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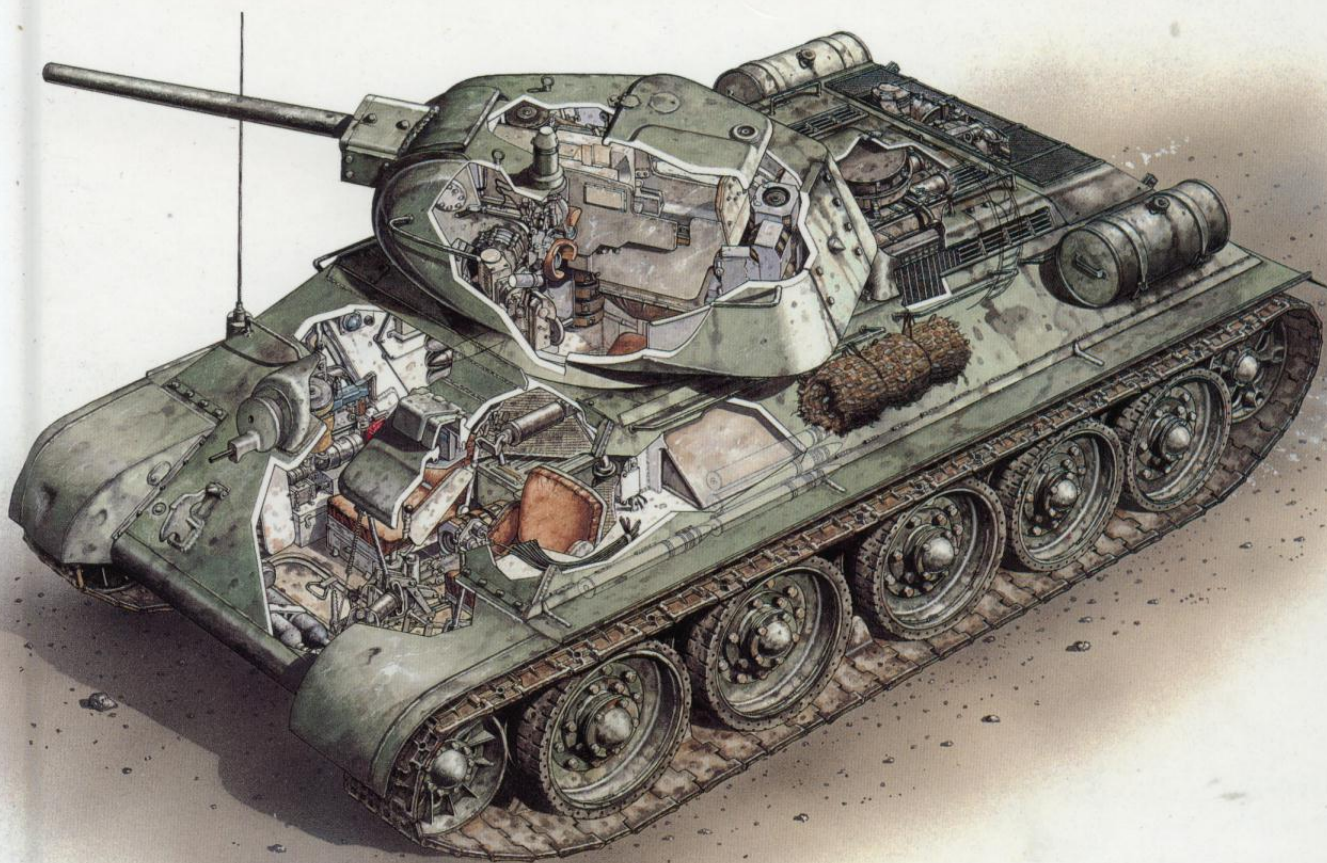
FIGHTING ARMOR OF WWII

