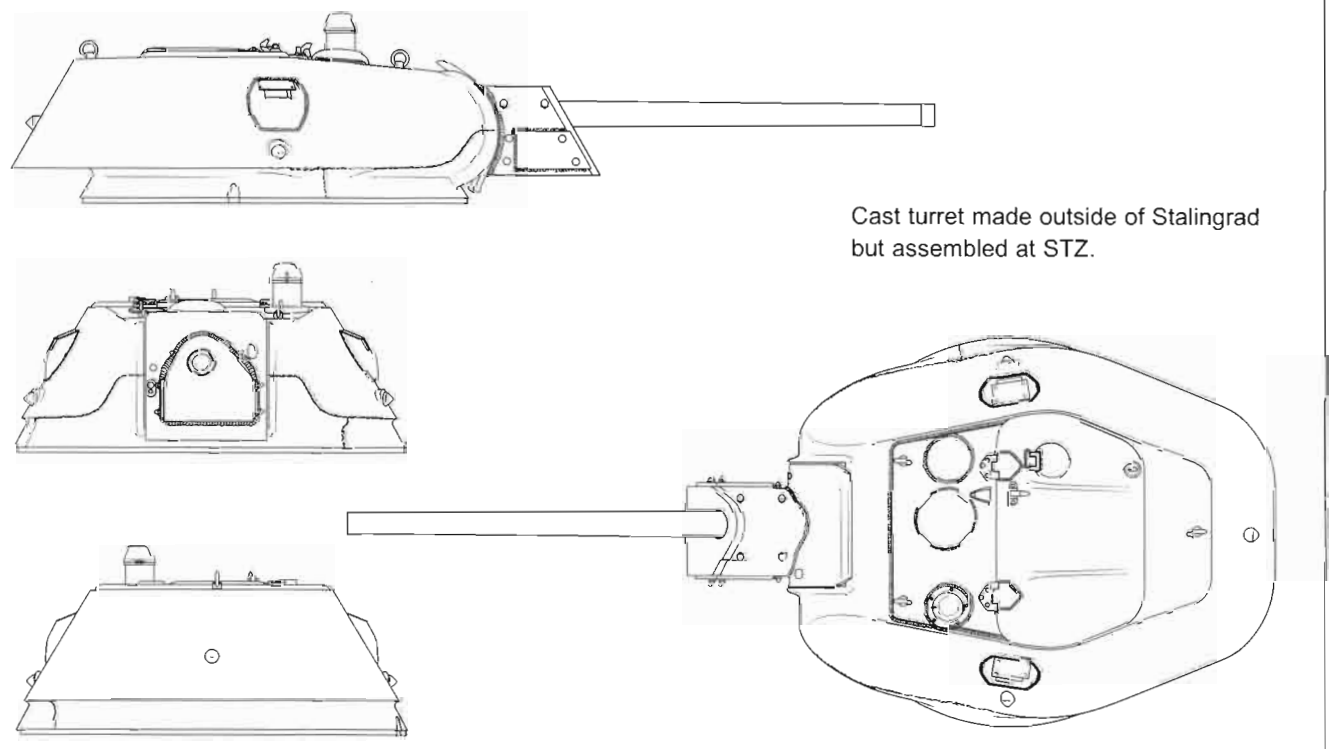
Welded STZ turret for F–34 gun. Its production was probably started at end of 1941.



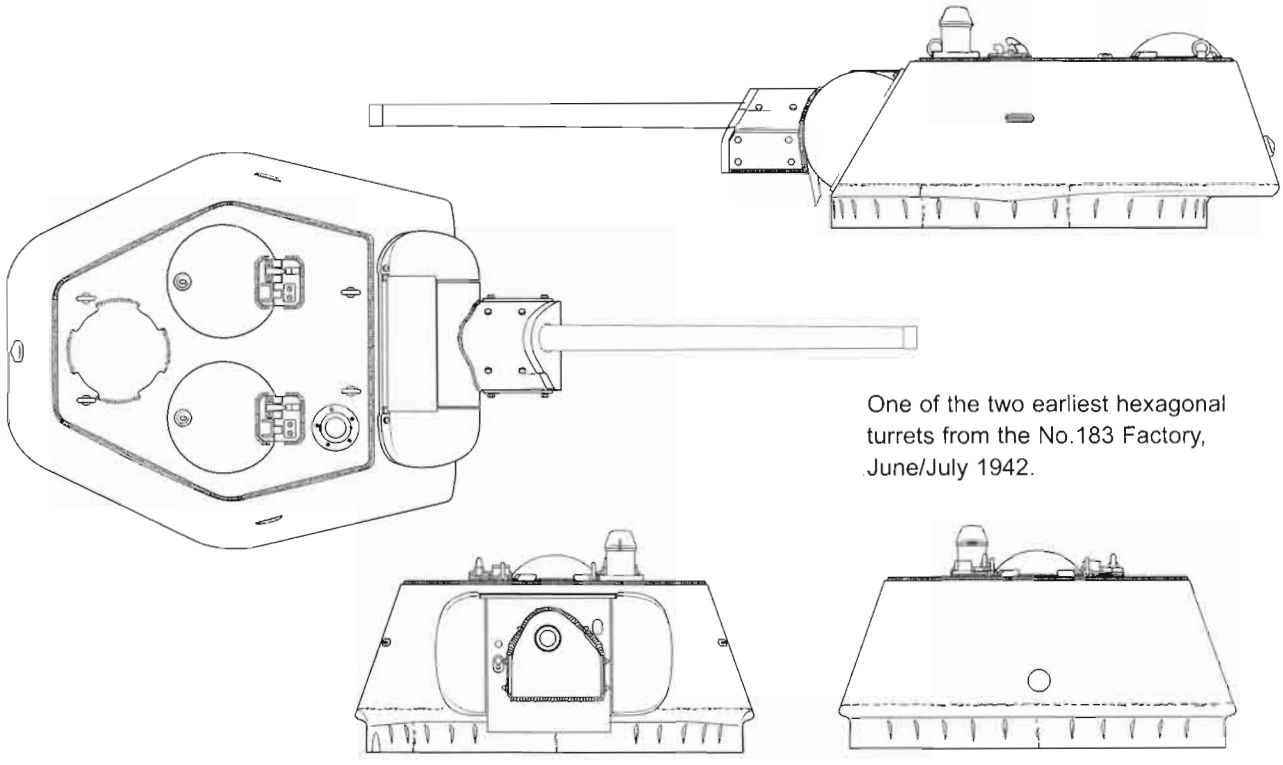
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1/35th scale



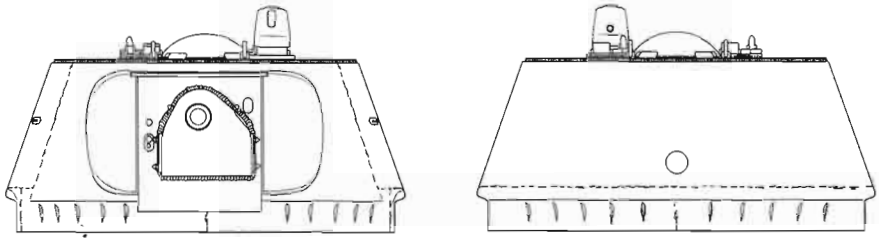
Cast turret made outside of Stalingrad but assembled at STZ.



One of the two earliest hexagonal turrets from the No.183 Factory, June/July 1942.

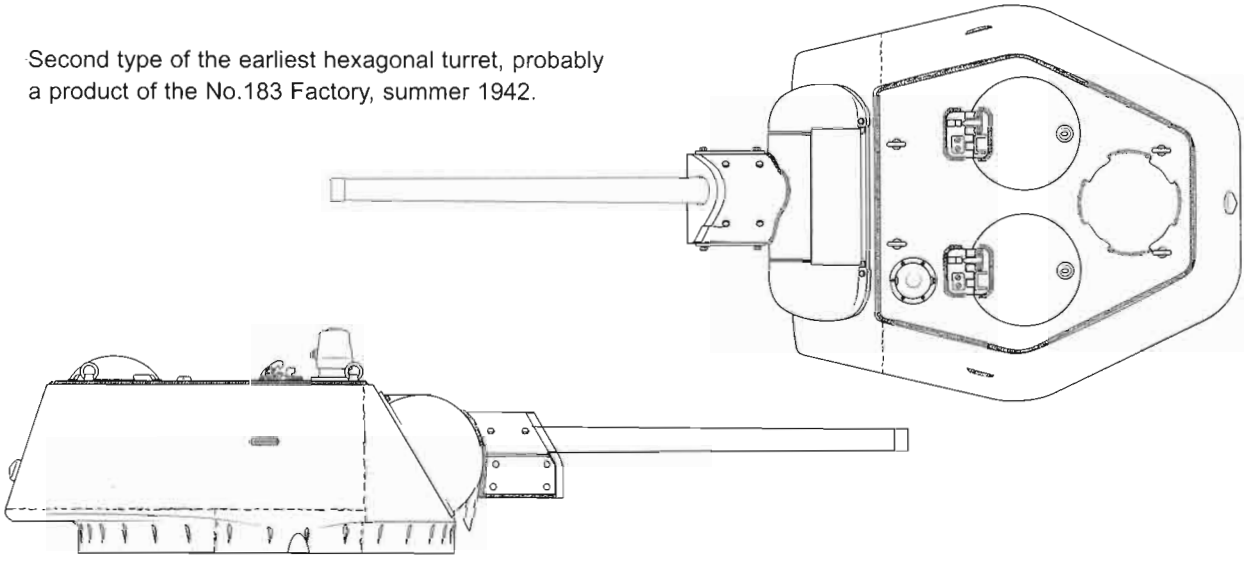


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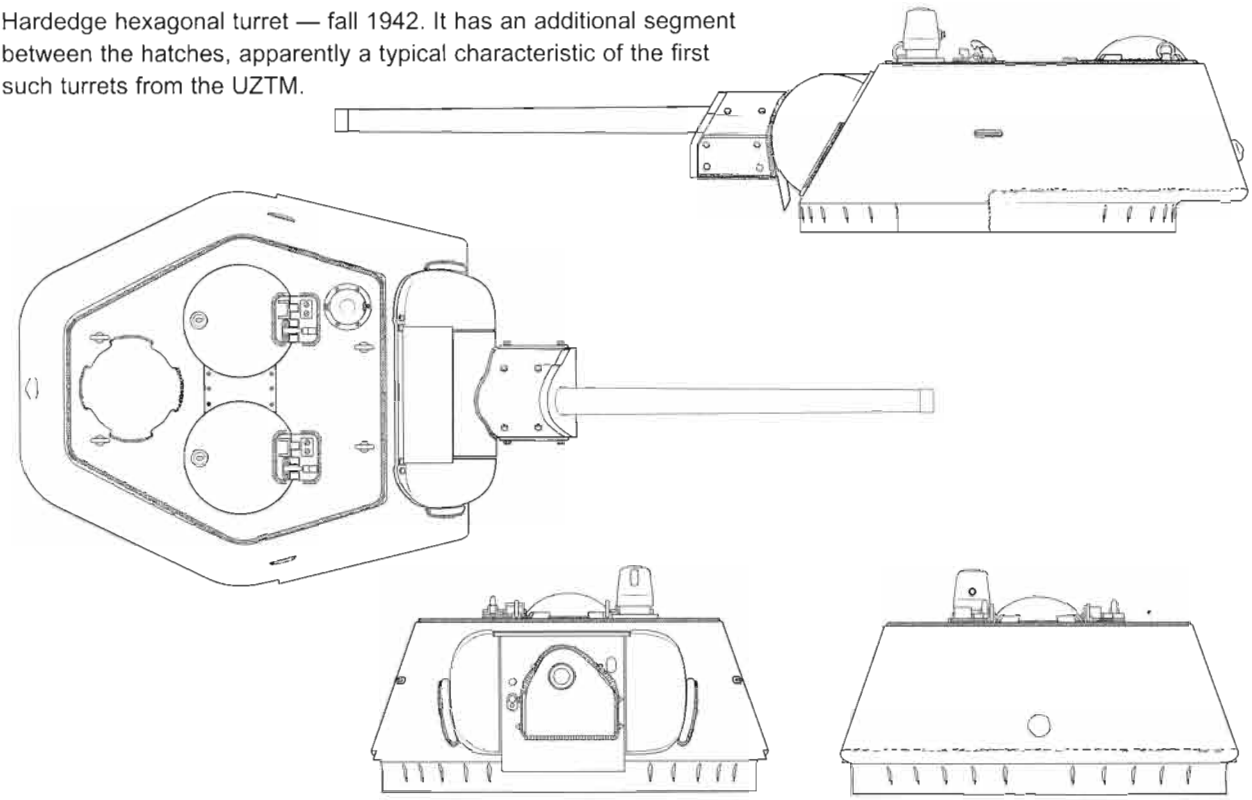


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Second type of the earliest hexagonal turret, probably a product of the No.183 Factory, summer 1942.

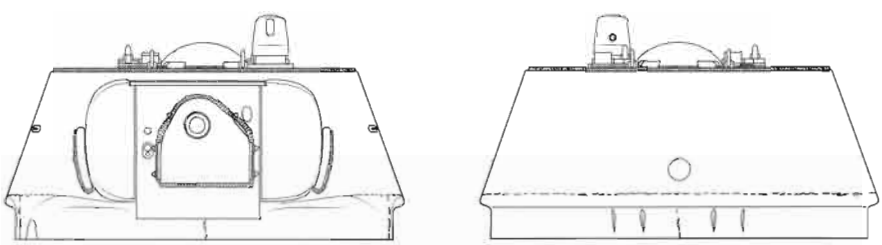


Hardedge hexagonal turret — fall 1942. It has an additional segment between the hatches, apparently a typical characteristic of the first such turrets from the UZTM.

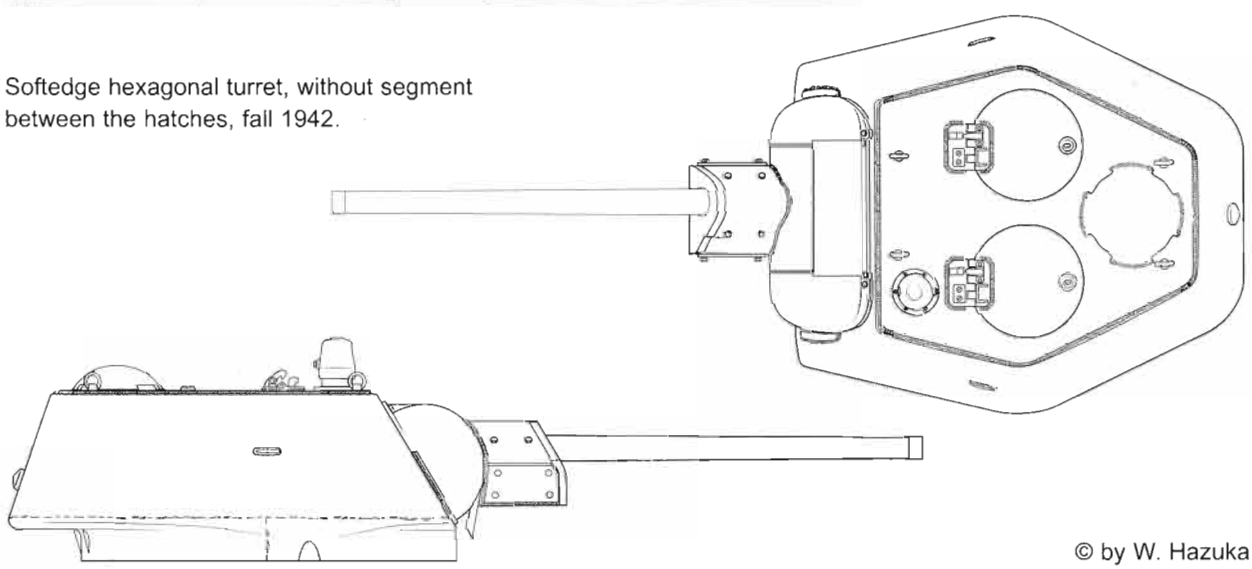




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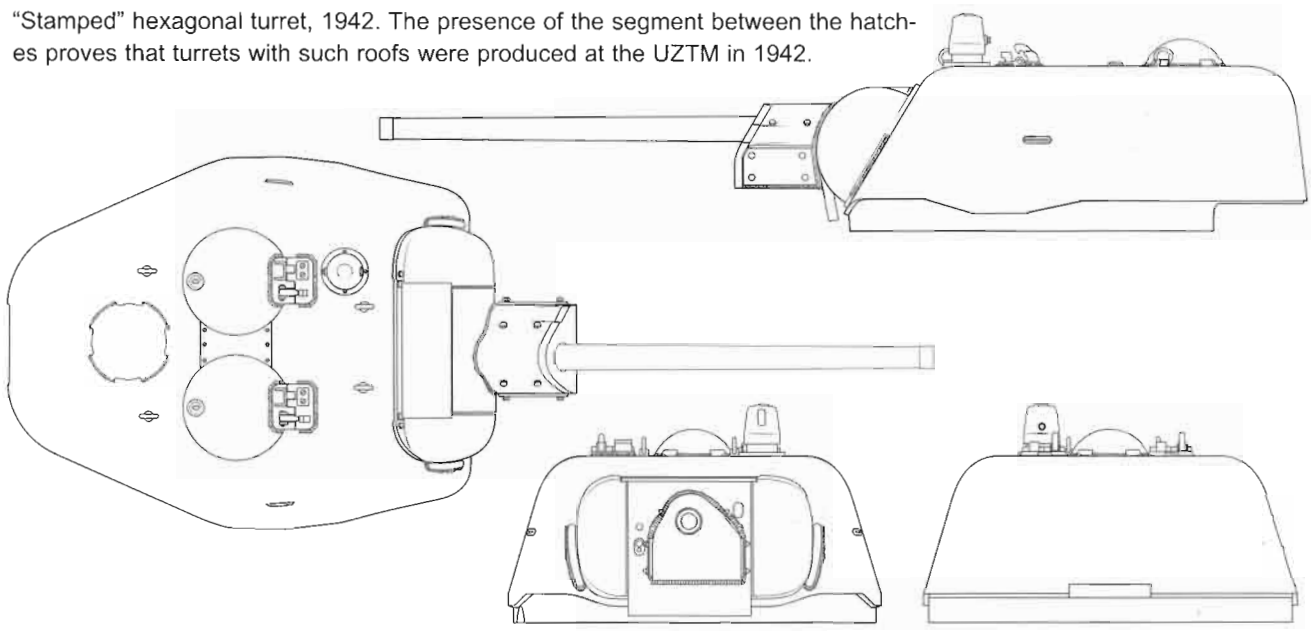


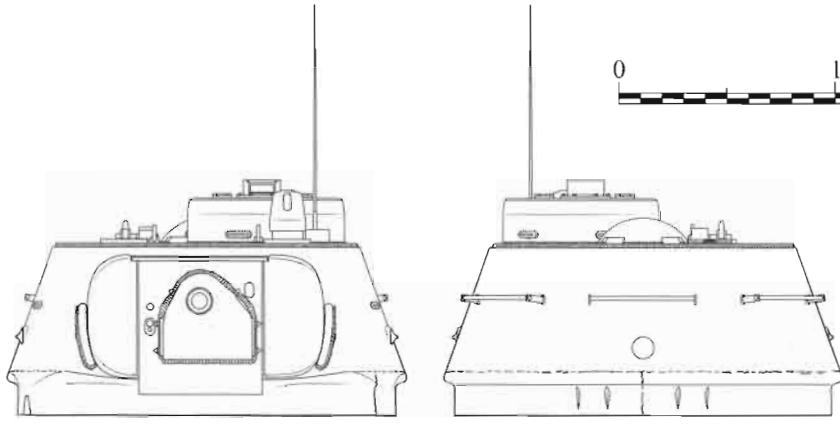
Softedge hexagonal turret, without segment between the hatches, fall 1942.



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"Stamped" hexagonal turret, 1942. The presence of the segment between the hatches proves that turrets with such roofs were produced at the UZTM in 1942.



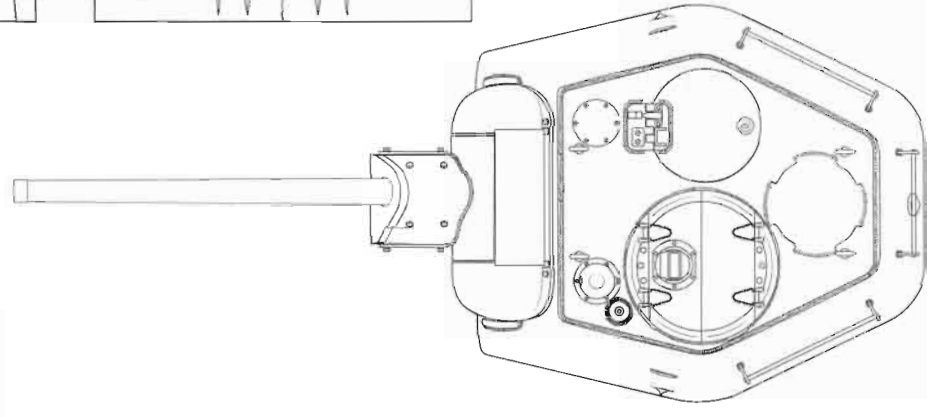


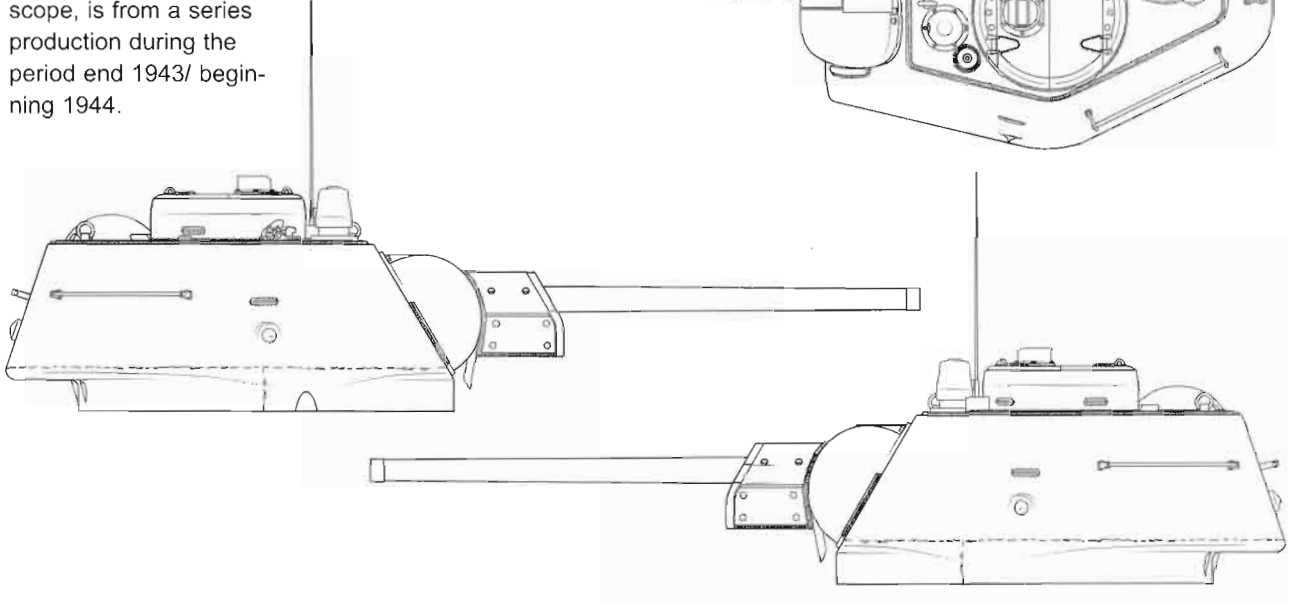
0 1 2 3 m

1/35th scale

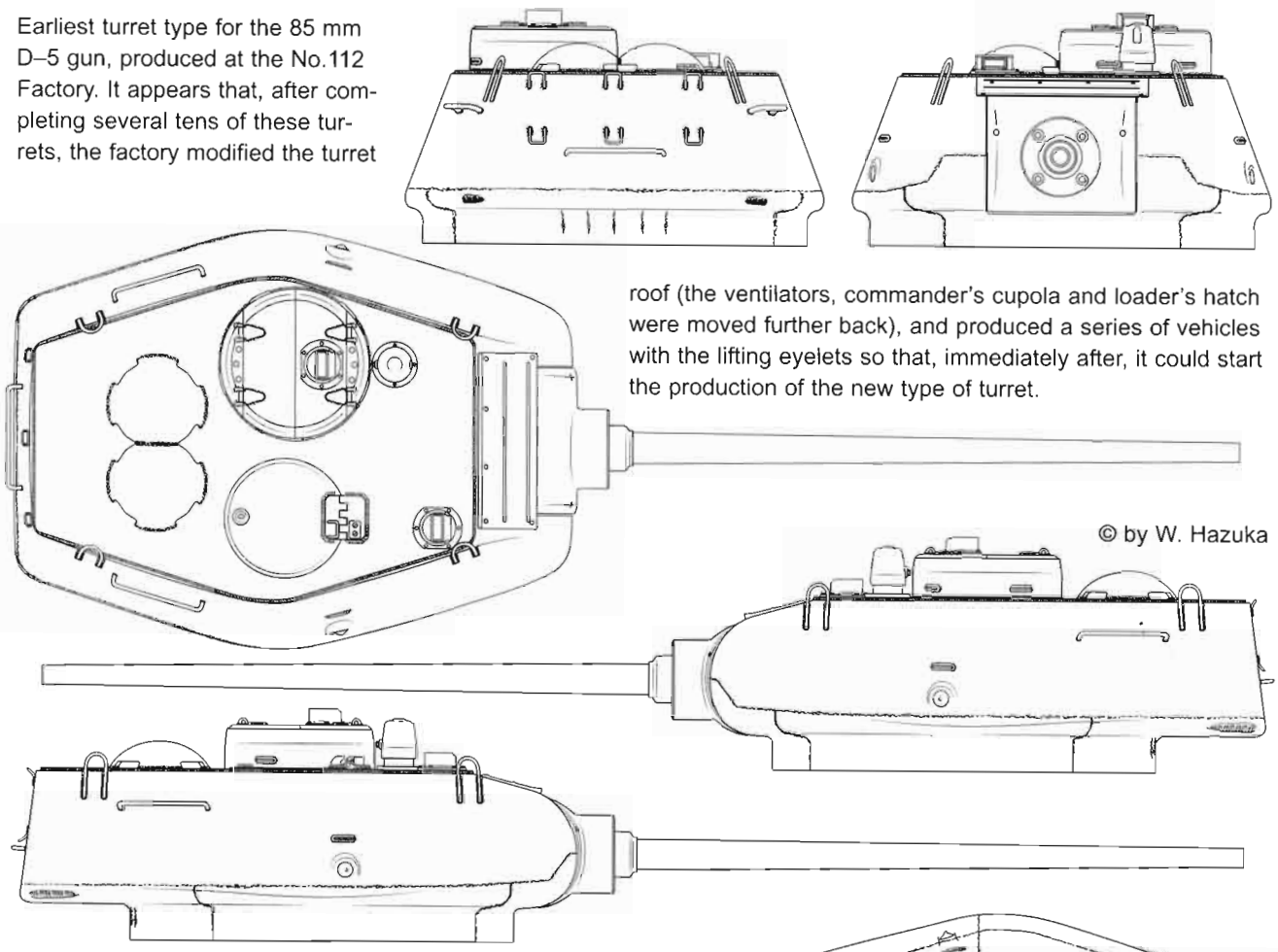
© by W. Hazuka

Softedge hexagonal turret, with commander's cupola and antenna mounting. This turret, with the MK–4 periscope, is from a series production during the period end 1943/ beginning 1944.





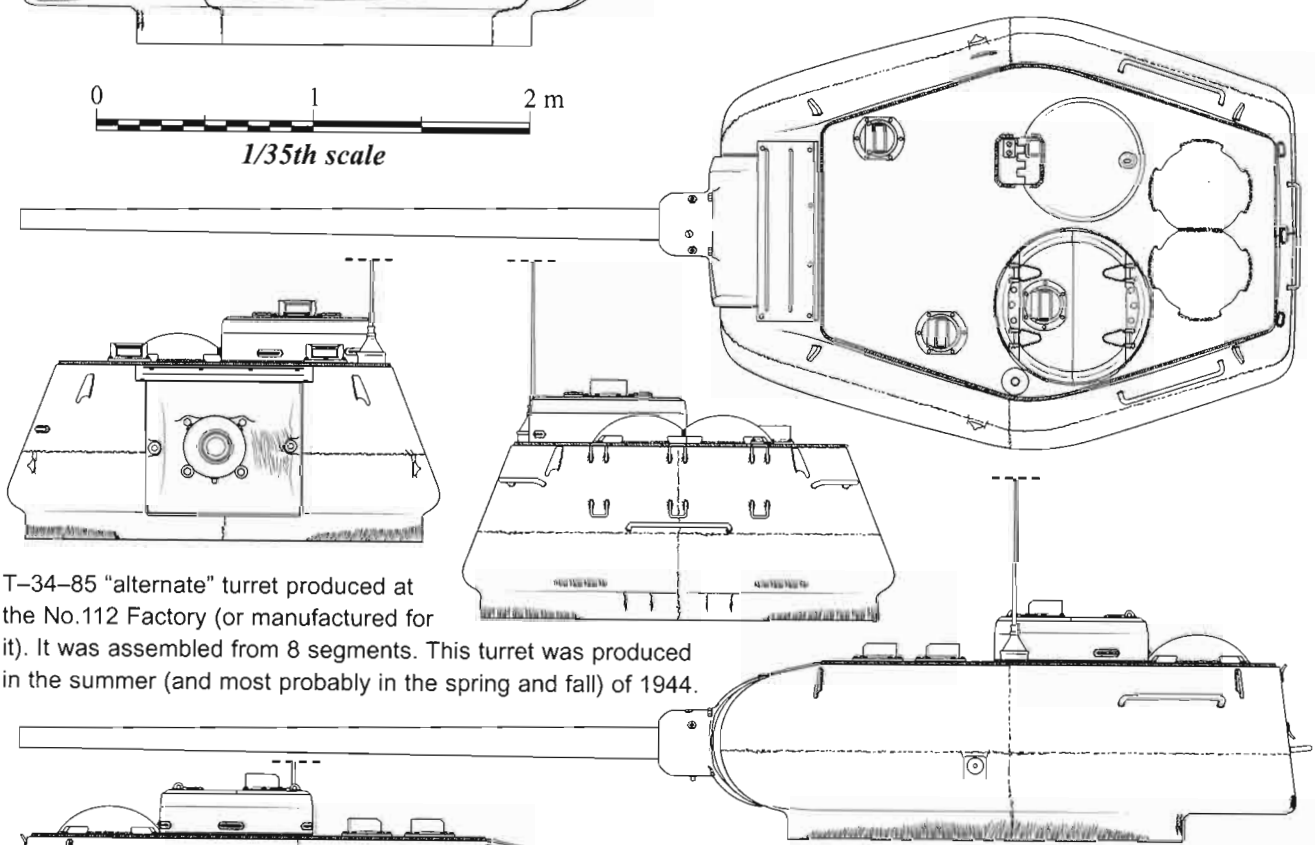
Earliest turret type for the 85 mm D–5 gun, produced at the No.112 Factory. It appears that, after completing several tens of these turrets, the factory modified the turret roof (the ventilators, commander's cupola and loader's hatch were moved further back), and produced a series of vehicles with the lifting eyelets so that, immediately after, it could start the production of the new type of turret.



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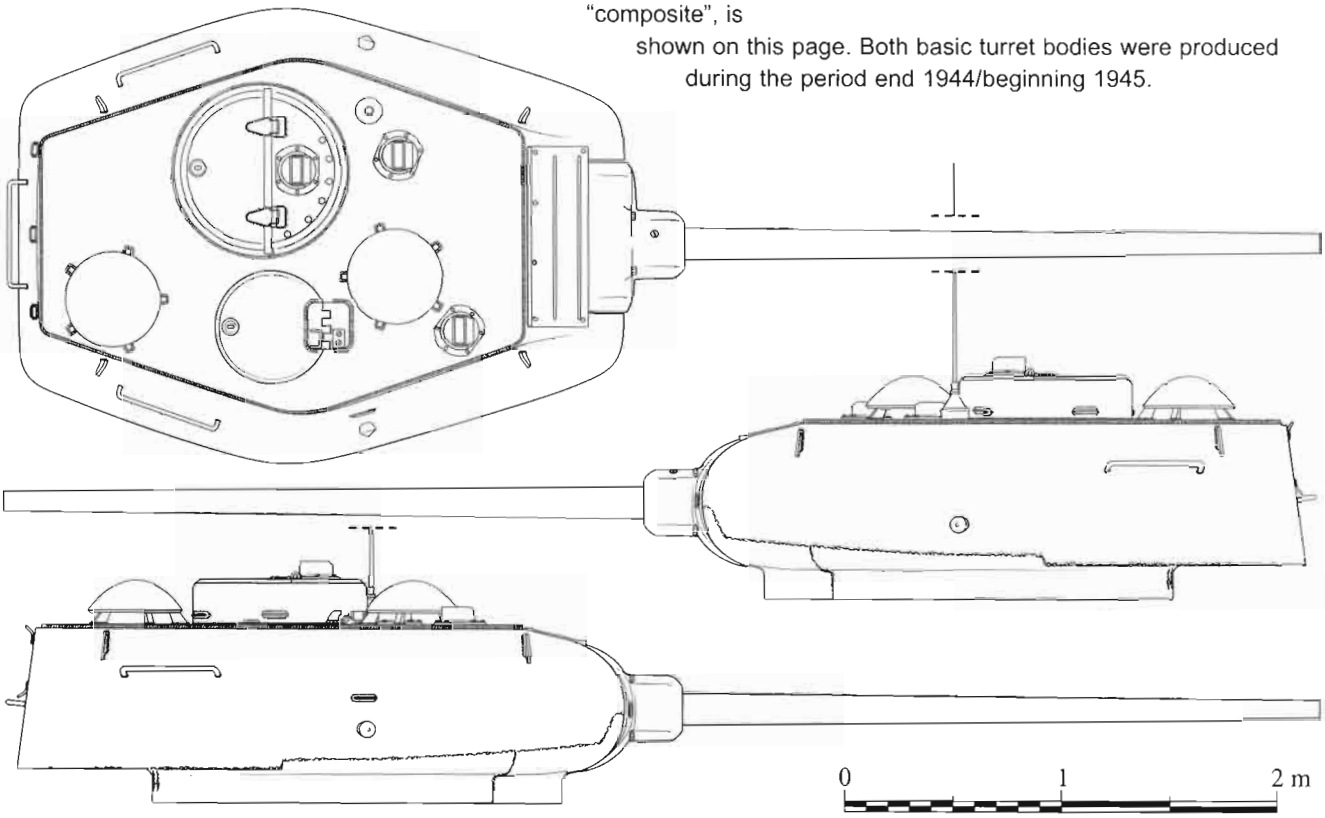
0 1 2 m

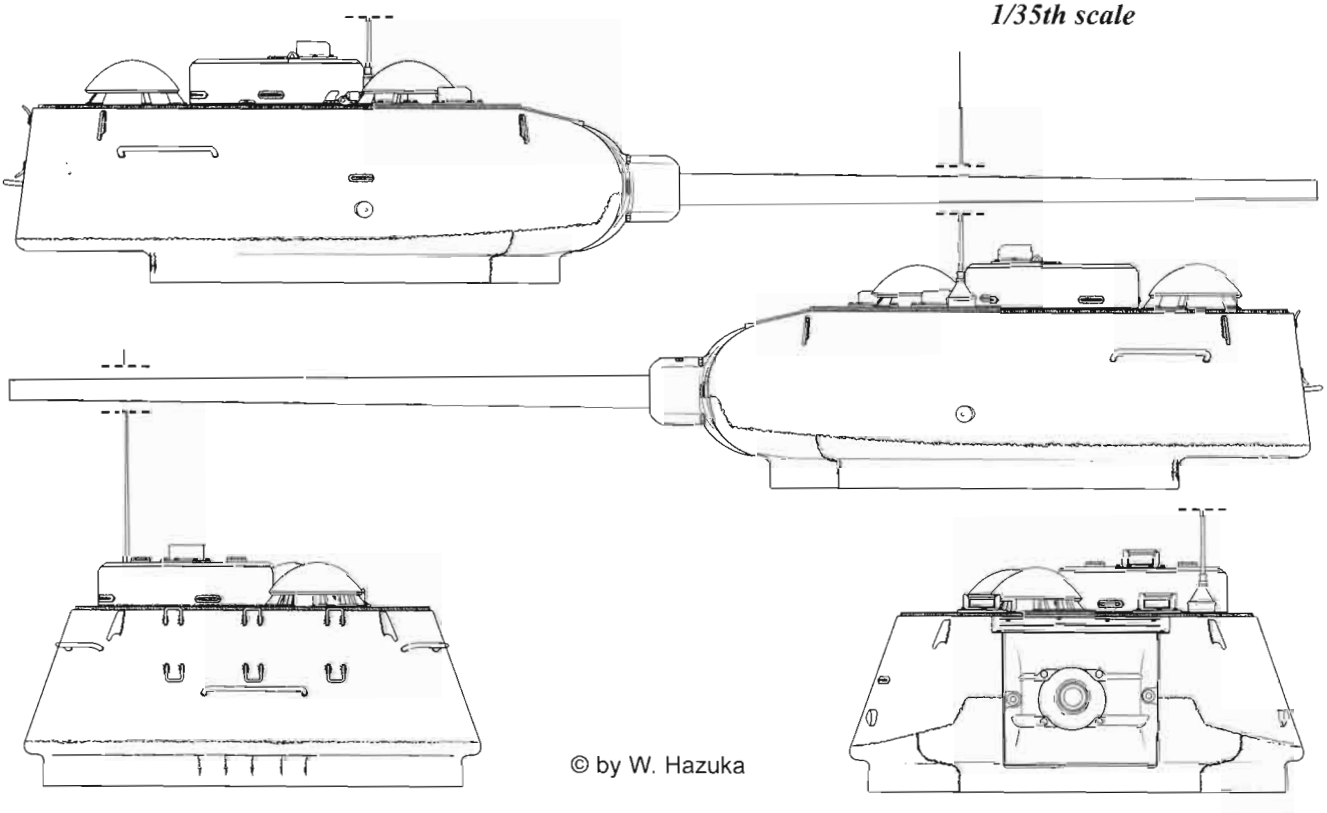
1/35th scale



T–34–85 "alternate" turret produced at the No.112 Factory (or manufactured for it). It was assembled from 8 segments. This turret was produced in the summer (and most probably in the spring and fall) of 1944.

The two "mushroom" turret versions were built at the No.112 Factory, and were based on two almost identical turret bodies, with exactly the same dimensions and appearance. The first, which became known as the "composite", is shown on this page. Both basic turret bodies were produced during the period end 1944/beginning 1945.



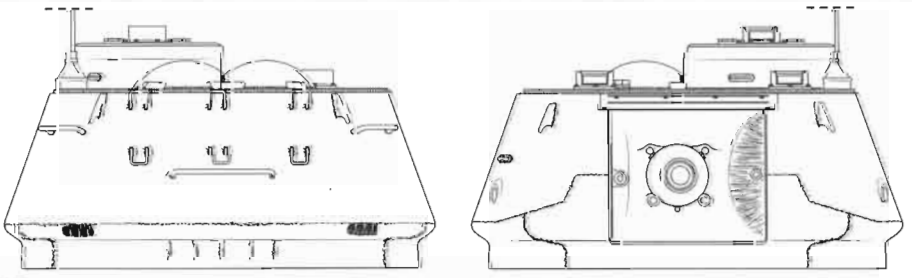


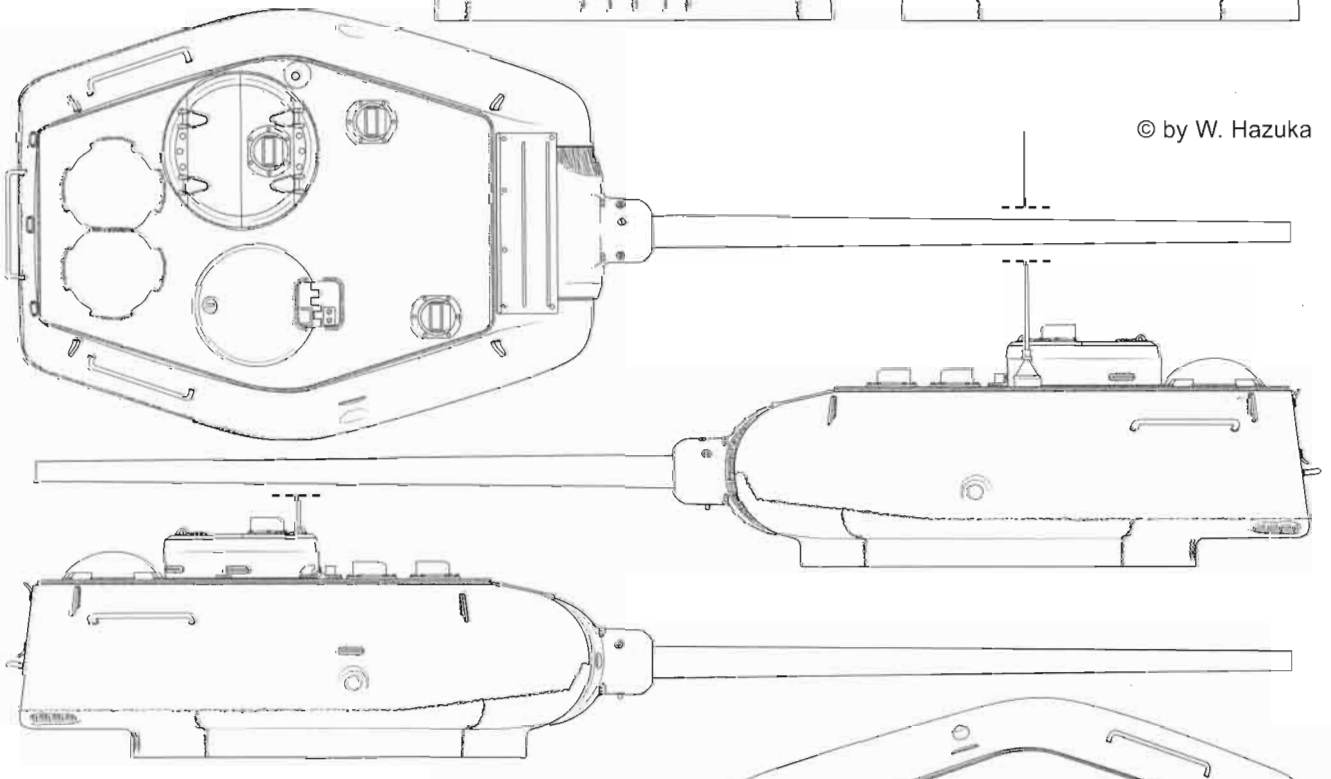
0 1 2 m

1/35th scale

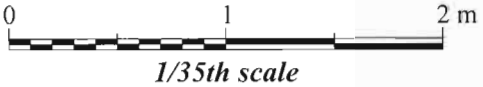
© by W. Hazuka

2nd version of a turret from the No.112 Factory. A characteristic of all the big turrets from that factory was their low, and slightly bigger, rear.



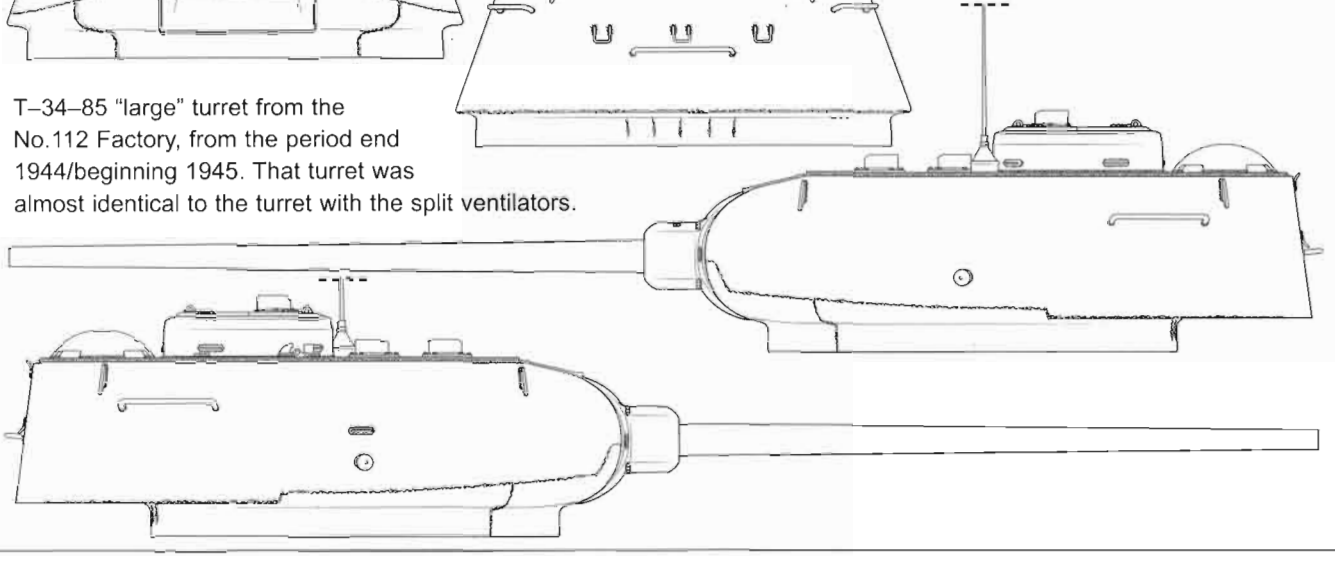


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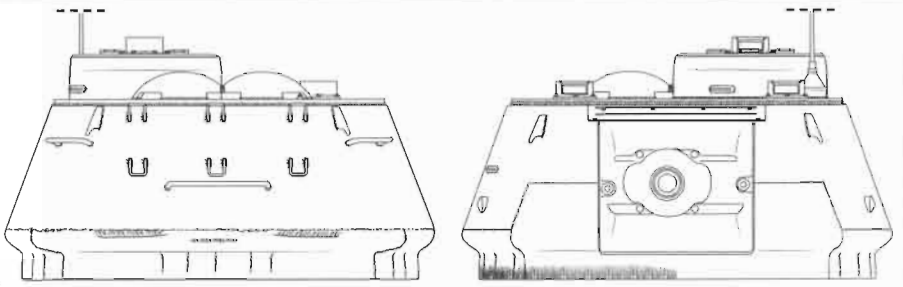


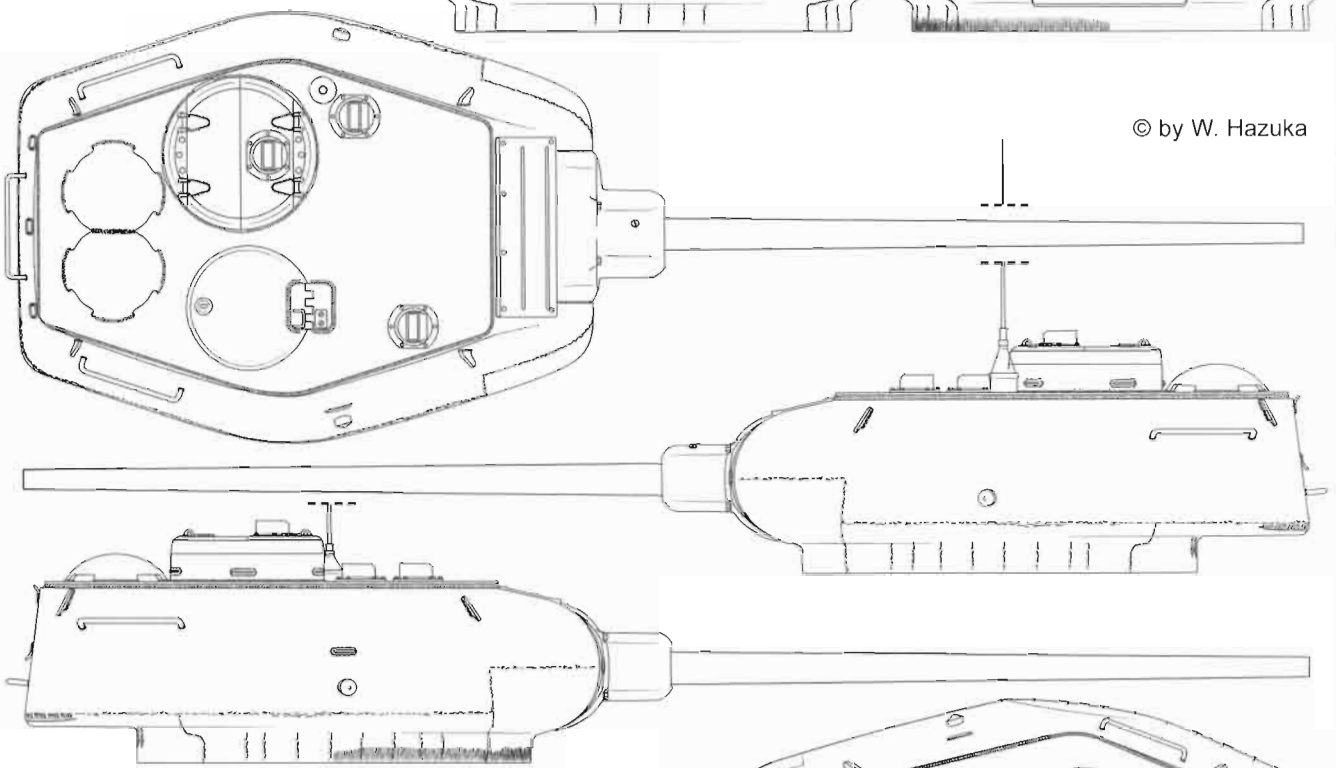
1/35th scale

T–34–85 "large" turret from the No.112 Factory, from the period end 1944/beginning 1945. That turret was almost identical to the turret with the split ventilators.



T–34–85 turret with the older S–53 gun from the No.174 Factory. The pattern of the welding seams appears similar to those from the No.183 Factory. The turret's overhang is rather high above the engine deck.

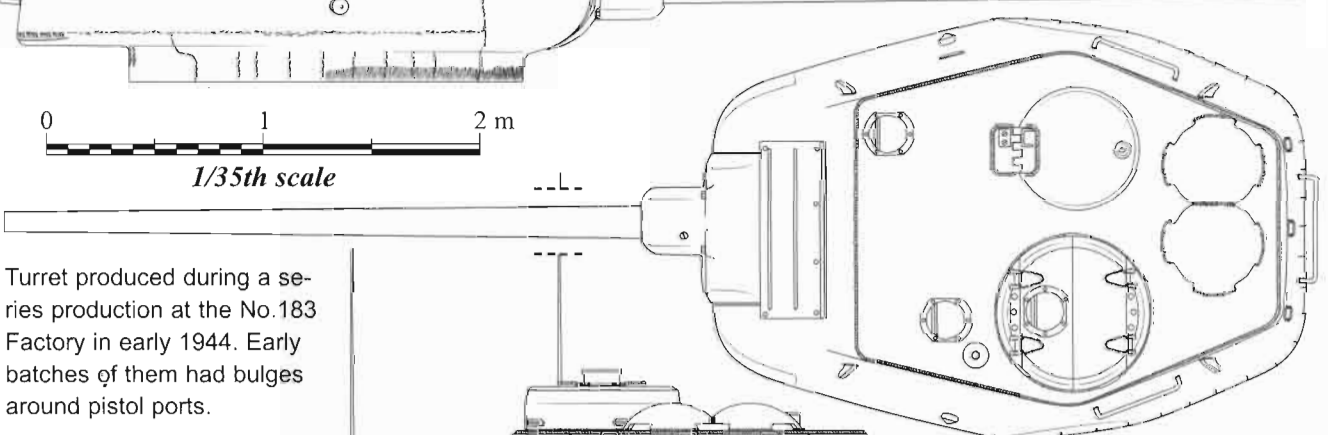




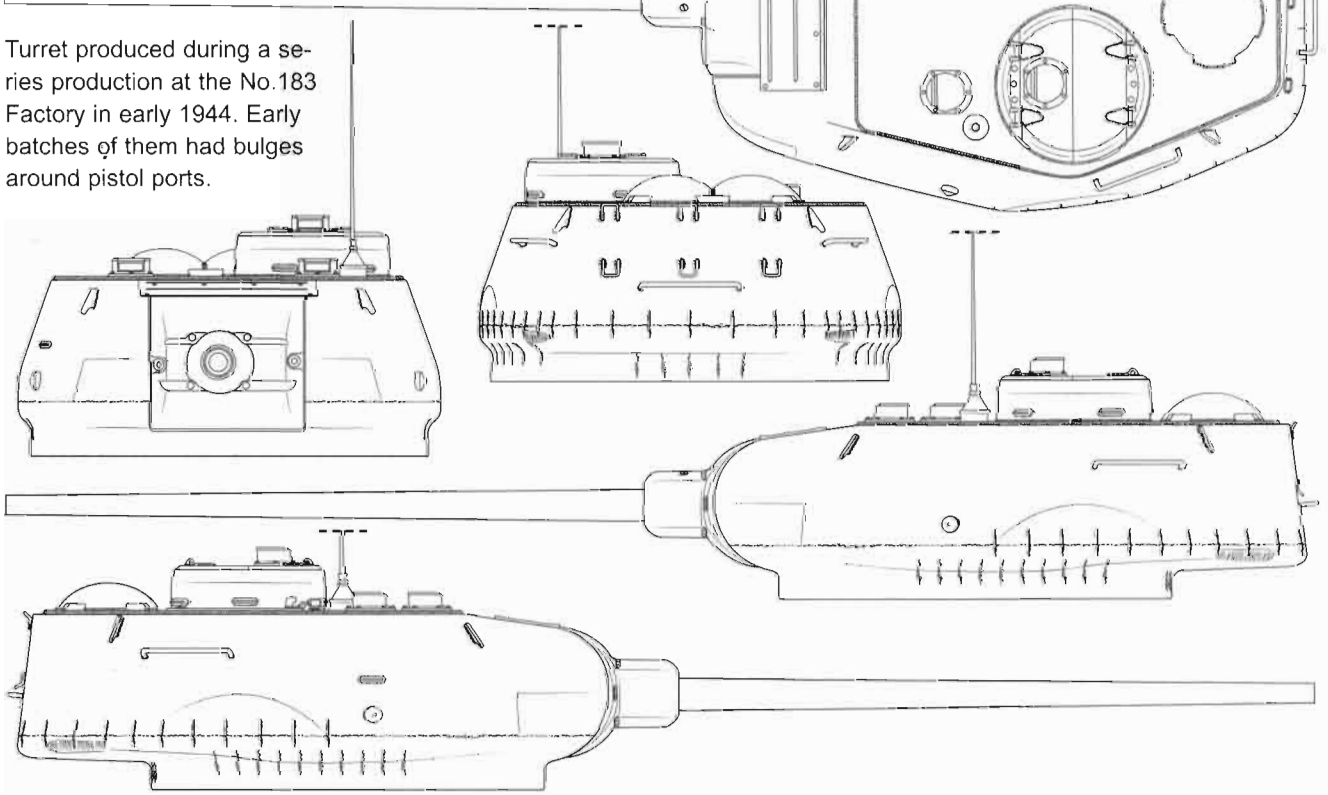
© by W. Hazuka

0 1 2 m

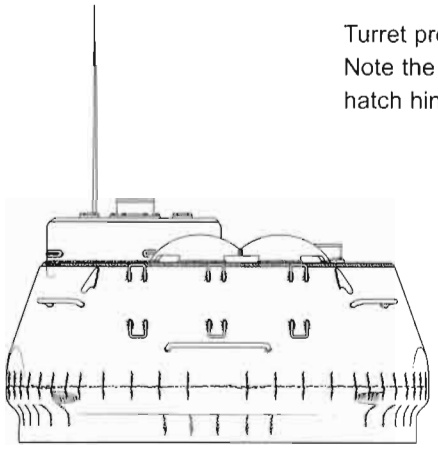
1/35th scale

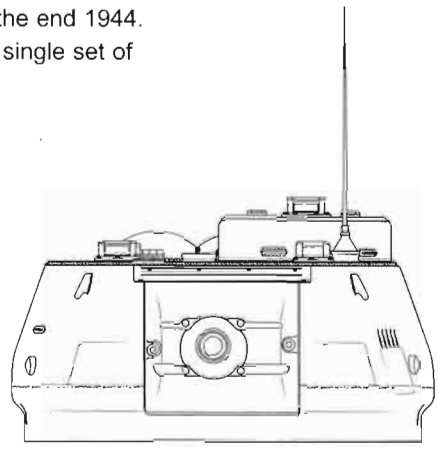


Turret produced during a series production at the No.183 Factory in early 1944. Early batches of them had bulges around pistol ports.



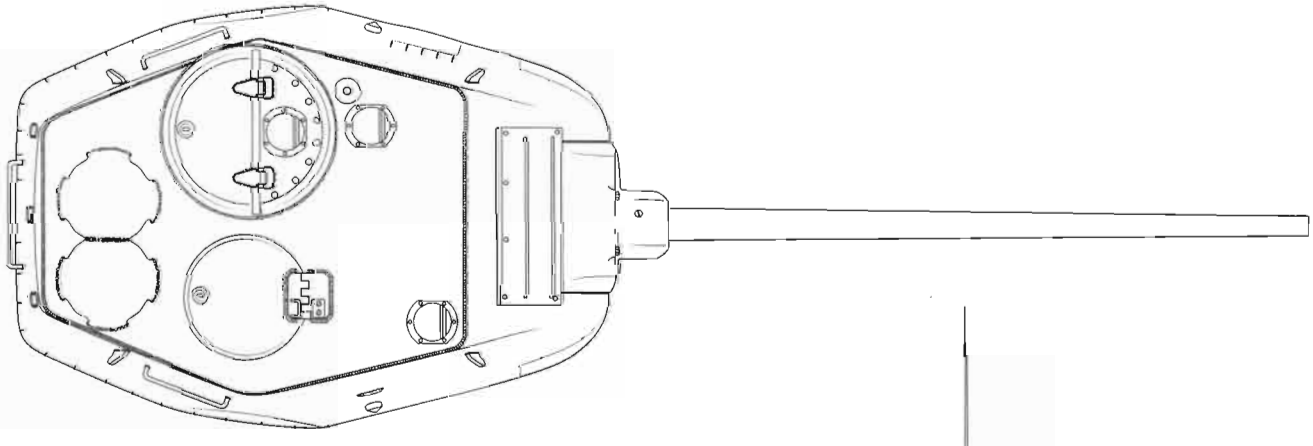
Turret produced at the No.183 Factory at the end 1944.
Note the bigger commander's cupola with single set of hatch hinges.

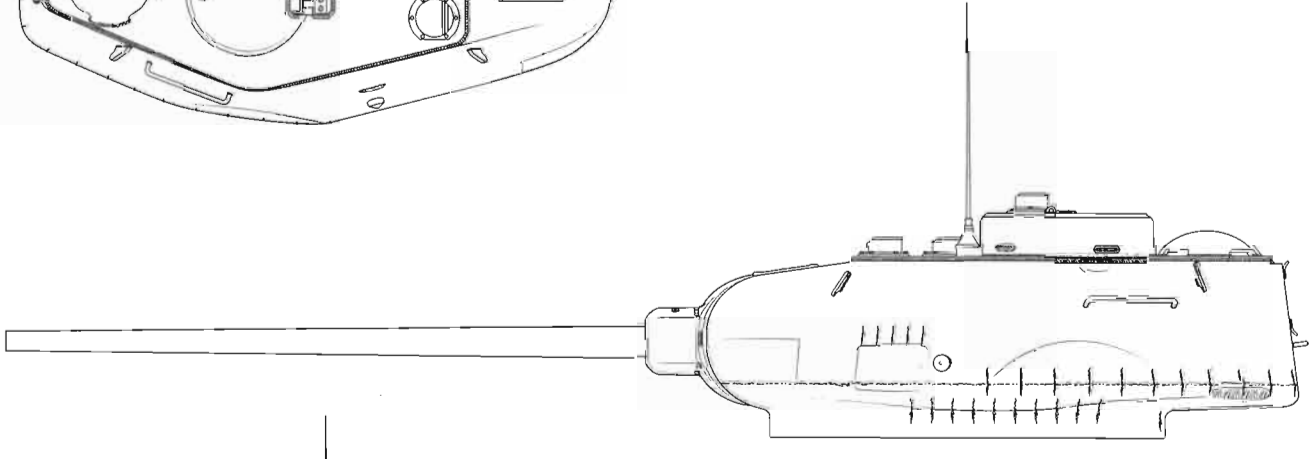


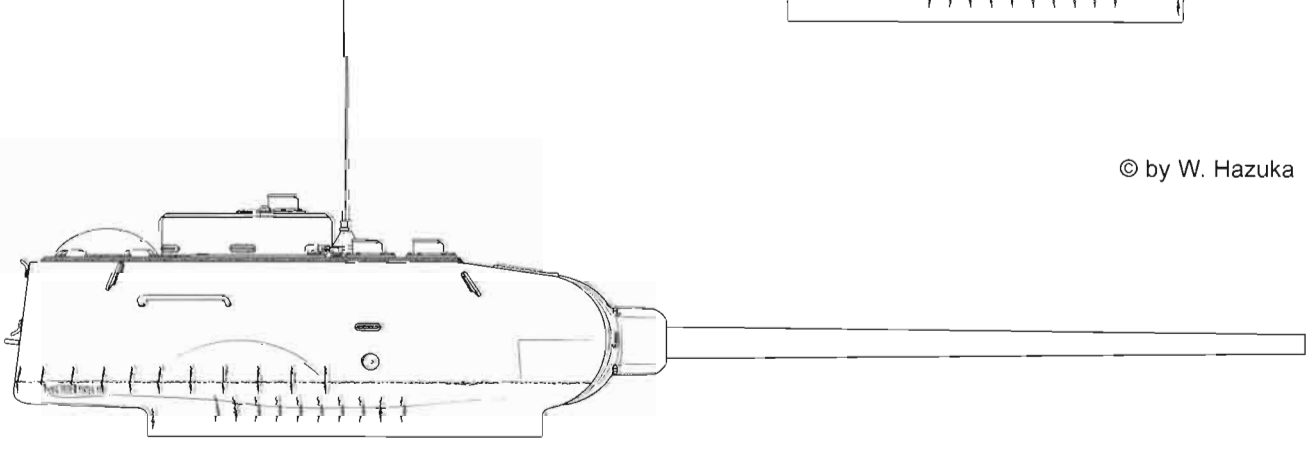




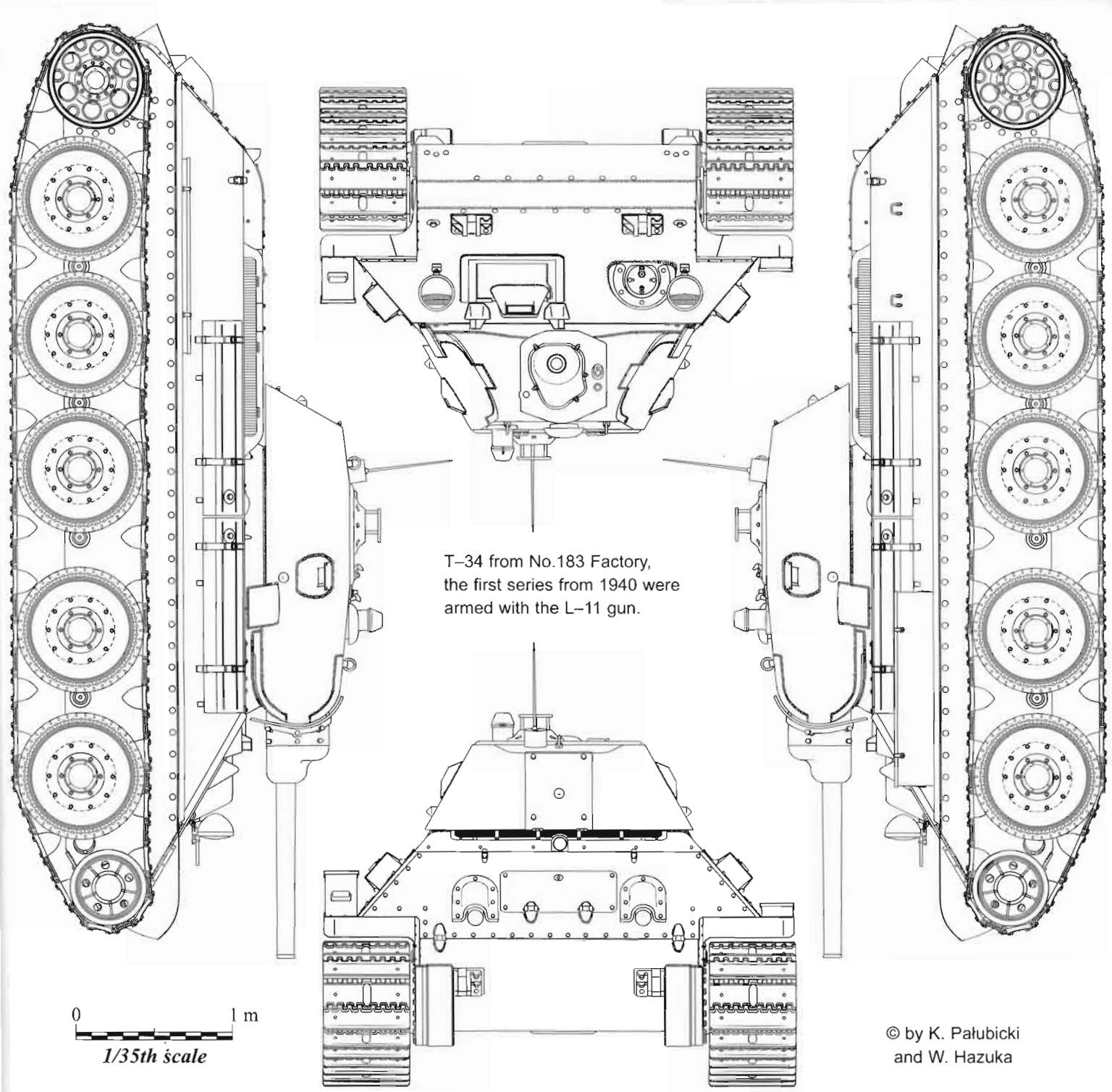
1/35th scale







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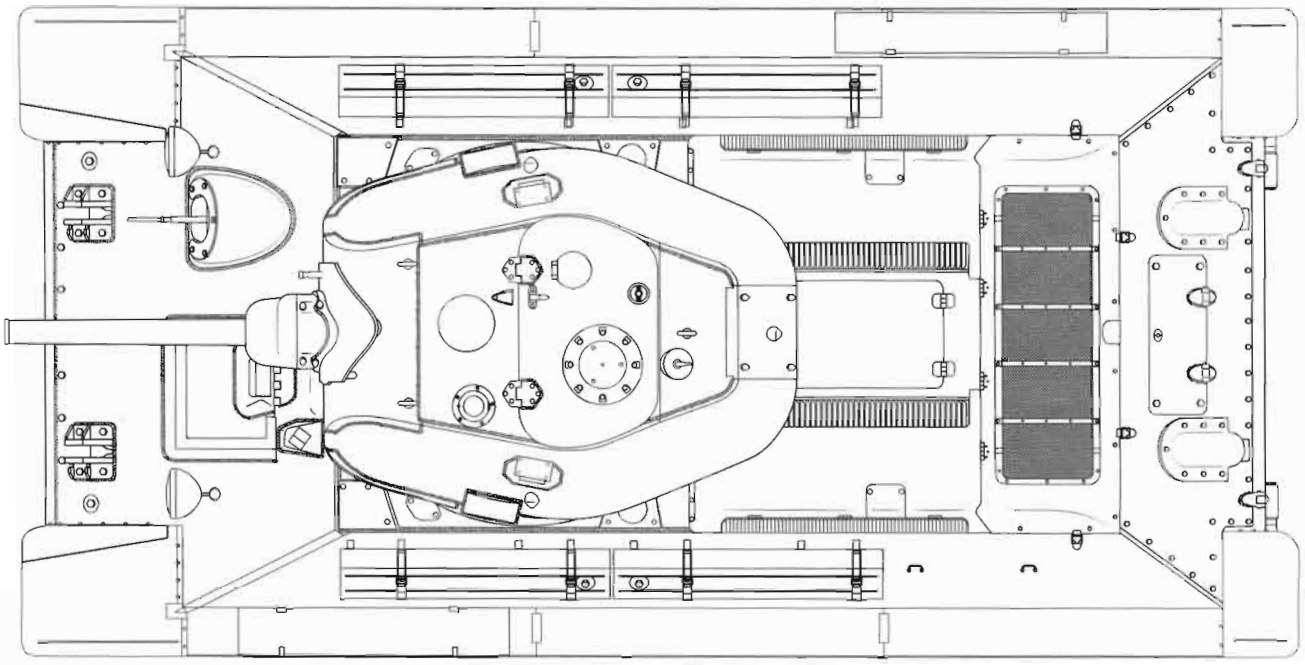


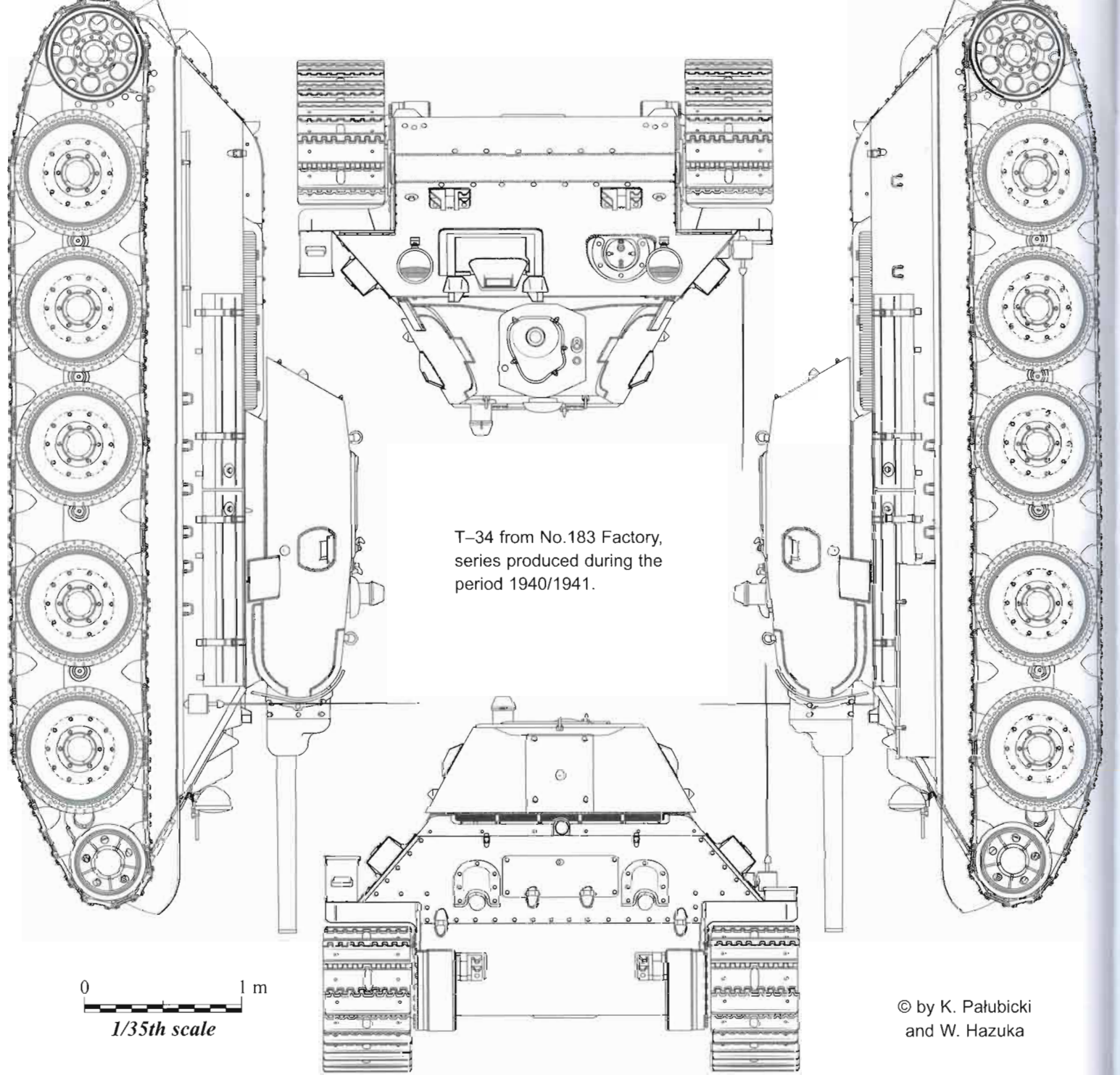
T–34 from No.183 Factory,
the first series from 1940 were
armed with the L–11 gun.

0 1 m

1/35th scale

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and W. Hazuka



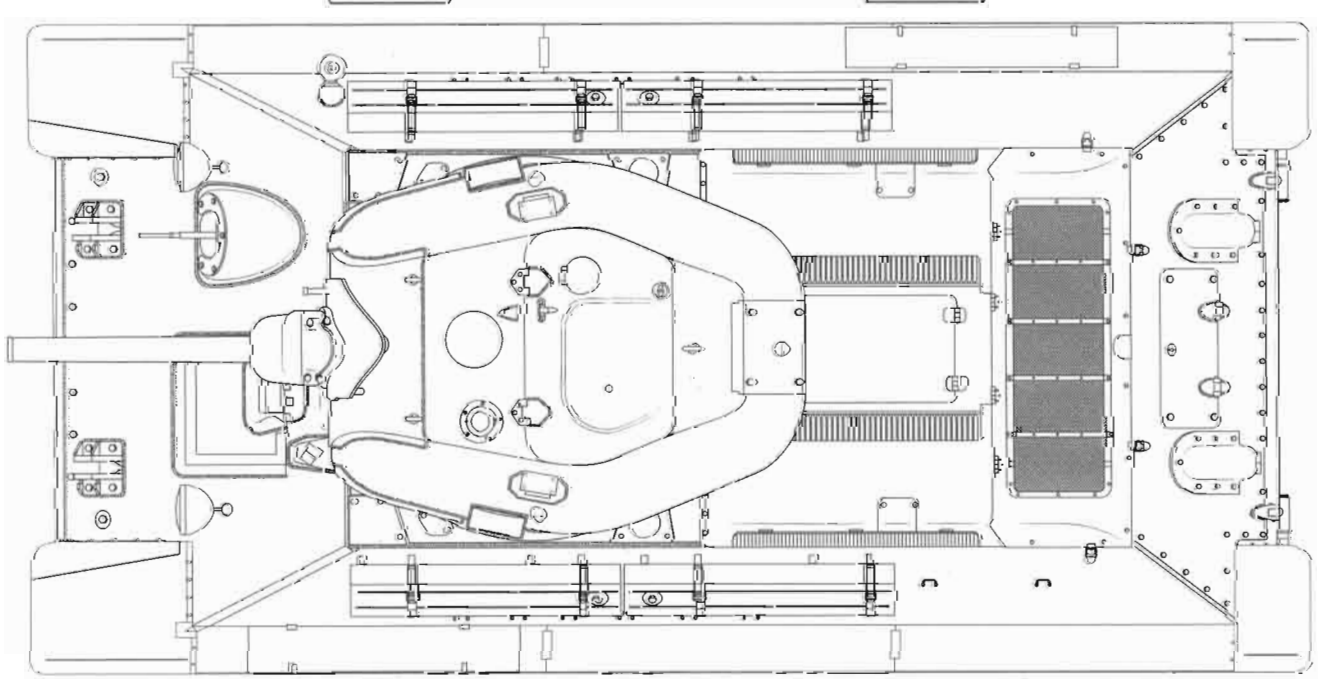


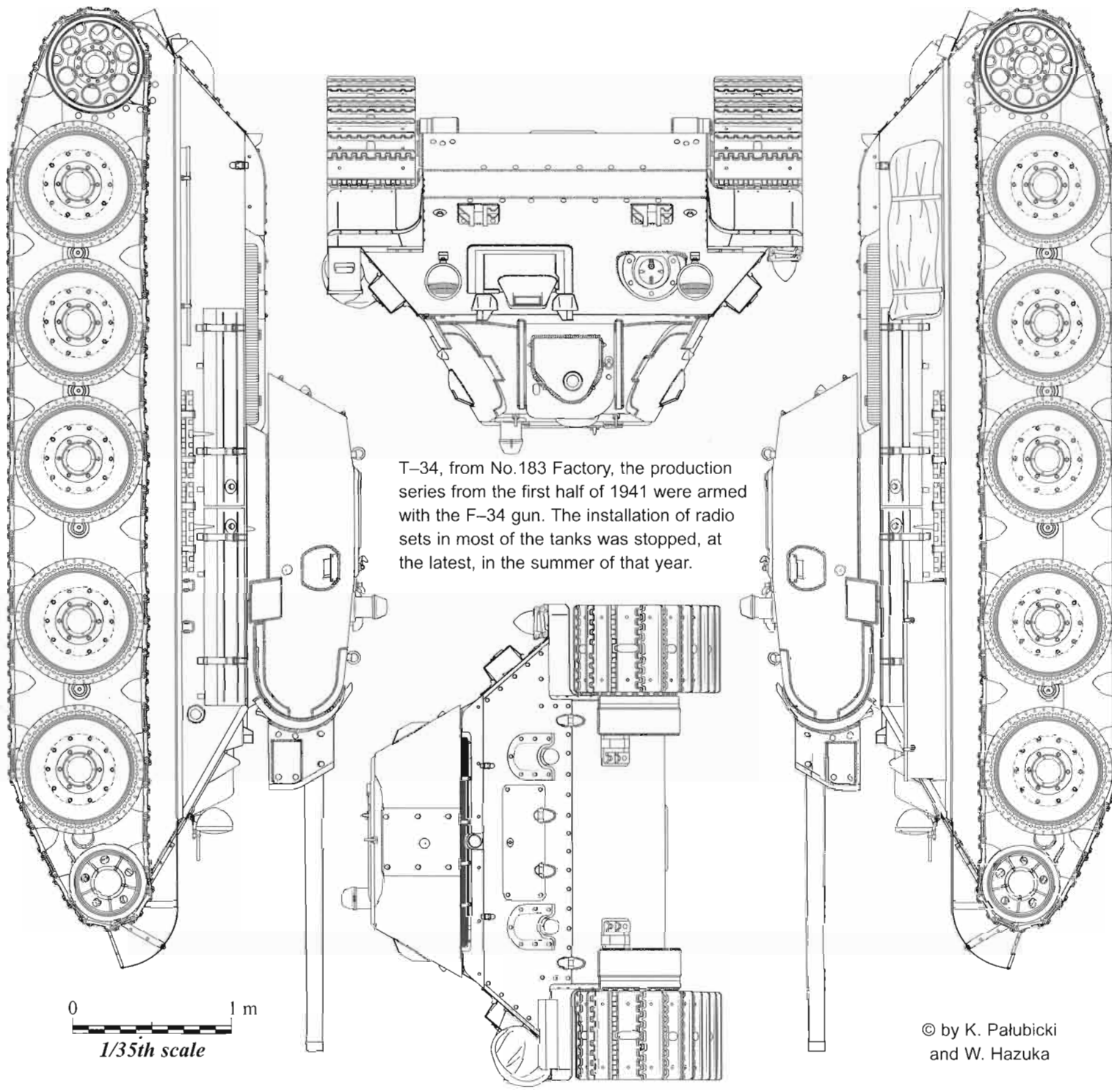
T–34 from No.183 Factory, series produced during the period 1940/1941.

0 1 m

1/35th scale

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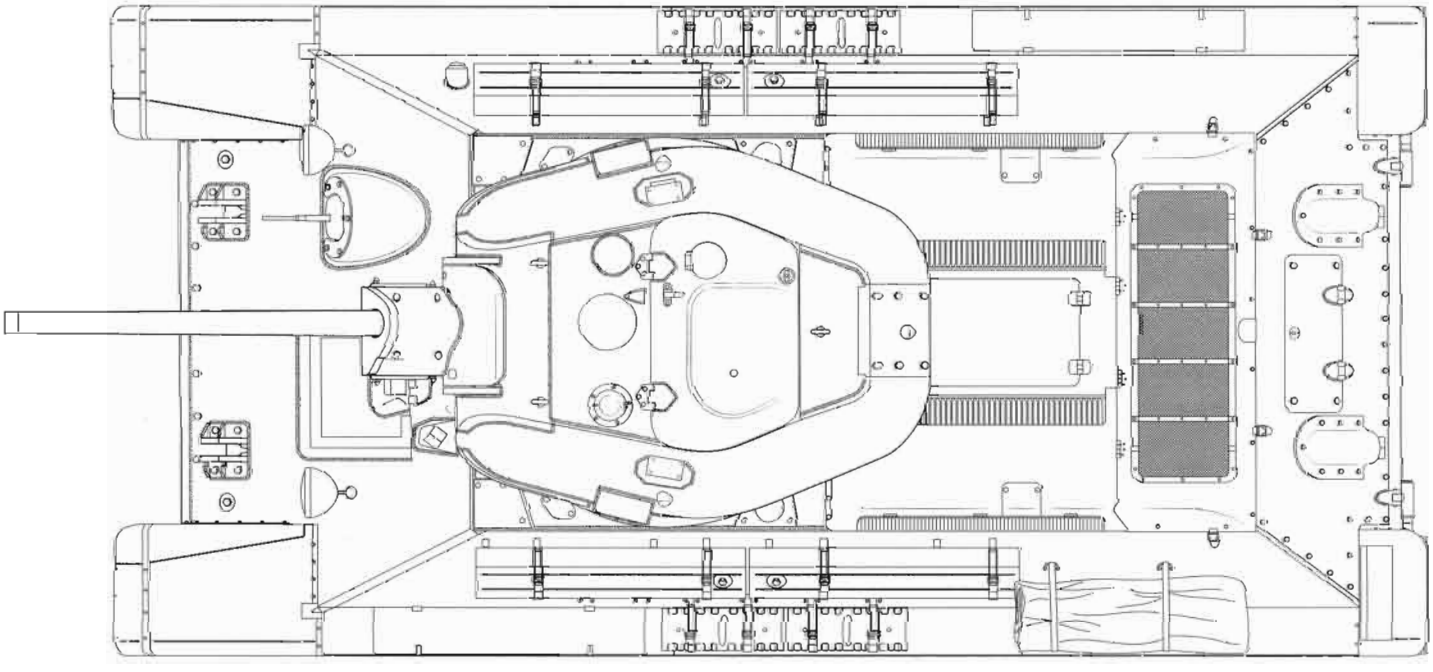


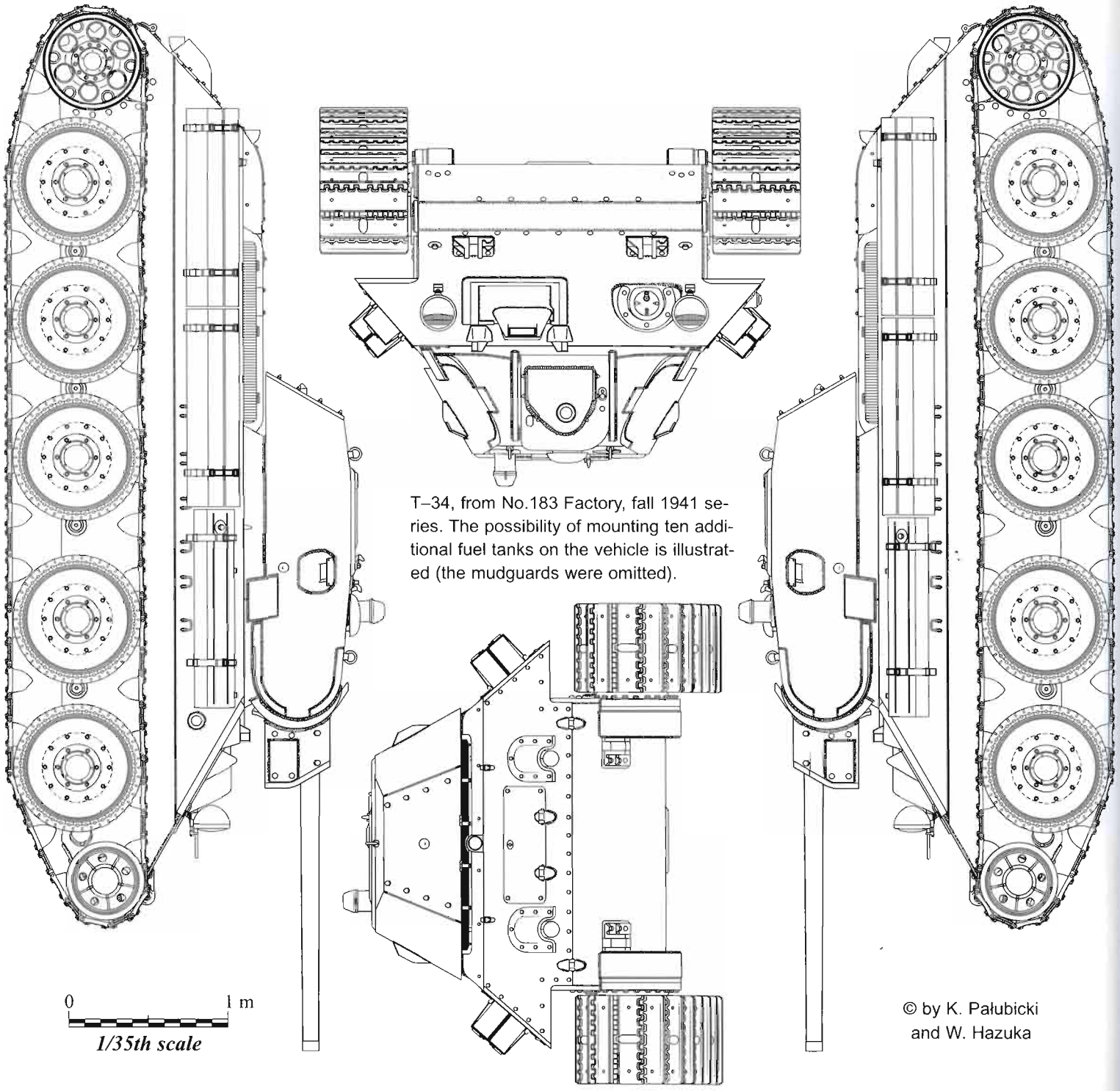
T–34, from No.183 Factory, the production series from the first half of 1941 were armed with the F–34 gun. The installation of radio sets in most of the tanks was stopped, at the latest, in the summer of that year.

0 1 m

1/35th scale

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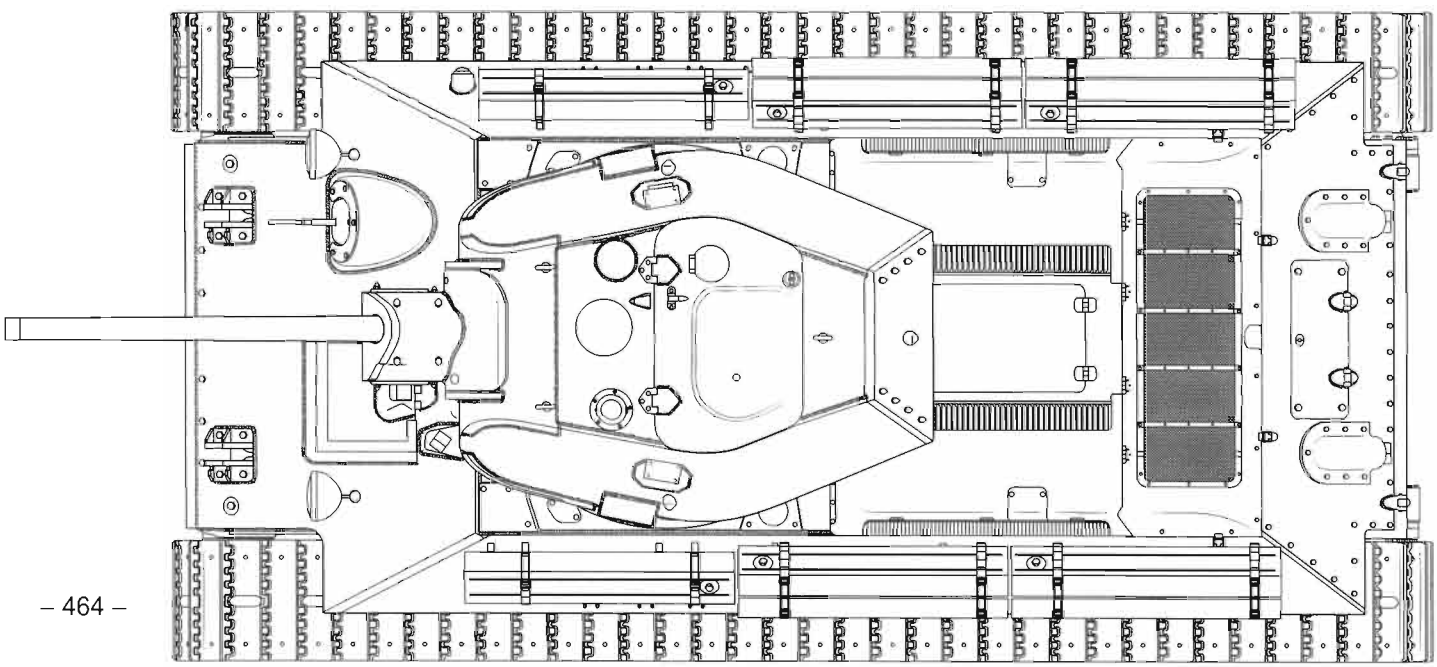


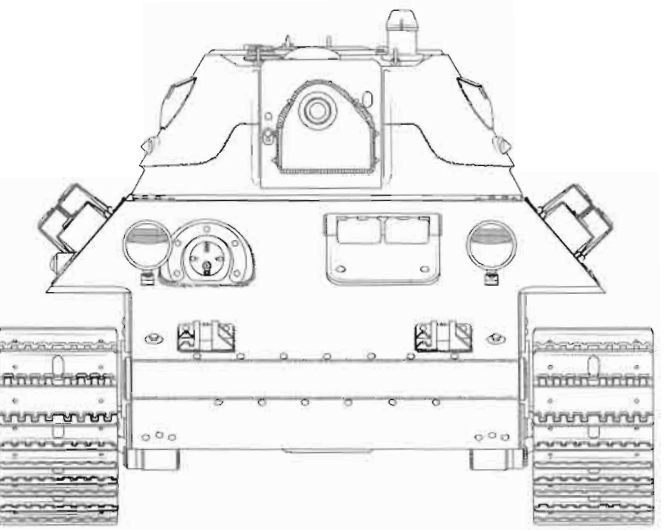
T–34, from No.183 Factory, fall 1941 series. The possibility of mounting ten additional fuel tanks on the vehicle is illustrated (the mudguards were omitted).

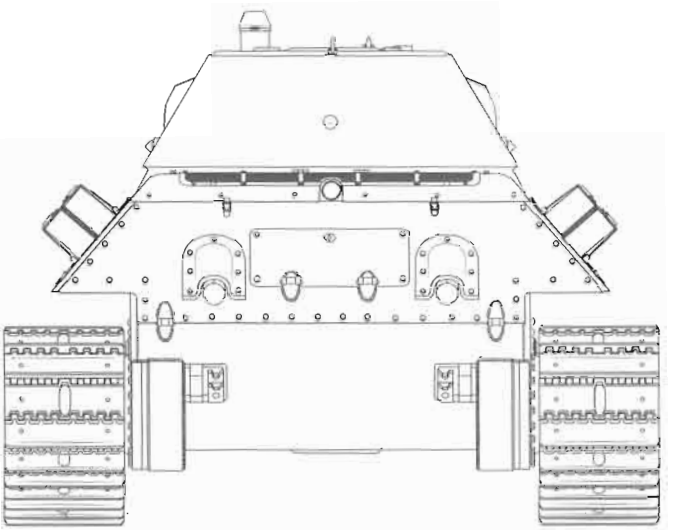
0 1 m

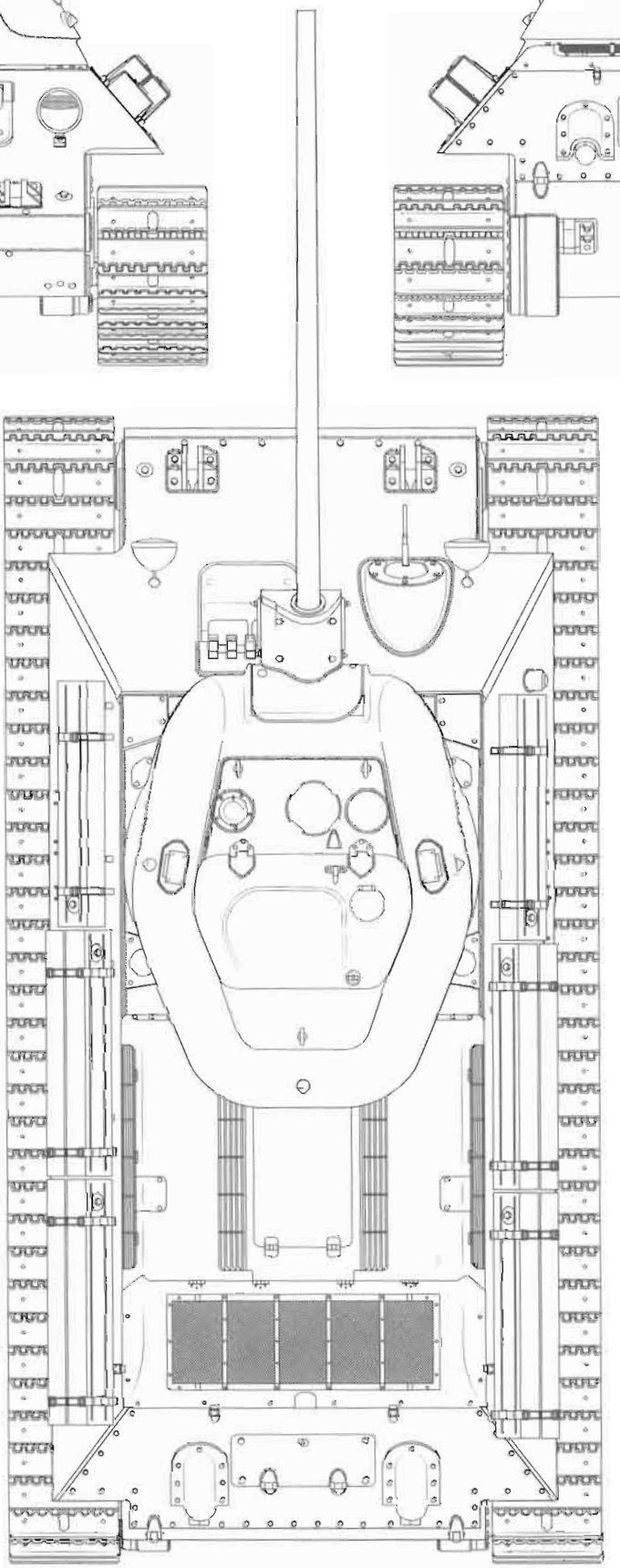
1/35th scale

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Pages 465–466:

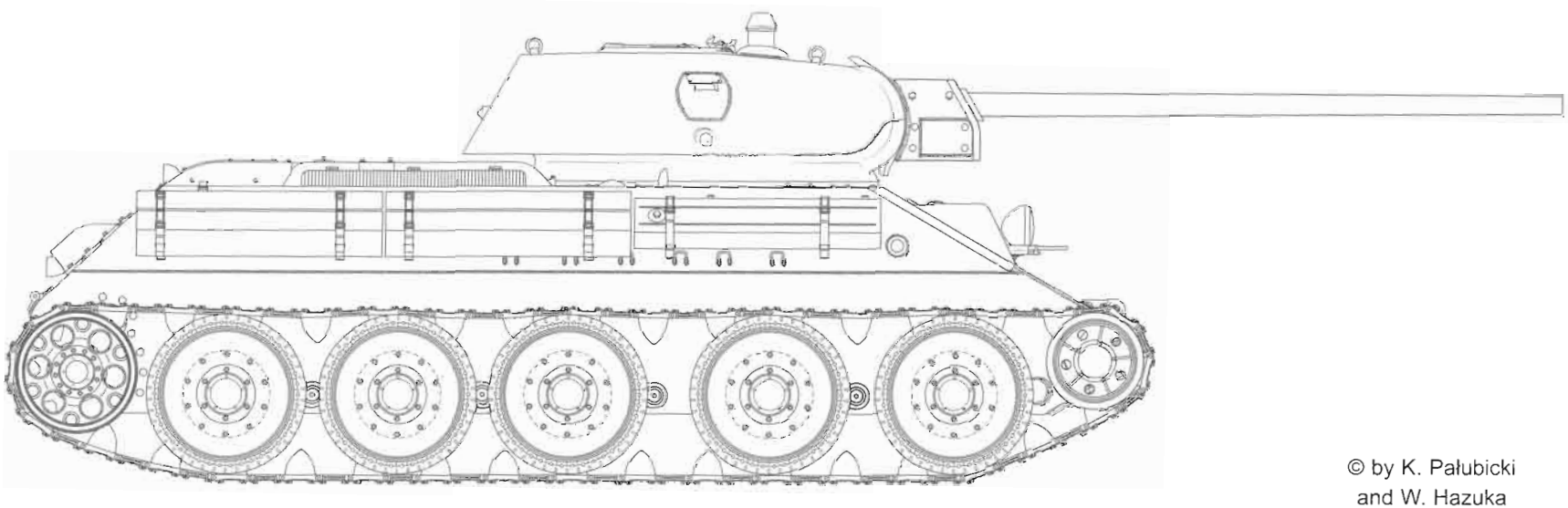
T–34 from No.183 Factory, short production series at the end of the fall of 1941, was armed with the 57 mm ZIS–2 gun (the mudguards were omitted). The tanks produced toward the end of 1941 were the last to have the old type of track (74 links), and the old drive and idler wheel. In the drawings of the T–34 in this book, only two types of the drive and idler wheels (the initial and late war) have been presented due to the lack of appropriate source materials. This situation makes it impossible to determine the manufacturers and production time frames of the various wheels (and their variants) used in the different series of the T–34.

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Based on archival photos, it must be concluded that the installation of various equipment carried on the mudguards was stopped completely or partially during the period fall 1941/spring 1943. As a result, with the exception of the two tool boxes (which were located in the same place on all the tanks), the placement of the equipment depended on the producer and the time of production. For this reason, the drawings in this book show, at best, only examples of the way the equipment was placed on the tanks. During the same time period (fall 1941/spring 1943), radio sets were installed for platoon and company commanders in every fifth or tenth vehicle only.



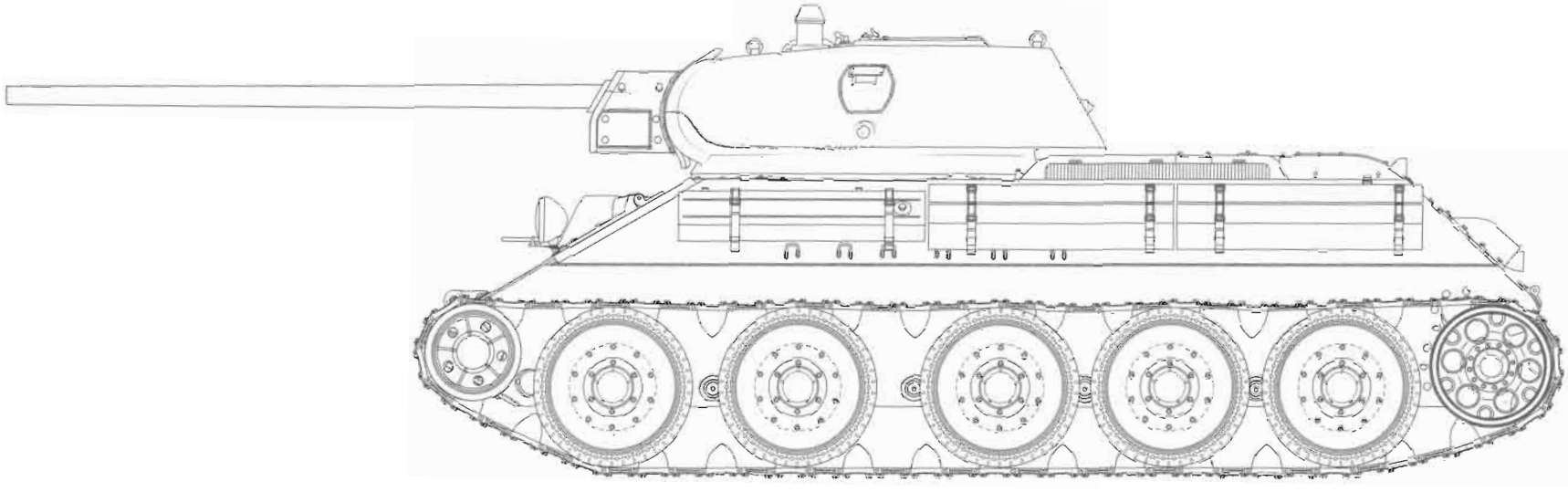
1/35th scale



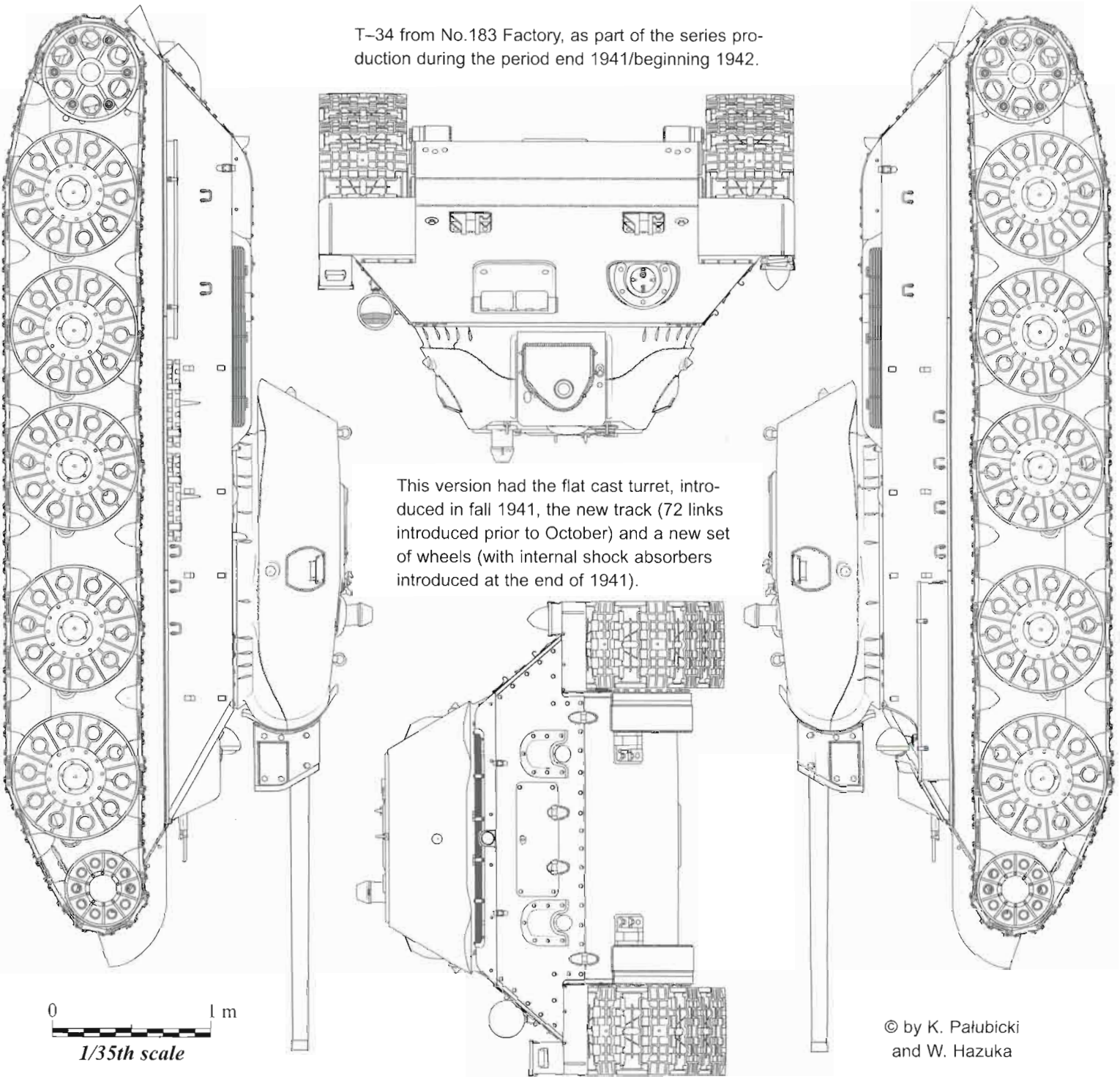
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0 1 2 3 m

1/35th scale



T–34 from No.183 Factory, as part of the series production during the period end 1941/beginning 1942.