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# T-34/76

## MEDIUM TANK

### 1941-1945



STEVEN ZALOGA PETER SARSON

EDITOR: LEE JOHNSON

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STEVEN ZALOGA

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PETER SARSON

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# T-34/76 MEDIUM TANK

## DESIGN AND DEVELOPMENT

The T-34 was the most influential tank design of the Second World War. When first introduced into combat in the summer of 1941, it represented a revolutionary leap forward in tank design. Its firepower, armour protection and mobility were superior to that of any other medium tank of the period. This superiority did not last long. While the T-34 underwent a series of incremental improvements during 1943, it was being surpassed by new German tank designs, most notably the Panther. Paradoxically, when the T-34 held the clearest technological advantage over the Germans, in the summer of 1941, the Soviet armoured force was at its weakest and most ineffectual. Yet in the summer of 1943, when the T-34 was being increasingly outmatched by new German tank designs, the armoured force was finally reaching combat maturity, culminating in the Soviet victory at Kursk-Orel. The T-34 and its improved vari-

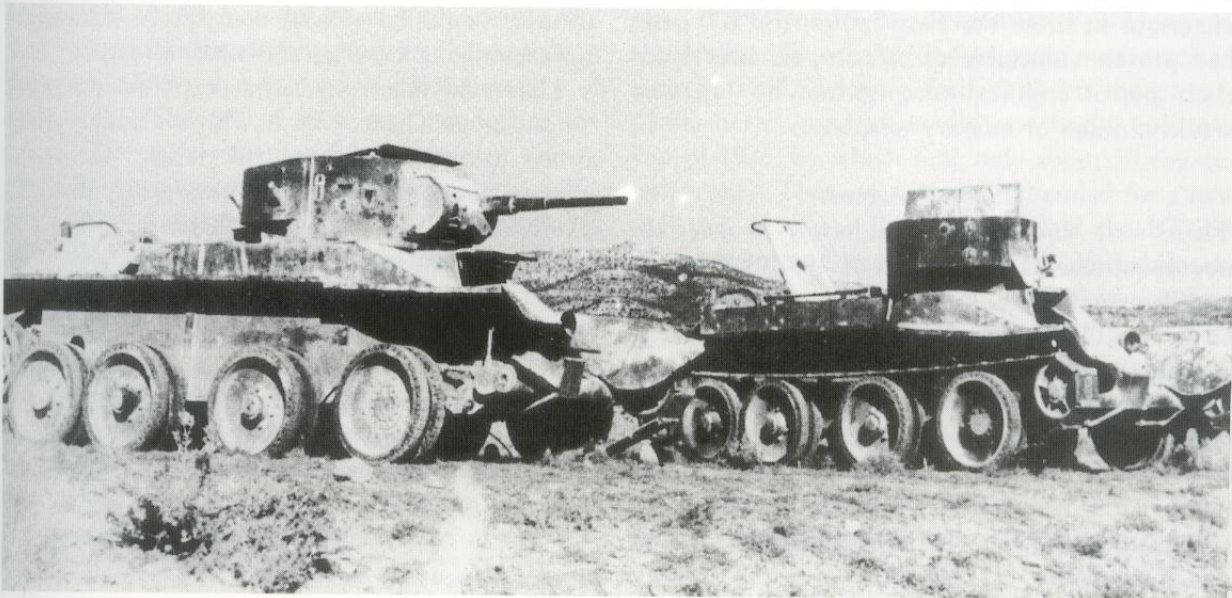
ant, the T-34/85, were the most widely produced Allied tanks of the war, easily outnumbering their American counterpart, the M4 Sherman.