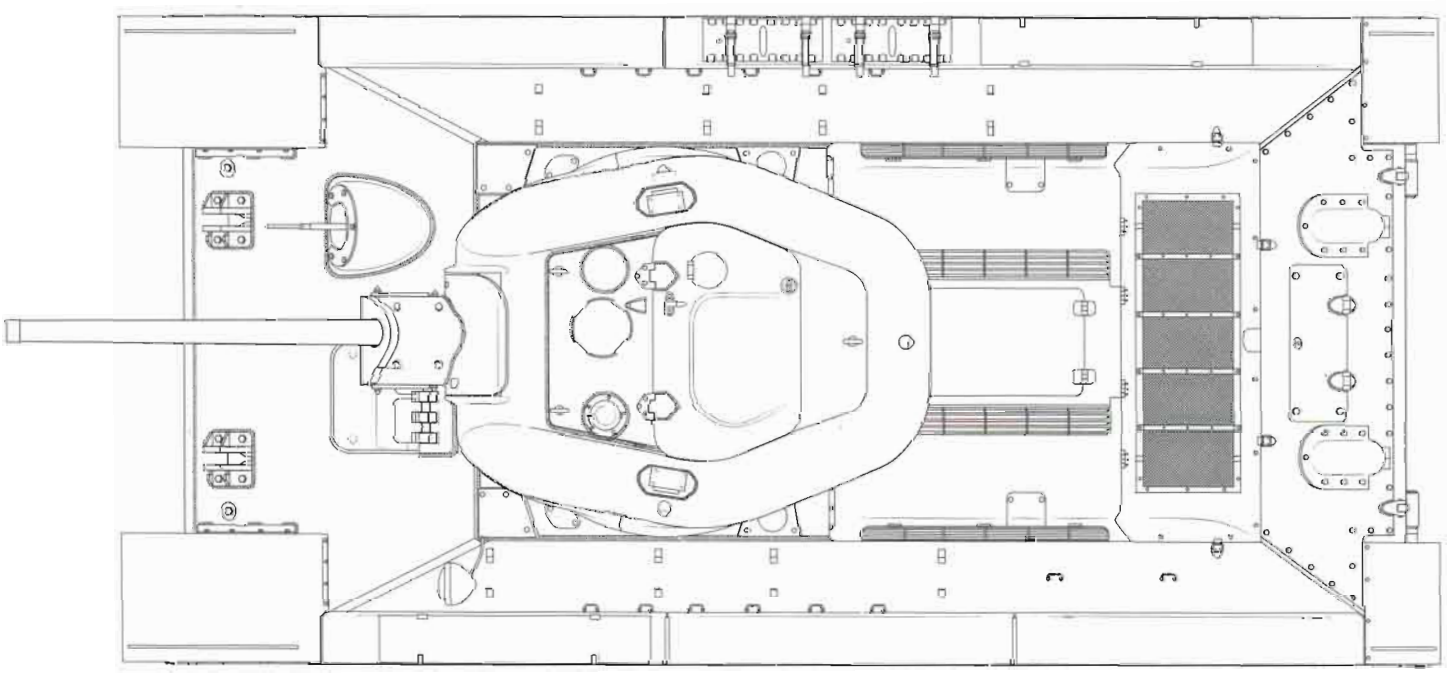


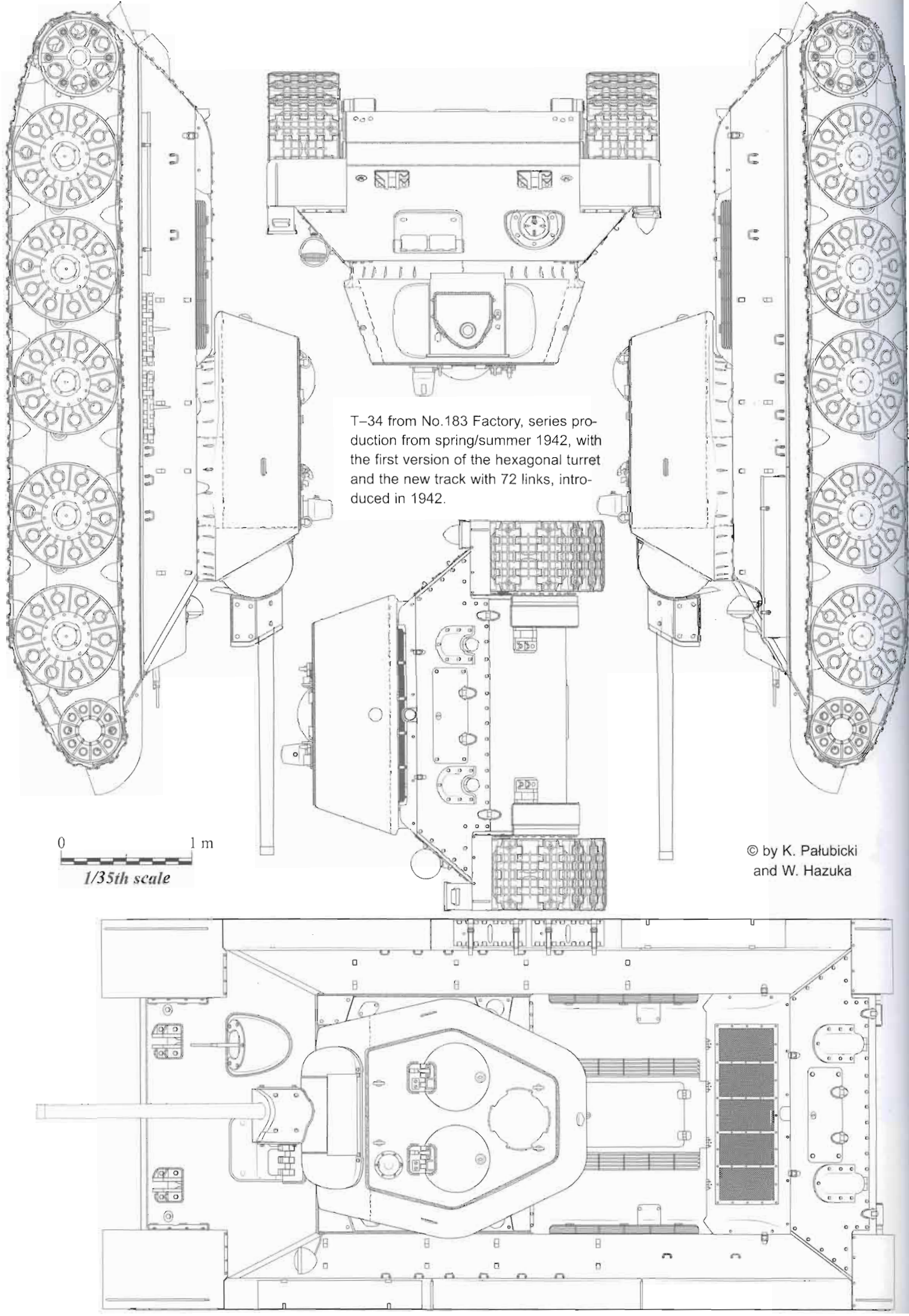
This version had the flat cast turret, introduced in fall 1941, the new track (72 links introduced prior to October) and a new set of wheels (with internal shock absorbers introduced at the end of 1941).

0 1 m

1/35th scale

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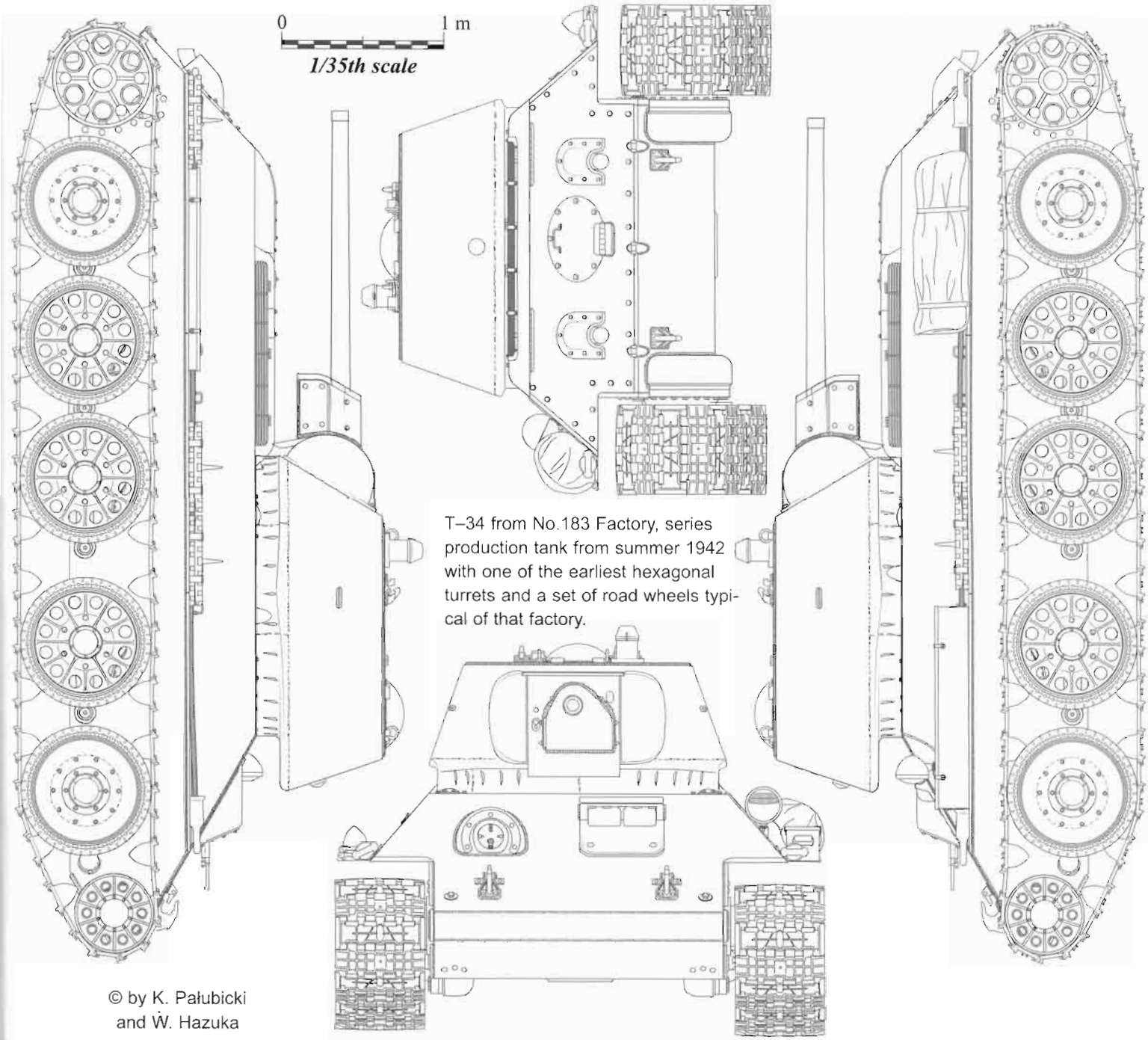


T–34 from No.183 Factory, series production from spring/summer 1942, with the first version of the hexagonal turret and the new track with 72 links, introduced in 1942.

0 1 m

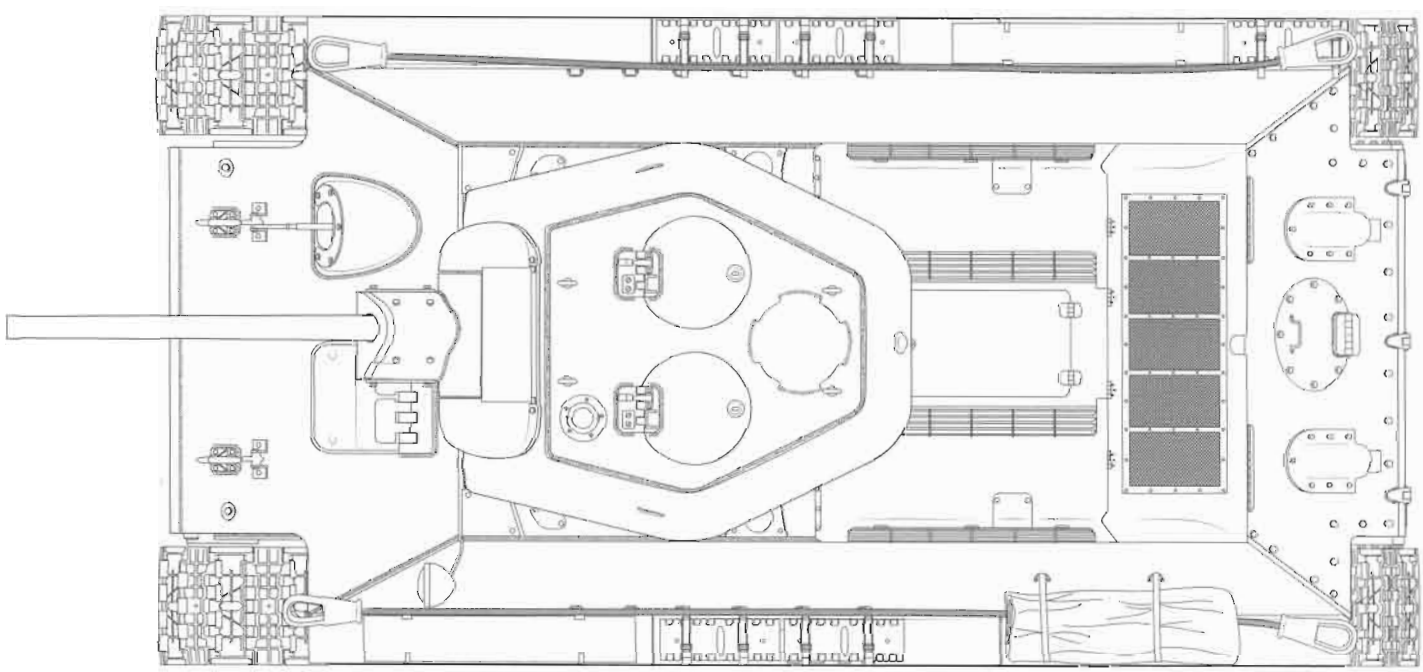
1/35th scale

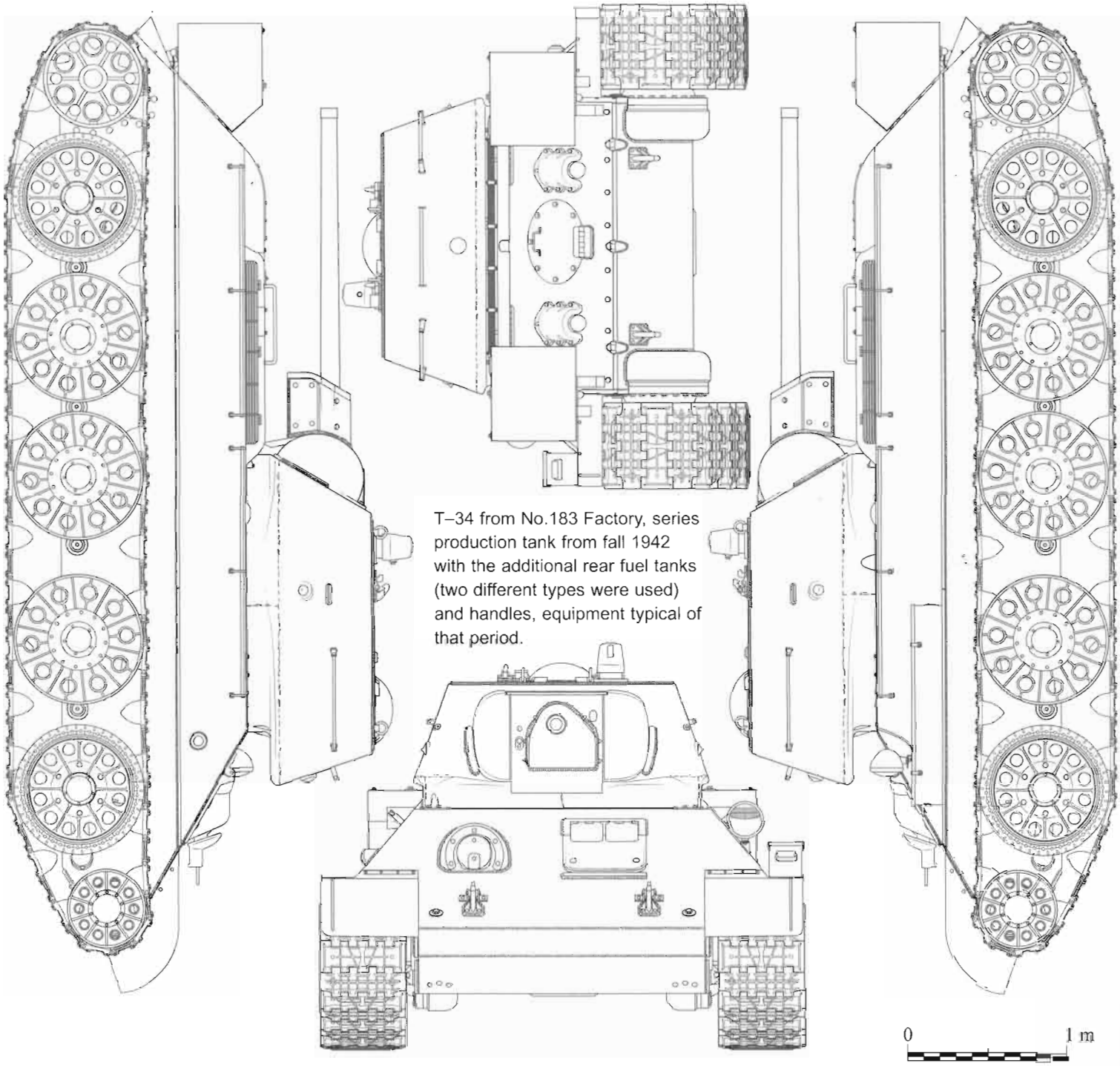
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T–34 from No.183 Factory, series production tank from summer 1942 with one of the earliest hexagonal turrets and a set of road wheels typical of that factory.

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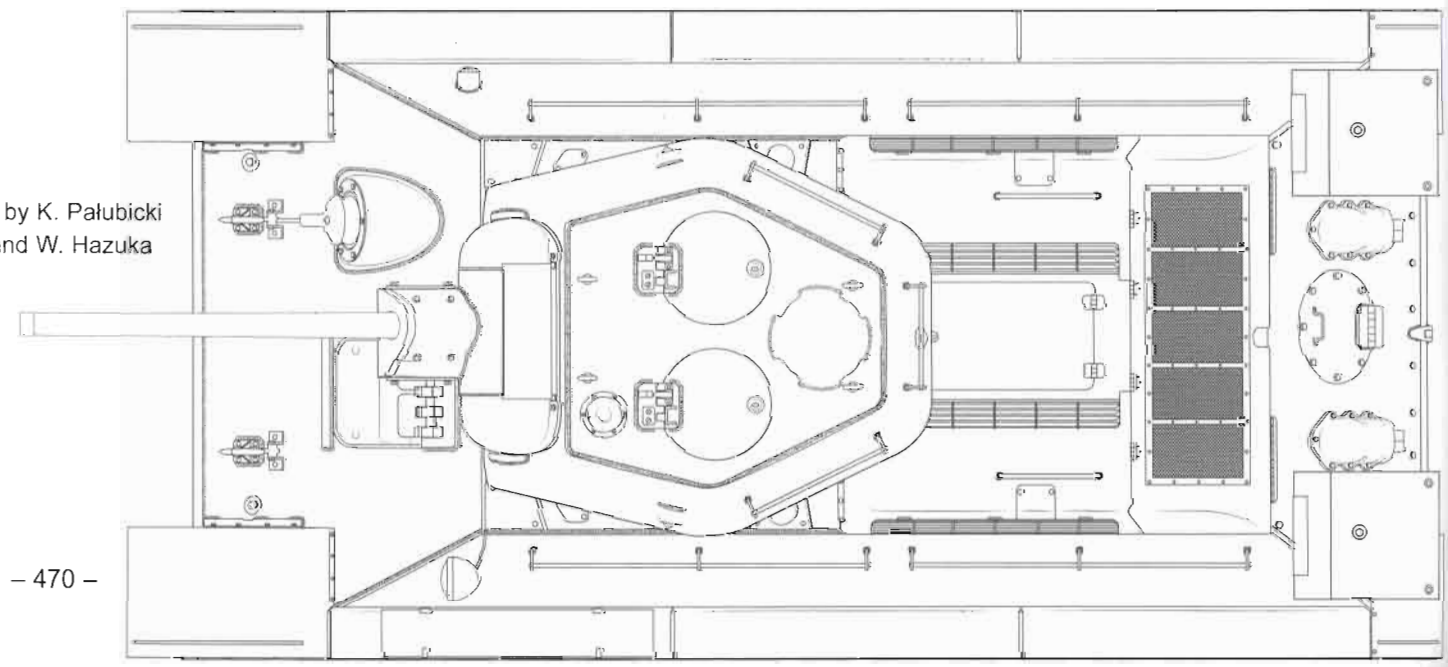


T–34 from No.183 Factory, series production tank from fall 1942 with the additional rear fuel tanks (two different types were used) and handles, equipment typical of that period.

0 1 m

1/35th scale

The road wheel complement was typical of that factory, and contained six wheels with internal shock absorbers (the three middle ones on each side). Tracks of 1941 model, but modified in 1942.

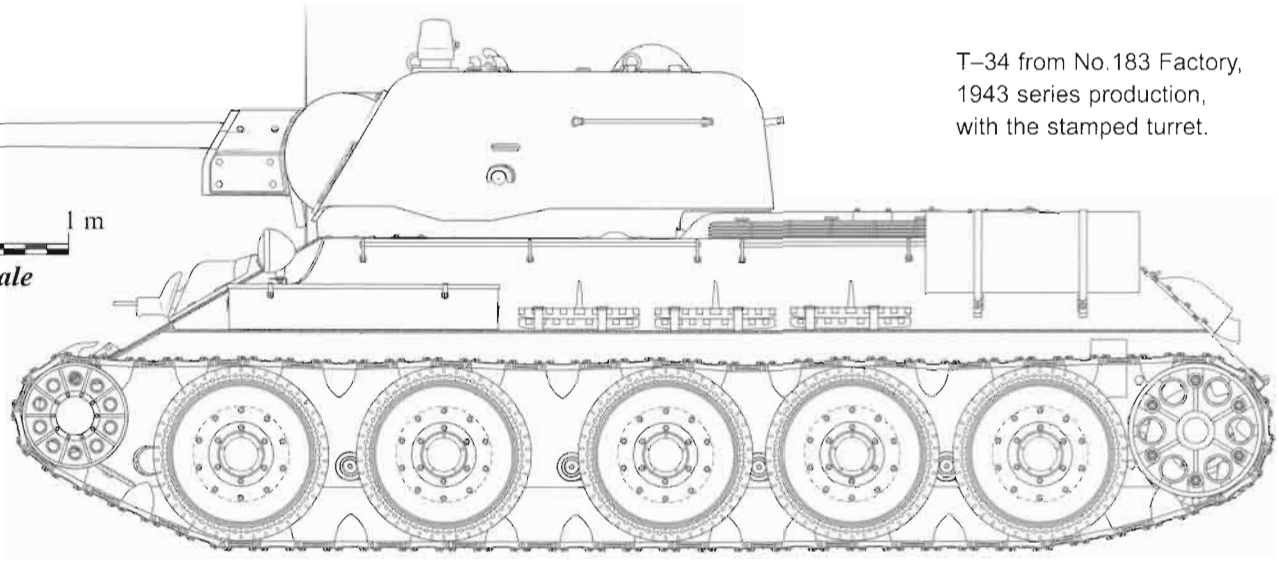


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T–34 from No.183 Factory,
1943 series production,
with the stamped turret.

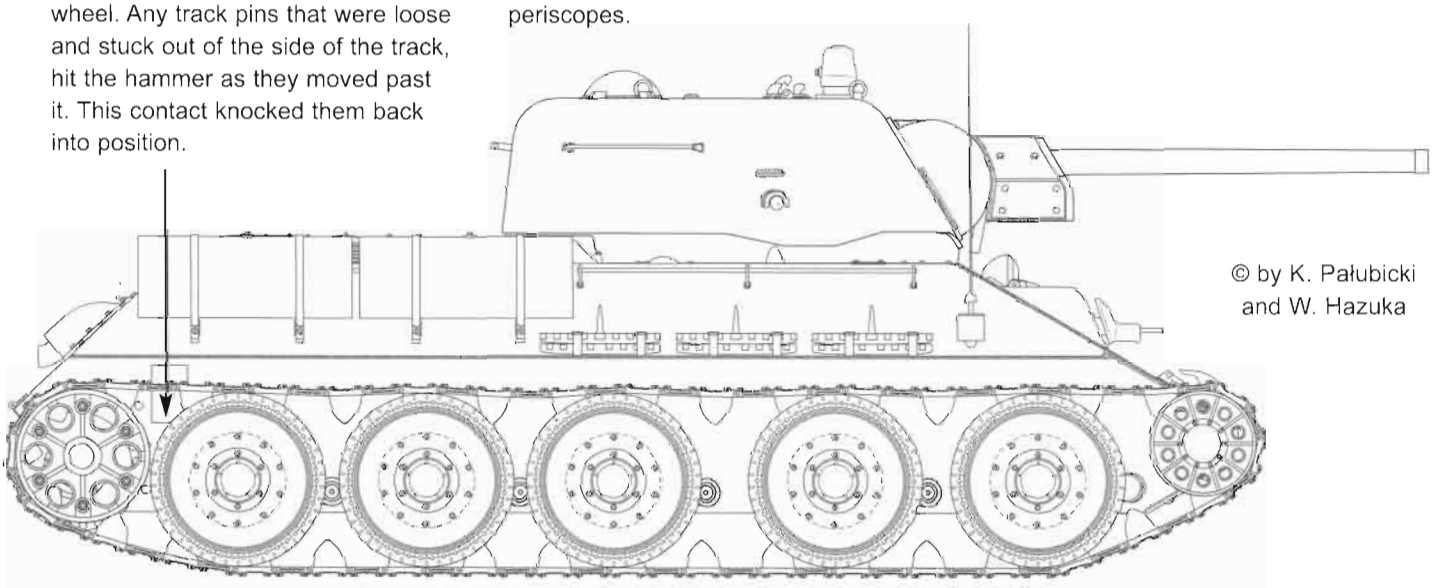
0 1 m

1/35th scale

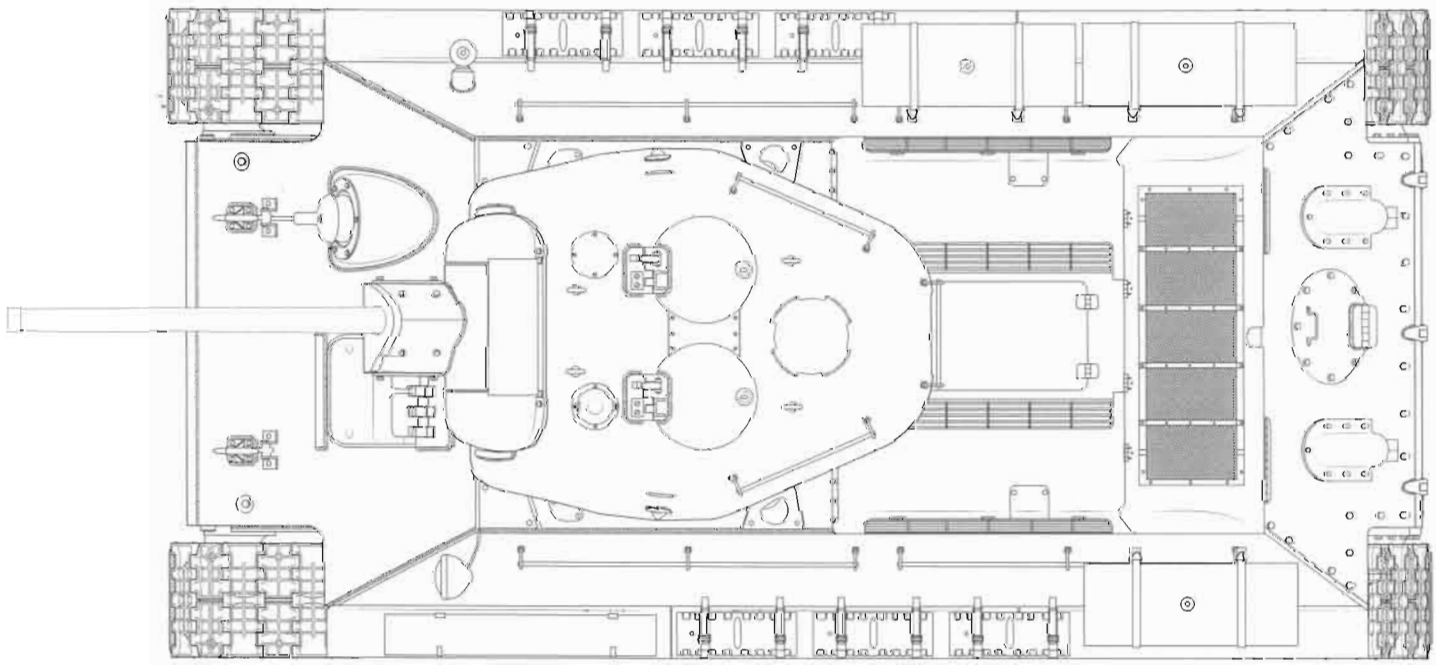


* This was a rectangular bulge at the rear of the hull side, next to the drive wheel. Any track pins that were loose and stuck out of the side of the track, hit the hammer as they moved past it. This contact knocked them back into position.

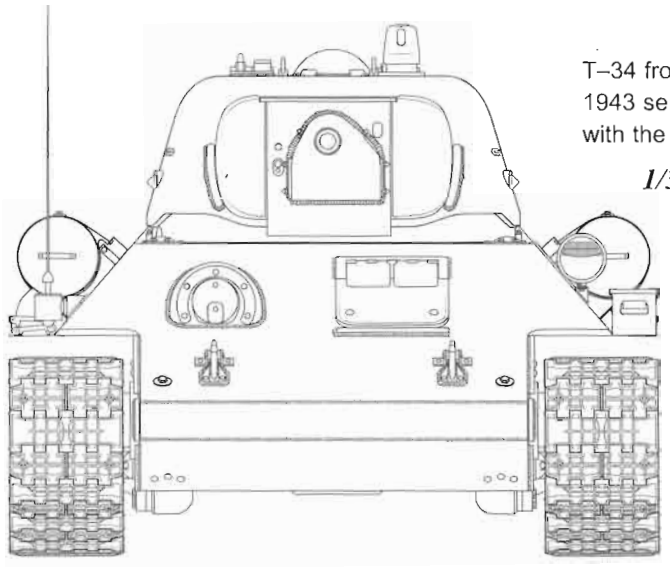
The turret has been drawn according to published materials, which (most probably) show the first production series without the cutouts for the periscopes.



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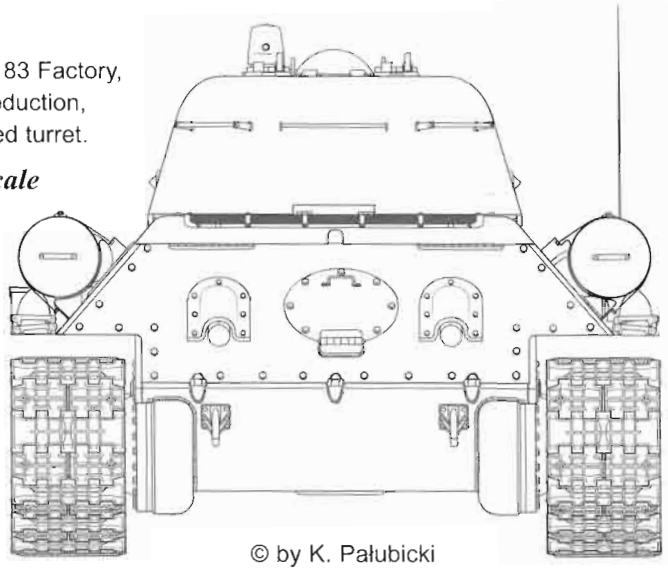


Many of the tanks from that period had the radio sets, and, as standard, the track pin hammer* (this addition was introduced in 2nd half of 1942), the armored machine gun cover and rubber-rimmed road wheels. The additional fuel tanks were moved from the rear of the tank to its sides.



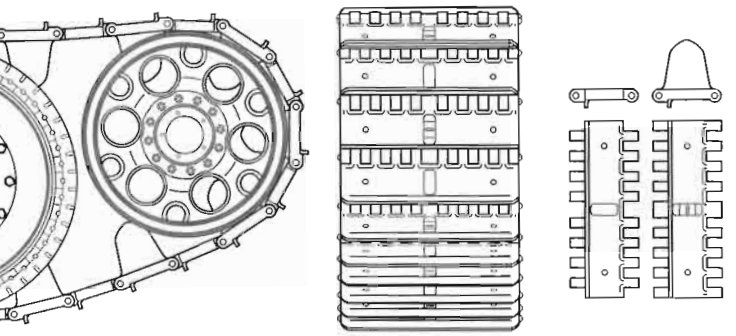
T–34 from No.183 Factory,
1943 series production,
with the stamped turret.

1/35th scale

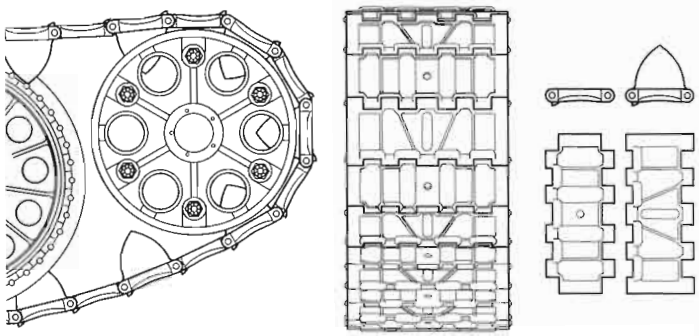


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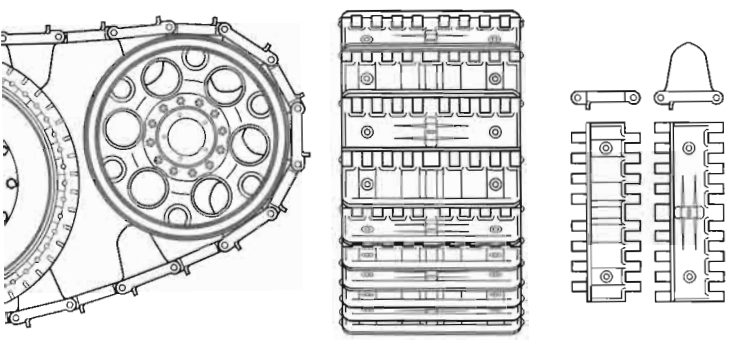
nitial type of track (74 links, width of 550 mm).



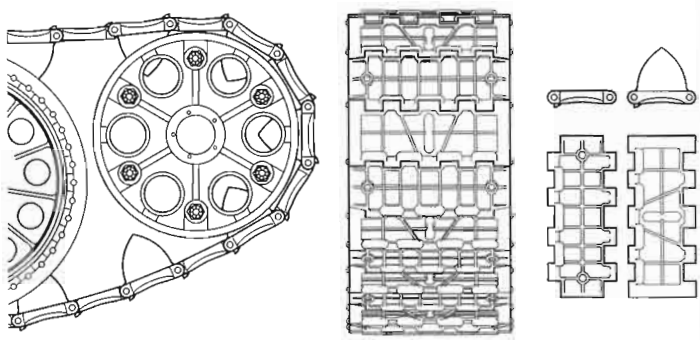
Variant of Ural type of track (72 links,
width of 550 mm).



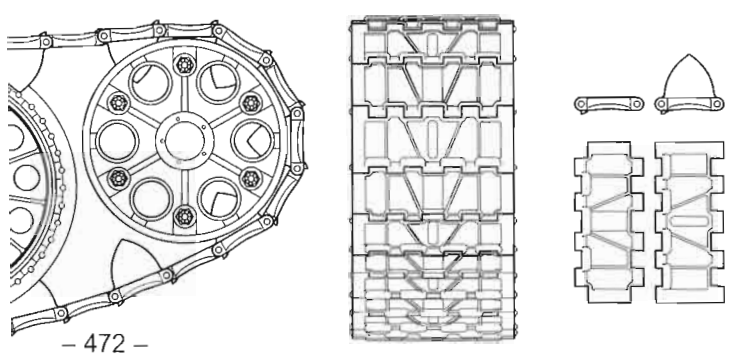
Second type of track (74 links, width of 550 mm)
rom 1941.



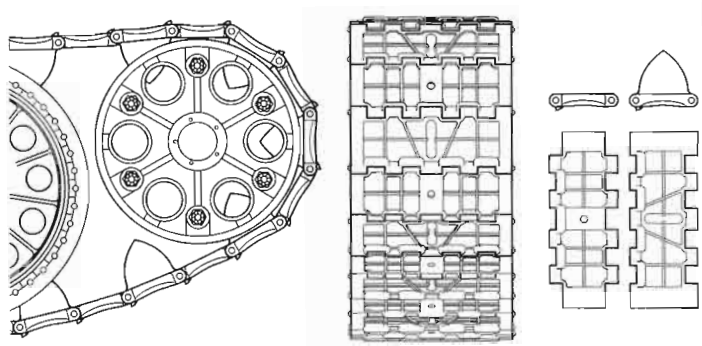
Track from the STZ Factory (72 links,
width of 550 mm), used from fall 1941.

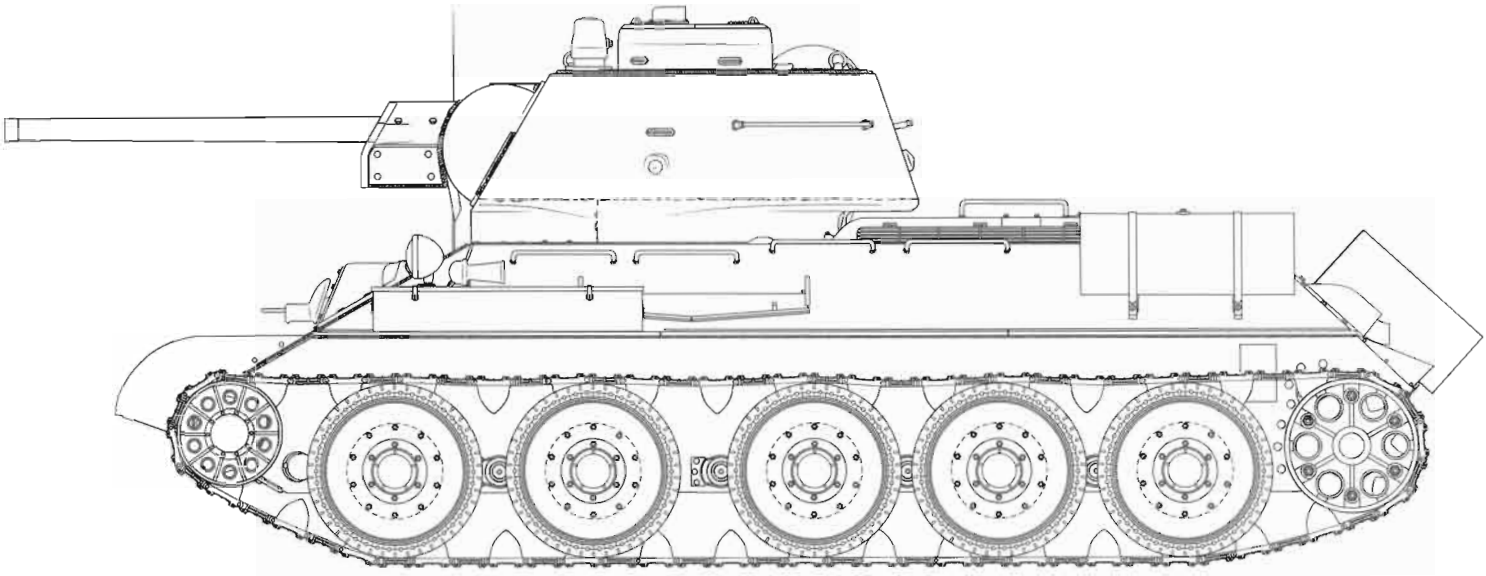


Jral type of track (72 links, width of 550 mm),
ıtroduced prior to October 1941.



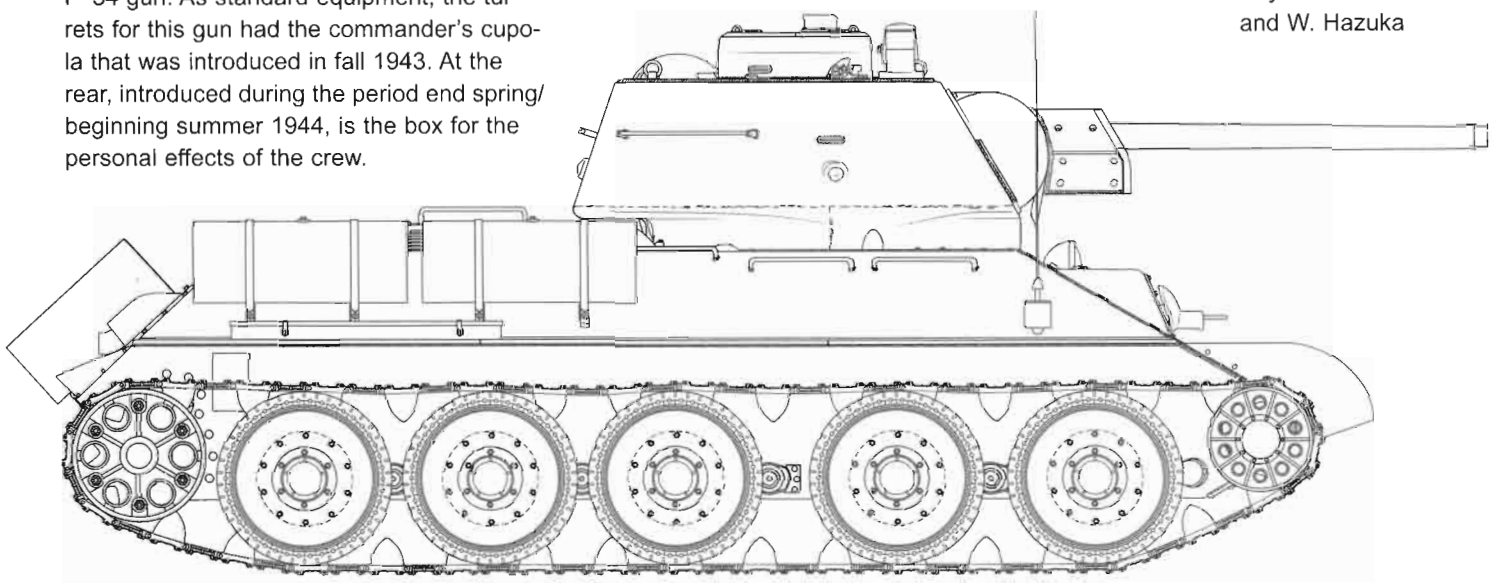
Variant of the track from the STZ Factory
(72 links, width of 550 mm), used from fall 1941.





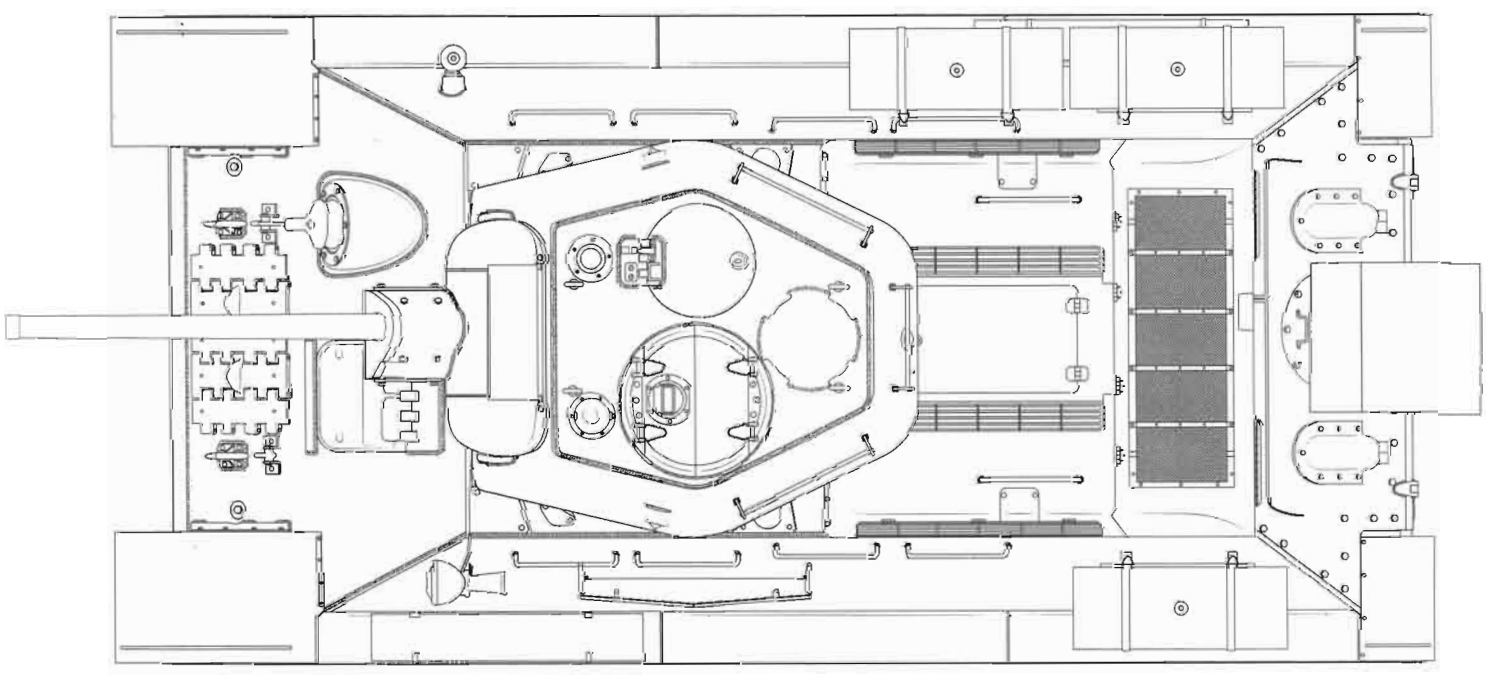
T–34, from No.183 Factory during the last production series in spring 1944, mounts the F–34 gun. As standard equipment, the turrets for this gun had the commander's cupola that was introduced in fall 1943. At the rear, introduced during the period end spring/ beginning summer 1944, is the box for the personal effects of the crew.

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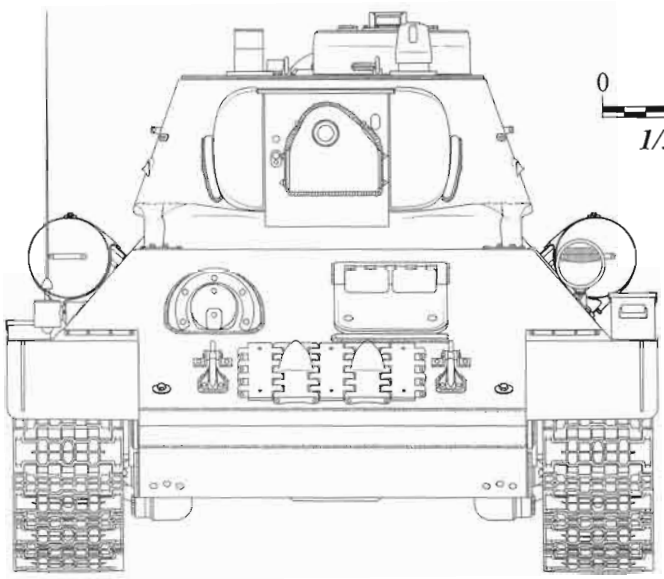




1/35th scale

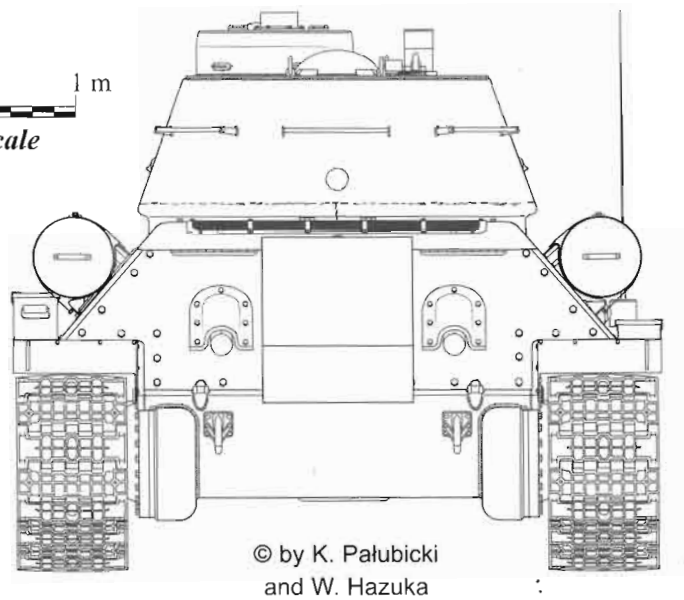


T–34, from No.183 Factory during the last production series in spring 1944, mounts the F–34 gun. As standard equipment, the turrets for this gun had the commander's cupola that was introduced in fall 1943. At the rear, introduced during the period end spring/beginning summer 1944, is the box for the personal effects of the crew.



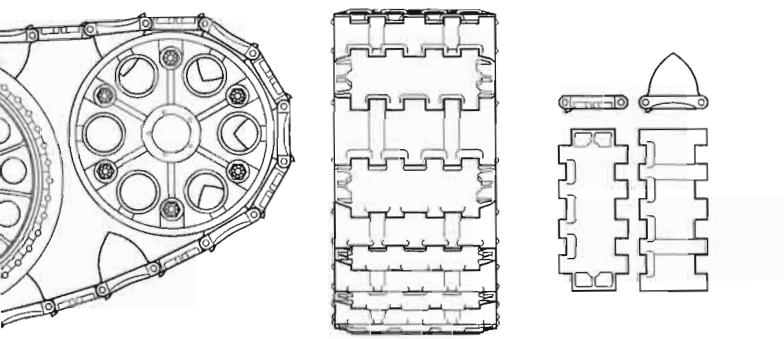
0 1 m

1/35th scale

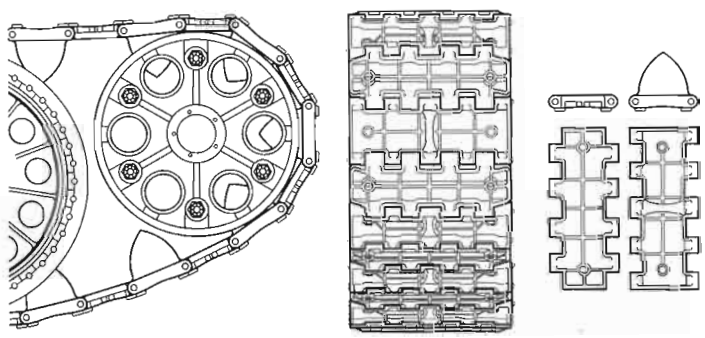


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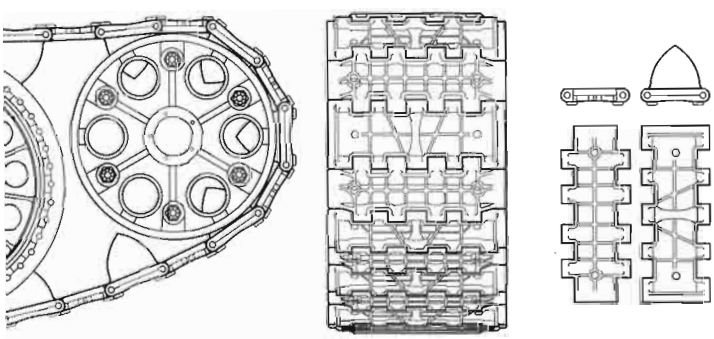
he new type of track (72 links, width of 550 mm) was introduced
fall/winter 1941, as well as the road wheels with internal shock
bsorbers ("transition" track).



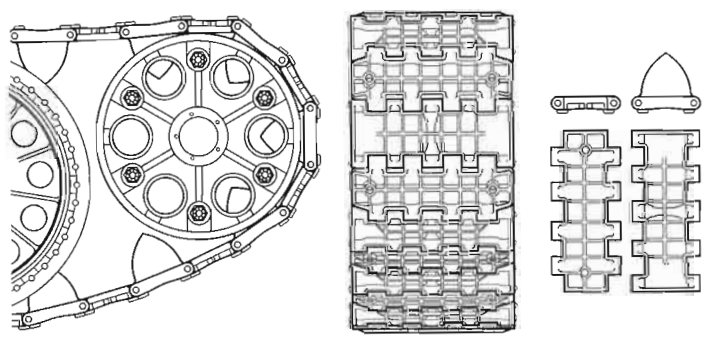
Track, most probably from the No.112 Factory (72 links, width of 500 mm), that was used beginning in 1942.



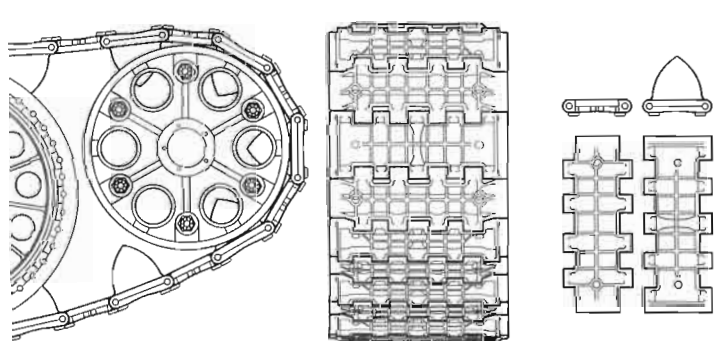
ral type of track (72 links, width of 550 mm),
om 1942.



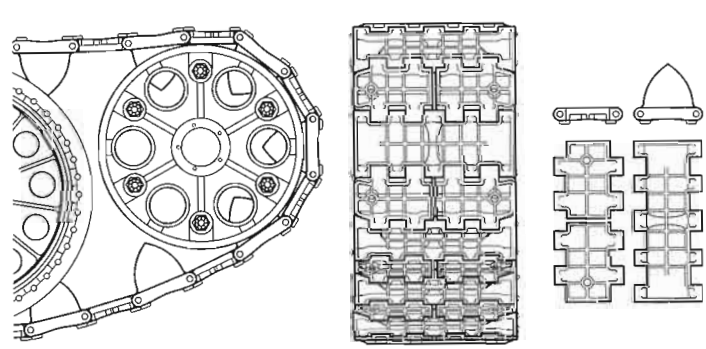
This most popular type of track (72 links, width of 500 mm — "summer" version), was used beginning in 1942 ("standard").



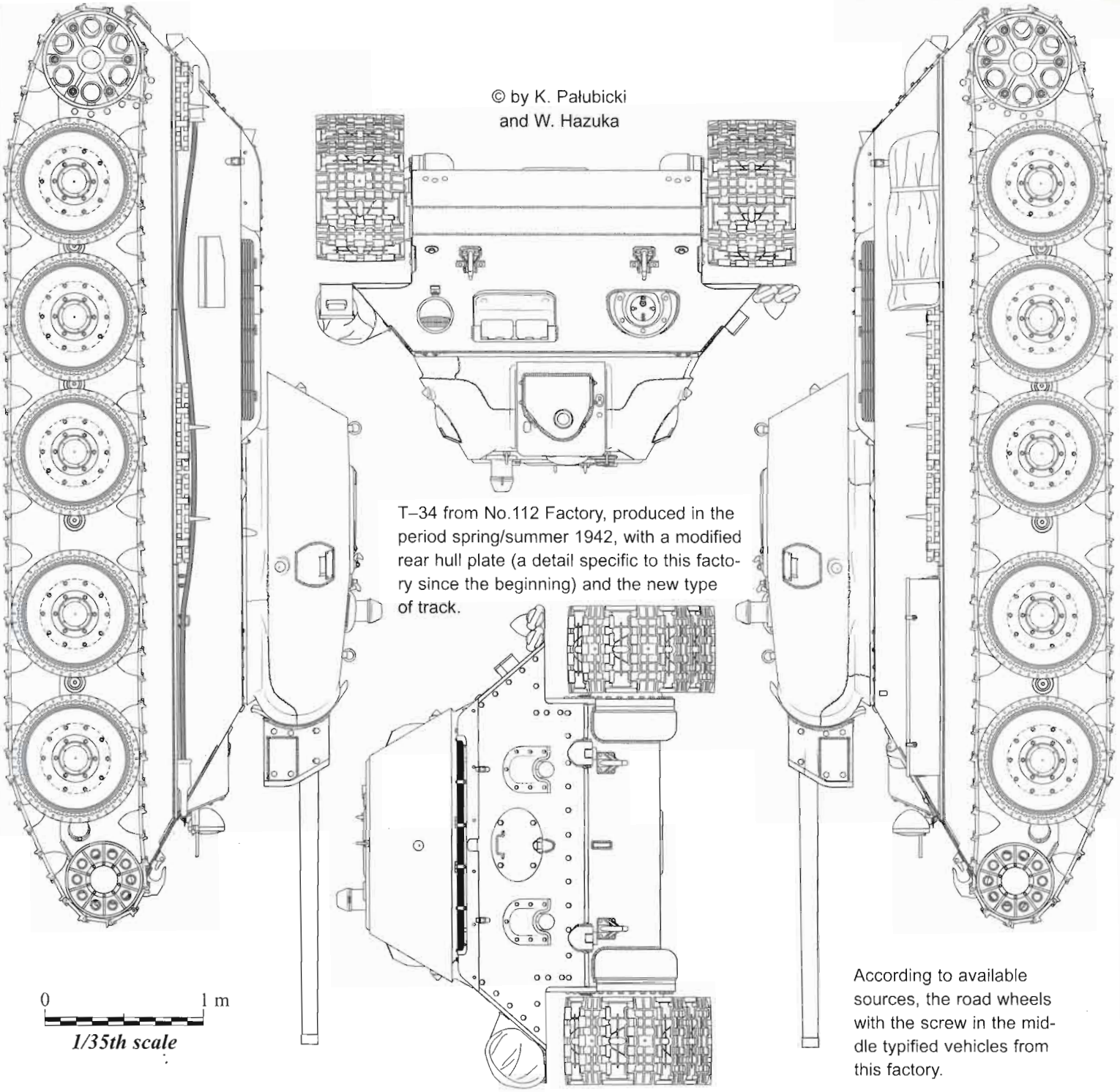
his most popular type of track (72 links, width of 550 mm
- "winter" version) was used beginning in 1942 ("standard" track).



Two-part track without guide, produced in 1943 (72 links, width of 500 mm).



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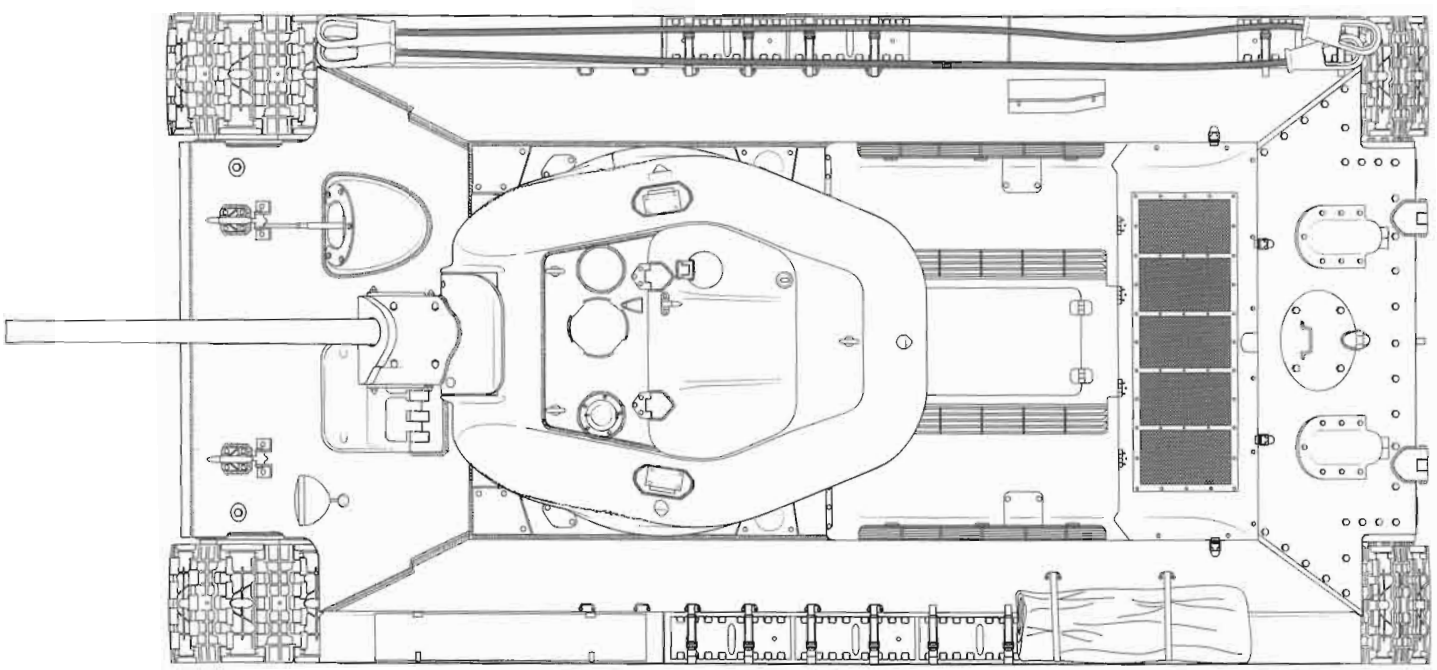


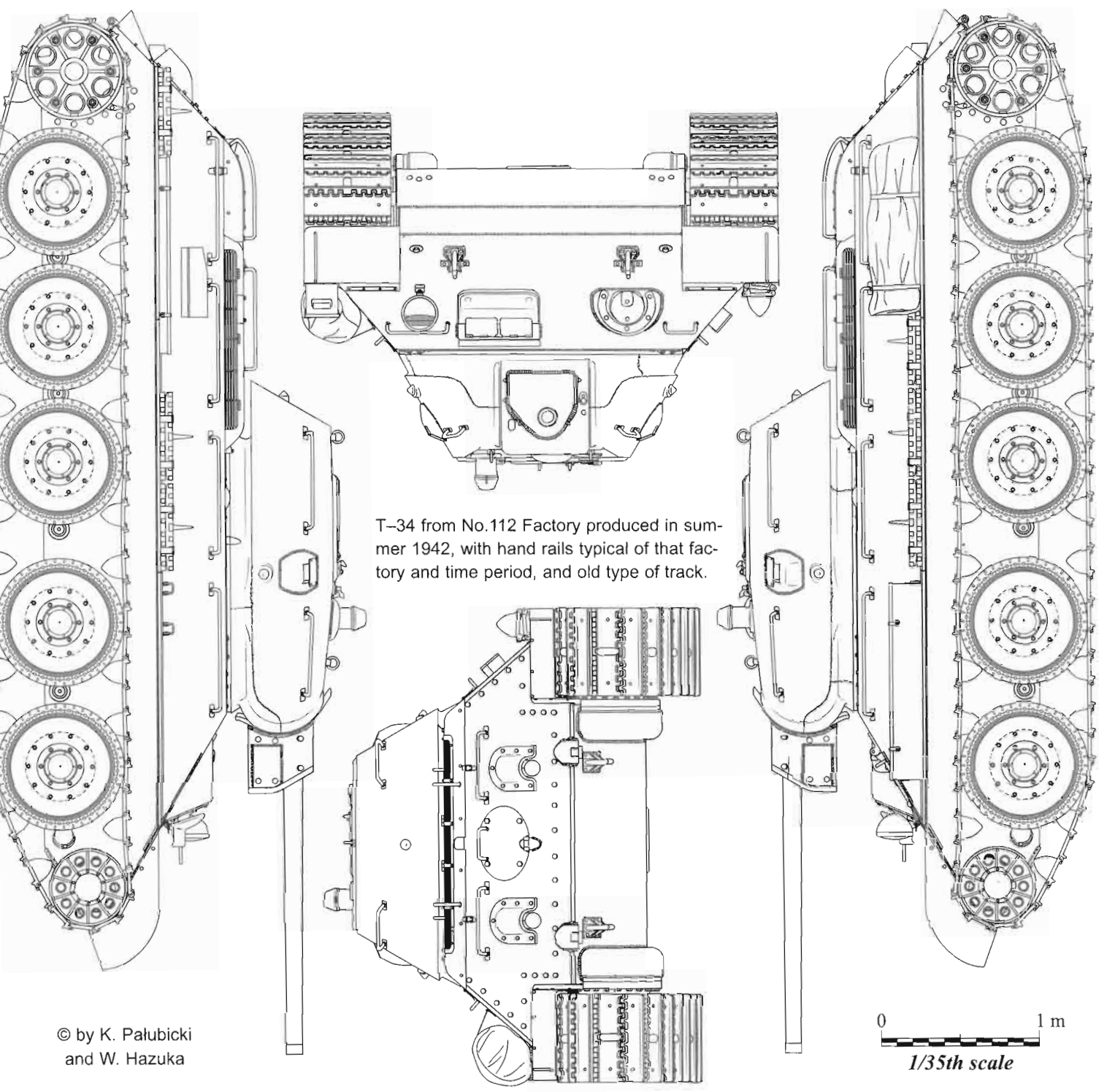
T–34 from No.112 Factory, produced in the period spring/summer 1942, with a modified rear hull plate (a detail specific to this factory since the beginning) and the new type of track.

0 1 m

1/35th scale

According to available sources, the road wheels with the screw in the middle typified vehicles from this factory.



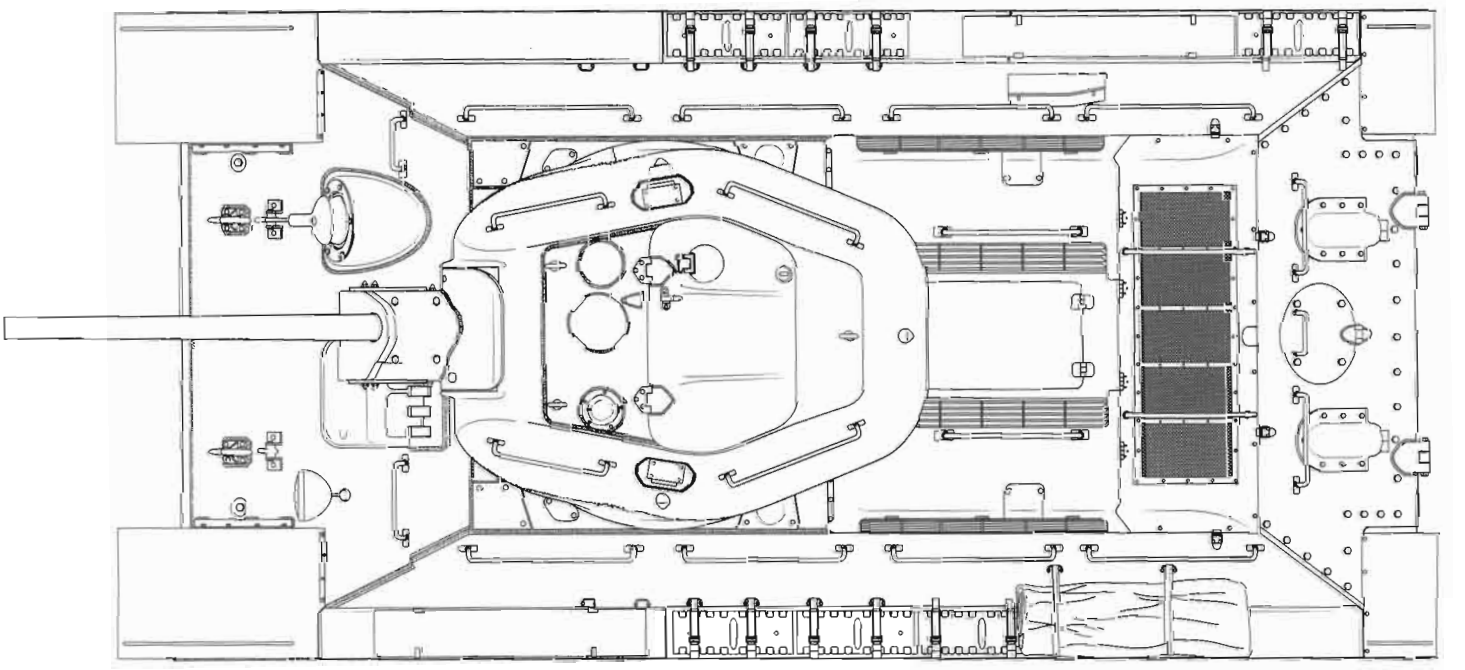


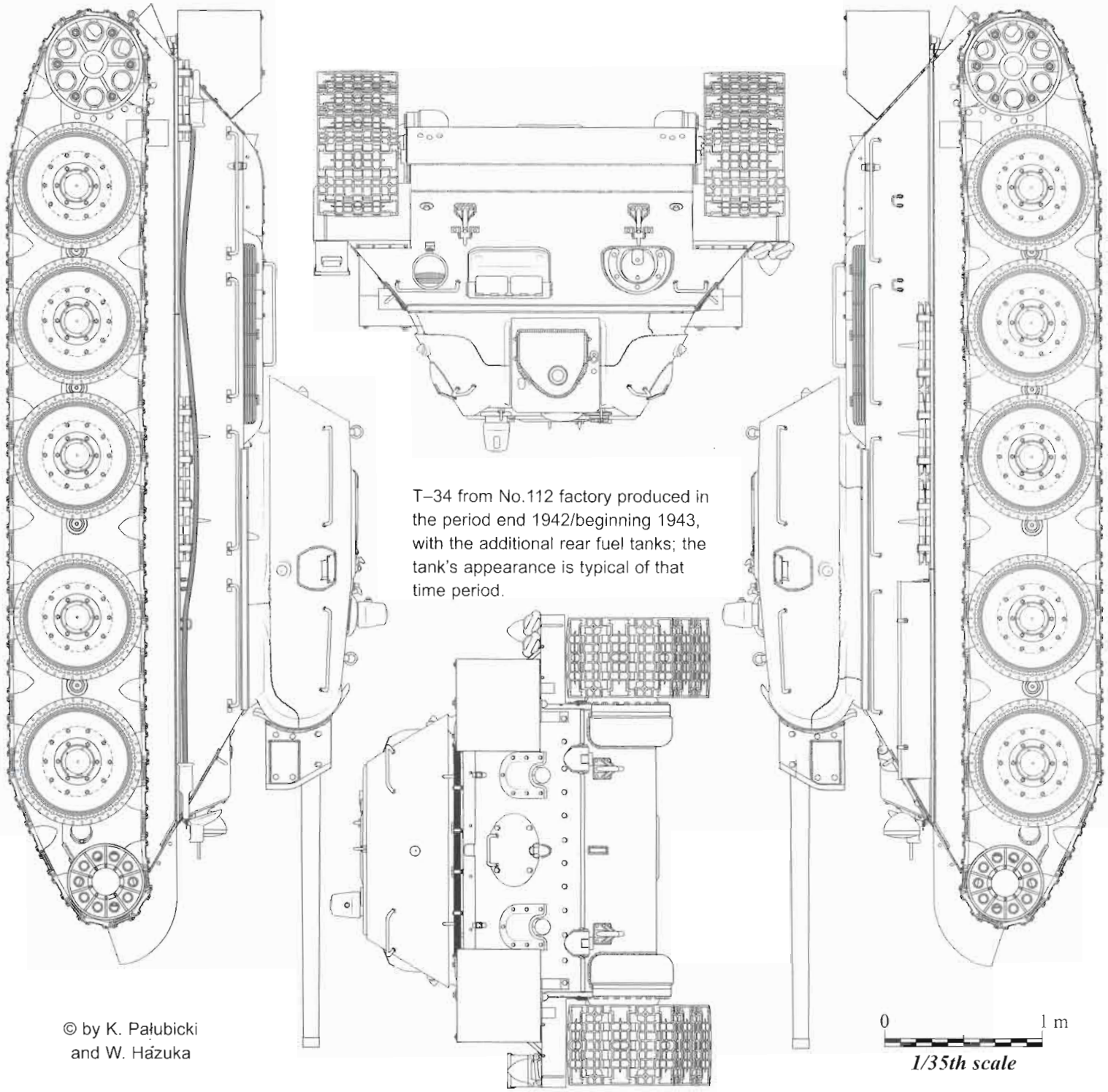
T–34 from No.112 Factory produced in summer 1942, with hand rails typical of that factory and time period, and old type of track.

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and W. Hazuka

0 1 m

1/35th scale



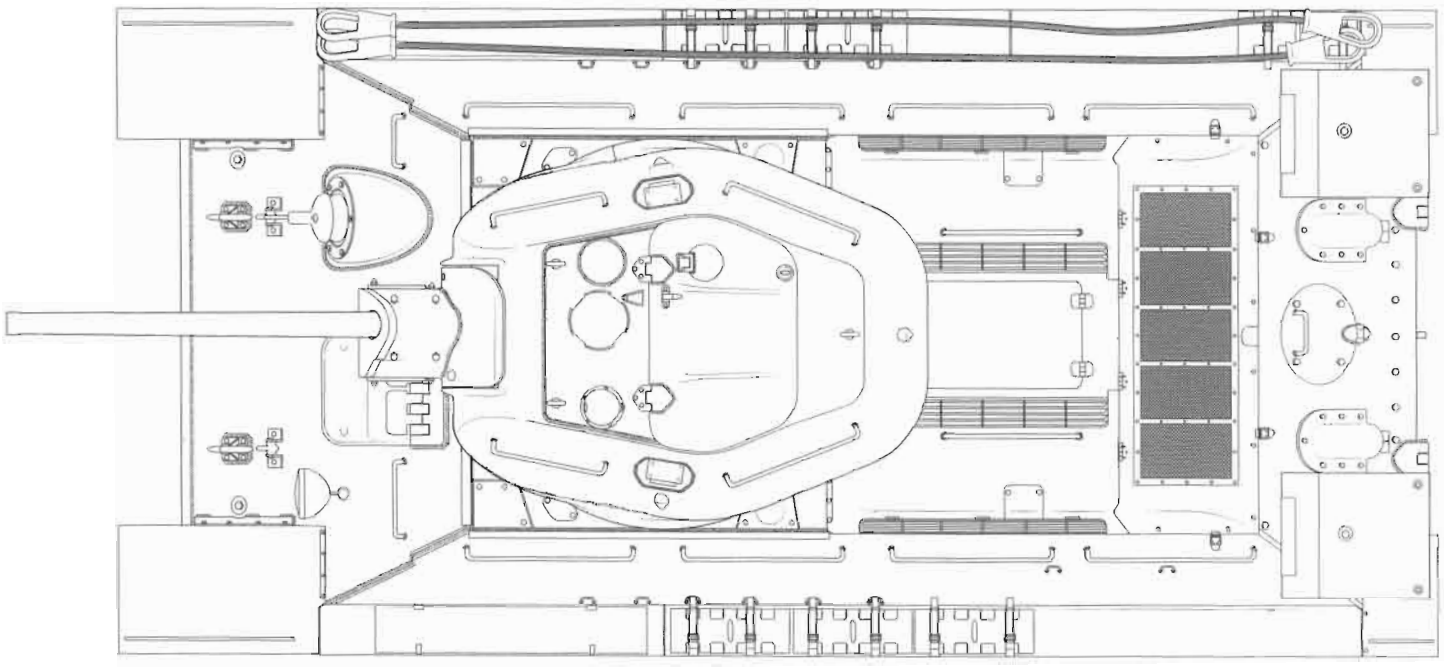


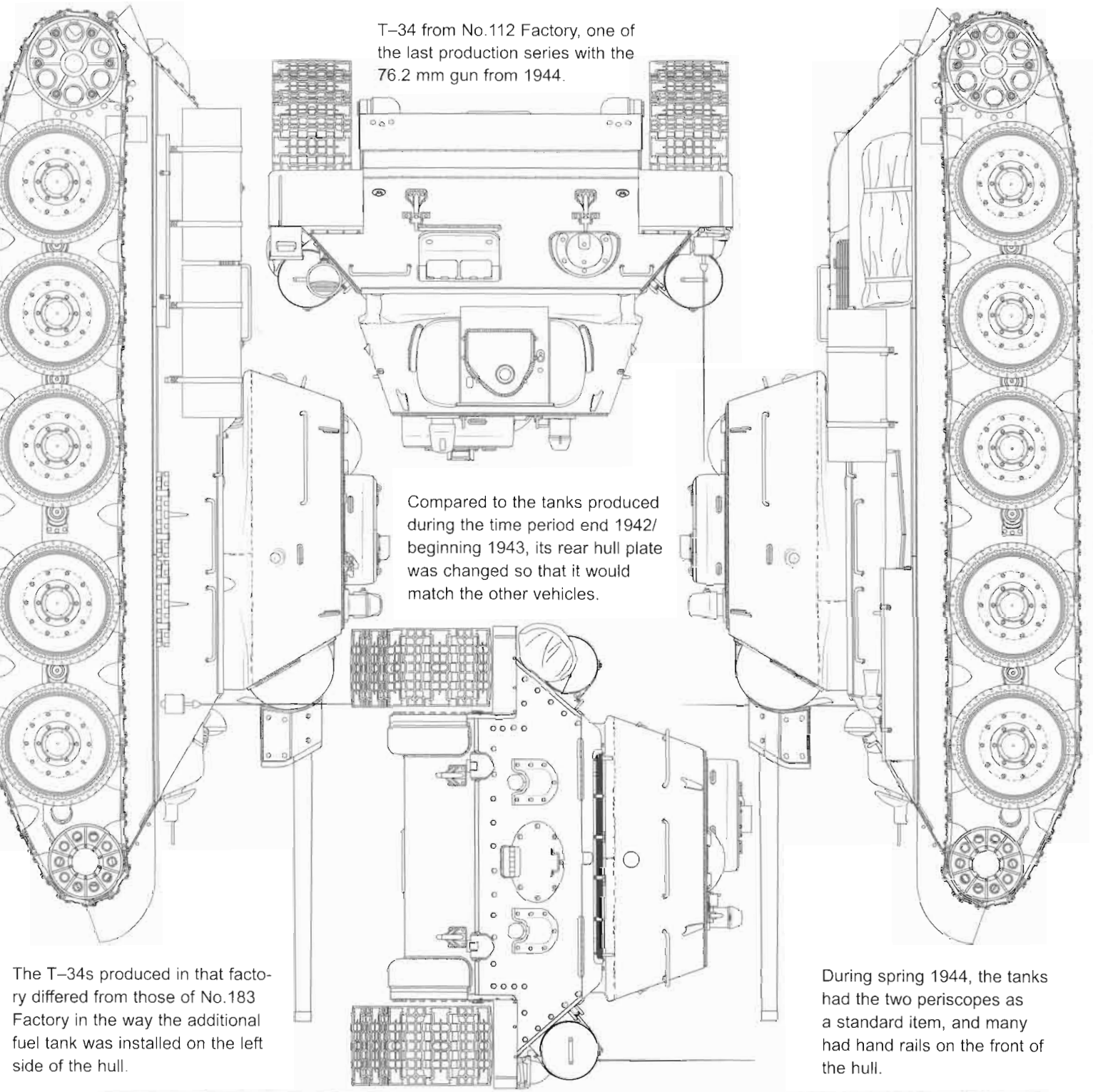
T–34 from No.112 factory produced in the period end 1942/beginning 1943, with the additional rear fuel tanks; the tank's appearance is typical of that time period.

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0 1 m

1/35th scale



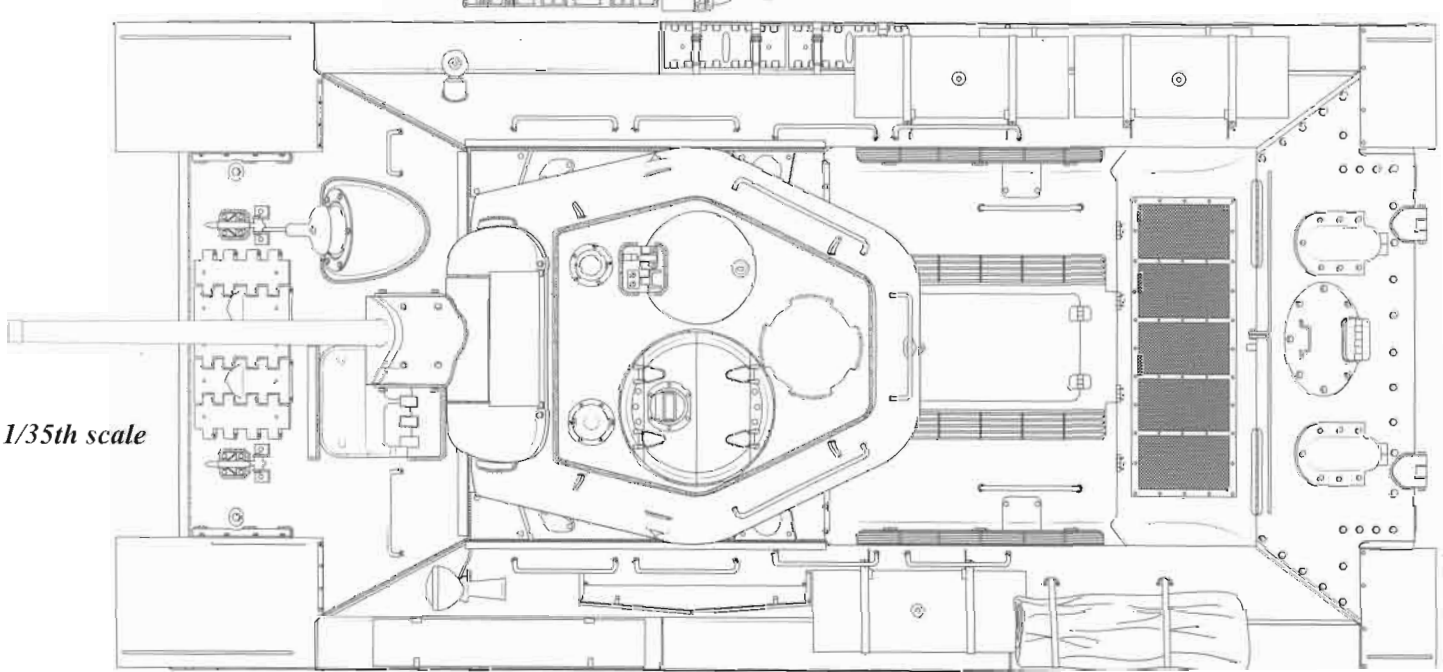


T–34 from No.112 Factory, one of the last production series with the 76.2 mm gun from 1944.

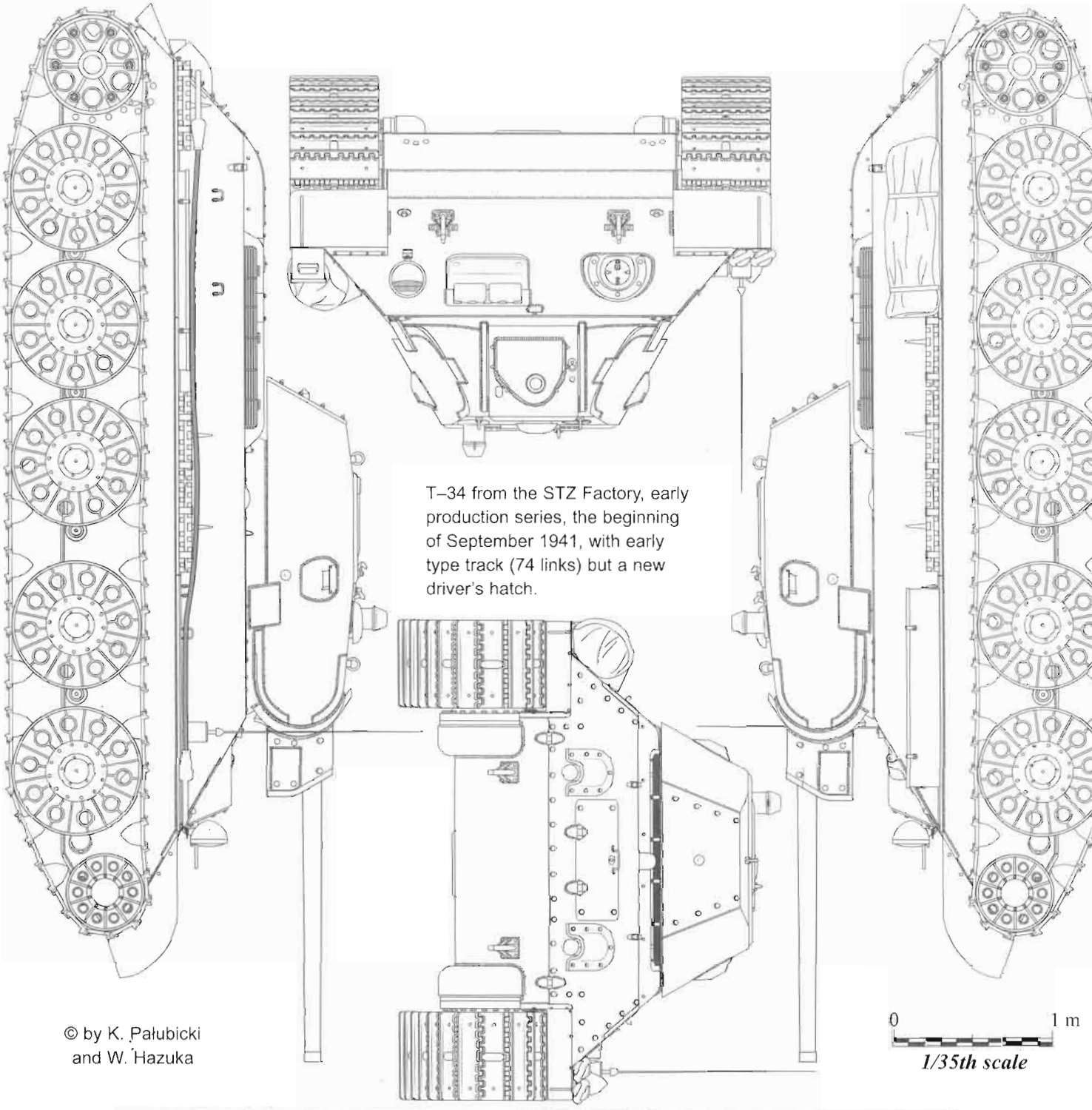
Compared to the tanks produced during the time period end 1942/ beginning 1943, its rear hull plate was changed so that it would match the other vehicles.

The T–34s produced in that factory differed from those of No.183 Factory in the way the additional fuel tank was installed on the left side of the hull.

During spring 1944, the tanks had the two periscopes as a standard item, and many had hand rails on the front of the hull.



1/35th scale

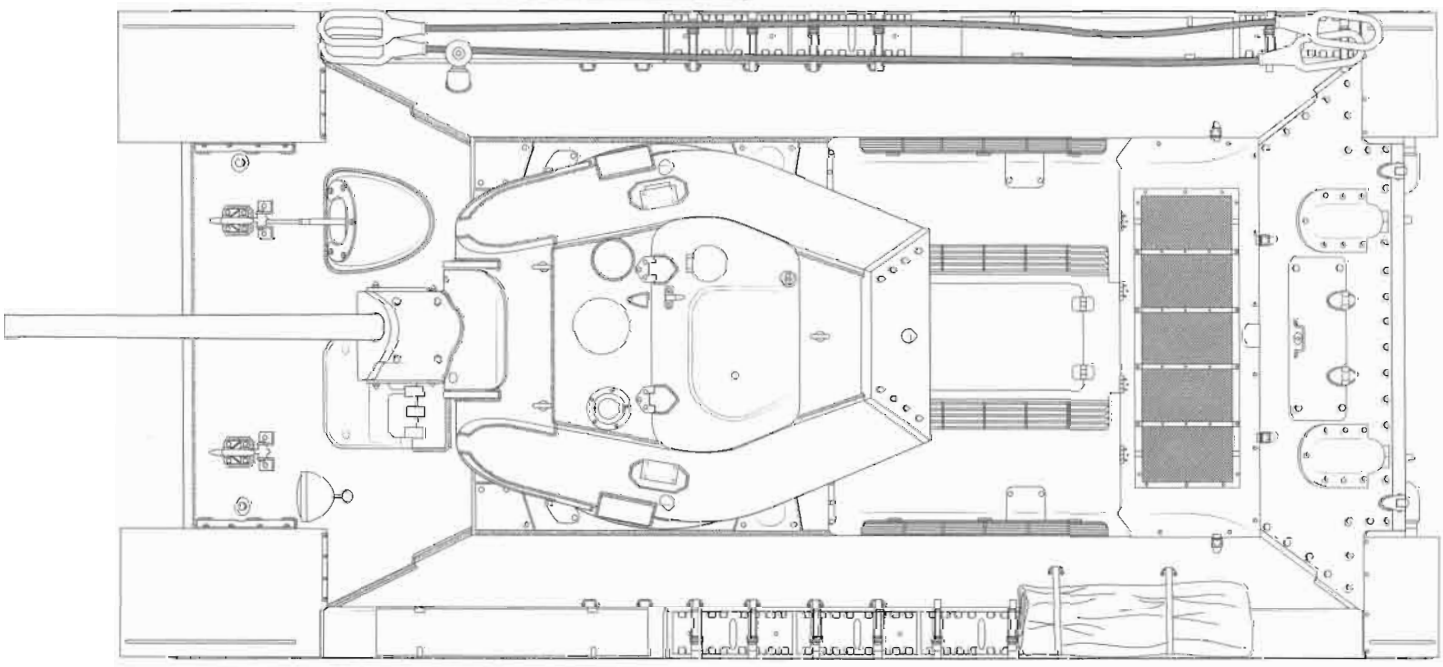


T–34 from the STZ Factory, early production series, the beginning of September 1941, with early type track (74 links) but a new driver's hatch.

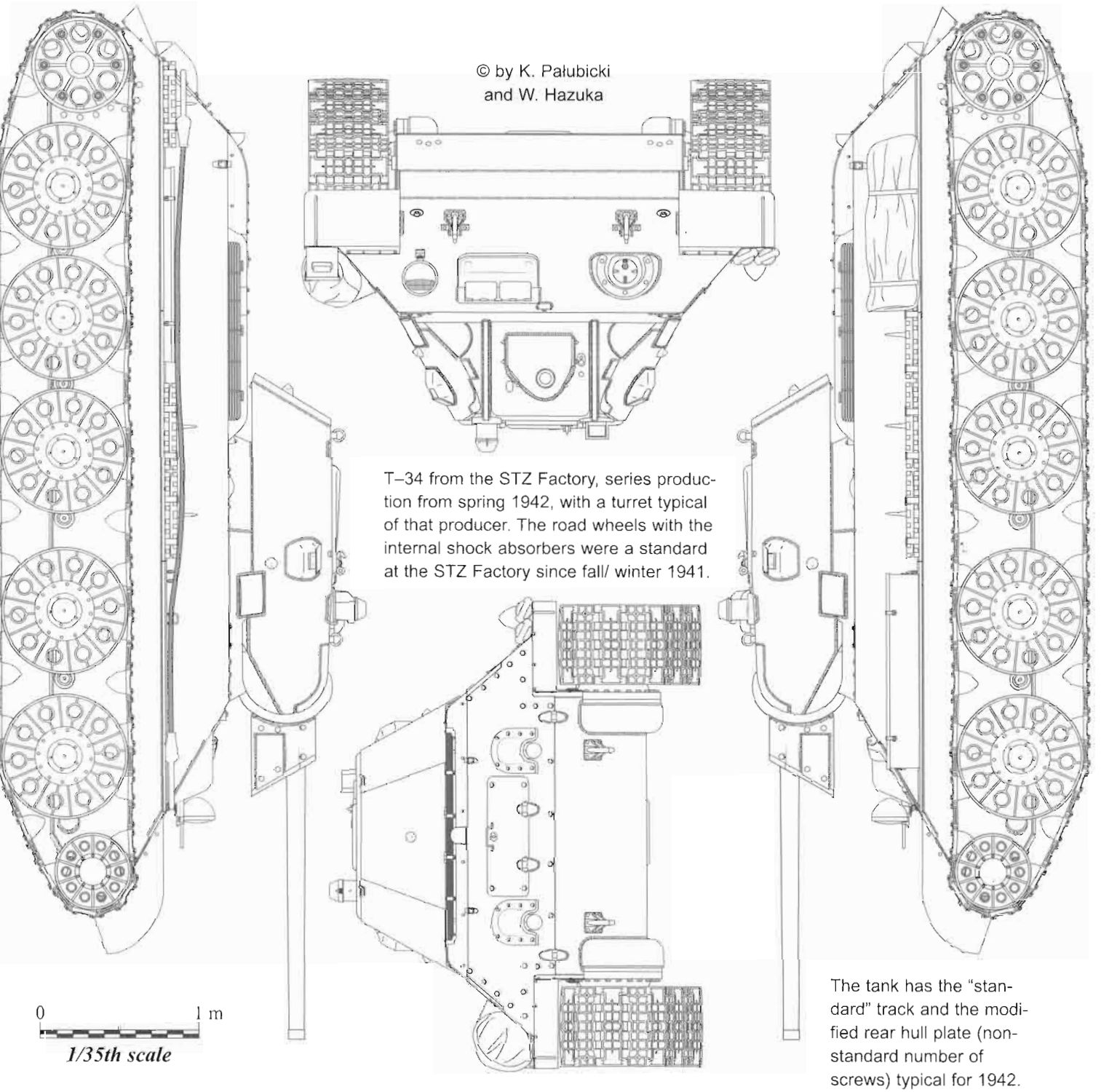
© by K. Pałubicki
and W. Hazuka

0 1 m

1/35th scale



© by K. Pałubicki
and W. Hazuka

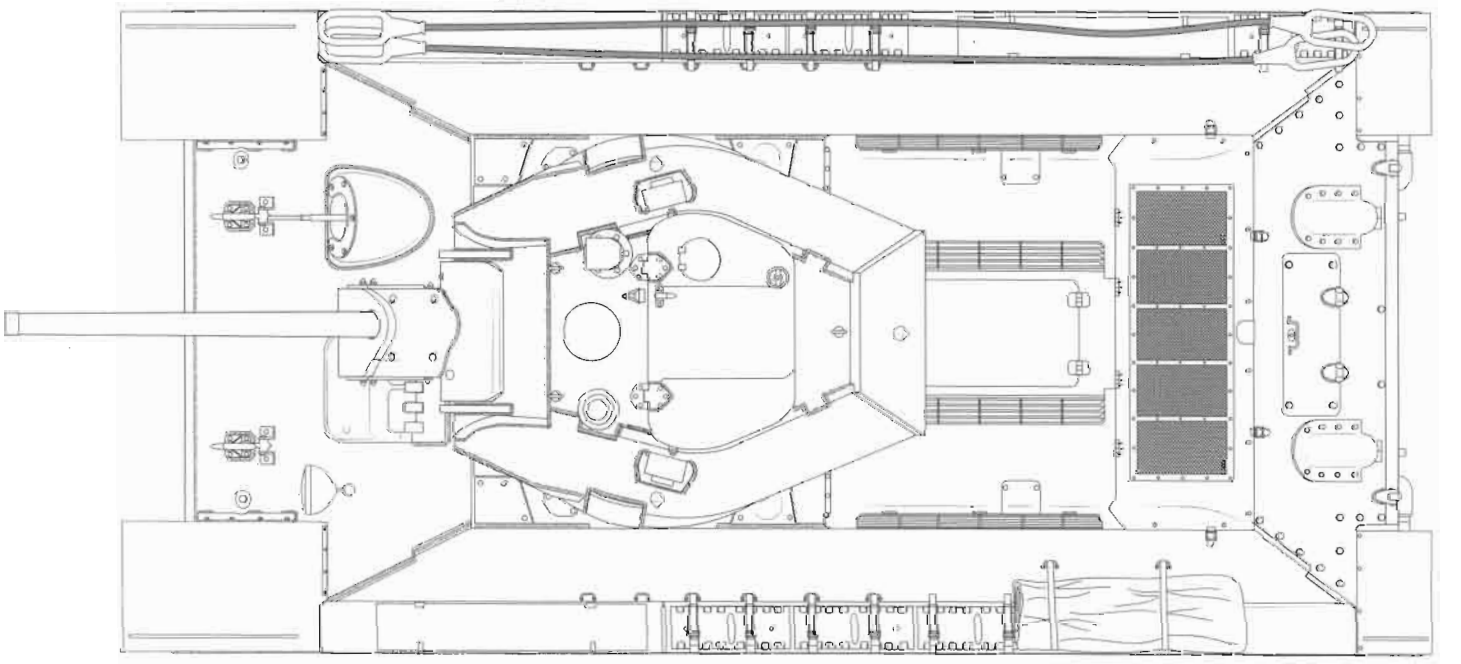


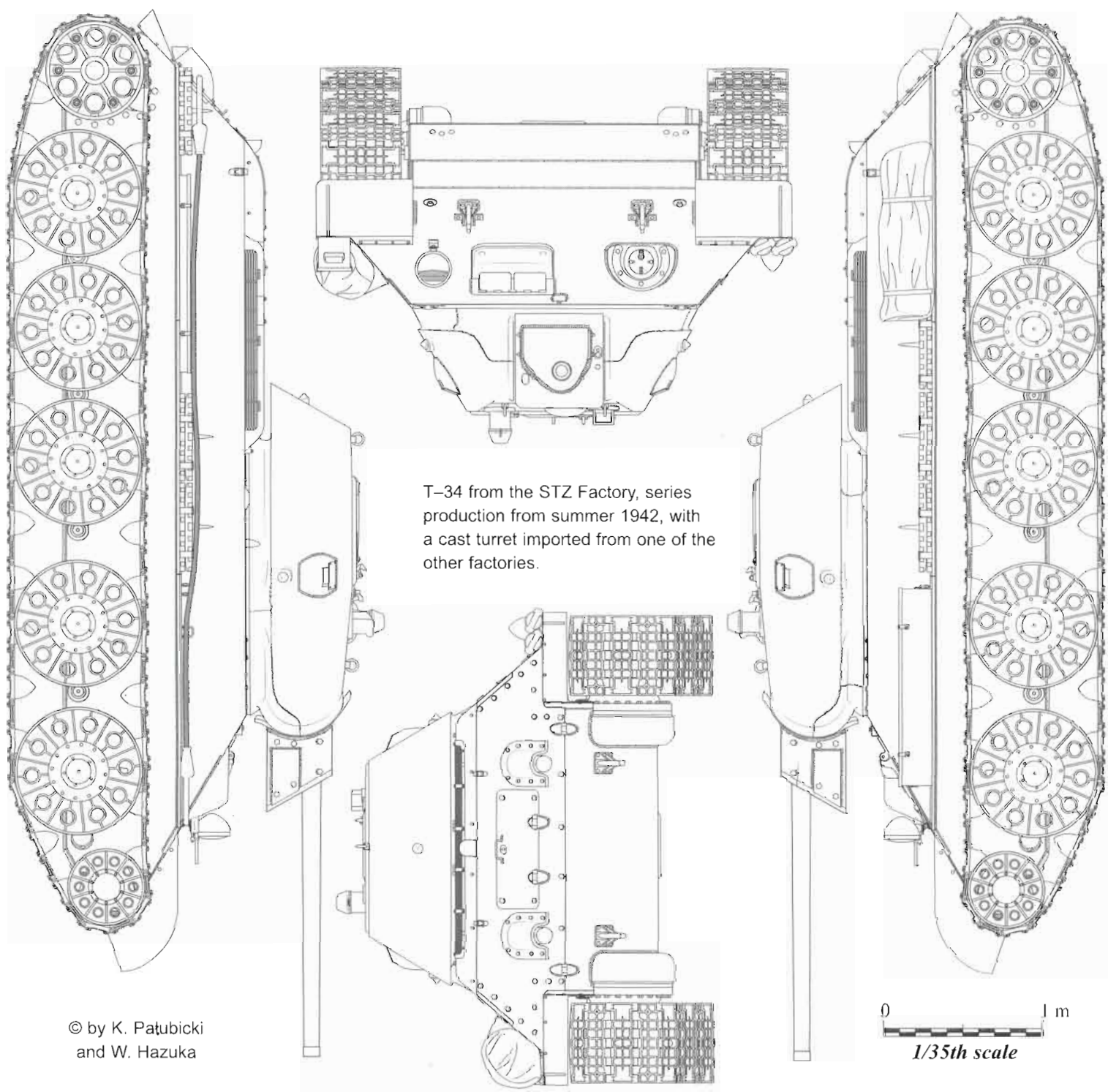
T–34 from the STZ Factory, series production from spring 1942, with a turret typical of that producer. The road wheels with the internal shock absorbers were a standard at the STZ Factory since fall/ winter 1941.