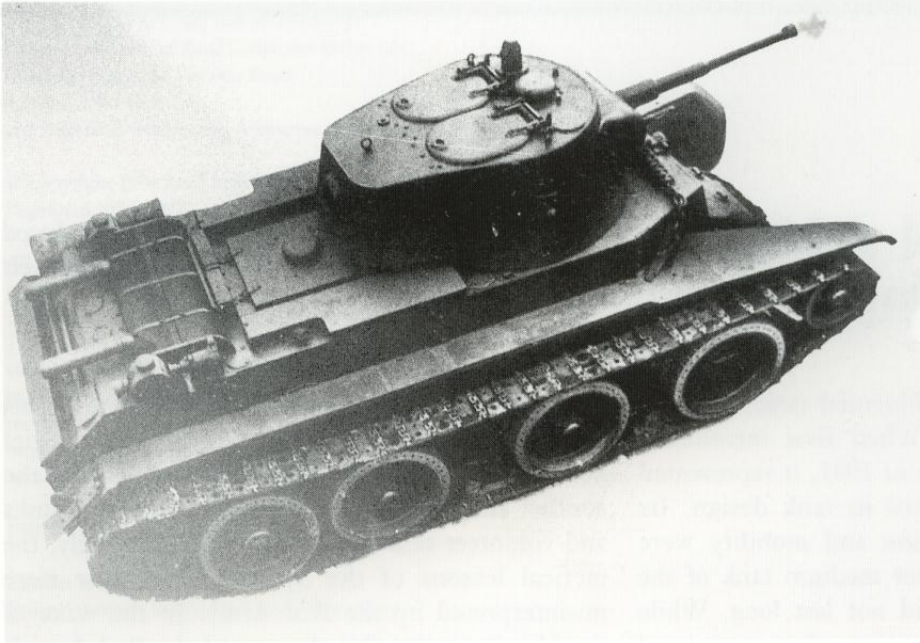
### Pre-war tank design theory

The inspiration for the T-34 came from lessons learnt during the Spanish Civil War. The Soviet government supported the Republican side in the conflict and dispatched several shipments of tanks and volunteer tankers to Spain. Unfortunately, the tactical lessons of the Spanish Civil War were misinterpreted by the Red Army. In the wake of the bloody purges that devastated the Red Army's officer corps from 1937 to 1939, the armoured force was gradually taken over by inexperienced and often incompetent officers, who had a poor appreciation for the potential of mechanised

*The Spanish Civil War made it clear that existing tank armour was inadequate. Soviet tankers serving on the Republican side were critical of the poor protection afforded by the T-26 and BT tanks used in*

*Spain, as well as their propensity to catch fire after being hit. These BT-5 tanks of the Regimiento de Carros Pesados were knocked out during the Ebro battles of 1937. (US National Archives)*





*The A-8 was the final member of the BT family produced. It was powered by the new Trashutin V-2 diesel engine. It was called the BT-7M in Red Army service, though it is sometimes called BT-8 due to its experimental designator.*

forces. It was in the technical field that the Spanish Civil War held several clear lessons for Soviet tank designers. The first was that existing levels of tank armour, little changed since the First World War, were completely inadequate. The Soviet T-26 infantry tanks and BT-5 cavalry tanks used in Spain were easily penetrated by German 37mm anti-tank guns. This lesson was reinforced in 1938 and 1939<sup>1</sup> during clashes with the Japanese Army at Lake Khasan and Khalkin Gol. Although the Red Army eventually emerged victorious in these Far East battles, the BT tanks had proven vulnerable to catastrophic fires when their petrol engines were ignited by Japanese artillery, mines or infantry weapons.