0 1 m

1/35th scale

The tank has the "standard" track and the modified rear hull plate (non-standard number of screws) typical for 1942.



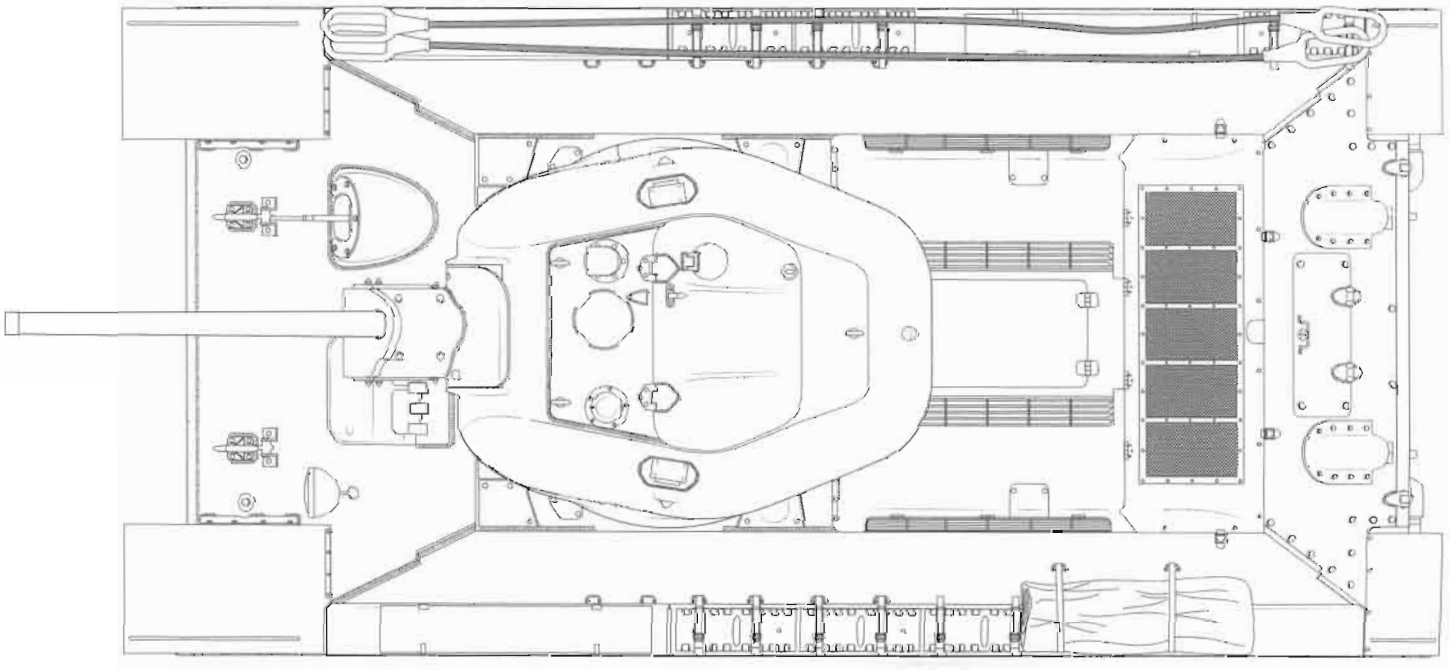


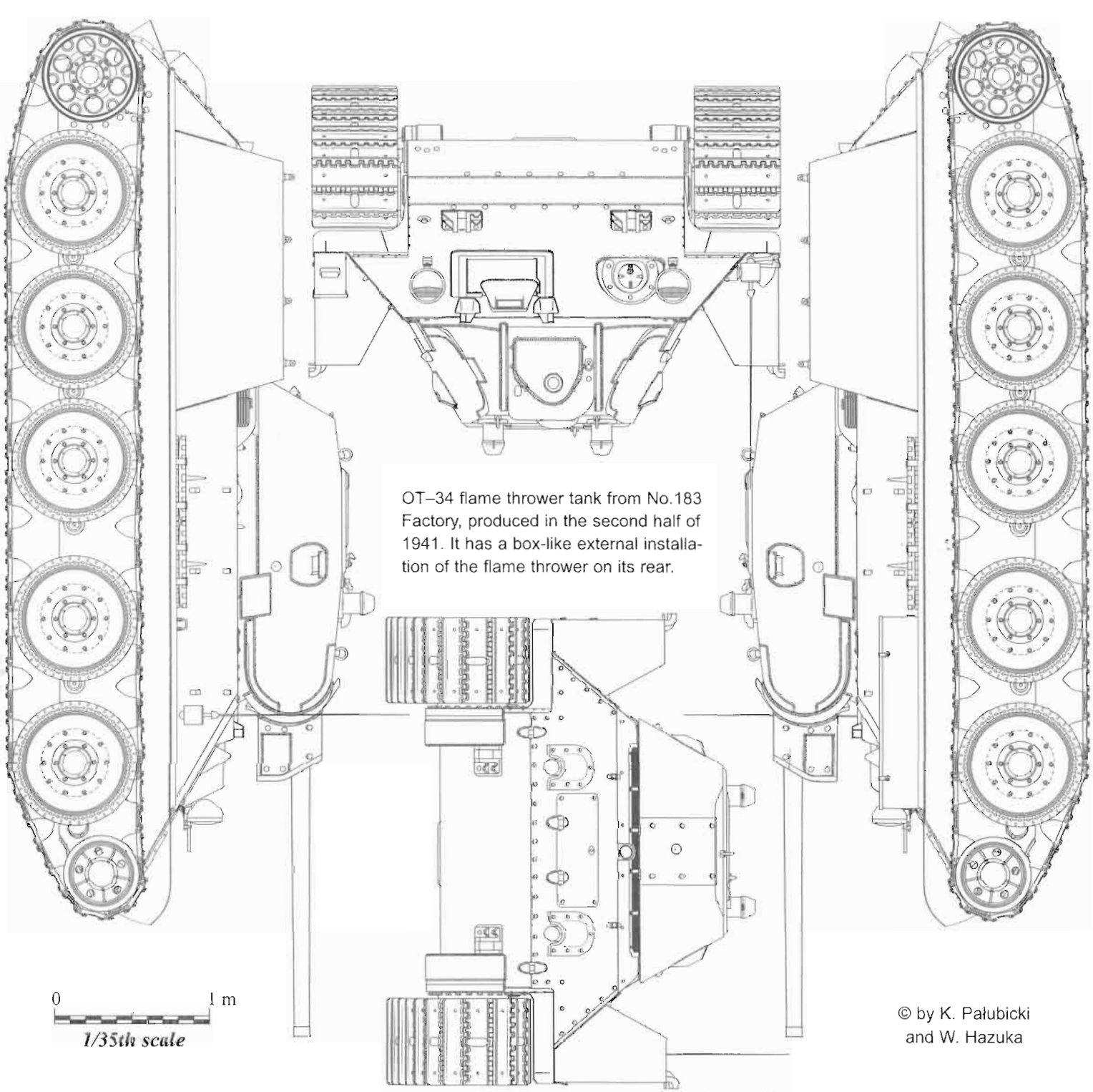
T–34 from the STZ Factory, series production from summer 1942, with a cast turret imported from one of the other factories.

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0 1 m

1/35th scale



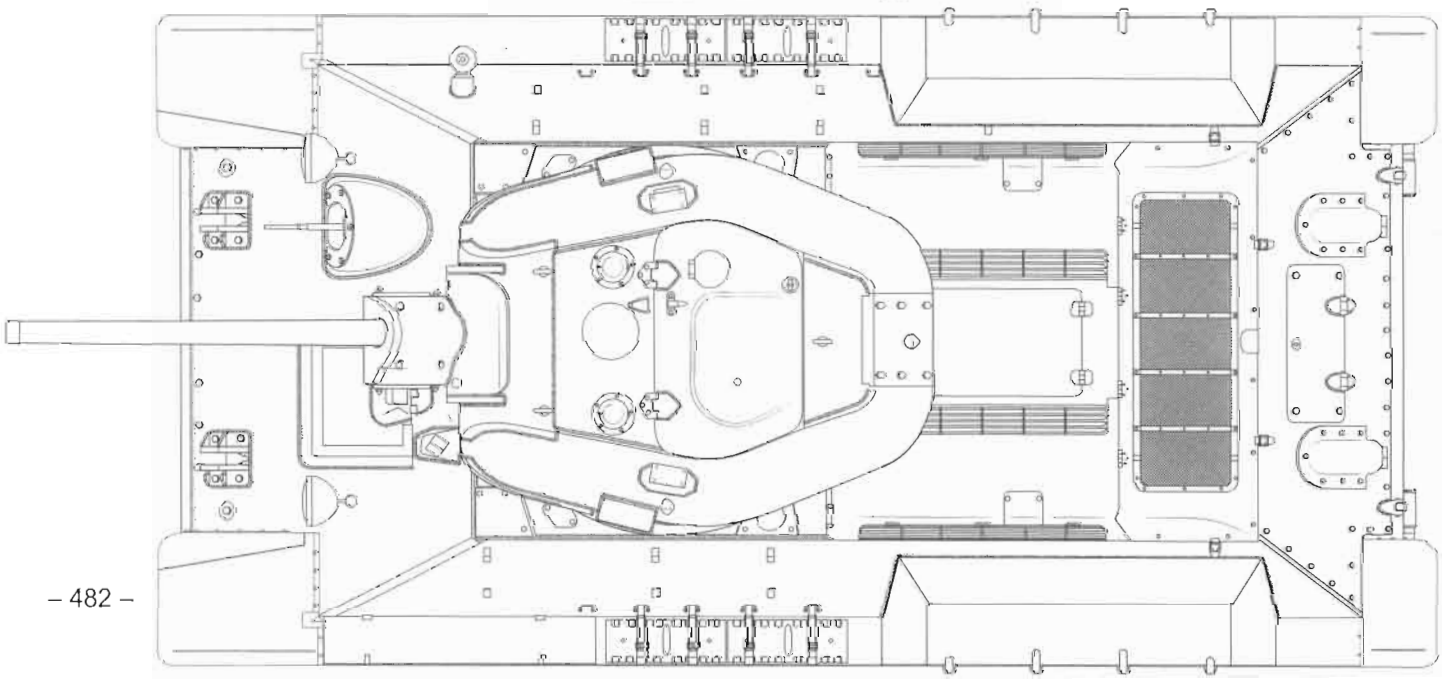


OT–34 flame thrower tank from No.183 Factory, produced in the second half of 1941. It has a box-like external installation of the flame thrower on its rear.

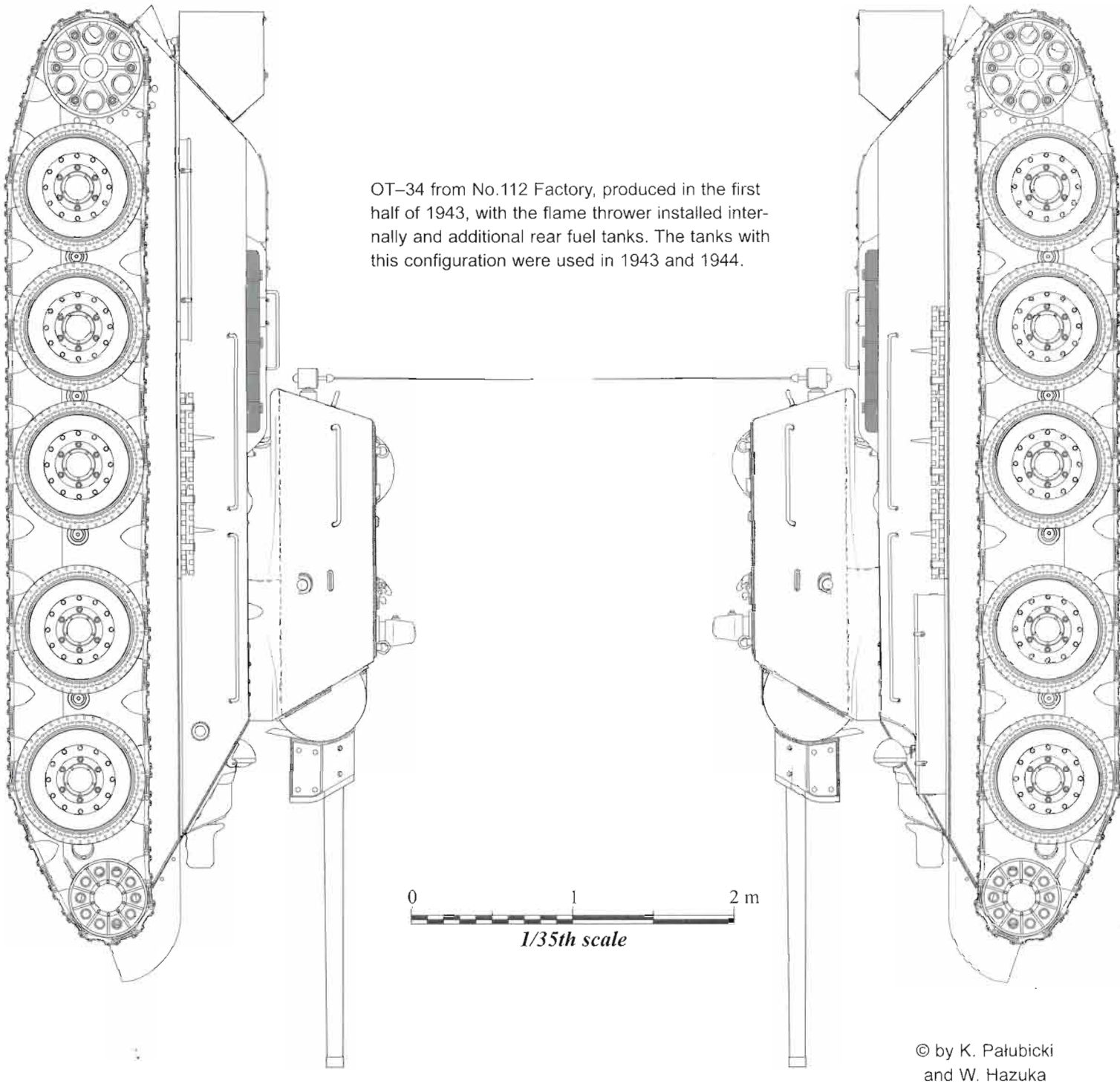
0 1 m

1/35th scale

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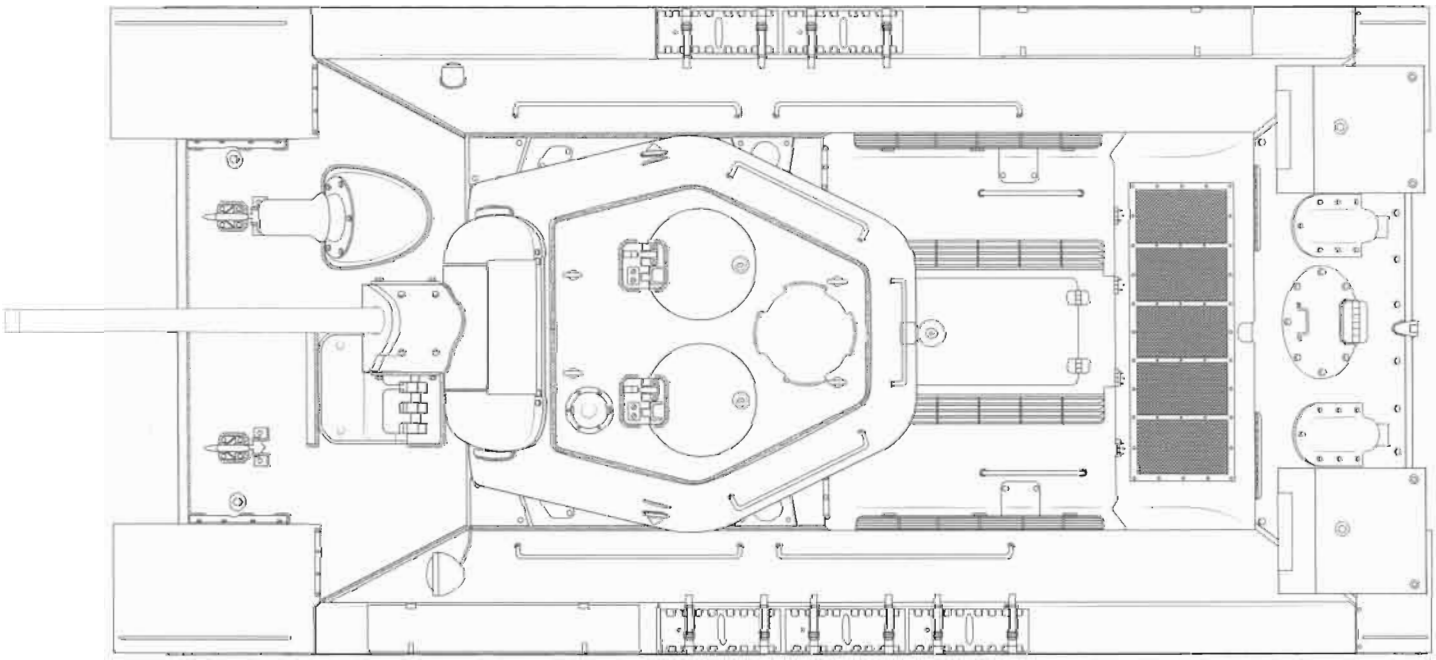


OT–34 from No.112 Factory, produced in the first half of 1943, with the flame thrower installed internally and additional rear fuel tanks. The tanks with this configuration were used in 1943 and 1944.

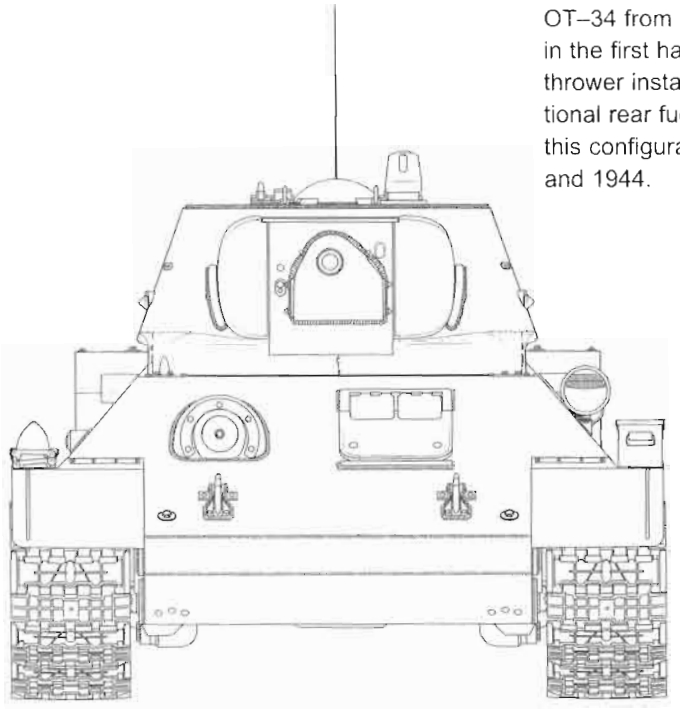


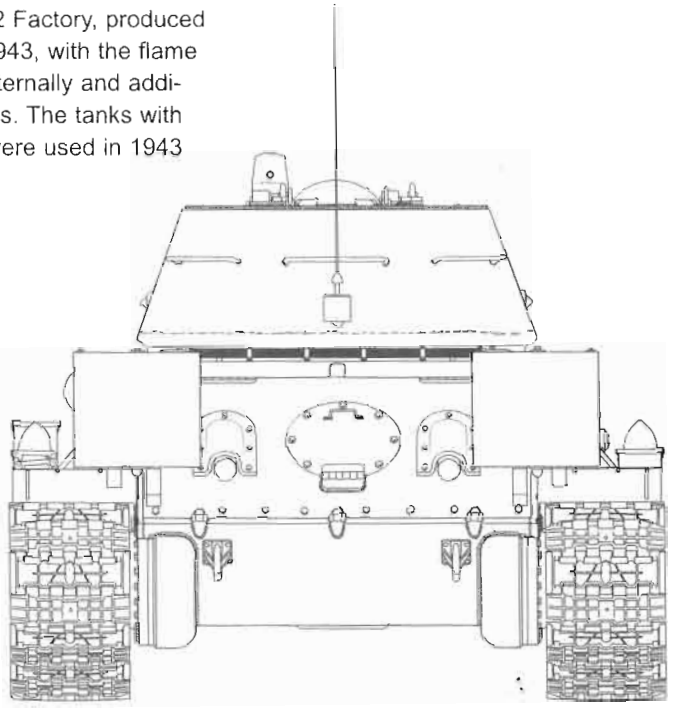
1/35th scale

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OT–34 from No.112 Factory, produced in the first half of 1943, with the flame thrower installed internally and additional rear fuel tanks. The tanks with this configuration were used in 1943 and 1944.

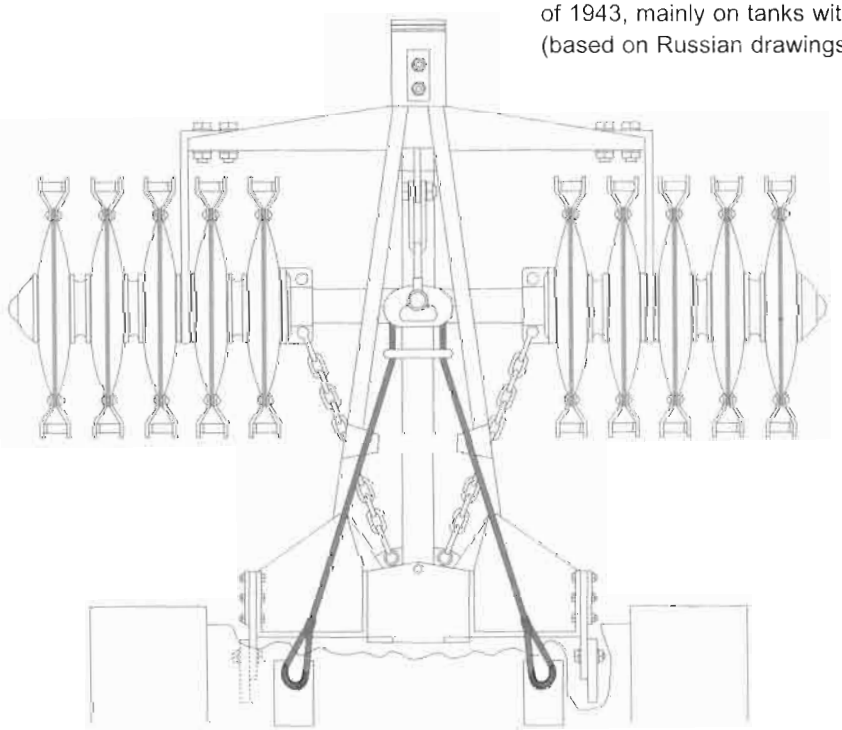




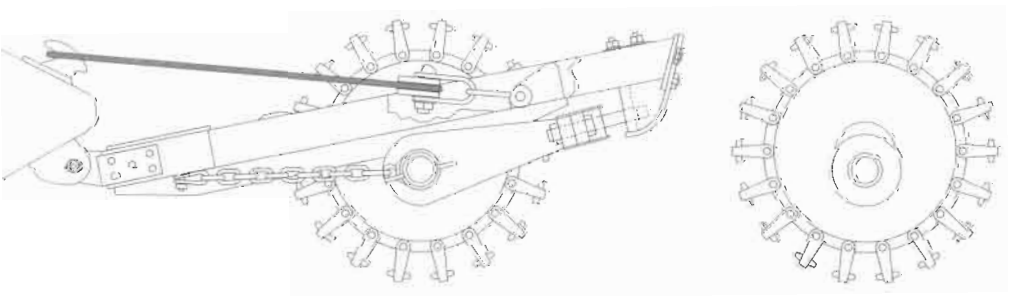
0 1 2 m

1/35th scale

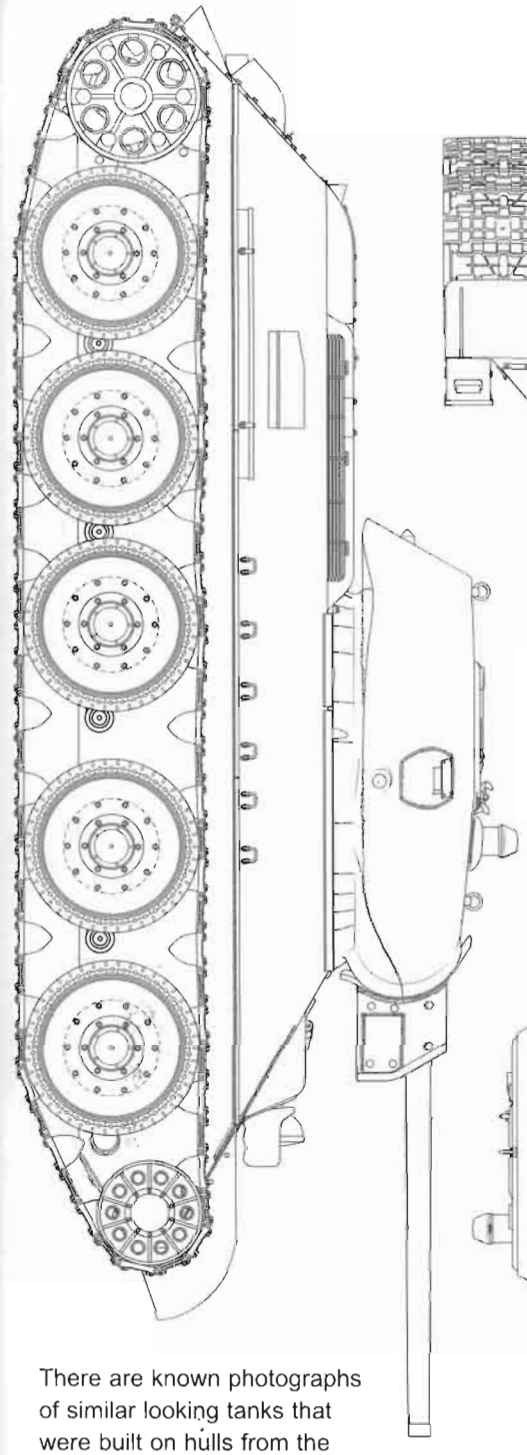
Mine roller for the T–34, used since the second half of 1943, mainly on tanks with the 76.2 mm gun (based on Russian drawings).

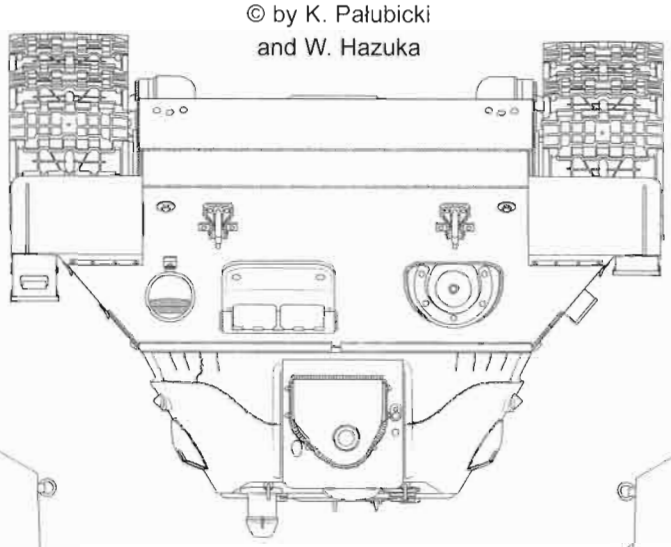


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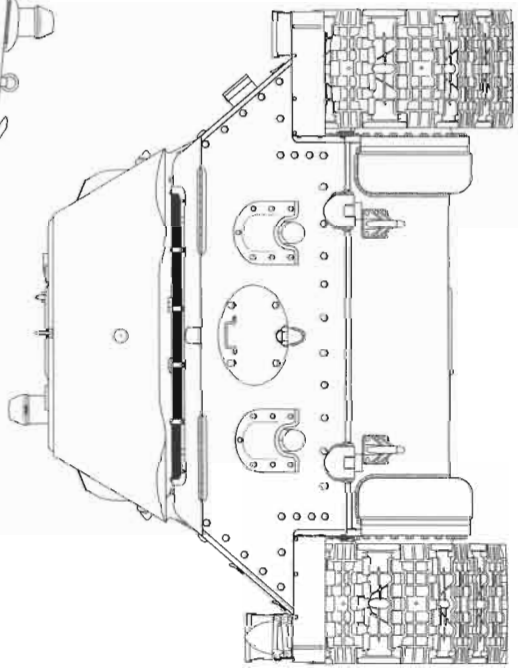


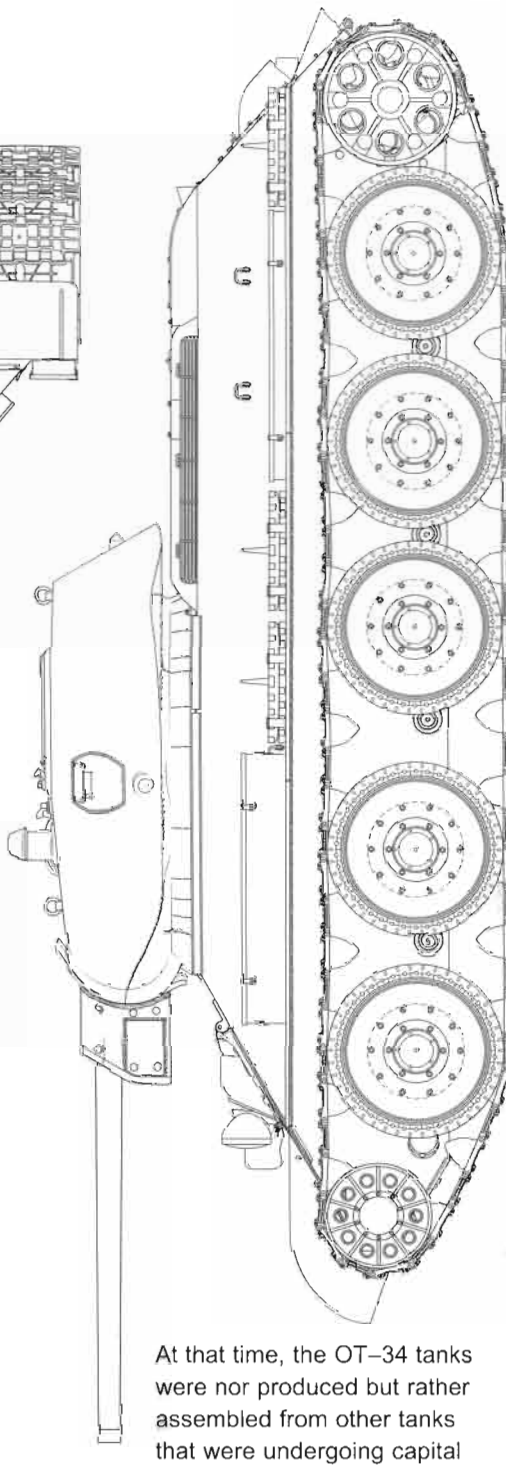
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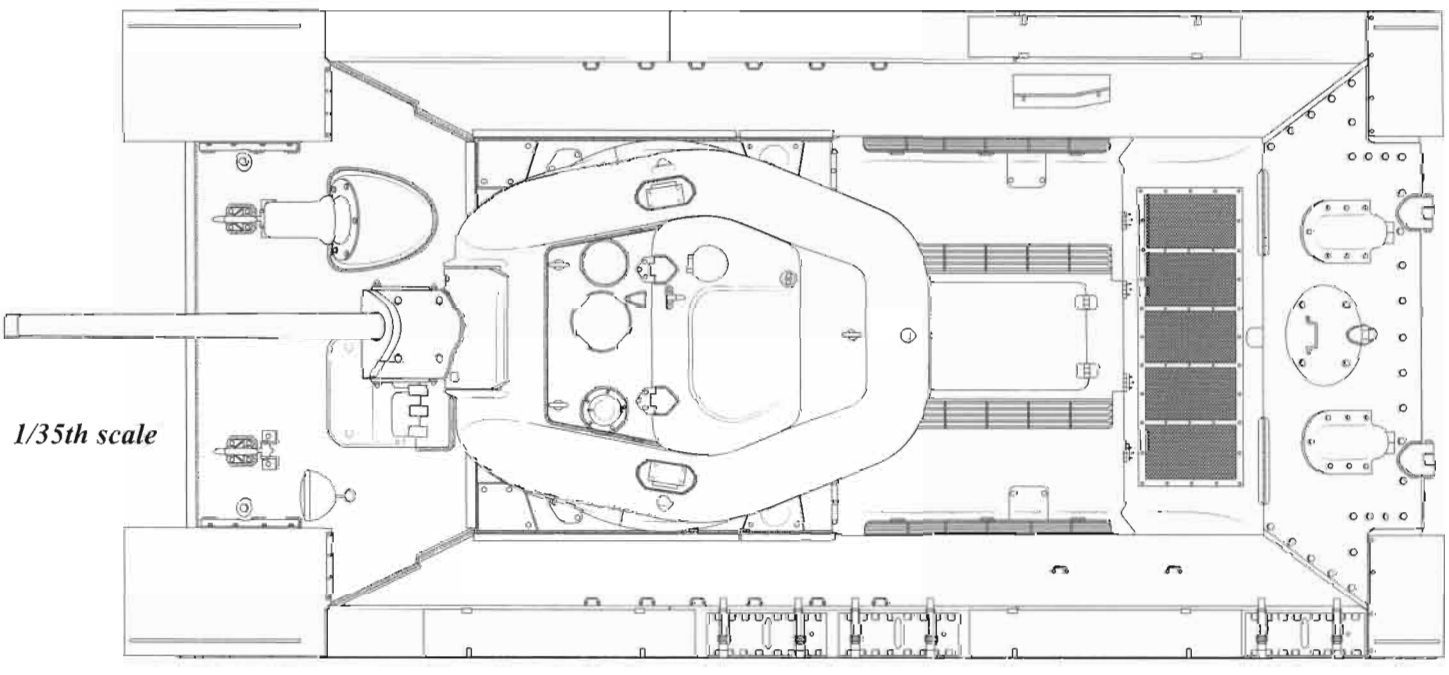
OT–34 from No.112 Factory, from 1942. This is a typical „composite", just like other tanks of this type from that time period that were assembled at that factory.



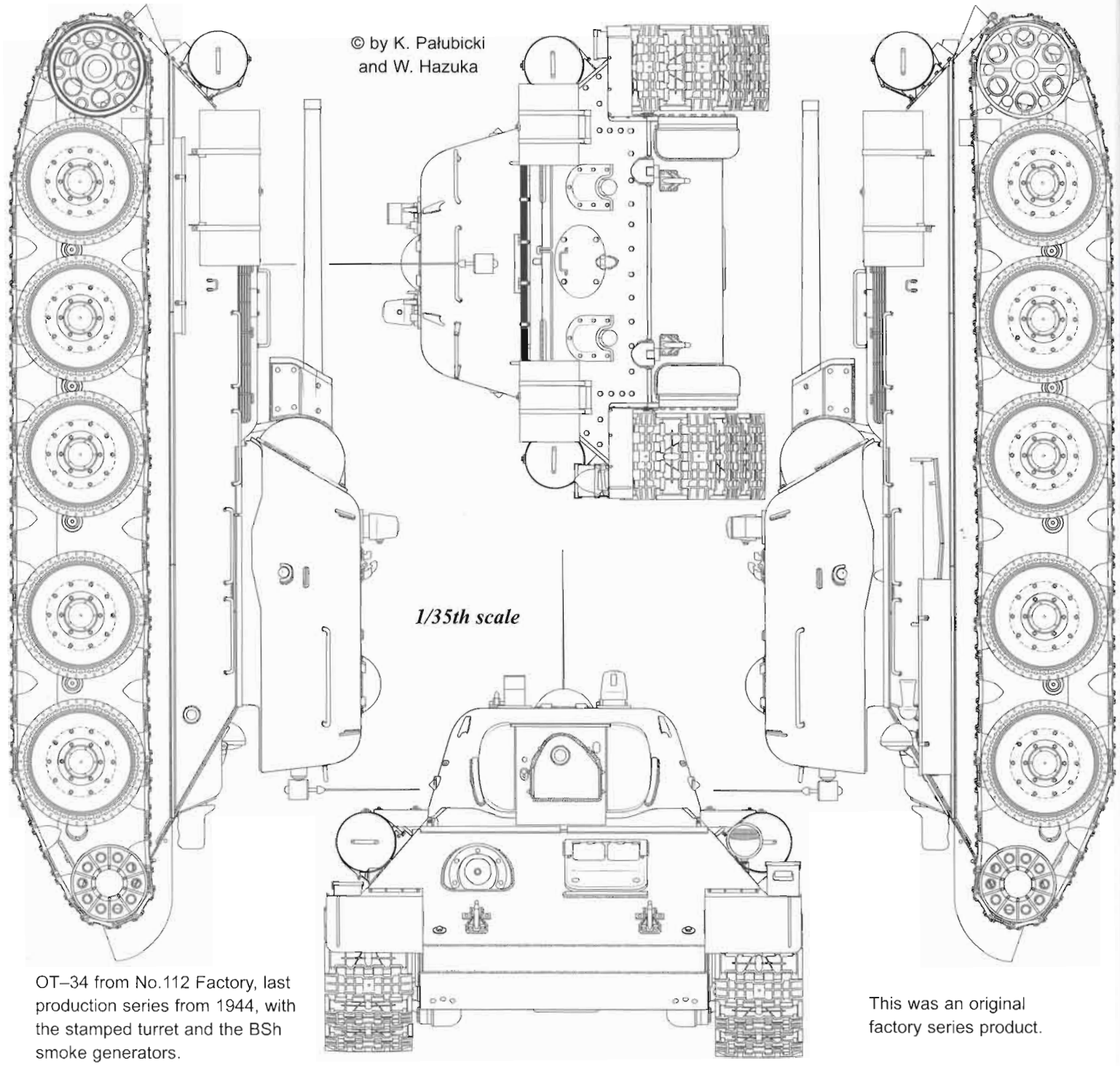


There are known photographs of similar looking tanks that were built on hulls from the STZ Factory (see p. 233).

At that time, the OT–34 tanks were nor produced but rather assembled from other tanks that were undergoing capital repairs at the No.112 Factory.

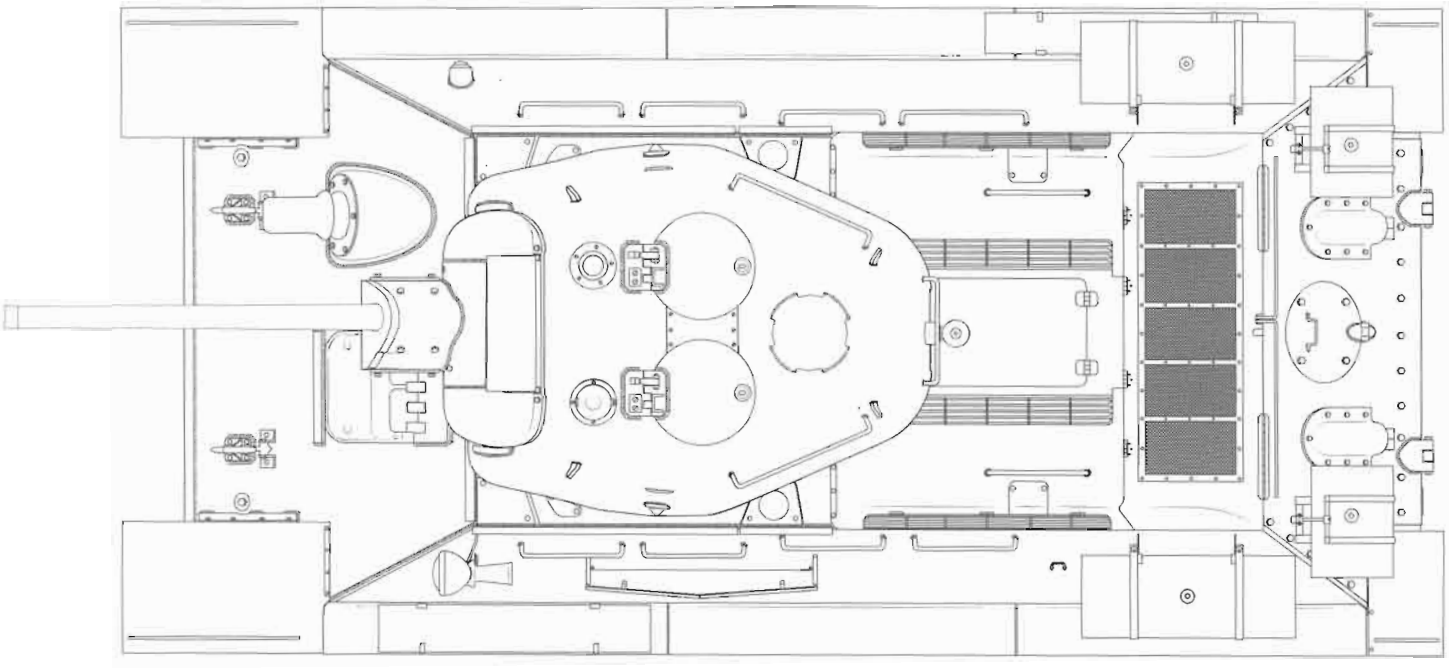


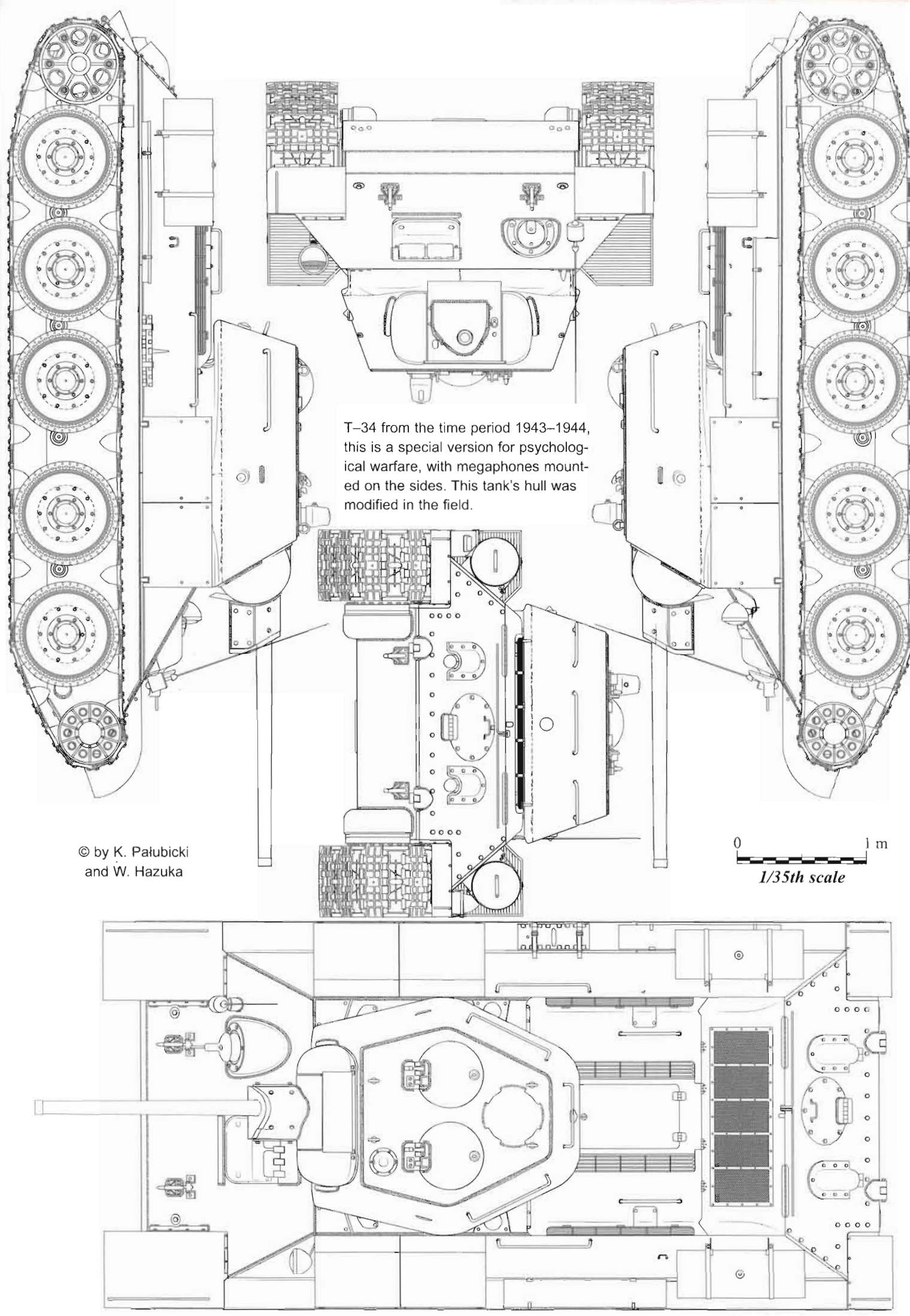
1/35th scale



OT–34 from No.112 Factory, last production series from 1944, with the stamped turret and the BSh smoke generators.

This was an original factory series product.



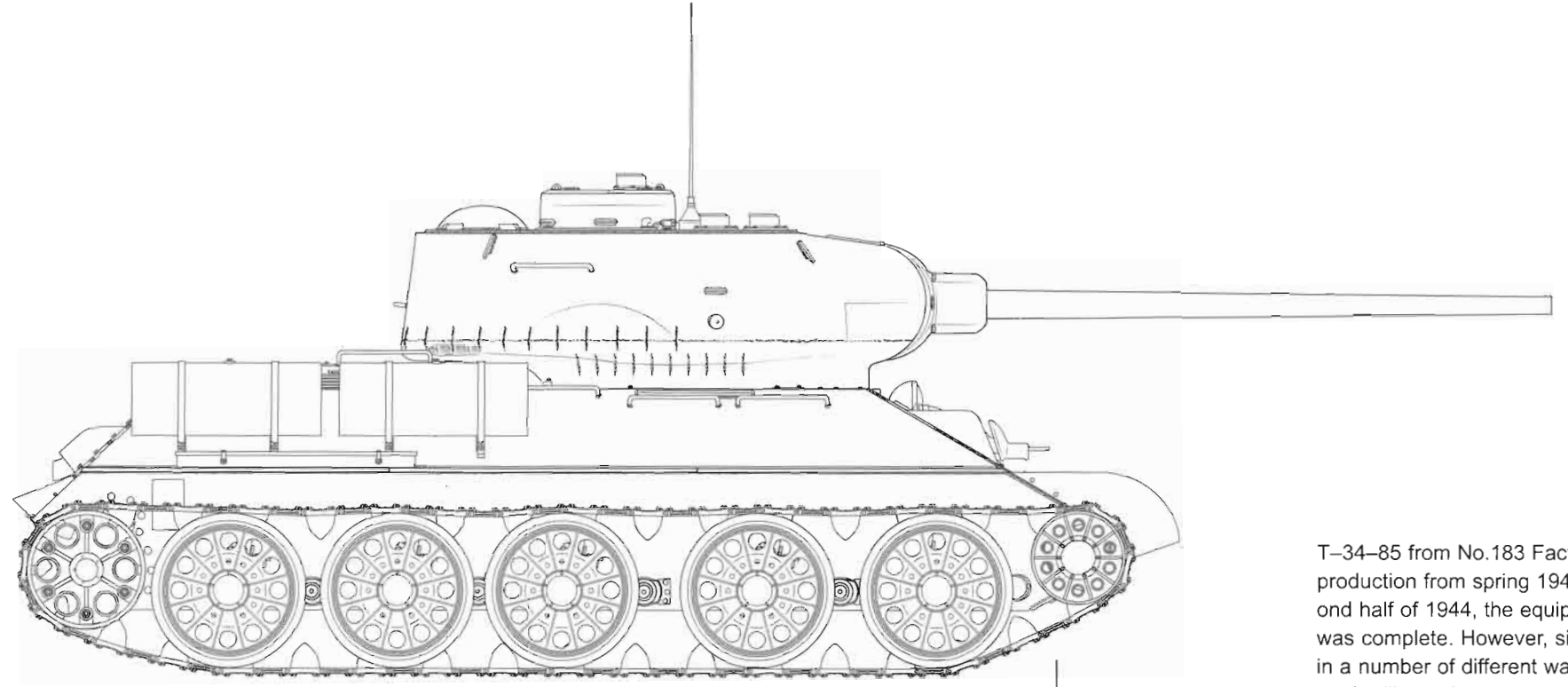


T–34 from the time period 1943–1944, this is a special version for psychological warfare, with megaphones mounted on the sides. This tank's hull was modified in the field.

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0 1 m

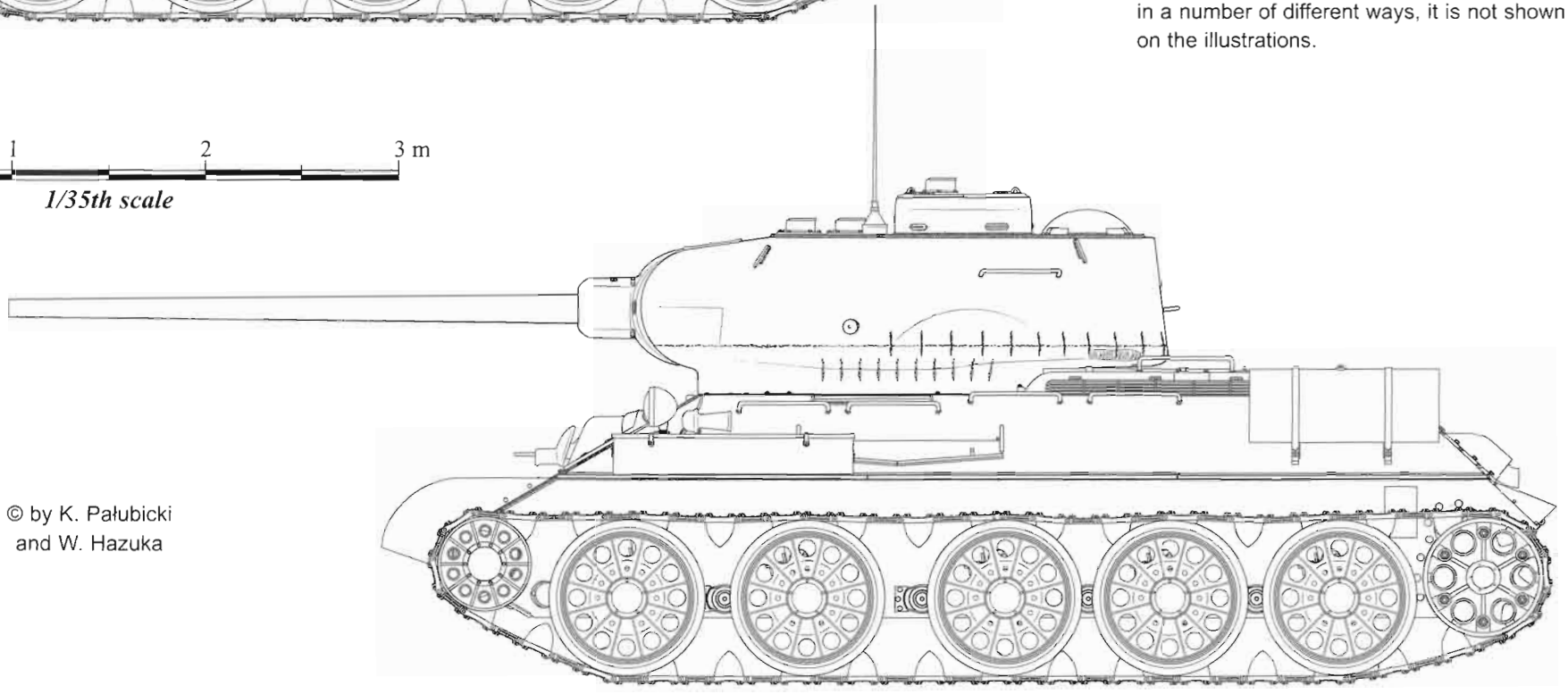
1/35th scale



T–34–85 from No.183 Factory, early series production from spring 1944. From the second half of 1944, the equipment on the tanks was complete. However, since it was placed in a number of different ways, it is not shown on the illustrations.

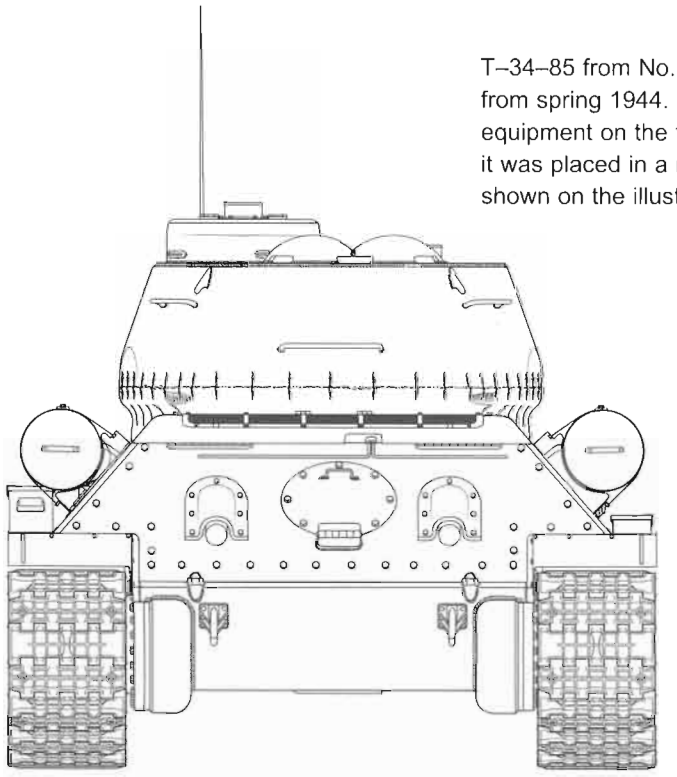
0 1 2 3 m

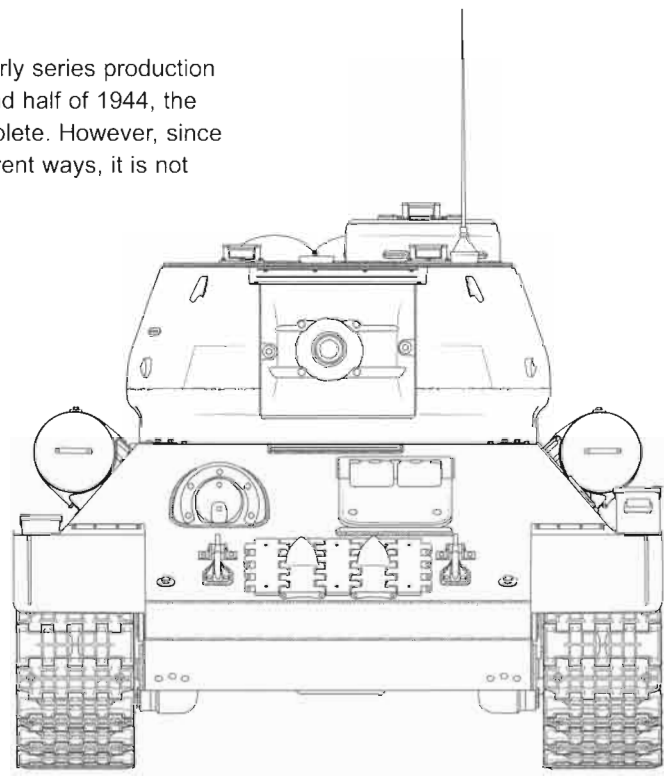
1/35th scale

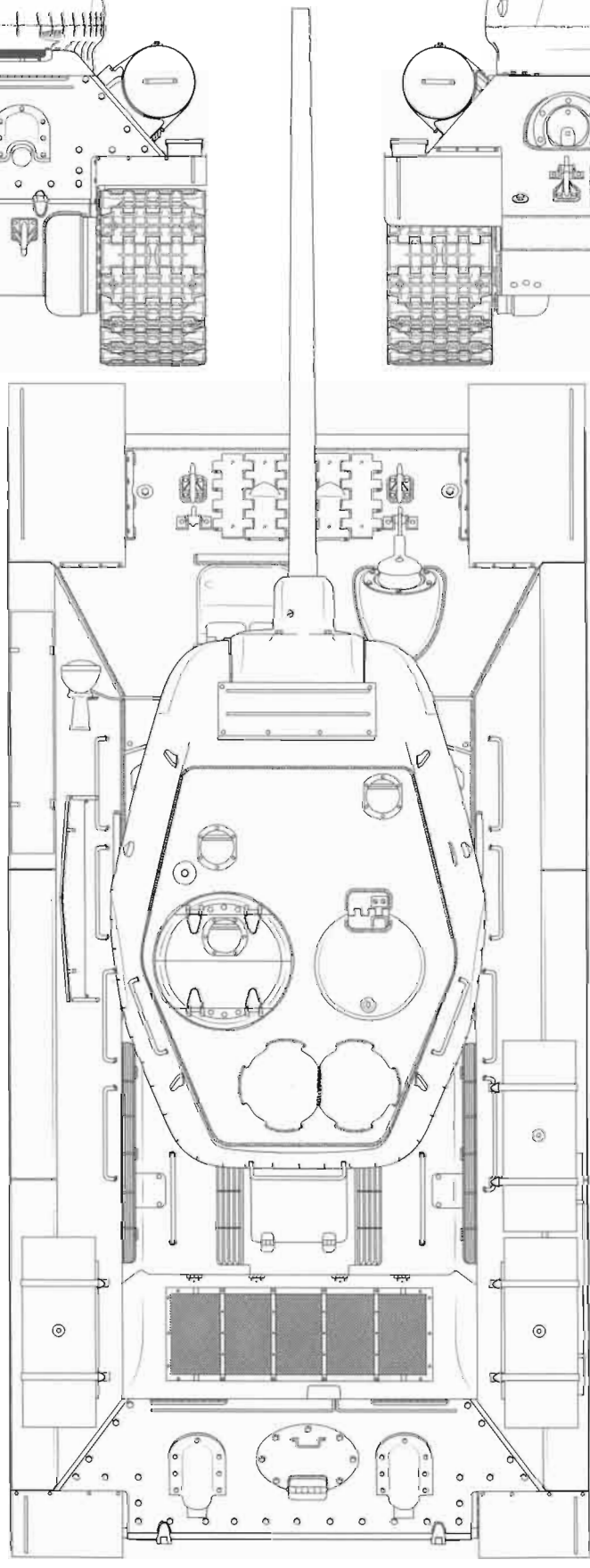


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T–34–85 from No.183 Factory, early series production from spring 1944. From the second half of 1944, the equipment on the tanks was complete. However, since it was placed in a number of different ways, it is not shown on the illustrations.



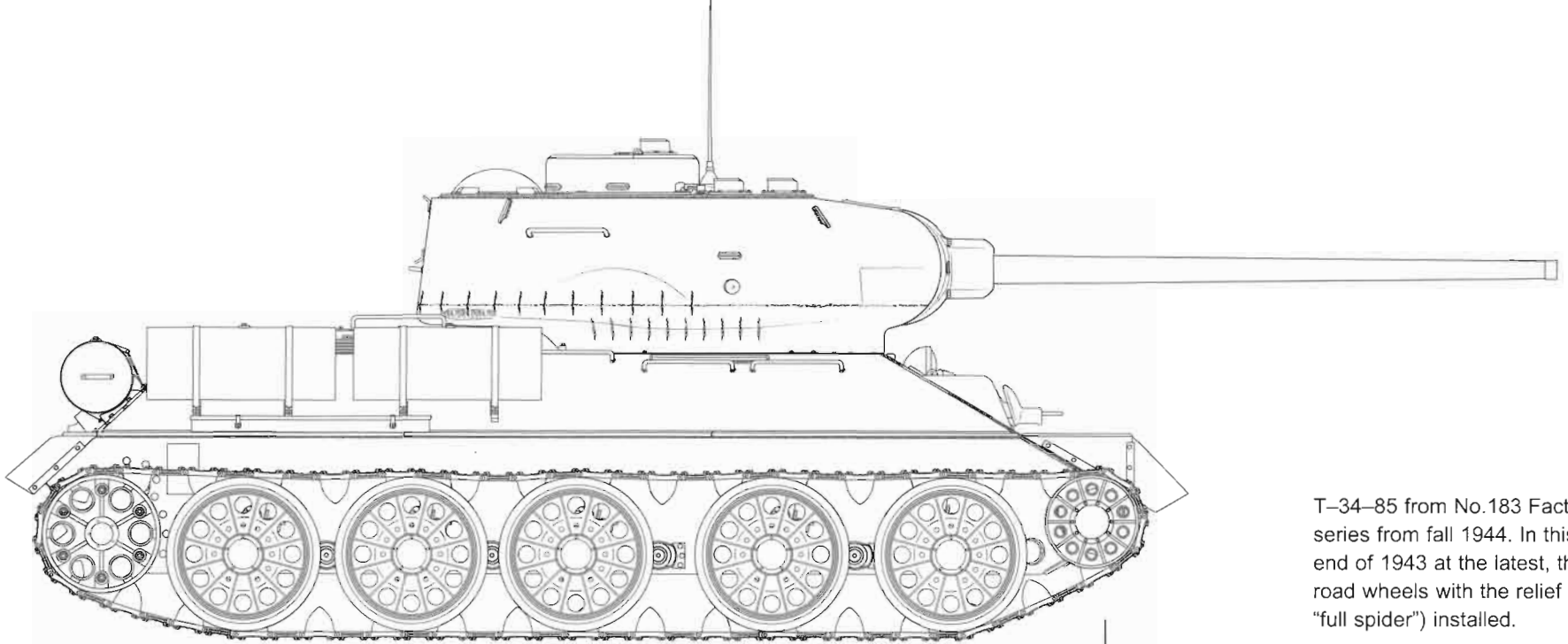




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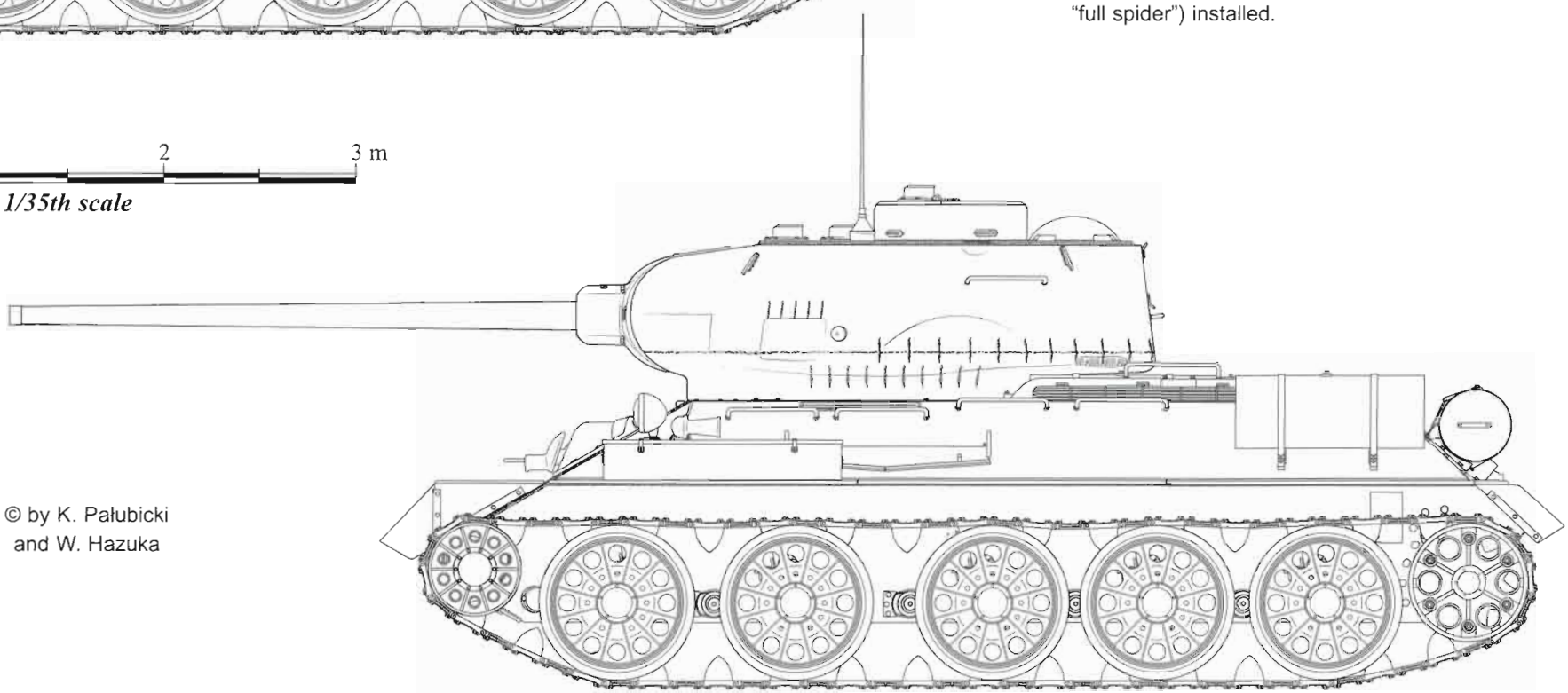
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T–34–85 from No.183 Factory, later production series from fall 1944. In this factory, since the end of 1943 at the latest, the tanks had the road wheels with the relief holes (so-called "full spider") installed.

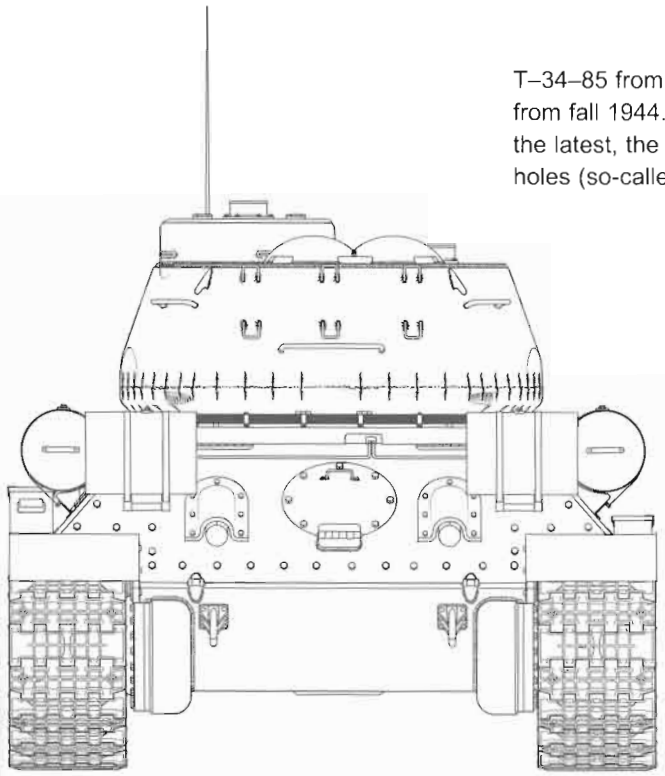
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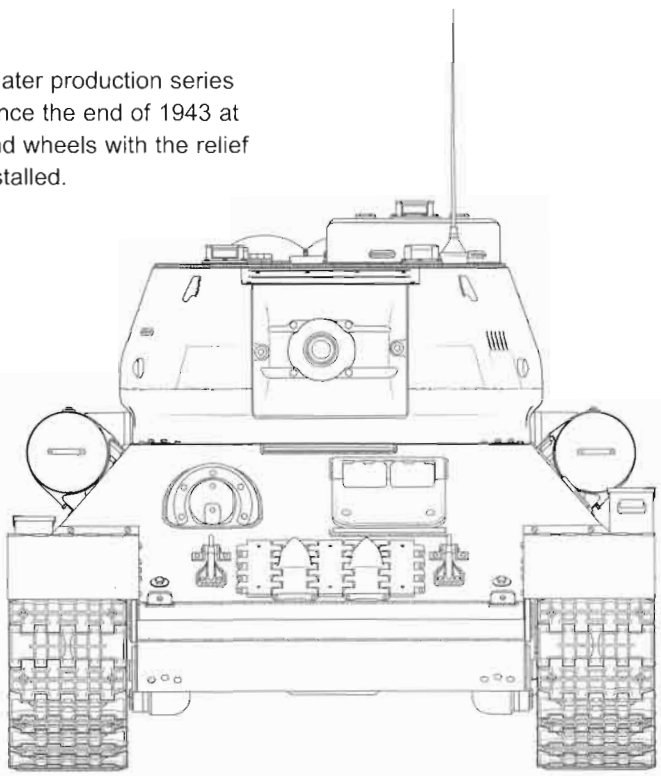
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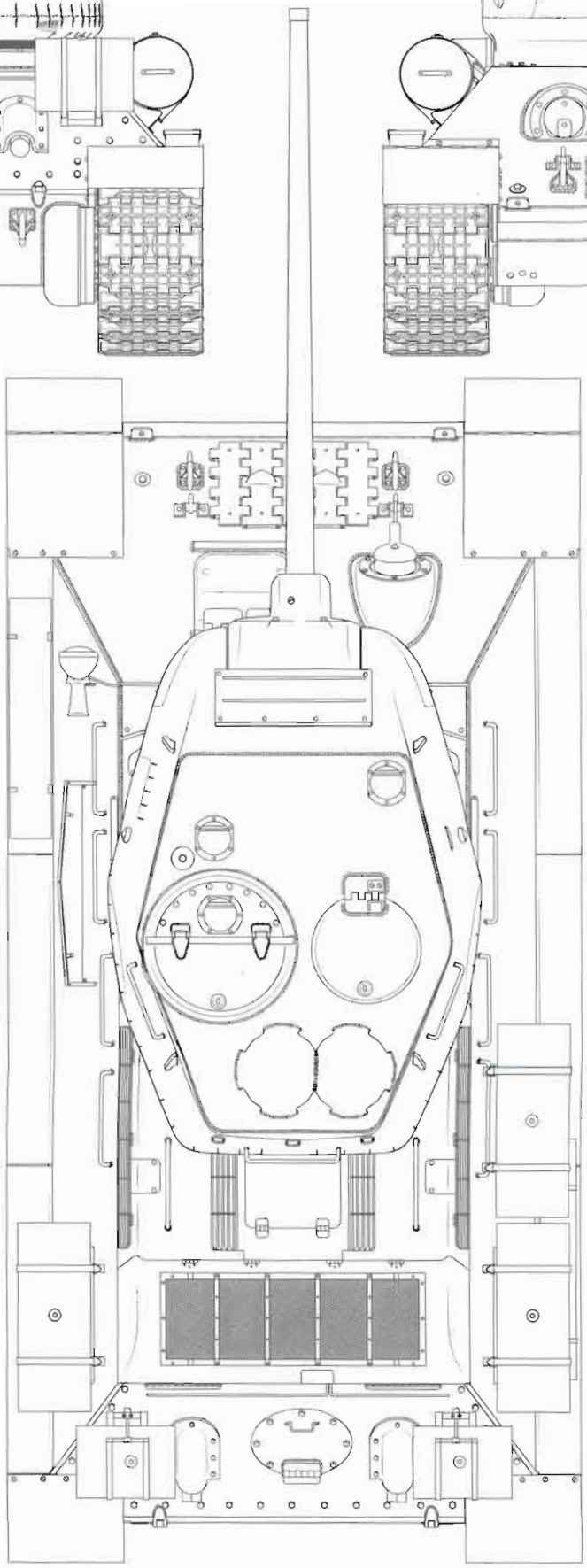


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T–34–85 from No.183 Factory, later production series from fall 1944. In this factory, since the end of 1943 at the latest, the tanks had the road wheels with the relief holes (so-called "full spider") installed.



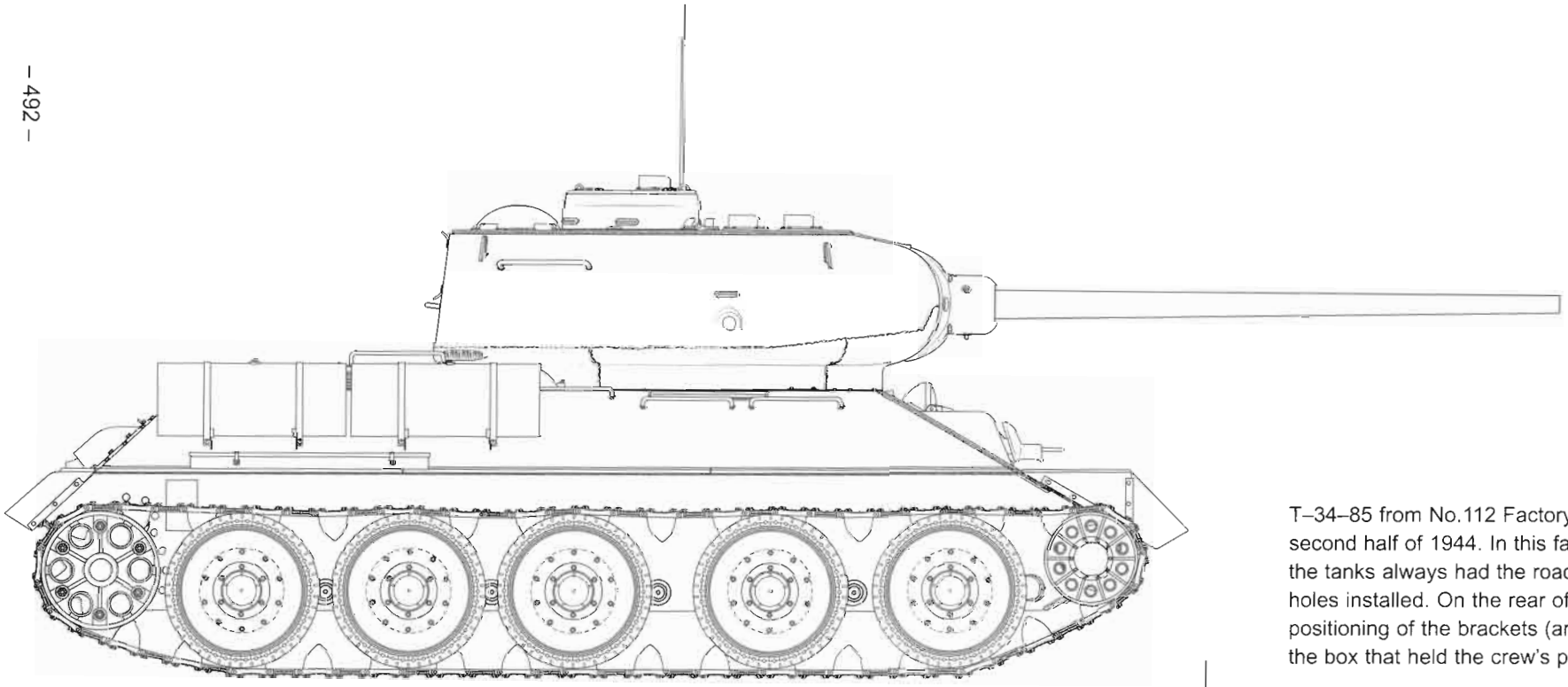




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1/35th scale

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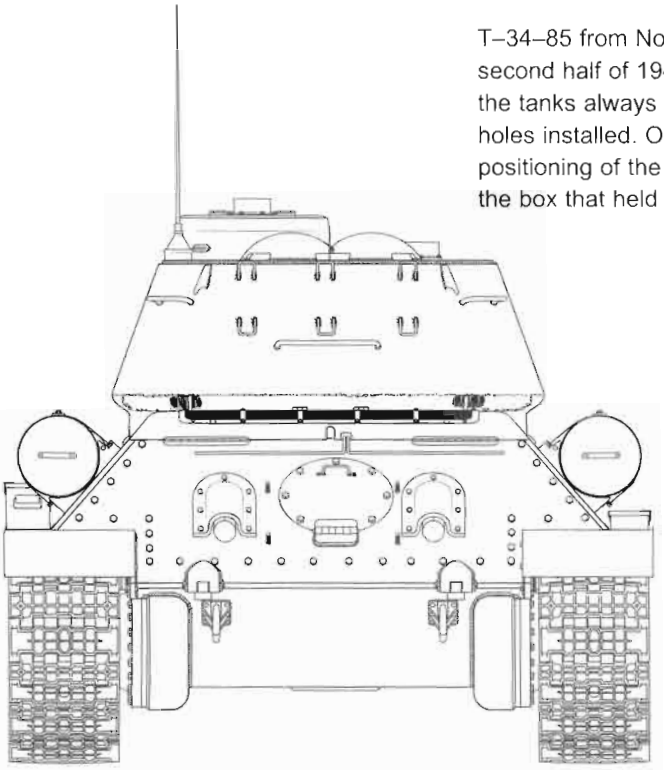
T–34–85 from No.112 Factory, series production from the second half of 1944. In this factory, from the beginning, the tanks always had the road wheels without the relief holes installed. On the rear of the hull is illustrated the positioning of the brackets (around the engine hatch) for the box that held the crew's personal effects.

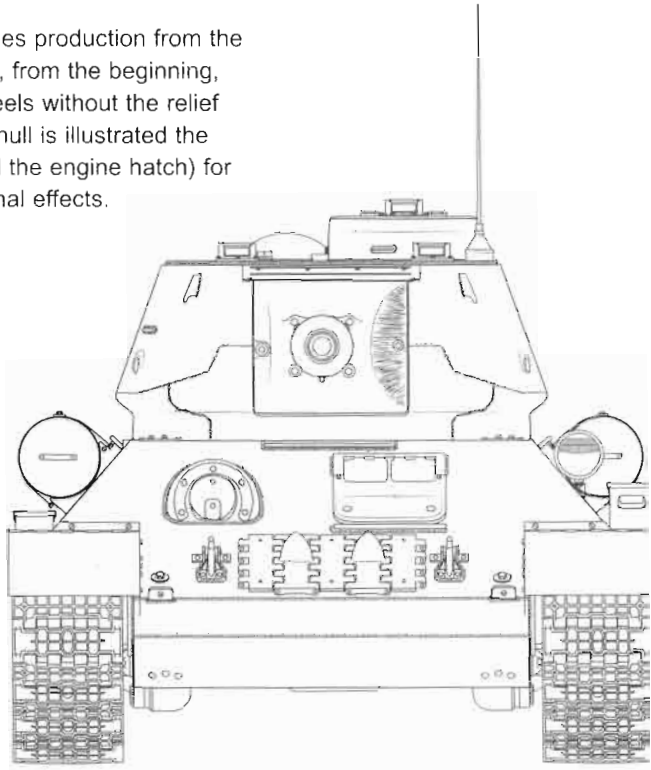


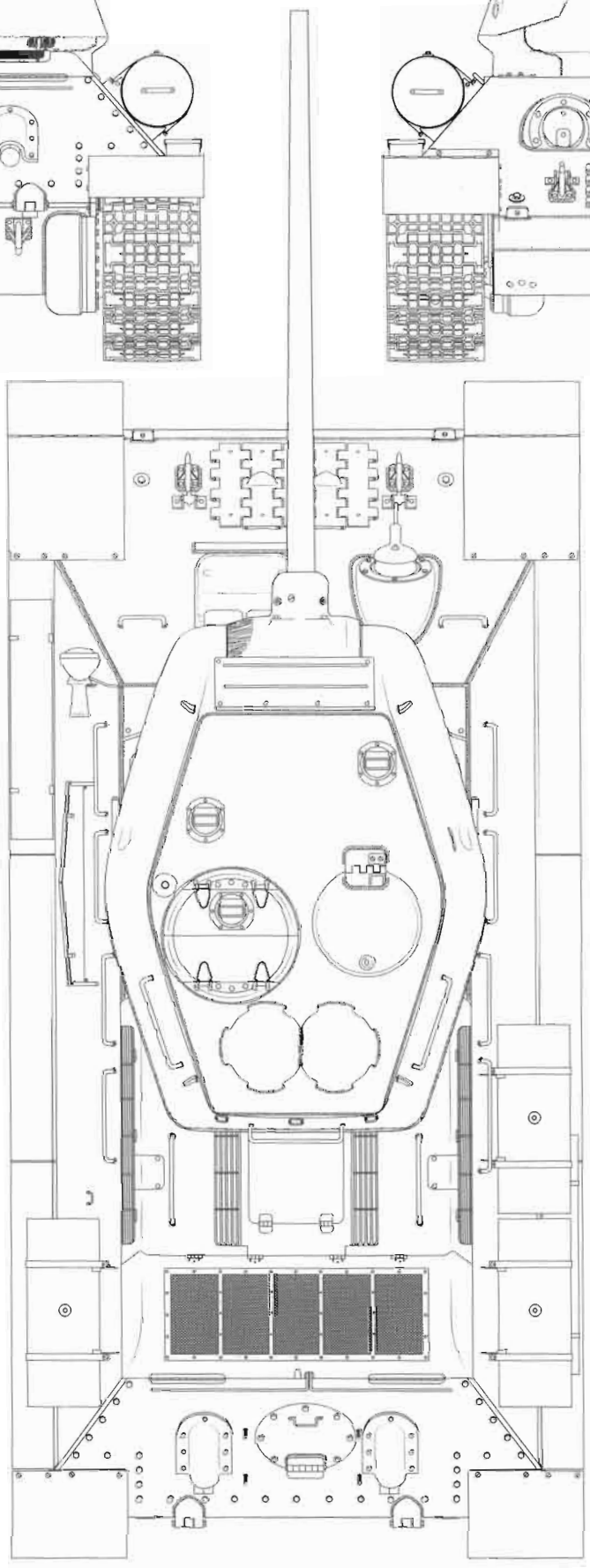
1/35th scale

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T–34–85 from No.112 Factory, series production from the second half of 1944. In this factory, from the beginning, the tanks always had the road wheels without the relief holes installed. On the rear of the hull is illustrated the positioning of the brackets (around the engine hatch) for the box that held the crew's personal effects.



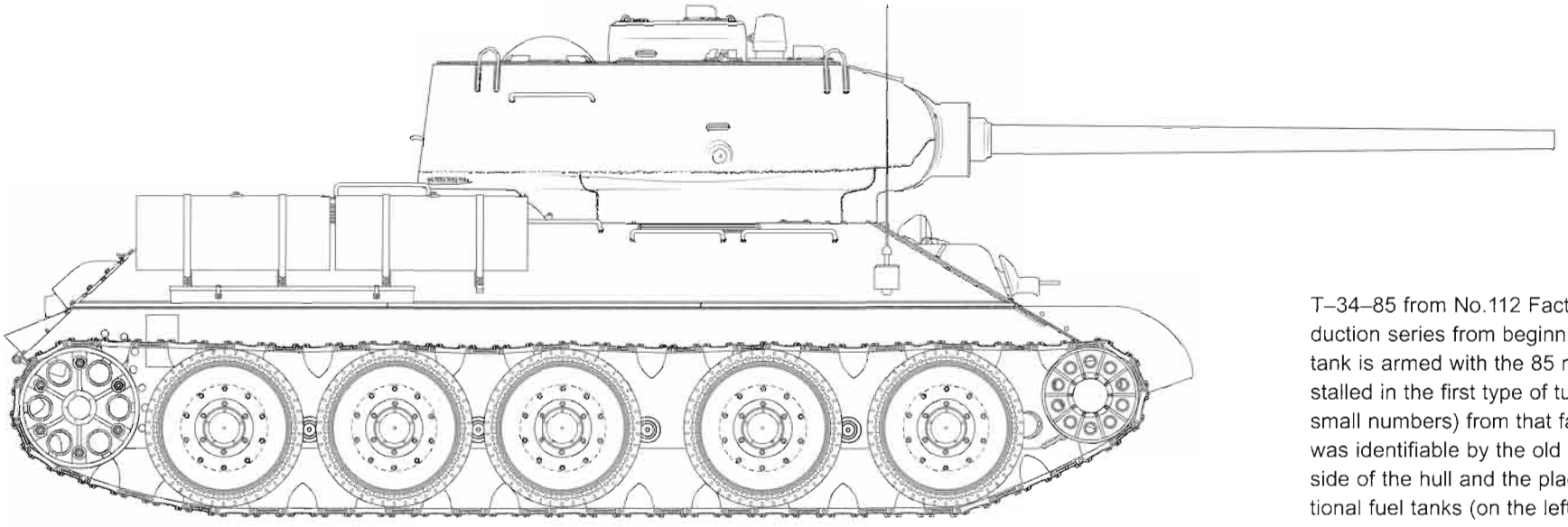




0 1 m

1/35th scale

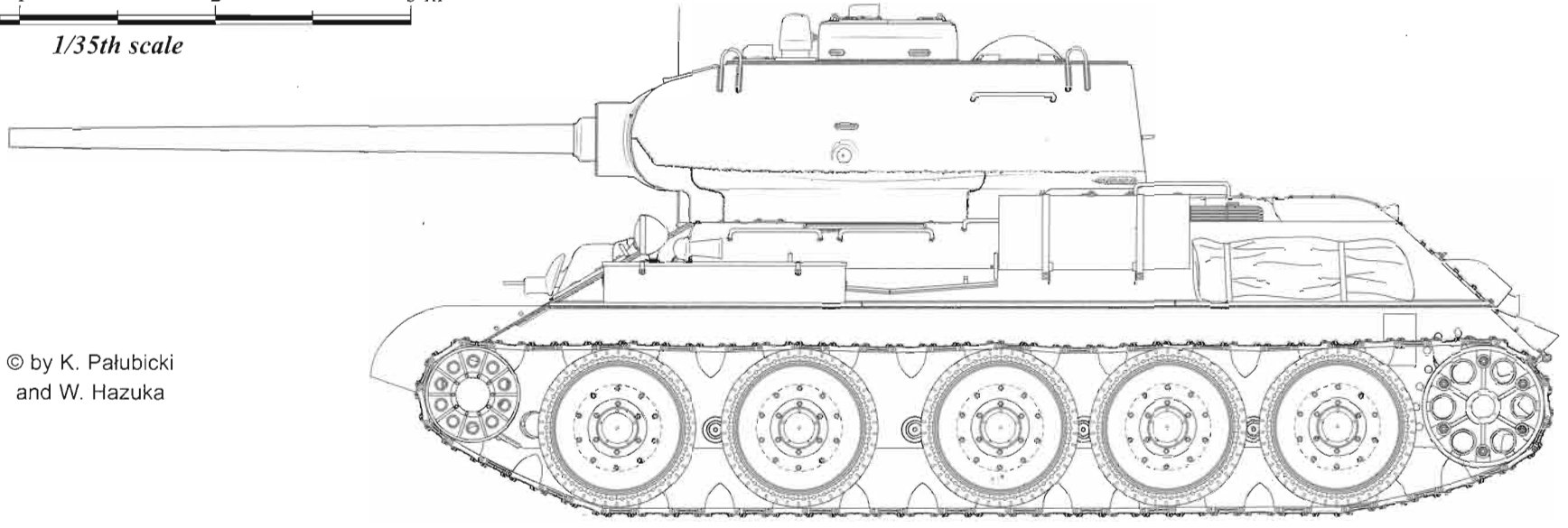
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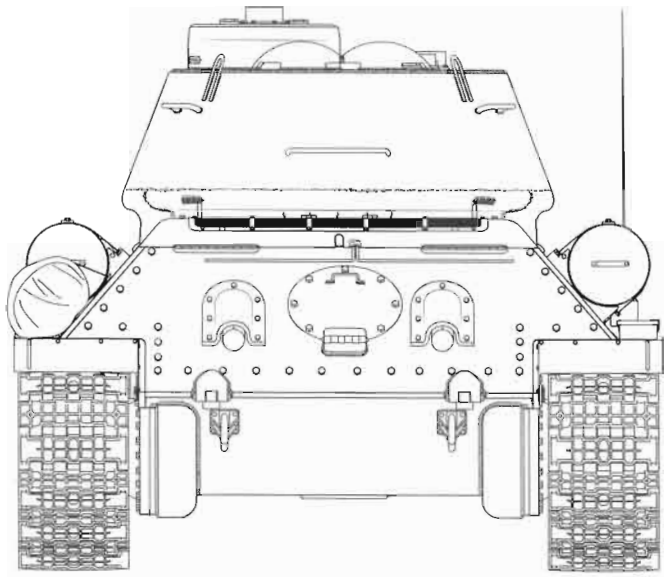
T–34–85 from No.112 Factory, earliest production series from beginning of 1944. This tank is armed with the 85 mm D–10 gun, installed in the first type of turret (produced in small numbers) from that factory. This vehicle was identifiable by the old antenna on the side of the hull and the placement of the additional fuel tanks (on the left side of the hull) typical of that factory and that time period.

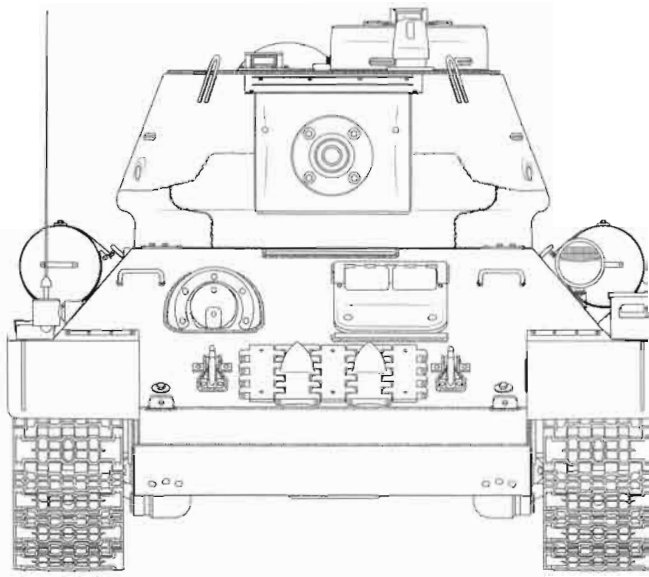
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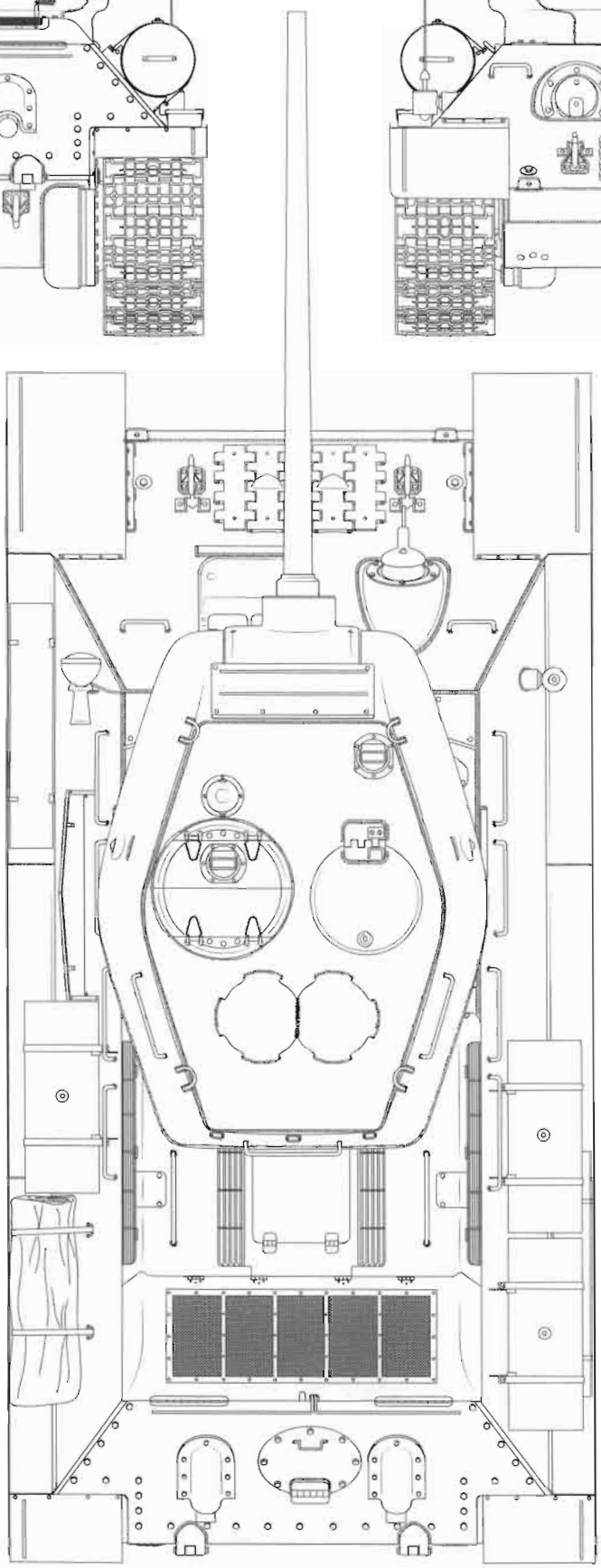
1/35th scale



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T–34–85 from No.112 Factory, earliest production series from beginning of 1944. This tank is armed with the 85 mm D–10 gun, installed in the first type of turret (produced in small numbers) from that factory.

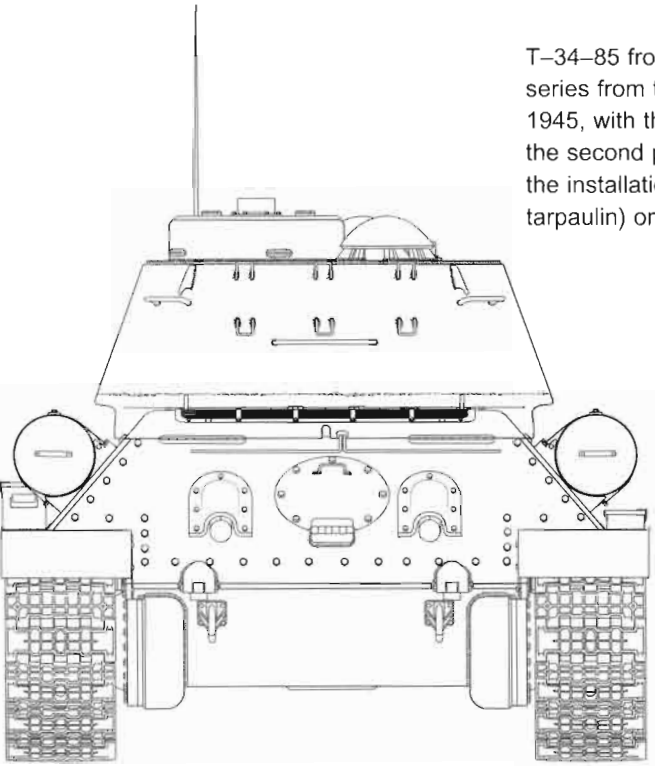
This vehicle was identifiable by the old antenna on the side of the hull and the placement of the additional fuel tanks (on the left side of the hull) typical of that factory and that time period.

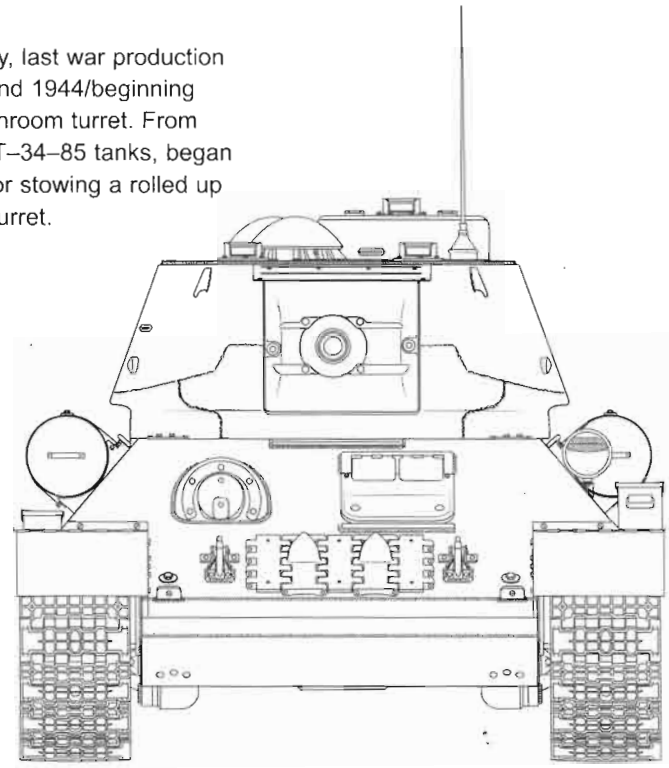
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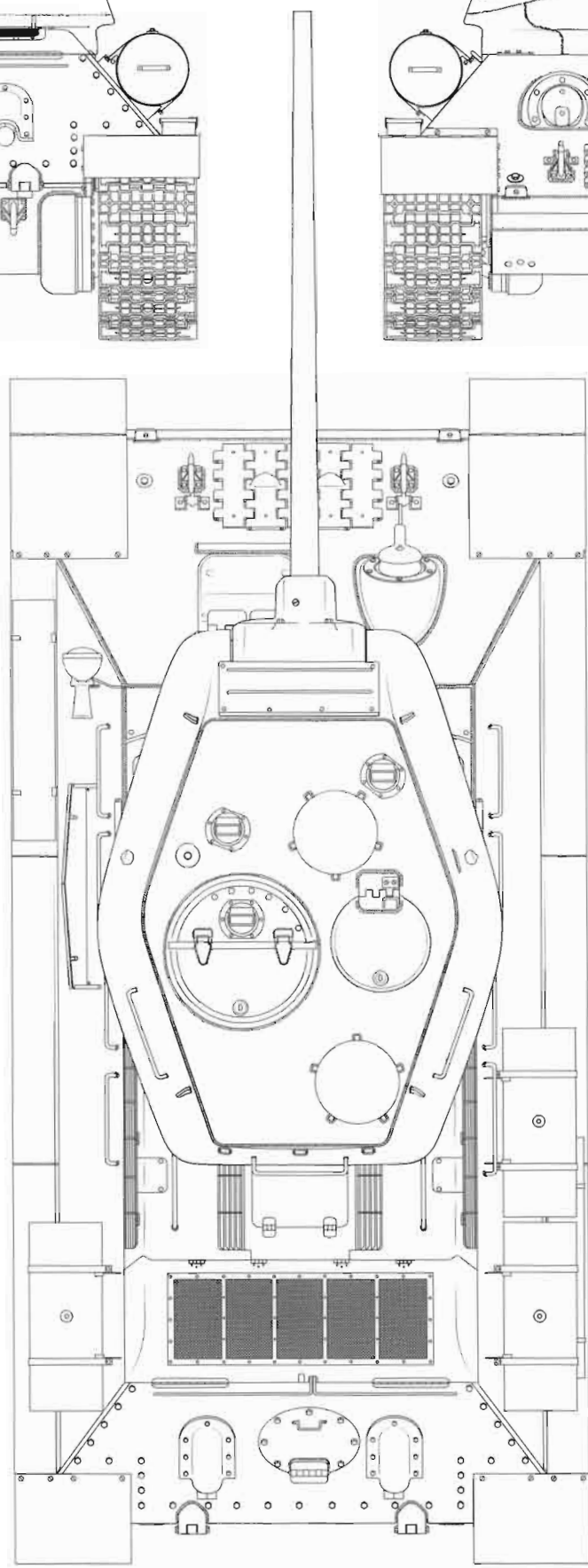
1/35th scale

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T–34–85 from No.112 Factory, last war production series from the time period end 1944/beginning 1945, with the so-called mushroom turret. From the second part of 1944, on T–34–85 tanks, began the installation of brackets (for stowing a rolled up tarpaulin) on the rear of the turret.