#### The A-20 series

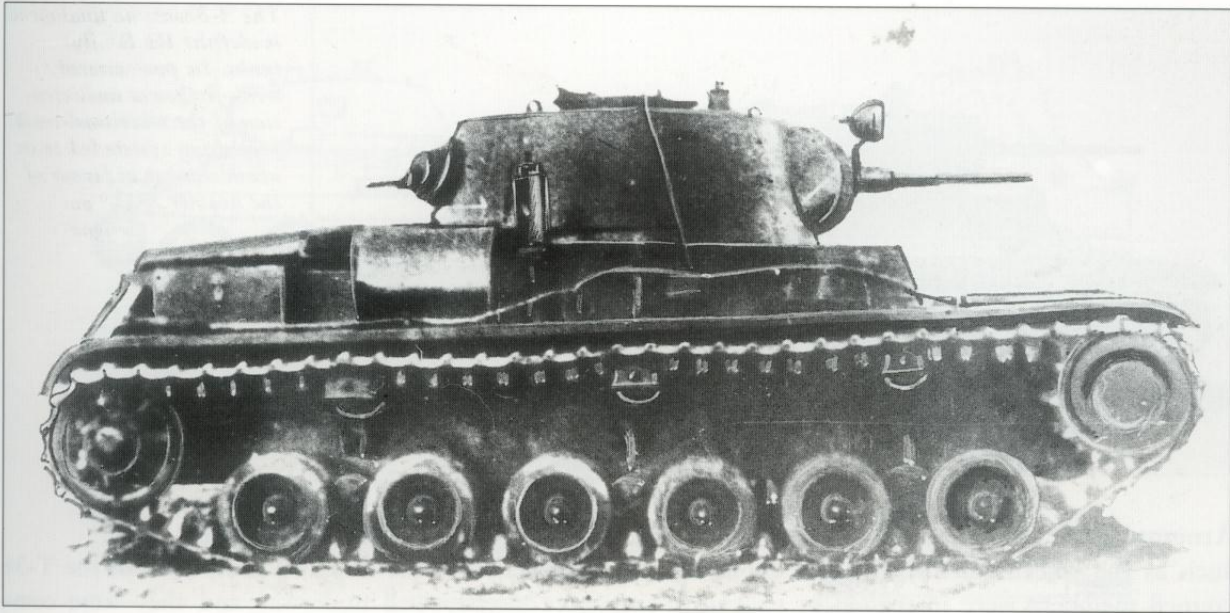
There were three projects underway to meet the new requirements by the end of 1937. Work on a replacement for the T-28 medium tank was started by the OKMO design bureau in Leningrad as Izdeliye 115. This was envisioned as a 32-ton tank with armour up to 50mm, a turreted 76mm gun and two sub-turrets with machine-guns (MGs). The concept was archaic, and the project disappeared. The first Soviet tank design which had a specific requirement for 'anti-projectile armour' was the Izdeliye 111, also known as the T-46/5.

This was a 32-ton tank, armed with a 45mm gun in a single turret, with armour up to 60mm thick. Although a prototype was completed, it was not accepted for series production. Ironically, the most successful venture was the Izdeliye 135 programme at the Kharkov Locomotive Plant's design bureau, which was not specifically aimed at developing a 'shell-proof' tank.<sup>1</sup> The requirement for this vehicle, better known by its bureau name A-20, was a light tank with 20mm armour suitable for replacing the outdated BT series. Its modest armour would have been completely inadequate against existing German anti-tank weapons.

The A-20 relied on earlier experimental work conducted at Kharkov by A. Firsov's design group aimed at improving the BT tanks. Two programmes in particular were noteworthy, the BT-SV/2 and BT-IS, both completed in 1937. The BT-SV was an important forerunner of the A-20, using 25mm armour. The key innovation in the BT-SV was not simply the thickness of the armour, but its layout. The designers steeply angled the side and turret armour. This increased the effective thickness of the armour and improved its protective qualities against typical anti-tank projectiles.

<sup>1</sup>The Kharkov tank plant was officially called the *Kharkovskii Paravozostroitelnyy Zavod No 183 Imeni Kominternu*, sometimes abbreviated KhPZ.

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In early 1937, the Kharkov plant was devastated by a series of arrests which included A. Firsov, the head of the BT design team, and many of his most talented colleagues. As a result of the purges a young engineer from the Leningrad OKMO heavy tank design bureau, Mikhail Koshkin, was pushed into Firsov's place to take over the A-20 programme. The new leadership resulted in a rethink of the basic concept. The original requirement had specified retaining the wheel-and-track configuration of the earlier BT tanks. The Christie wheel-and-track suspension allowed the tank crew to remove the track and operate the tank on wheels during long transits along roads, a feature necessary due to the low life-expectancy of tank tracks. The design team was sceptical of the concept; it was seldom used in practice and it required complicated, heavy and expensive additions to the suspension. On his own initiative, Koshkin and the team developed an alternative design, called the A-32. The A-32 had its frontal armour boosted from the A-20's 20mm to 32mm, hence its designation. Although the design was initially to be fitted with the same 45mm gun found on the A-20, it was decided to change this feature as well, and mount a short-barrelled 76.2mm gun.<sup>1</sup>

One of the most crucial ingredients in the new

*The T-46-5, also known as the Izdeliye 111, was the first Soviet tank with 'shell-proof' armour. Although*