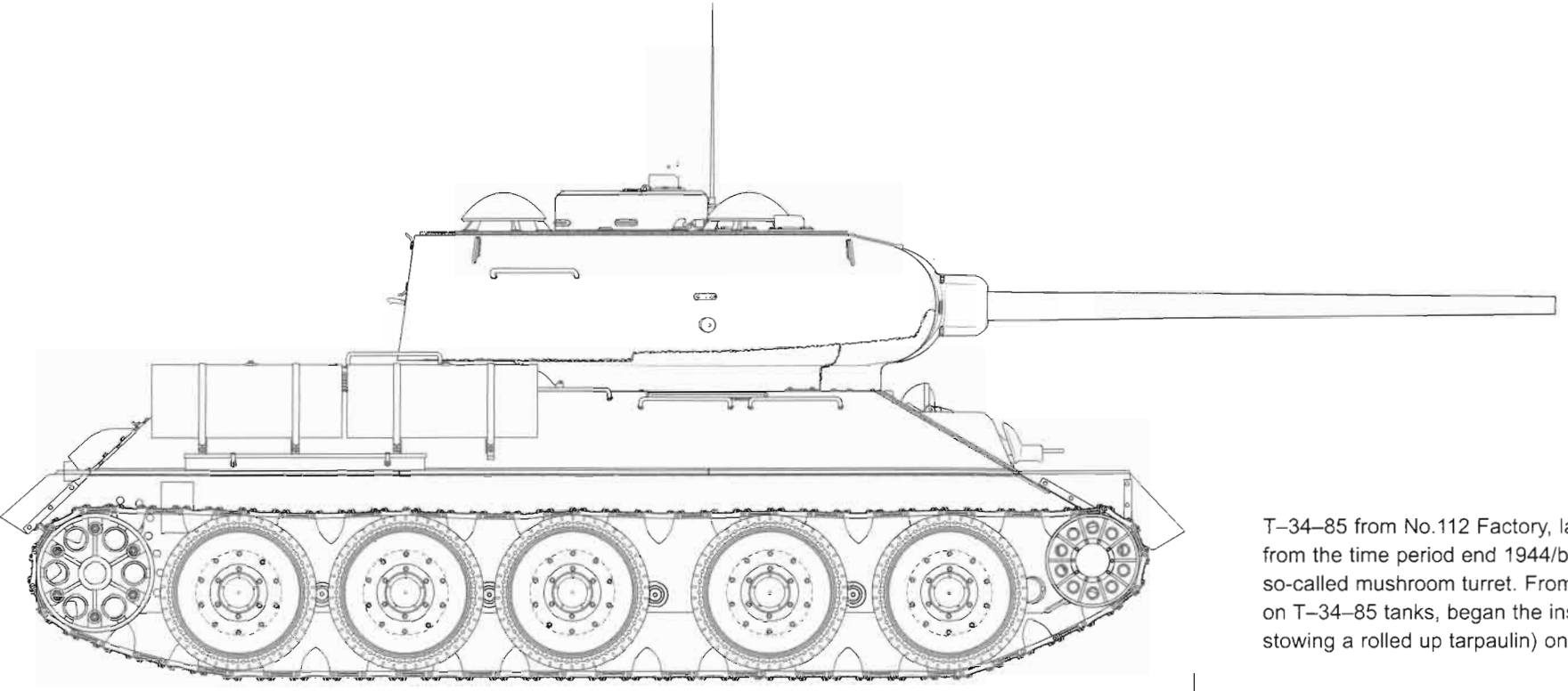




0 1 m

1/35th scale

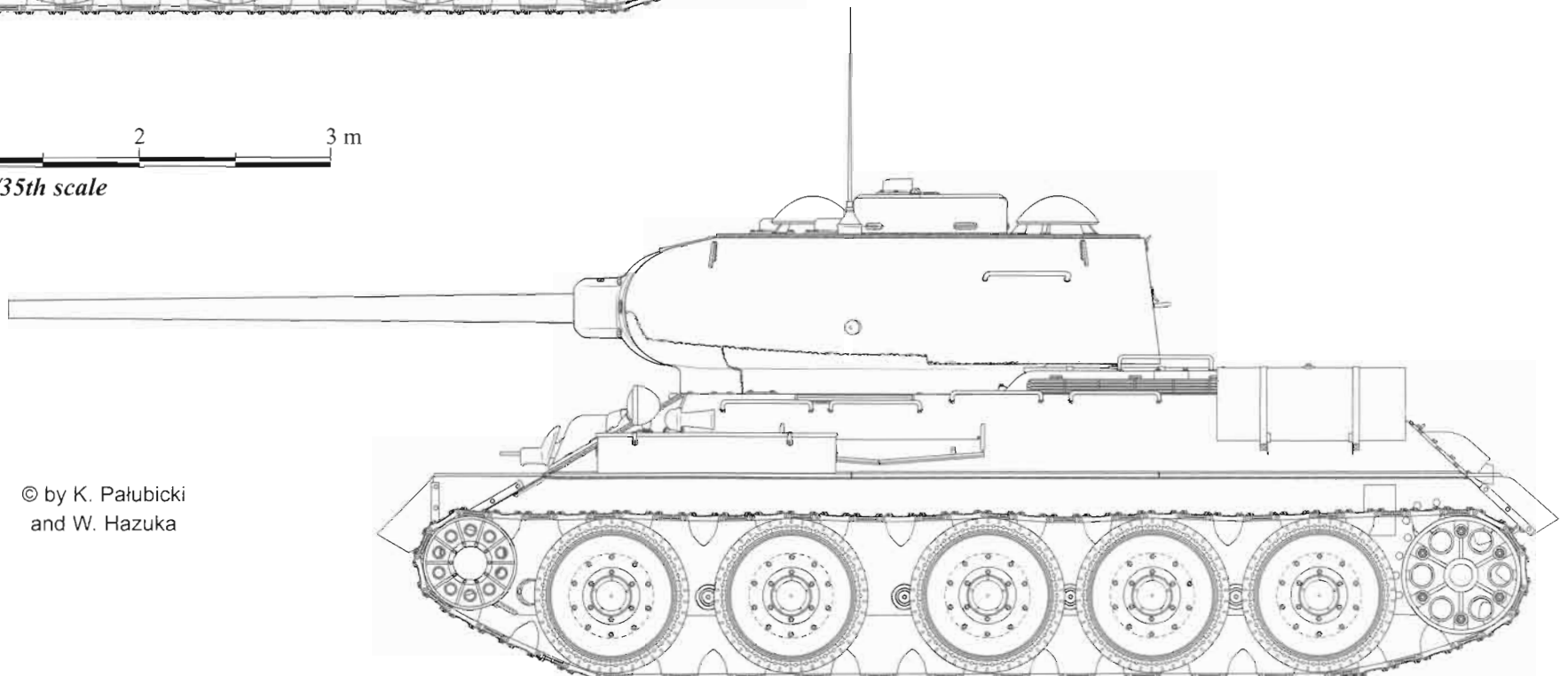
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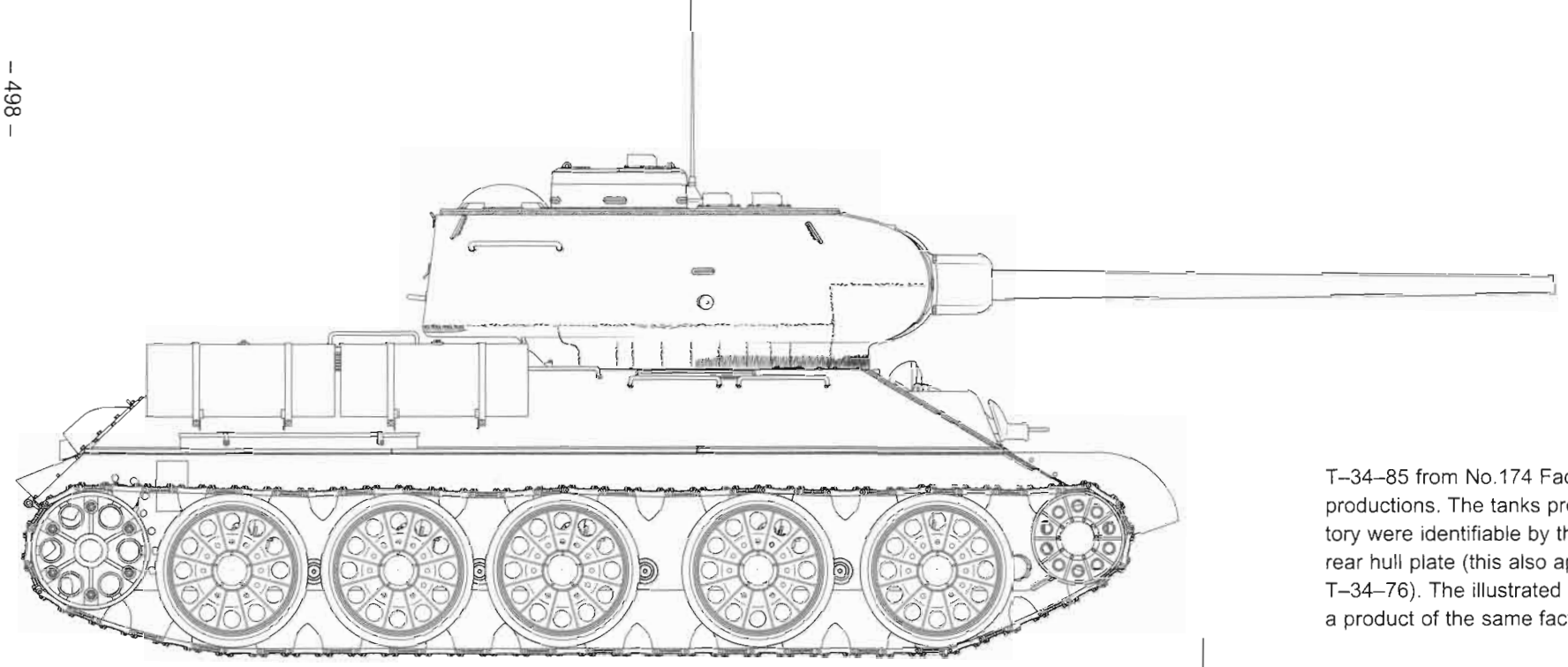
T–34–85 from No.112 Factory, last war production series from the time period end 1944/beginning 1945, with the so-called mushroom turret. From the second part of 1944, on T–34–85 tanks, began the installation of brackets (for stowing a rolled up tarpaulin) on the rear of the turret.

0 1 2 3 m

1/35th scale



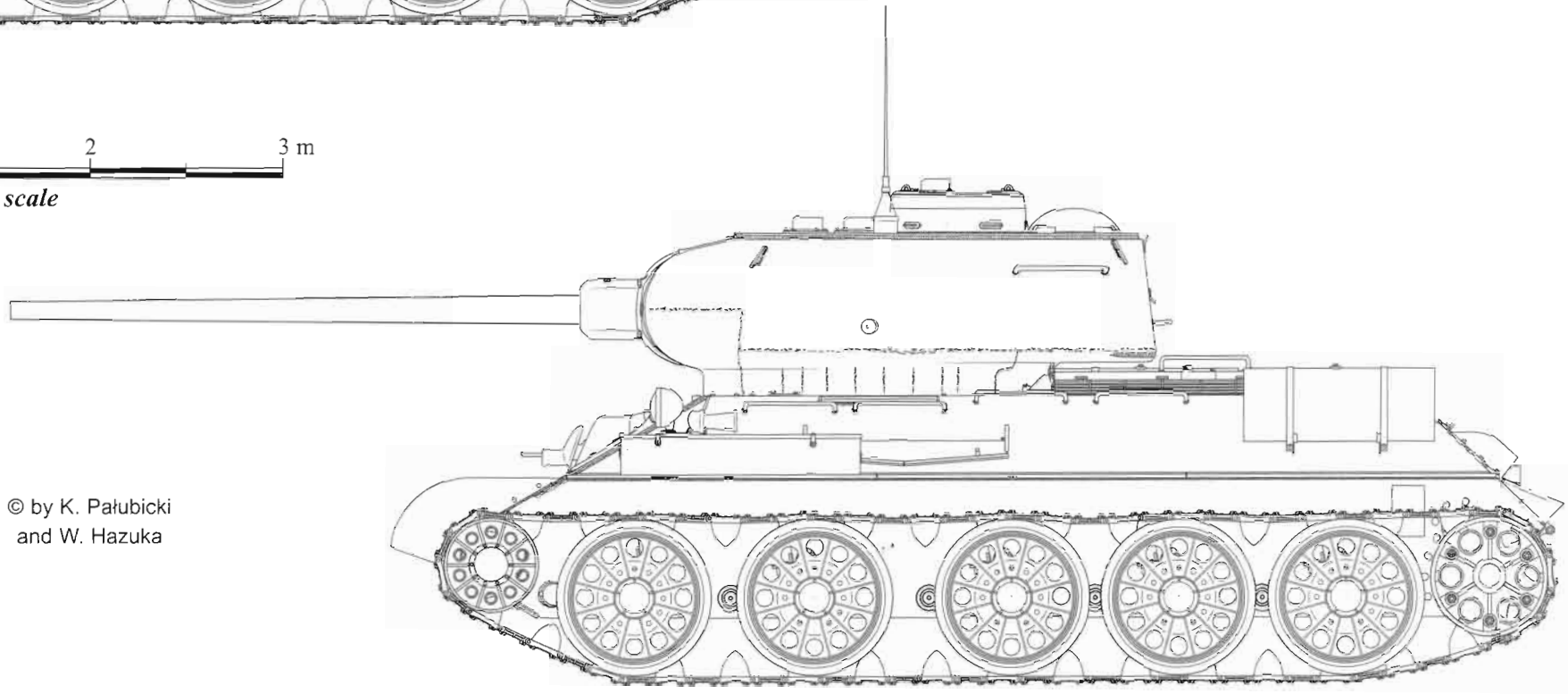
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T–34–85 from No.174 Factory, 1944 series productions. The tanks produced in that factory were identifiable by the hinges of the rear hull plate (this also applied to the early T–34–76). The illustrated turret may be a product of the same factory.

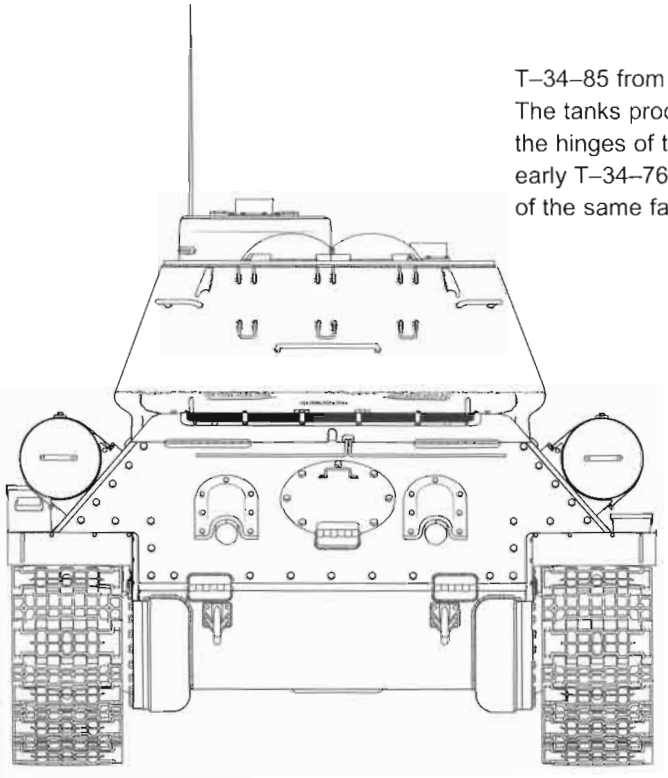
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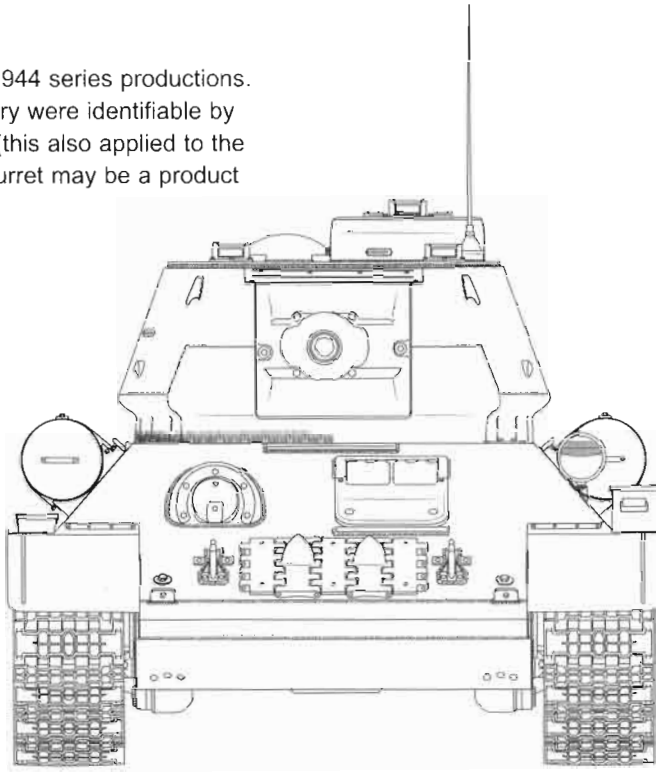
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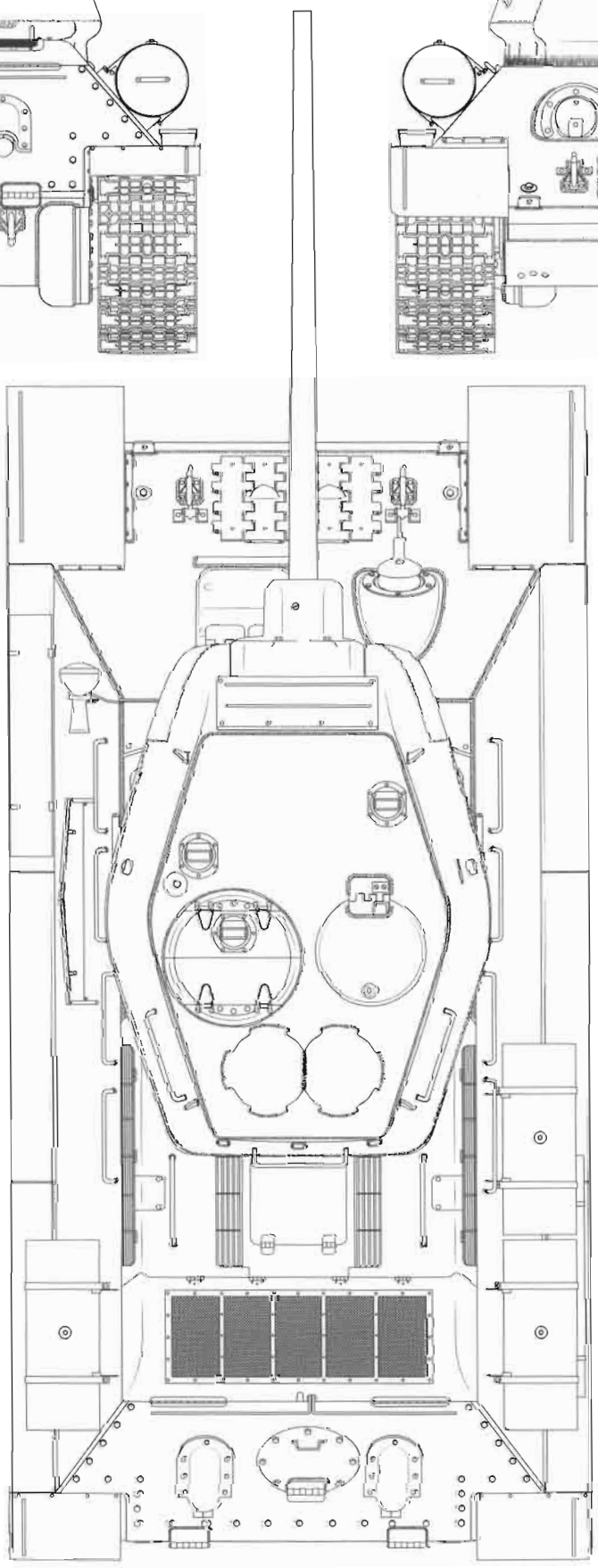


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T–34–85 from No.174 Factory, 1944 series productions. The tanks produced in that factory were identifiable by the hinges of the rear hull plate (this also applied to the early T–34–76). The illustrated turret may be a product of the same factory.





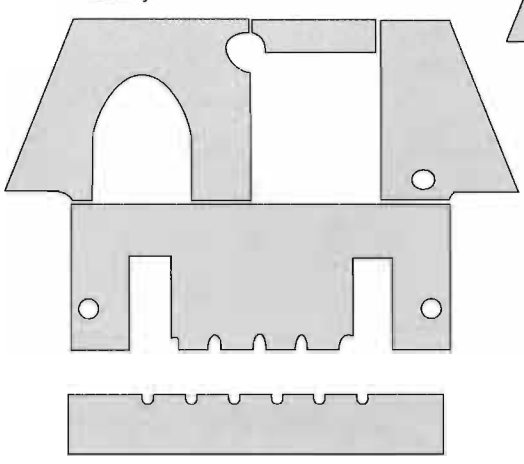


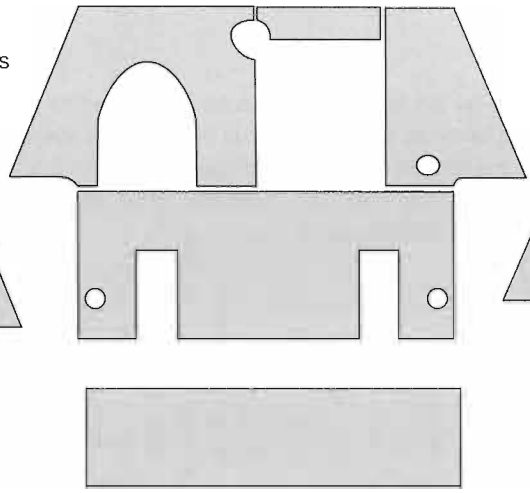
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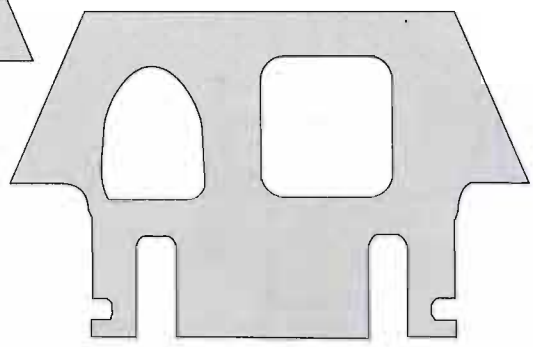
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Right and below: Additional armor plates installed on tanks produced at the STZ Factory.



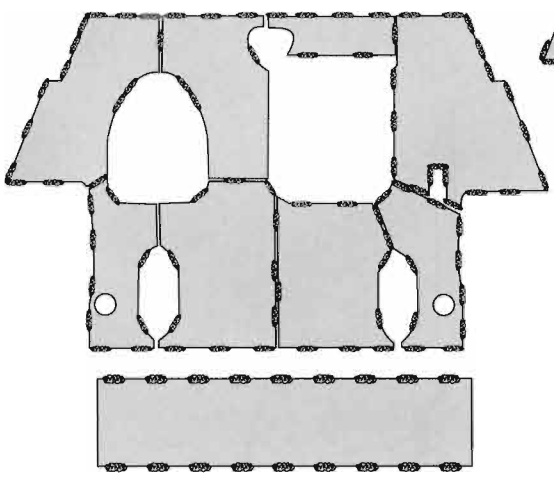


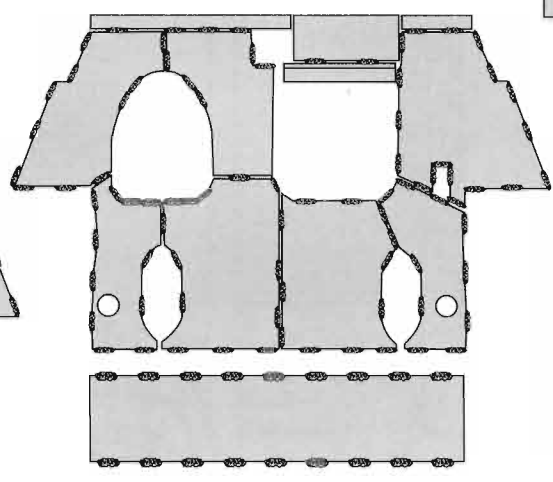
Below: Additional armor plate installed on tanks most probably produced at the No.112 Factory.



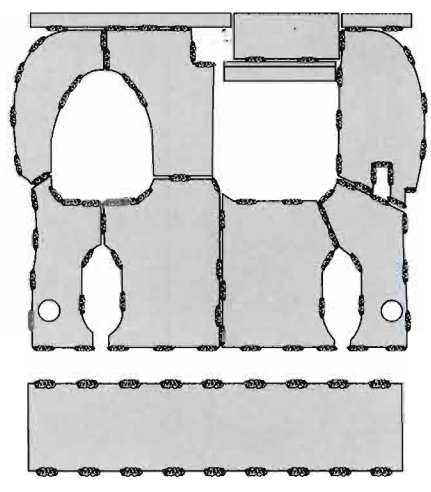


Above: This plate was fitted on tanks produced in 1941, along with the riveted hull linking beam.



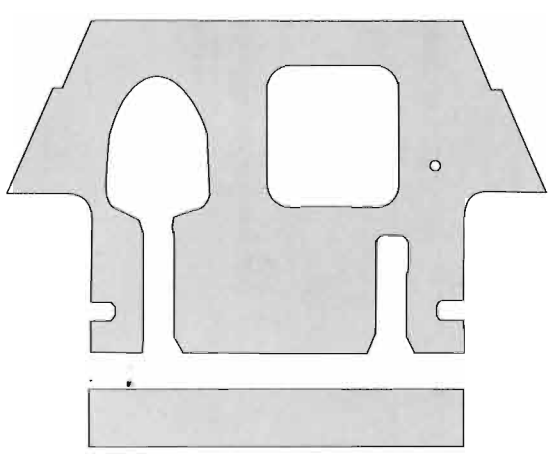


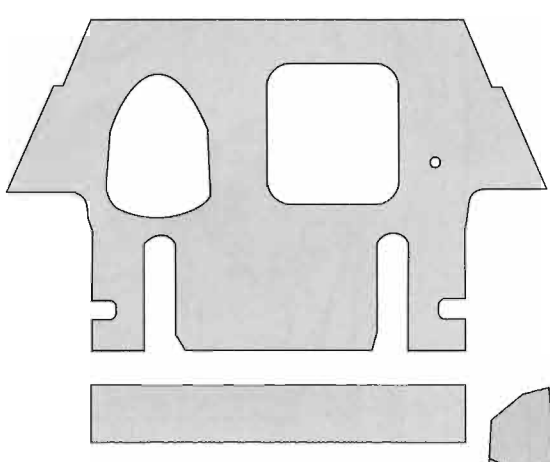
Above: The armor plates welded on in that factory had added handles on them.



Left, right and above: Additional armor plates installed on tanks produced at the No.112 and STZ factories. These type of plates were produced in Leningrad at the No.28 Plant.

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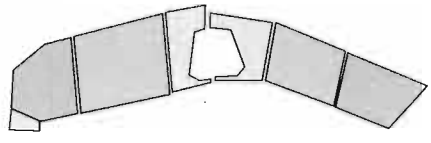




- drawings were done based on Russian sources -

0 1 m

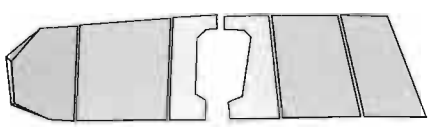
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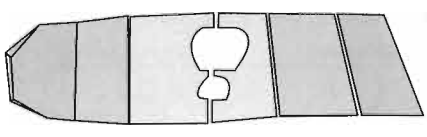


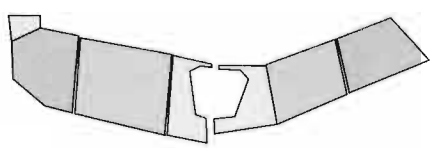
Above: Two types of additional armor plate, produced at either the No.112 or the STZ factory, with deep notches for tow hooks. The faulty sides of the upper part of the plate testify to the competence of the producer.

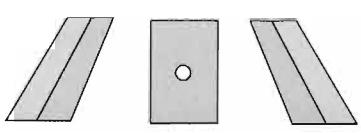
Above and bottom: Additional armor plates (various forms and shapes) for the flat turret produced from the end of 1941.



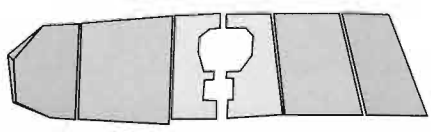








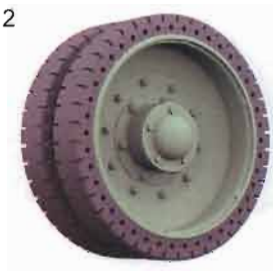




Road wheels

1–4. 1940–1941; 5. 1940–1941 of different manufacturer; 6–7. 1941/1942; 8–9. 1942/1943 'half spider'; 10–11. 1944–1945 'full spider'; 12–13. 1944–1945 'full spider' of different manufacturer; 14–19. 1944–1945 of No.112 Factory with different marks on rubber; 20–21. 1944–1945 of No.112 Factory without marks on rubber; 22. cast wheel; 23. T–54 wheel adapted in 1950s/1960s.

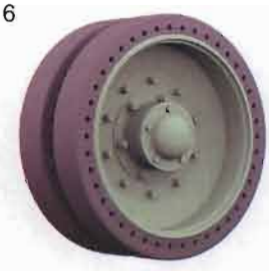

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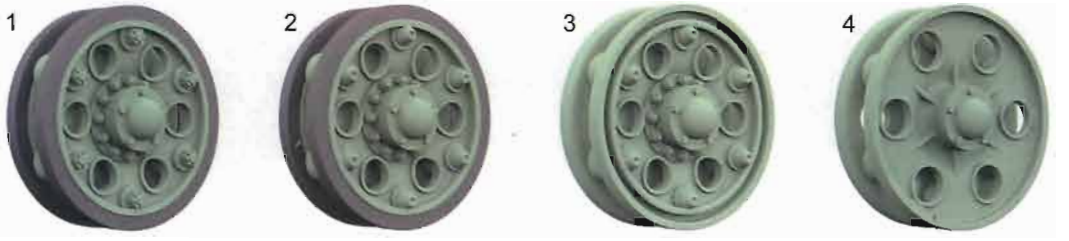
Idler wheels

1. 1940–1941; 2. Autumn 1941; 3–4. standard with oval relief openings; 5–6. standard of the other manufacturer



Driving sprockets

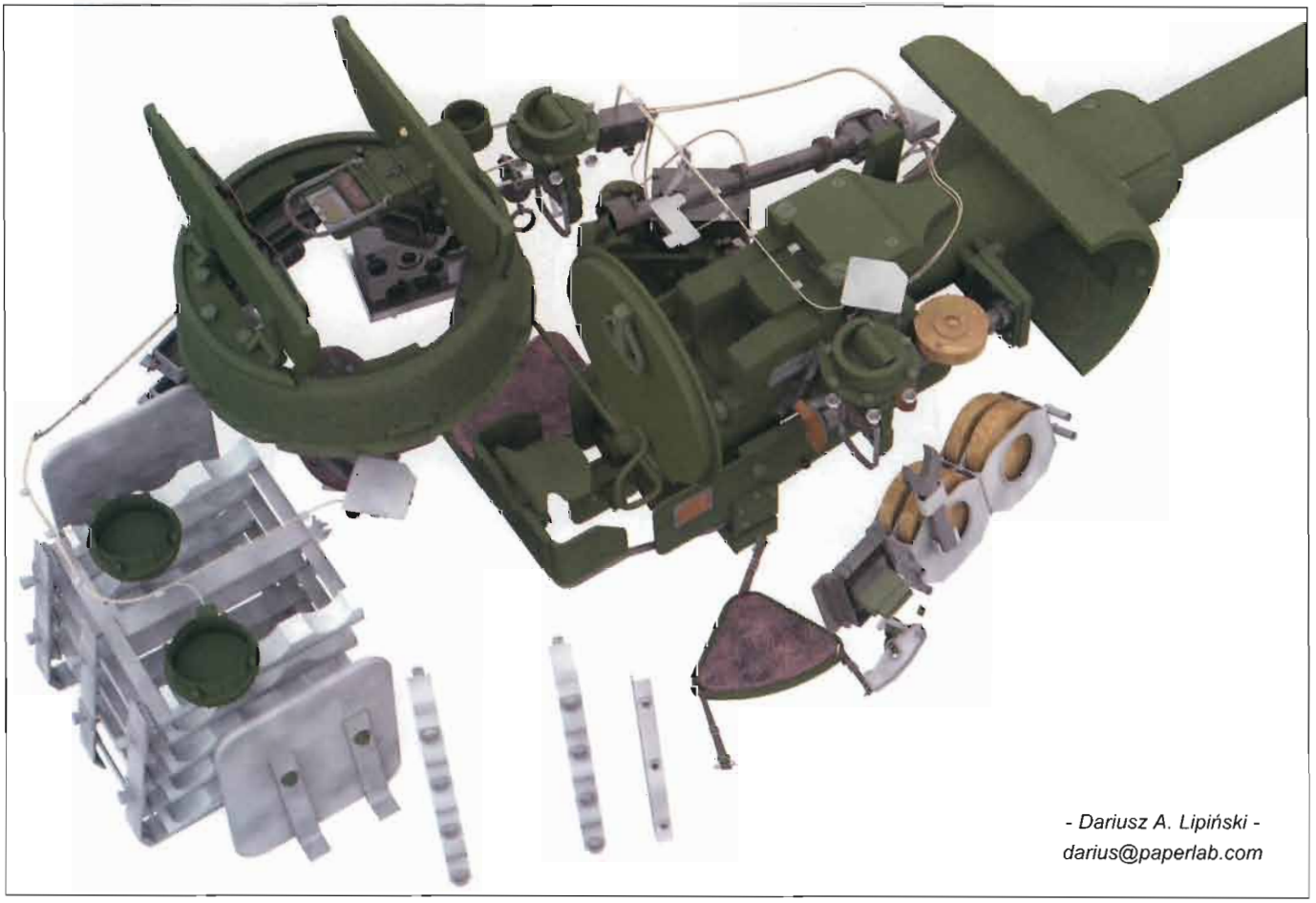
1–2. 1940–1941; 3. Autumn 1941; 4–9. different wartime standards.





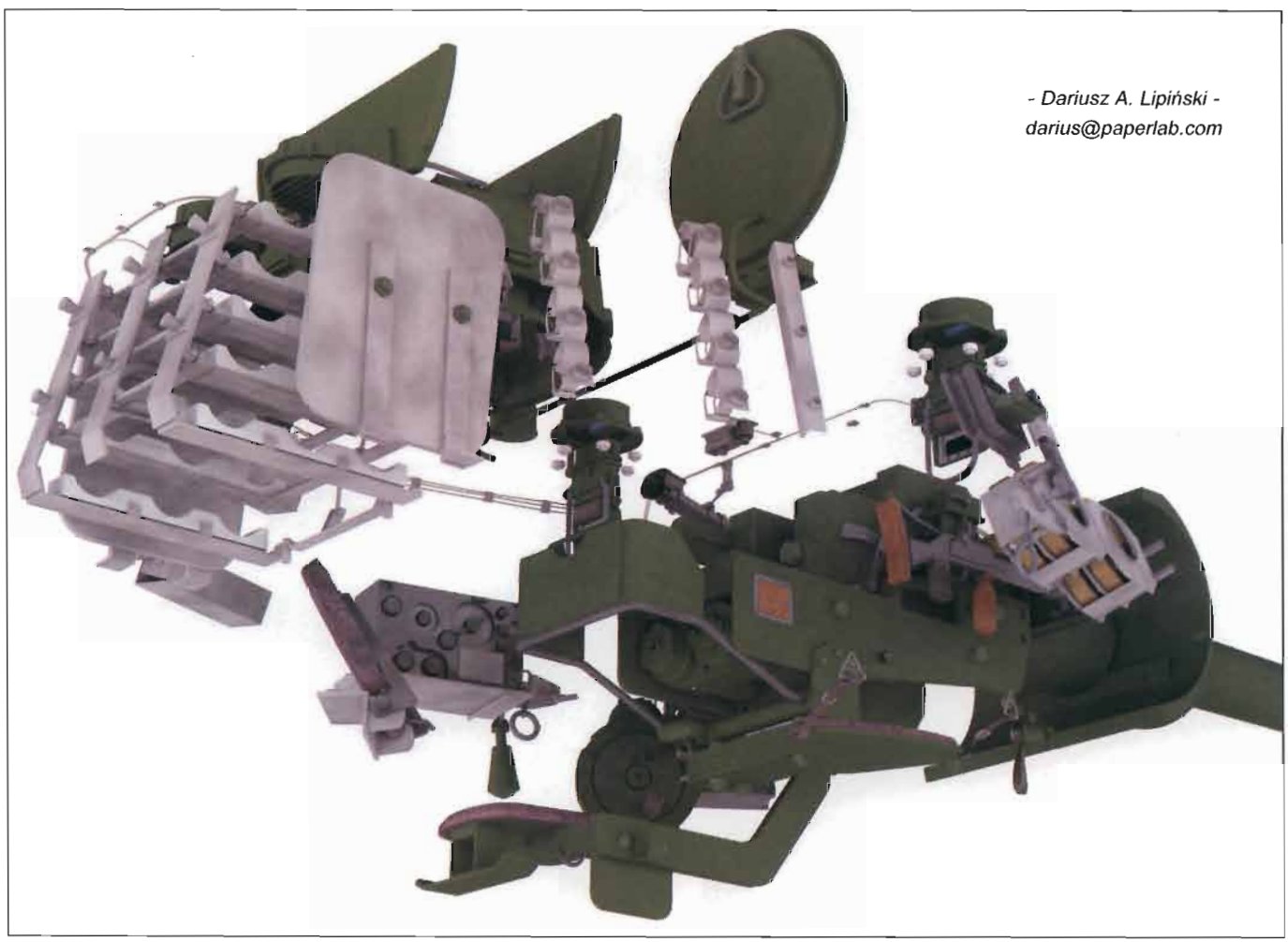
- Dariusz A. Lipiński -
darius@paperlab.com

The "large" turret from the No.112 Factory, produced in 1944–45.

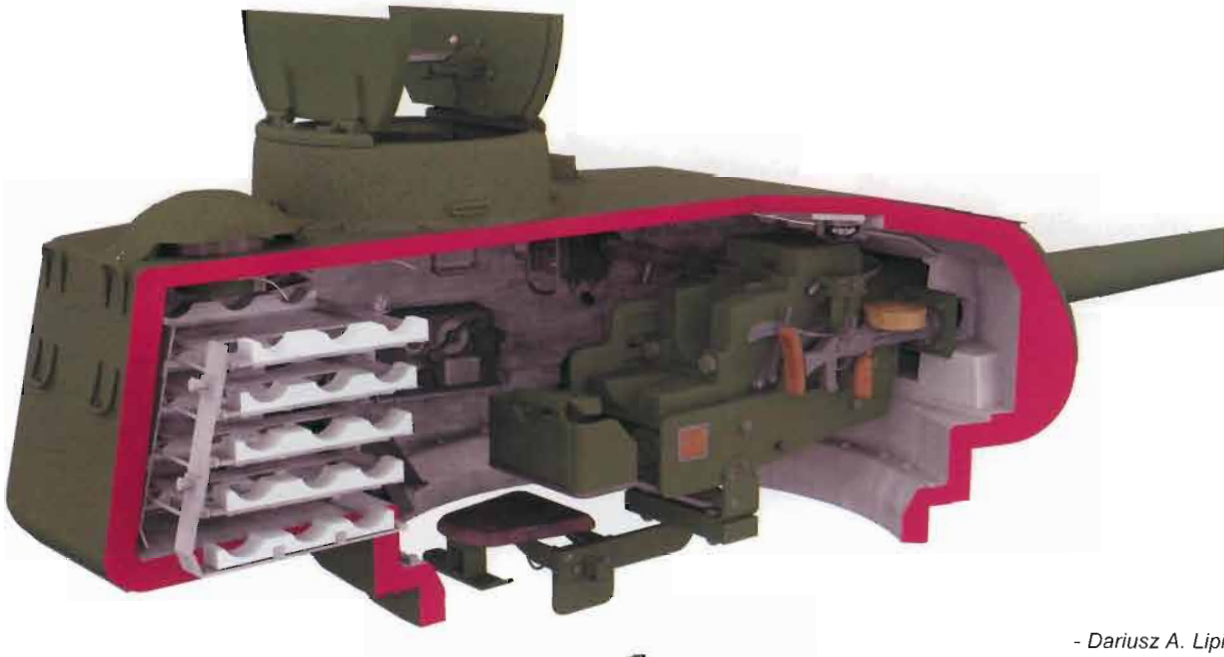


- Dariusz A. Lipiński -
darius@paperlab.com

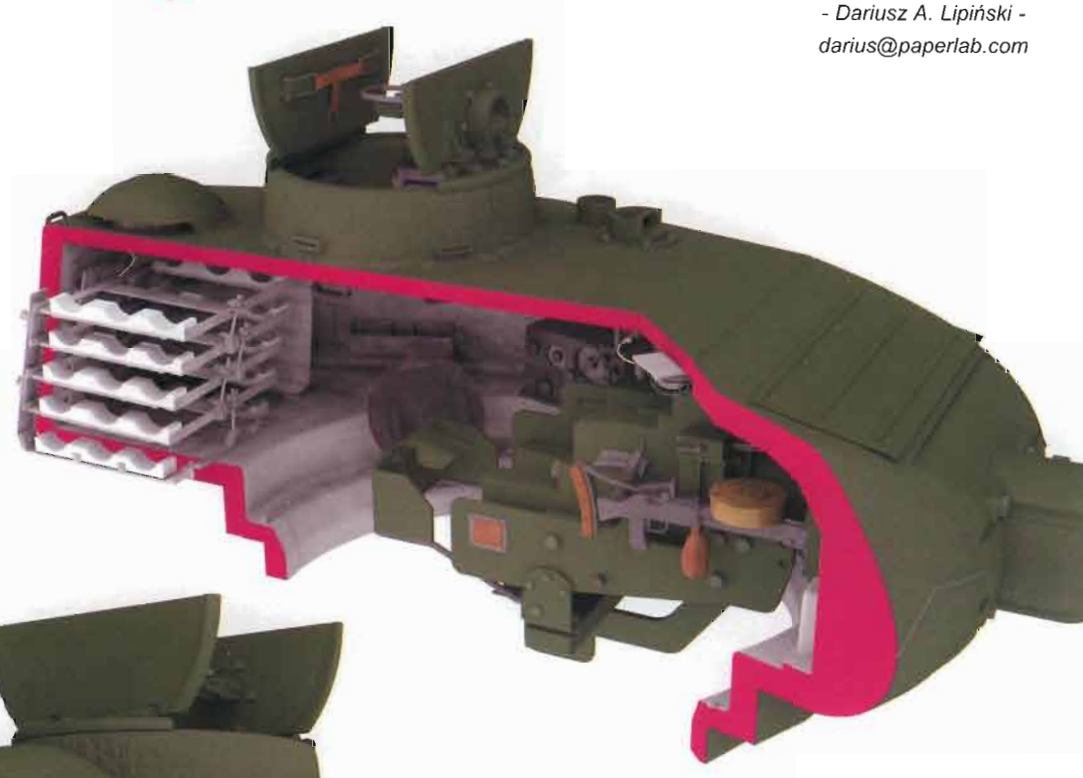


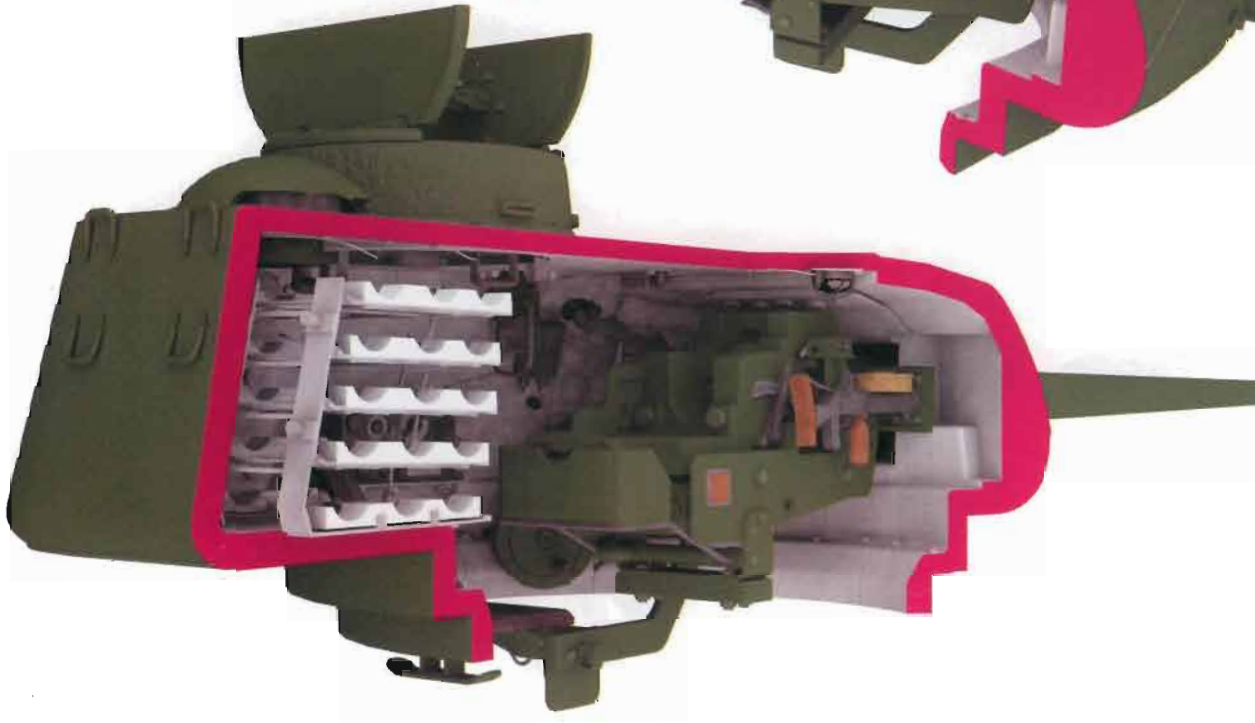


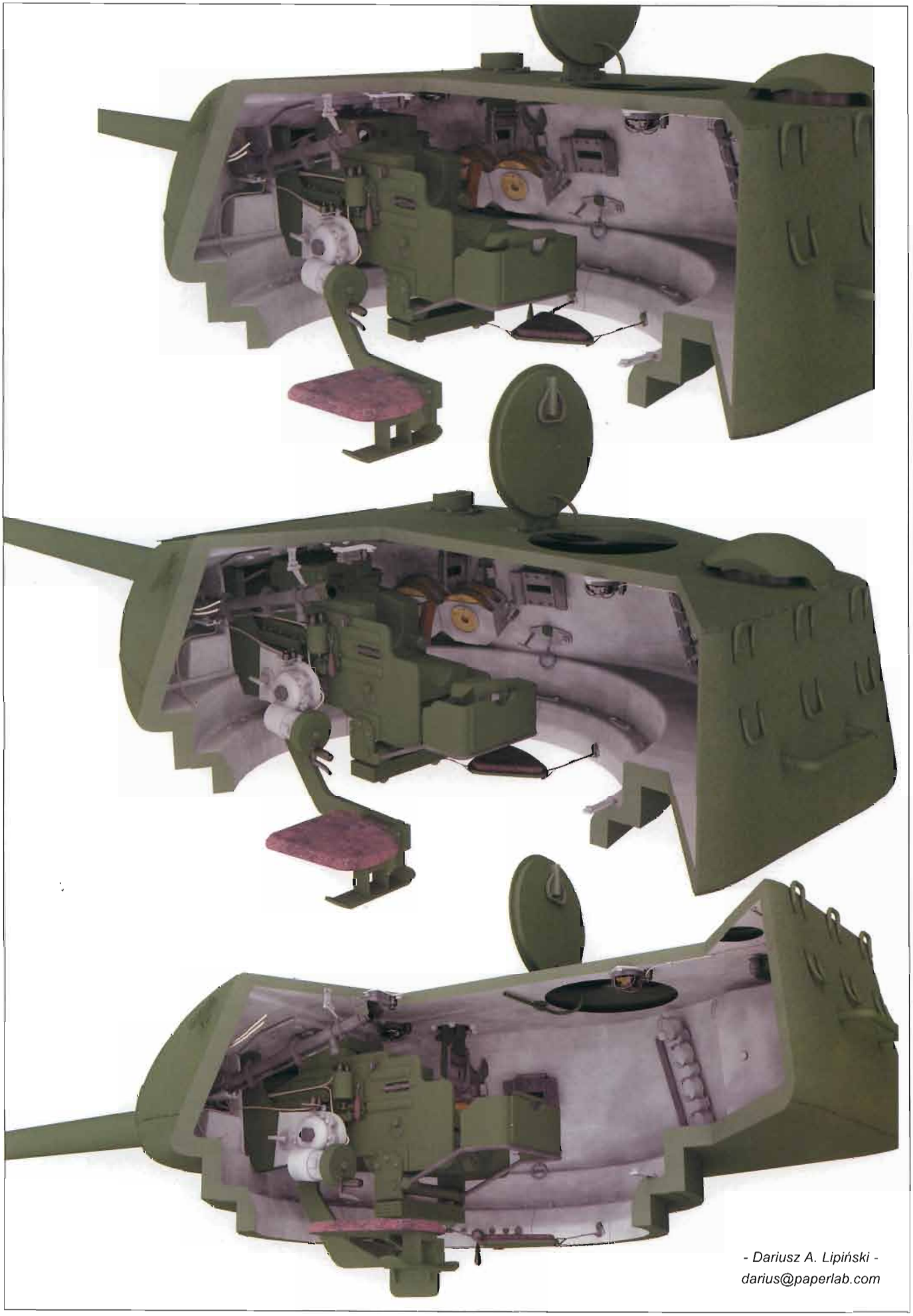
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Left and below: This Polish-made T–34–85 from the Kęszycki brothers collection, has well over 5,000 kilometers on its odometer.

- Author's collection -





Left: This T–34–85 was produced at the No.183 Factory at the beginning of 1945. This is restored and in running condition.

- Author's collection -



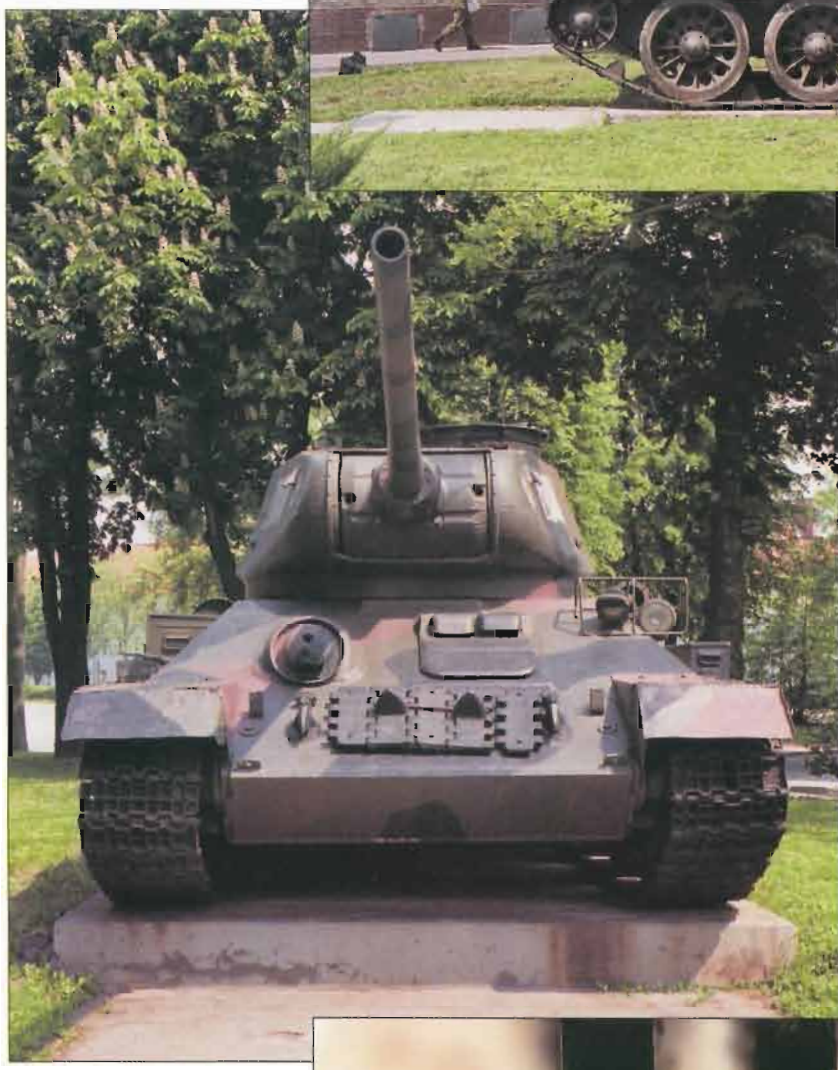


These three photos show a T–34–85, produced in Poland after the war, during a summertime rally. Belonging to the collection of the Kęszycki brothers, this tank is one of only two privately owned, and fully operational ones in Poland.

- Author's collection -





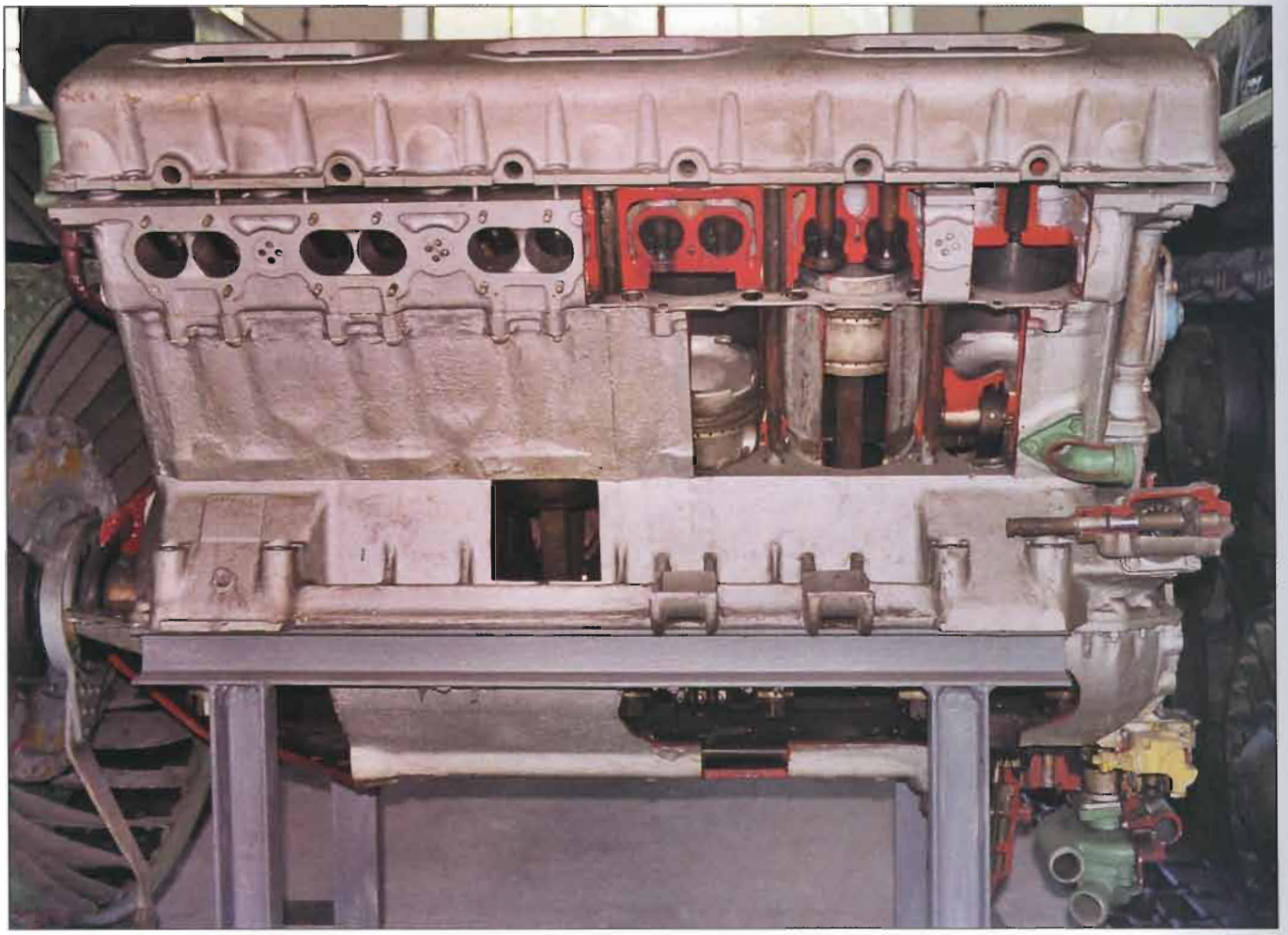


Left and above: This Polish-made T–34–85M2 was painted in the camouflage scheme used by the Polish Army in the 1960s.

- Author's collection -

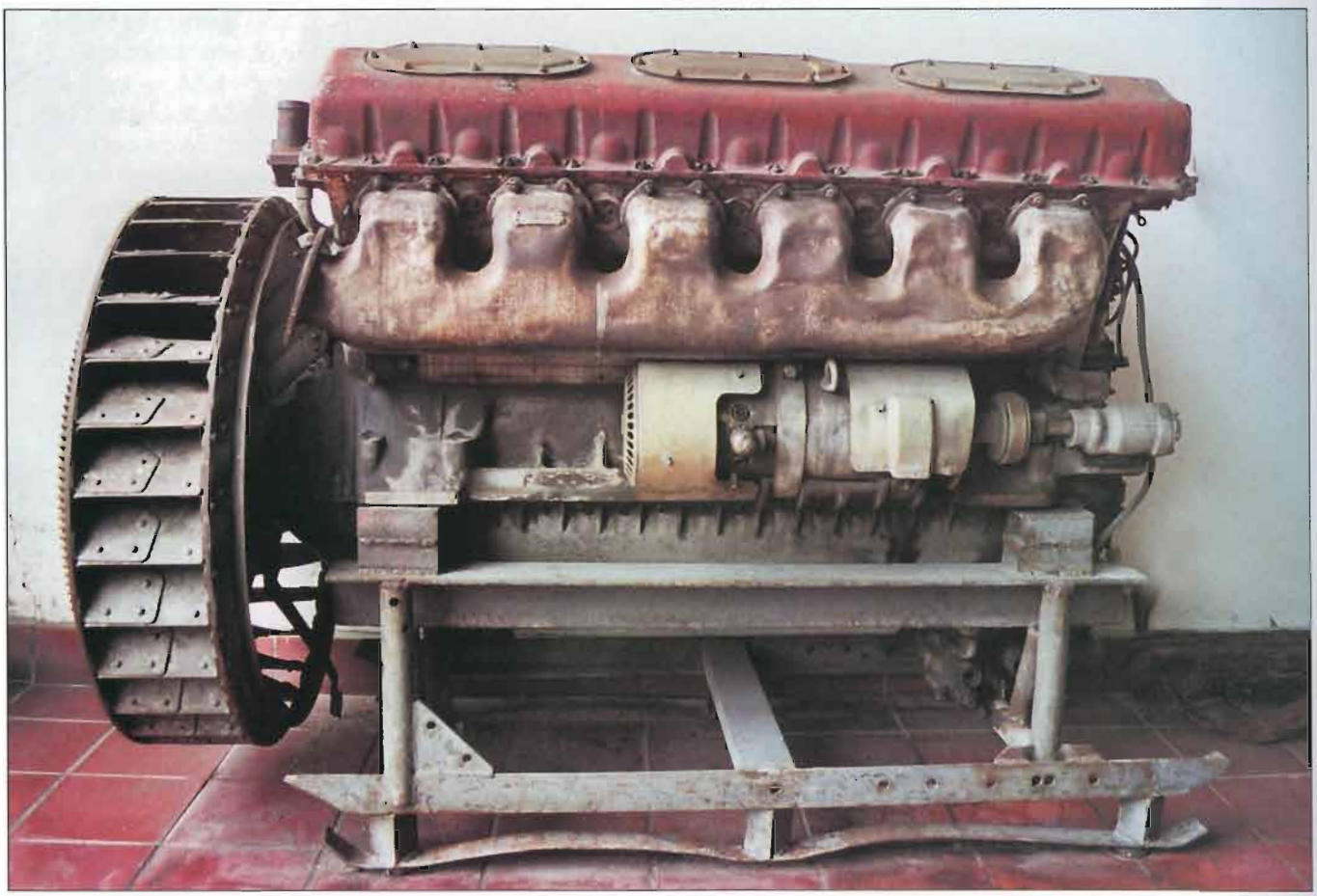
Below: A T–34–85 from the No.183 Factory belonging to the 8th Guards Tank Corps, Gdansk area, spring of 1945. The three-digit tactical number and the Corps emblem were the permanent recognition insignia of the Corps' tanks, but the significance of the light (white or red) stripe above them remains to be established.

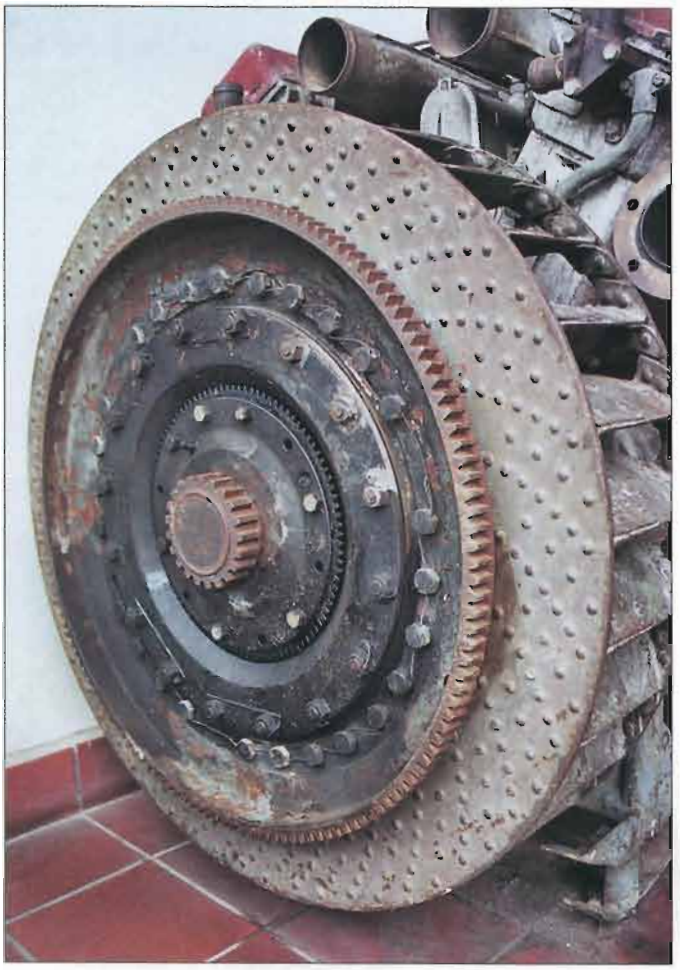




Detailed views of the V–2 engine.

- Author's collection -

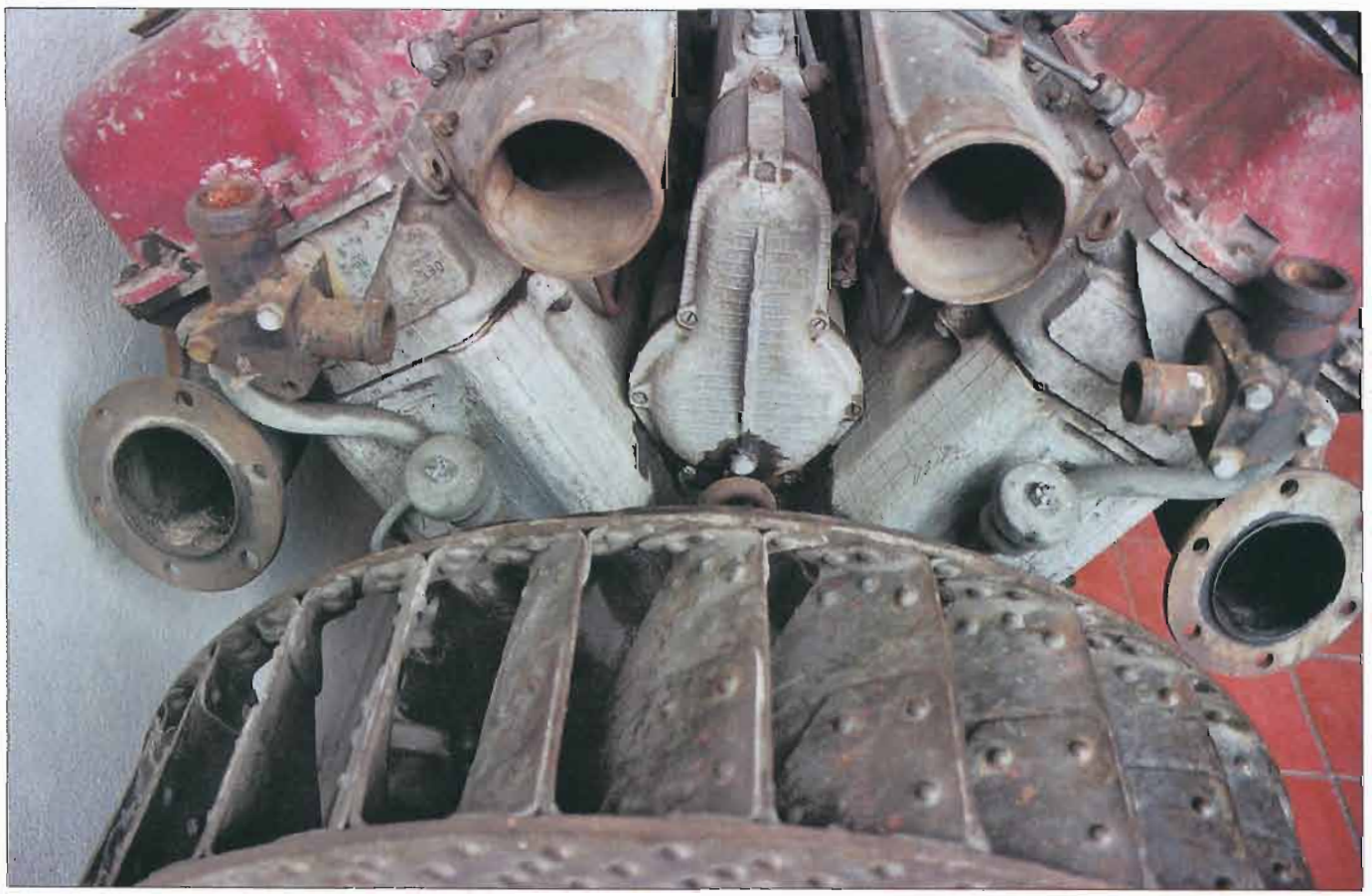






Detailed views of the V–2 engine.

- Author's collection -





Above and right: Cut-away view of the hull, the edges of the cut have been painted red. The fuel tanks and fuel lines have been painted in yellow. In the lower photo, the chamber for the shock absorber can be seen clearly and, next to it, through the cut-away fuel tank, the radiator.

- Author's collection -

Right: Oil tank produced at the end of the war in original brown color.

- Author's collection -



Interior details of T–34–85.





Above: MK–4 periscope.

- Author's collection -

Interior details of a T–34–85 from the No.112 Factory.



Above: Turret traverse mechanism.

- Author's collection -



Right: Original tool box, with light bulbs wrapped in waxed, grey paper.

- Author's collection -

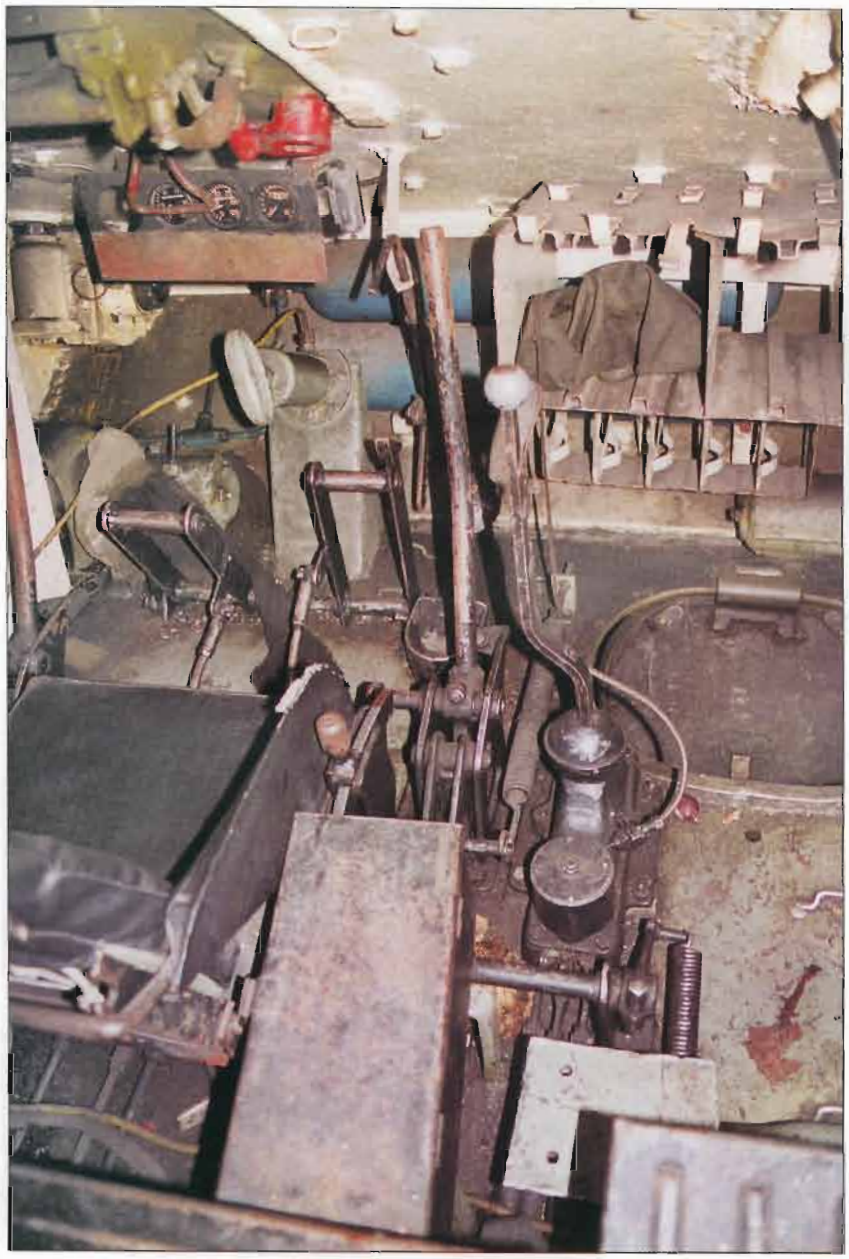
Right: T–34–76 interior.

- Author's collection -



Below: Interior of a T–34–76.

- Author's collection -

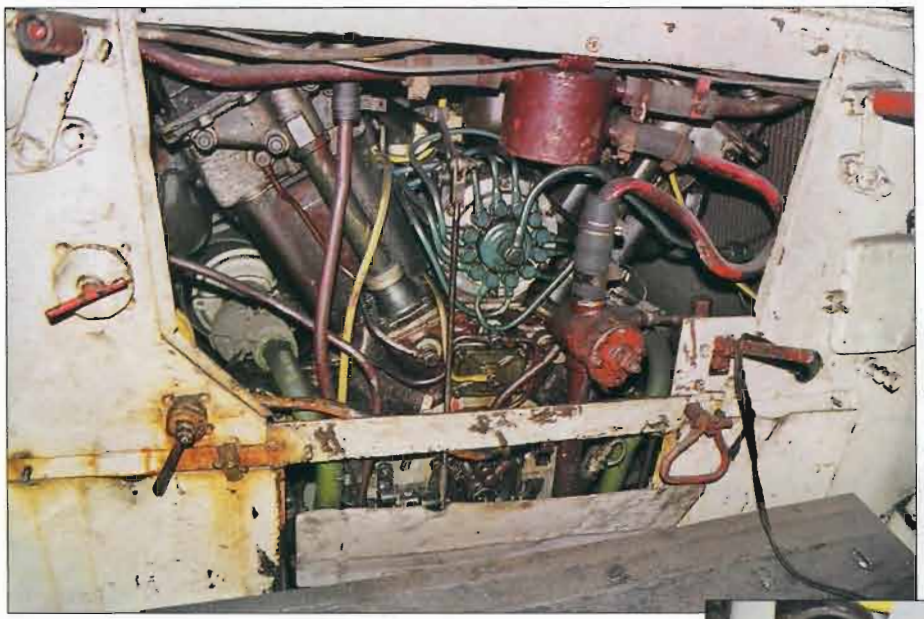


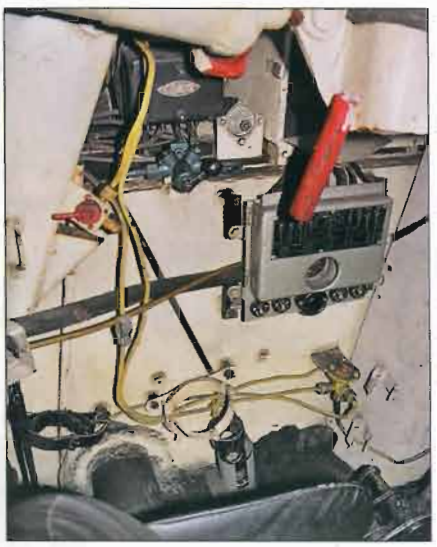


Above and below: MK–4 periscope.



- Author's collection -





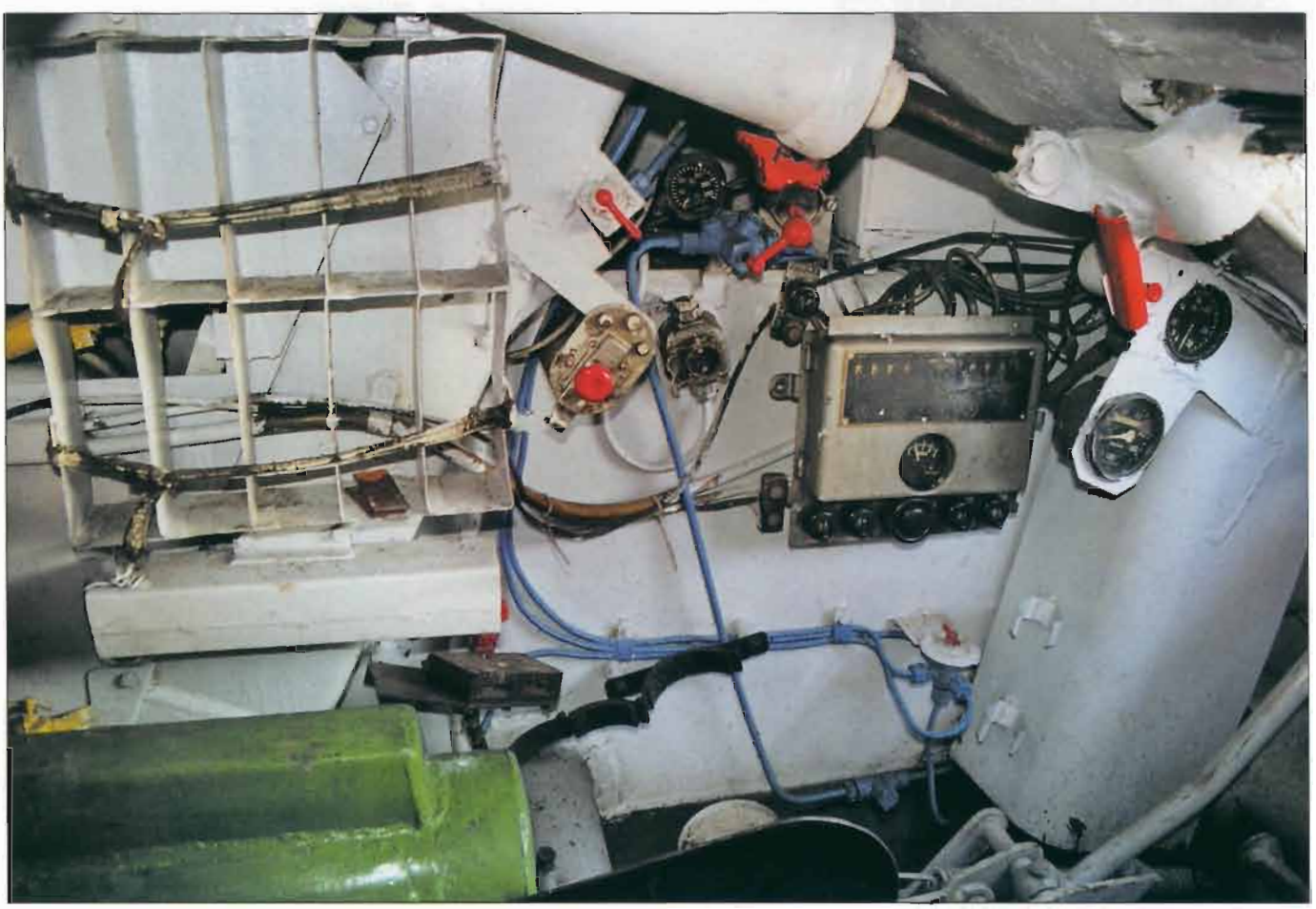
Above: Interior of a war-time production tank.

- Author's collection -

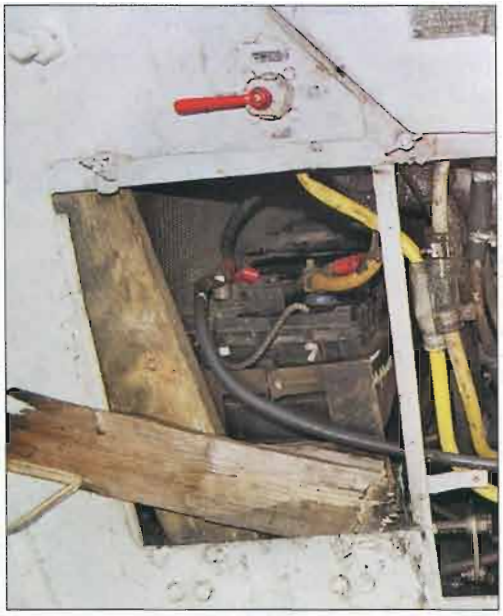


Below: Starter heater and interior of a Polish-made T–34–85.

- Author's collection -



Interior of a Polish-made T–34–85.



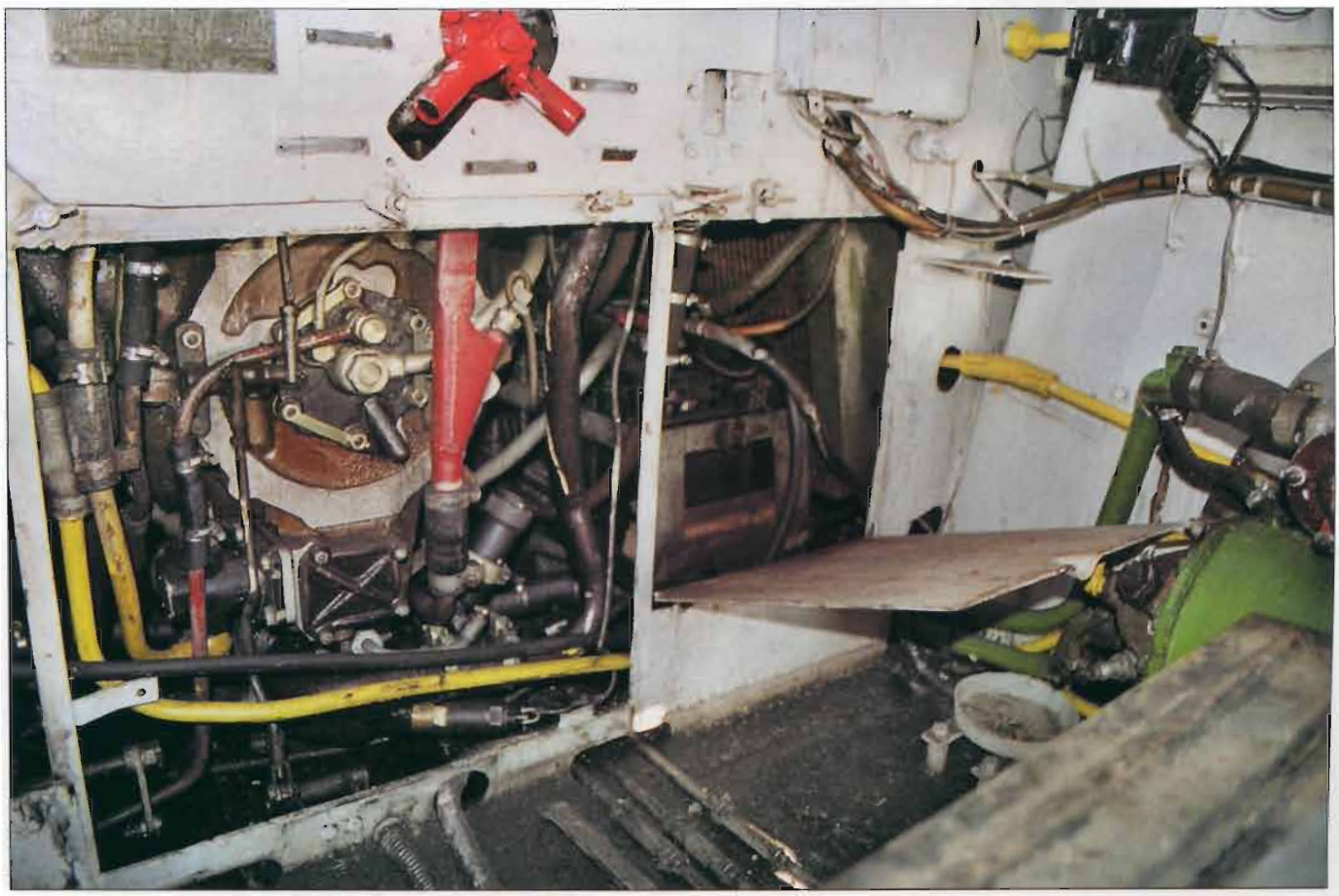


Top: Engine compartment fire wall, behind it is the generator.

Right: Driver's station.

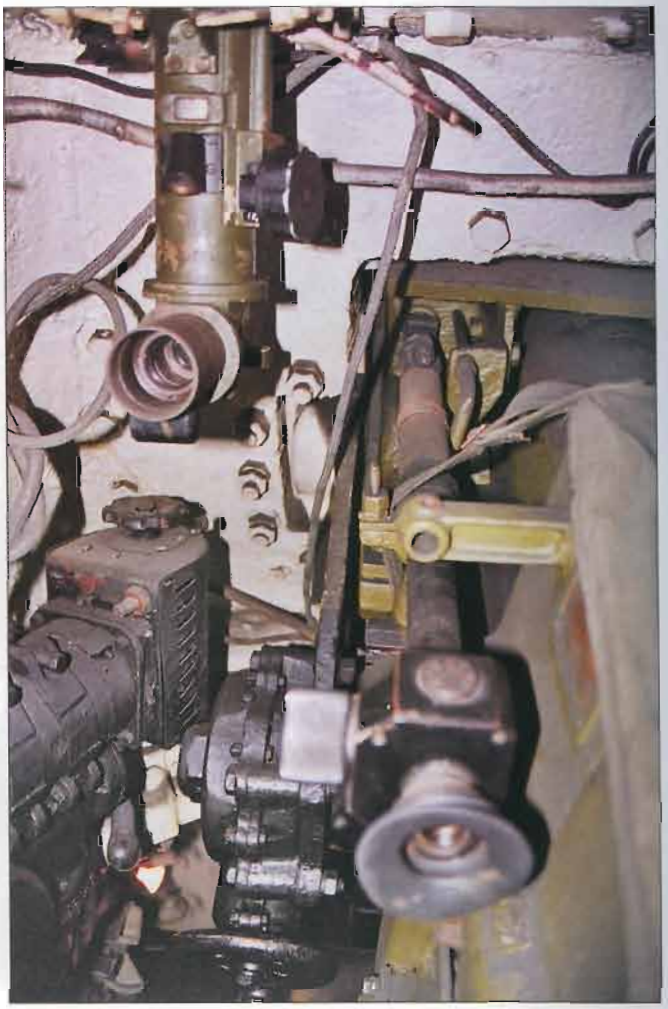
Bottom: Engine compartment firewall with open panels, giving the crew access to the engine from inside the tank.

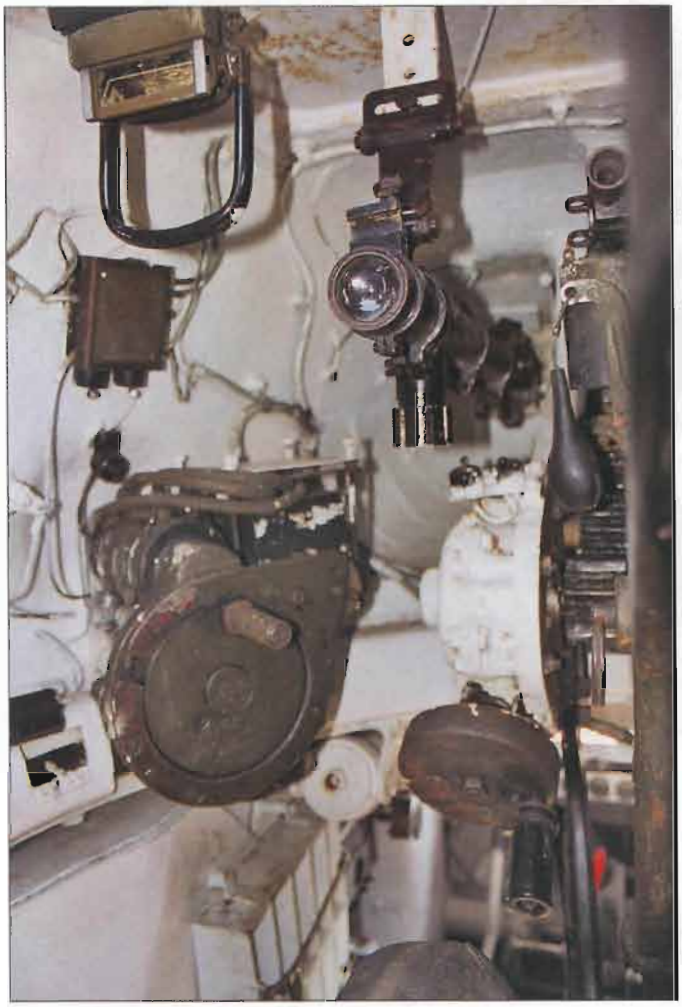
- Author's collection -



Right: Same gun sight in the turret of a T–34/76.

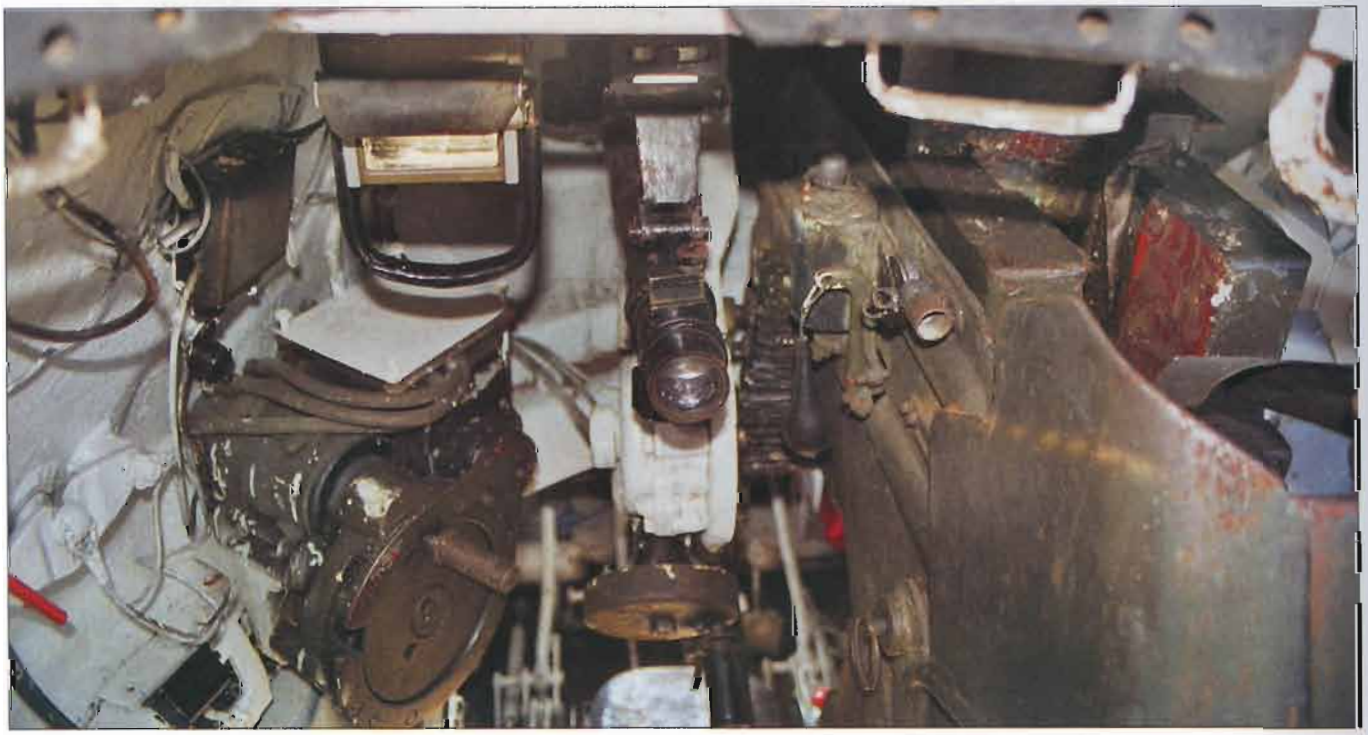
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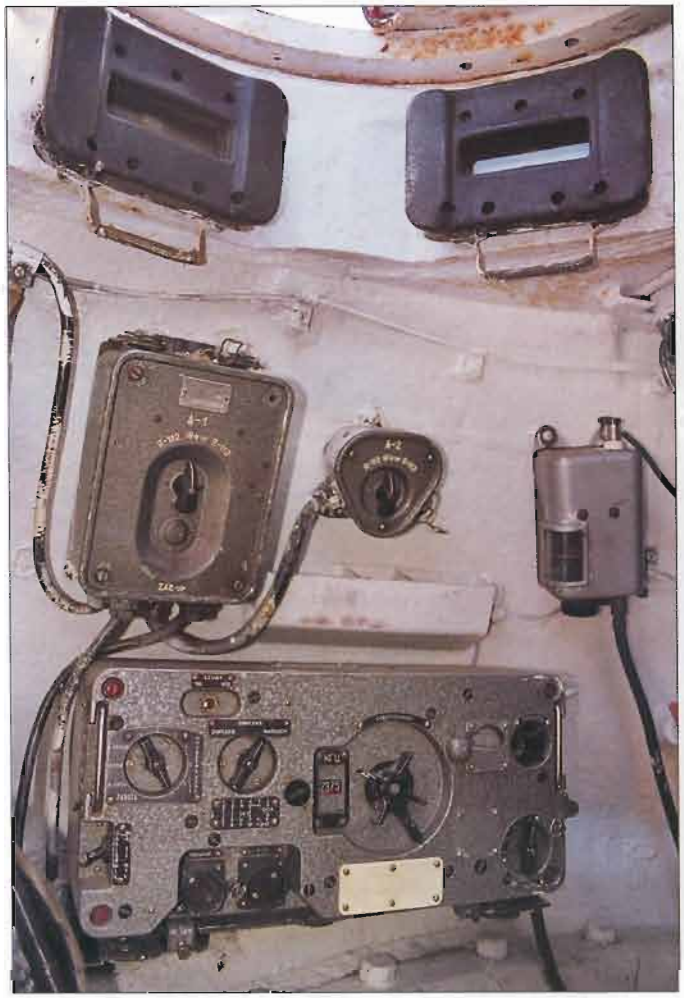


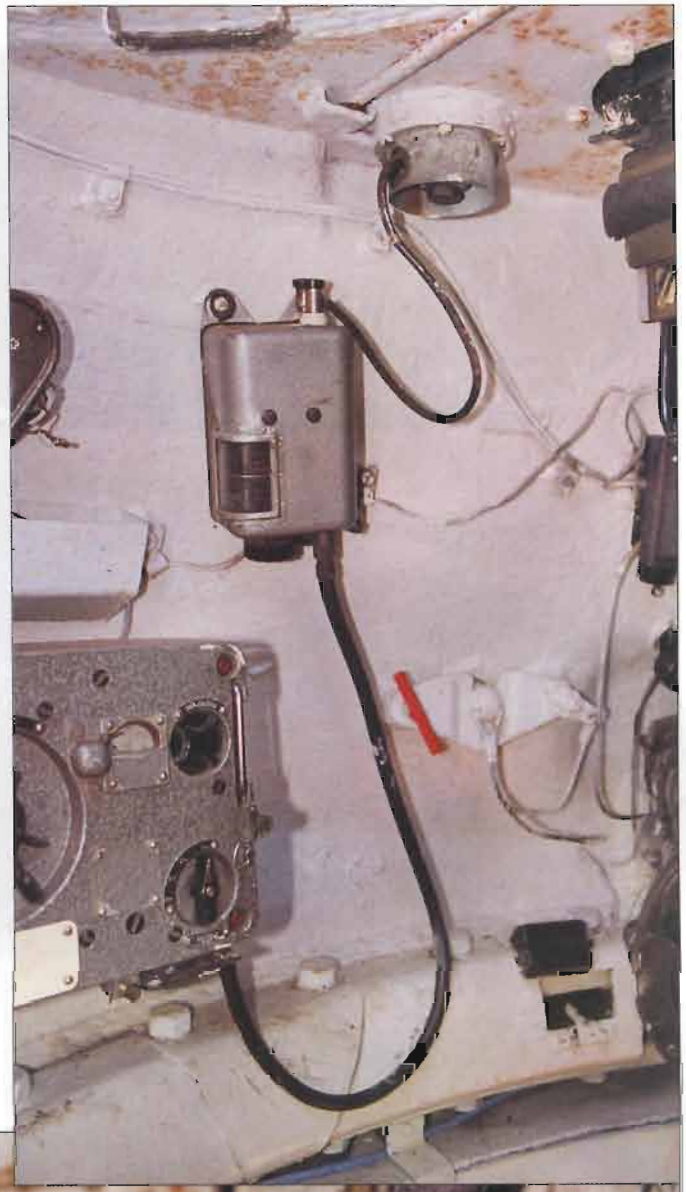


Left and below: Interior of a T–34–85 turret produced at the No.112 Factory, showing the TSh–16 gun sight.

- Author's collection -







Above and right: Radio equipment in a Polish-made turret.
Bottom: Fire extinguisher and one of the small tool boxes.

- Author's collection -





- artwork by Arkadiusz Wróbel -



This T–34, summer 1942 production series of the No.183 Factory, belonged to an unknown unit that operated in the southern part of the eastern front, in June – July 1942. "SPARTAK" was probably the name that its crew gave to it, while the white circle on the back of the turret was the tactical insignia of the unit.



This T–34 from the summer 1943 production series belonged to an unknown unit that fought in the Kursk Salient, July/August 1943. The name "Sibirak" was painted in white or yellow on the turret and hull side. It is not known whether this was the crew's name for the tank or if it represented a unit that was funded by Siberians. There is no known, if it had any, tactical insignia for this tank.

A product of the 1943 post-modernized production series, this T–34 belonged to the 30th Guards Tank Brigade, and is illustrated from the time when it was at Viborg during the summer of 1944. This tank was originally fitted with brackets for the rear fuel tanks (the large variation), which were still featured in 1944. The tank has a standard paint job but with the quick identification sign. The white panoramic sight indicates that the turret roof may have had a wide white outline around its edges.

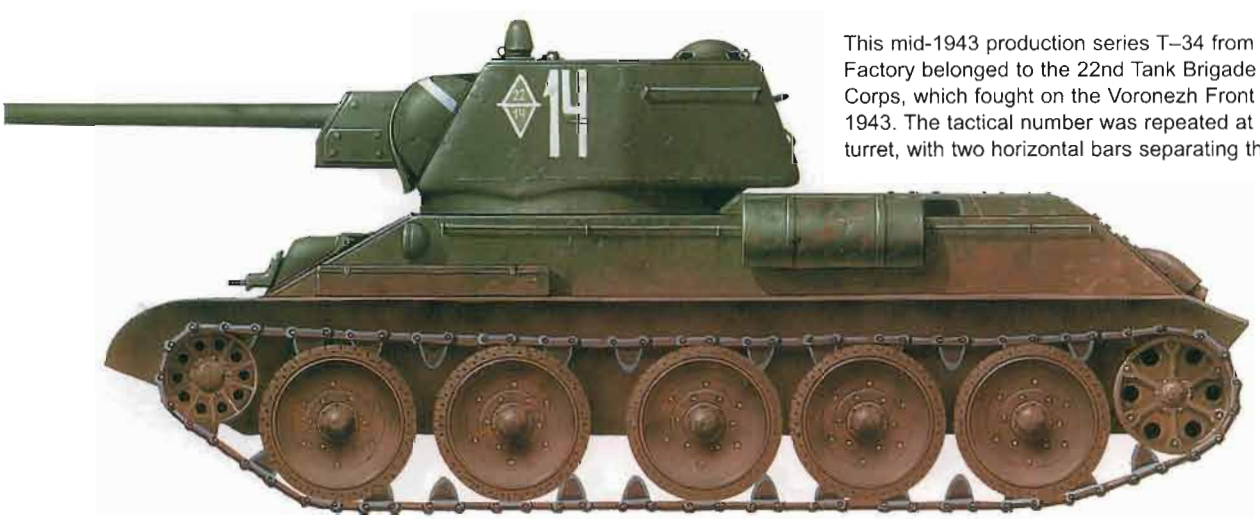




This winter 1943/44 production T–34 of the No.112 Factory is illustrated as seen in Austria in the spring of 1945. This was one of the tanks funded by the Mongolian Communists ("Choibalsan Mongoli") and carries the standard winter camouflage and markings. There were handrails on the glacis typical for this factory, and they were usually used for mounting single spare track links.



This spring 1942 STZ-made T–34 has the "07" tactical number and the "Za Stalina!" (For Stalin) slogan on the turret. This marking is widely believed to be white, but it is highly probable that in reality it was red, just like the star between the number and the slogan. The tank had an additional armor plate on the glacis and the hull roof was interlocked with the side plates.



This mid-1943 production series T–34 from the No.112 Factory belonged to the 22nd Tank Brigade of the 6th Tank Corps, which fought on the Voronezh Front in August 1943. The tactical number was repeated at the rear of the turret, with two horizontal bars separating the "1" and "4".



This T–34, most probably from the fall 1943 production series, served in the HQ of the 24th Tank Regiment, 46th Mechanized Corps commanded by Col. Nicolai Manzhurin. It is illustrated from the period when it operated in the region of the Lithuania – Latvia – Belarus frontier in mid-July 1944. These markings are widely assumed to be white or yellow, but they were in fact red (the star was outlined in yellow or white). The vehicle's tactical number was repeated in the same size on the rear of the turret. There were no visible side or rear brackets.

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A spring 1944 production series T–34–85 produced by the No.112 Factory, Magnuszew Bridgehead, summer 1944. This tank belonged to the 164th Tank Brigade of the 16th Tank Corps. It had the "T–31" tactical number, which was repeated on the rear of the turret.



This T–34–85, from the No.183 Factory, belongs to an unknown unit and is illustrated probably from the fall of 1944. The two-tone, brown over the standard khaki of the Soviet armored forces, camouflage is an exception to the rule. This method of painting T–34–85s is an absolute rarity.

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A T–34–85 from the No.183 Factory belonging to the 26th Guards Tank Brigade of the 2nd Guards Tank Corps, Eastern Prussia, October/November 1944. The tactical sign was repeated on the rear of the turret.

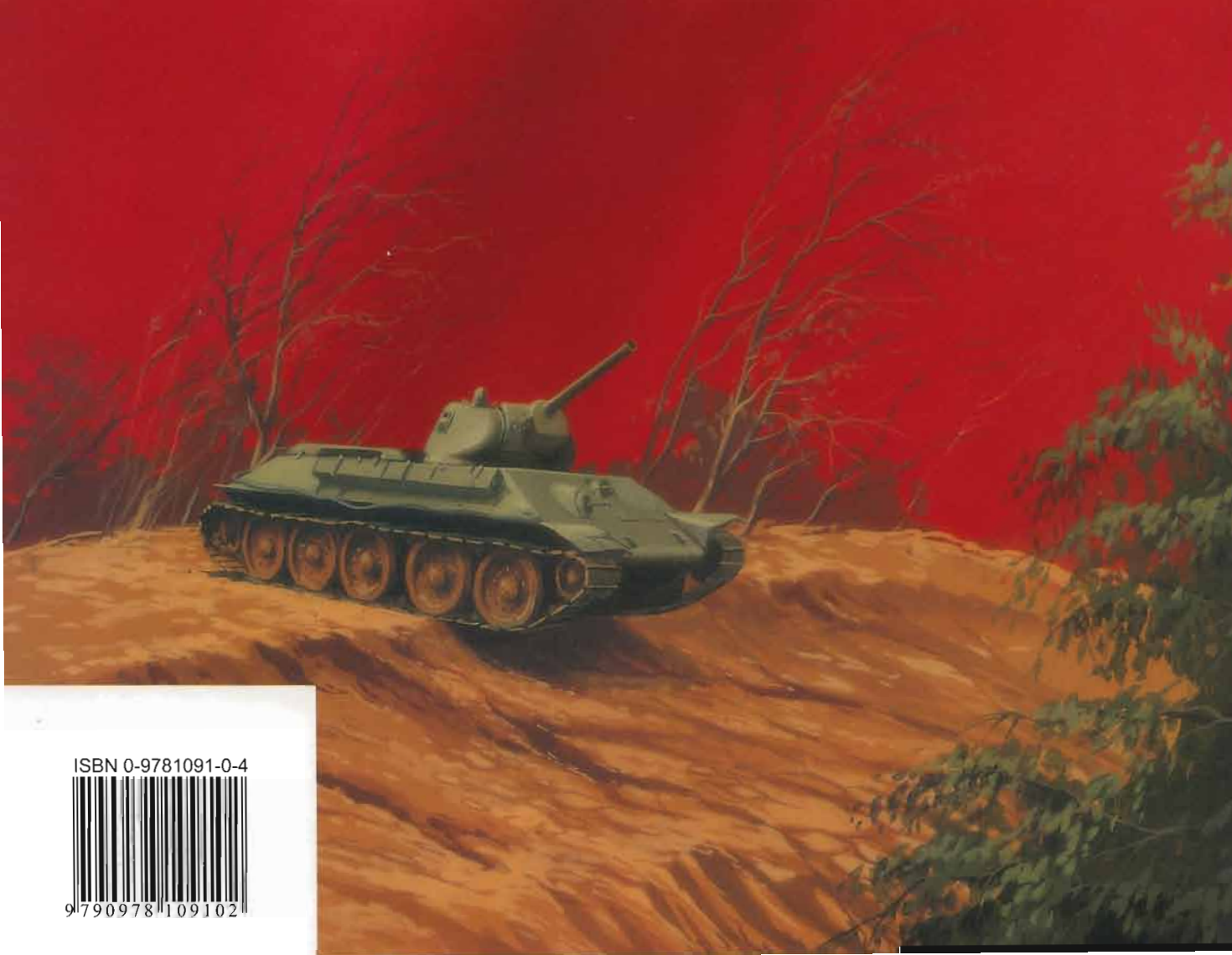


A T–34–85 from the No.112 Factory belonging to the 25th Guards Tank Brigade of the 2nd Guards Tank Corps, Eastern Prussia, October/November 1944. The tactical sign was repeated on the rear of the turret.

A T–34–85 from the No.183 Factory belonging to the 4th Guards Tank Brigade of the 2nd Guards Tank Corps, Belarus, June/July 1944. Contrary to the other brigades of the Corps, the 4th Brigade used a quick aerial recognition sign, a wide white stripe that ran down the middle of the tank's top surface. The tactical sign was repeated on the rear of the turret.



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ISBN 0-9781091-0-4

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