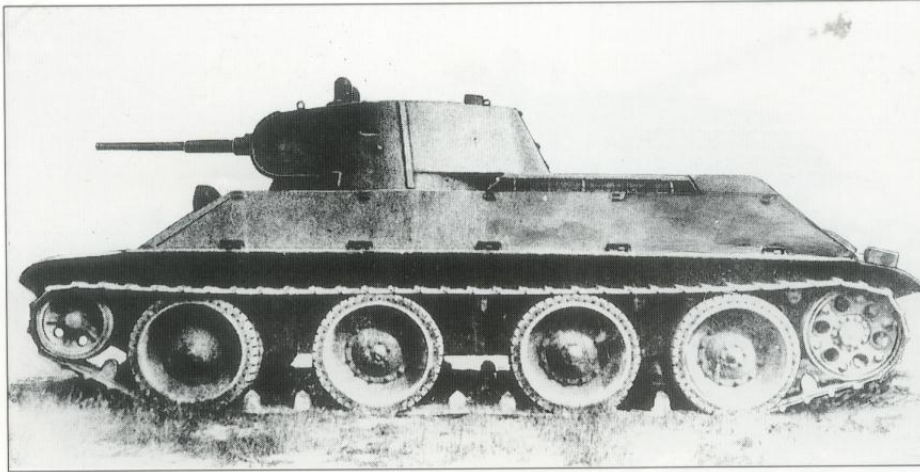
*better armoured than the BT tank, it did not prove successful enough for series production.*

tank programme was the development of an engine of compact size and sufficient power. A diesel was preferred, since combat experience in Spain and the Far East revealed the fire hazard inherent in petrol engines. The KhpZ had had a diesel engine programme underway since 1932, called the BD. A militarised version for tank propulsion had been completed by I. Trashutin's team in 1937 under the designation V-2. However, the leadership of the design team was arrested later in 1937, delaying final work on the powerplant. Series production did not begin until the end of 1938, by which time only about 50 engines were ready. These were mainly intended for a new A-8 version of the BT-7 tank, called the BT-7M when it entered service,<sup>2</sup> and the Voroshilovets artillery tractor.

On 4 May 1938, both the A-20 and A-32 design concepts were presented to Josef Stalin and the Defence Committee of the USSR. A decision on the programme was put off until an August 1938 Main Military Council conference. The council criticised the A-32 design since it didn't follow the original Main Administration for

<sup>1</sup>The A-32 was also called the T-32.

<sup>2</sup>This tank was also sometimes called the BT-8, related to its design designation of A-8.



*The A-20 was an attempt to modernise the BT fast tanks. Its poor armour, weak firepower and retention of the wheel-and-track propulsion system led to its abandonment in favour of the heavier A-32.*

Armoured Technology (GABTU) requirement, such as the wheel-and-track feature. None of the council members were interested in sticking their necks out in view of Stalin's purges. A number of Spanish Civil War tankers testified at the conference about the inadequacies of the armour on the BT tank, which made an impression on 'Uncle Joe'. Stalin disregarded the council's advice, and authorised construction of both an A-20 and A-32 prototype.

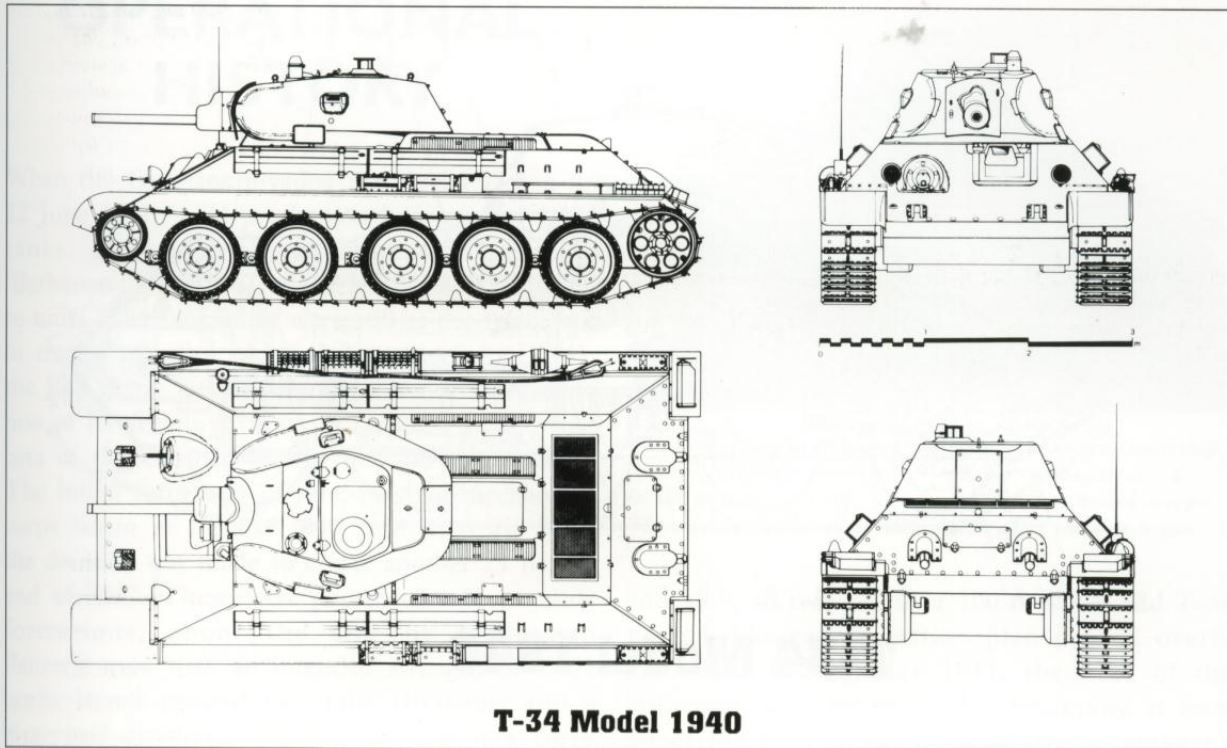
The prototypes were completed by the summer of 1939 and shipped to the GABTU proving grounds at Kubinka for trials. Both prototypes displayed similar automotive performance, the A-32 being more attractive due to its thicker armour and superior firepower. The Main Military Council now had second thoughts, and in August 1939, advocated accepting the A-32 and abandoning the A-20. On 19 December 1939, Stalin concurred. Koshkin was faced with naming the new tank. The heavy tank design bureau in Leningrad had reversed earlier practices and named their new tank after defence minister Kliment Voroshilov. Koshkin boldly told Voroshilov that naming the tank after another hero would be a bad idea. Koshkin argued that the designation 'T-34' might be better since it commemorated the 1934 state decree announcing the massive expansion of the Soviet armoured force, the 1934 start of Sergei Ordhonikidze's leadership of the tank production programme and his (Koshkin's) first ideas about the new tank. The name T-34 was accepted.

### The T-34 emerges

Production of the first two prototypes of the T-34 were already well underway and they were completed in January 1940. The two tanks were driven all the way from Kharkov in eastern Ukraine to Moscow for a demonstration to the Kremlin leadership. They then motored to Finland for trials along the Mannerheim Line, although they apparently arrived after the Russo-Finnish war ended. The prototypes demonstrated their firepower by demolishing some captured Finnish bunkers. Finally, the tanks were driven back to Kharkov, via Minsk and Kiev, in an impressive display of reliability.

As an offshoot of the German-Soviet alliance of 1939, the Red Army received several PzKpfw III tanks. According to Wehrmacht liaison officers in Moscow these were supposed to be the best German tanks available. They were sent to the GABTU proving grounds at Kubinka for evaluation. Koshkin's design team was very worried about how their tank would compare, but were relieved to find that the PzKpfw III was inferior to the T-34 in armour, firepower and mobility. It was derisively referred to as a pretty toy, over-engineered and needlessly comfortable for the crew. But, there was little celebration in Kharkov, as the health of the design bureau head, Mikhail Koshkin, grew progressively worse due to the hard winter demonstration drive. He died on 26 September 1940 of pneumonia, and his place was taken by the head of the conceptual design department, Aleksandr Morozov.

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**T-34 Model 1940**

#### Production begins

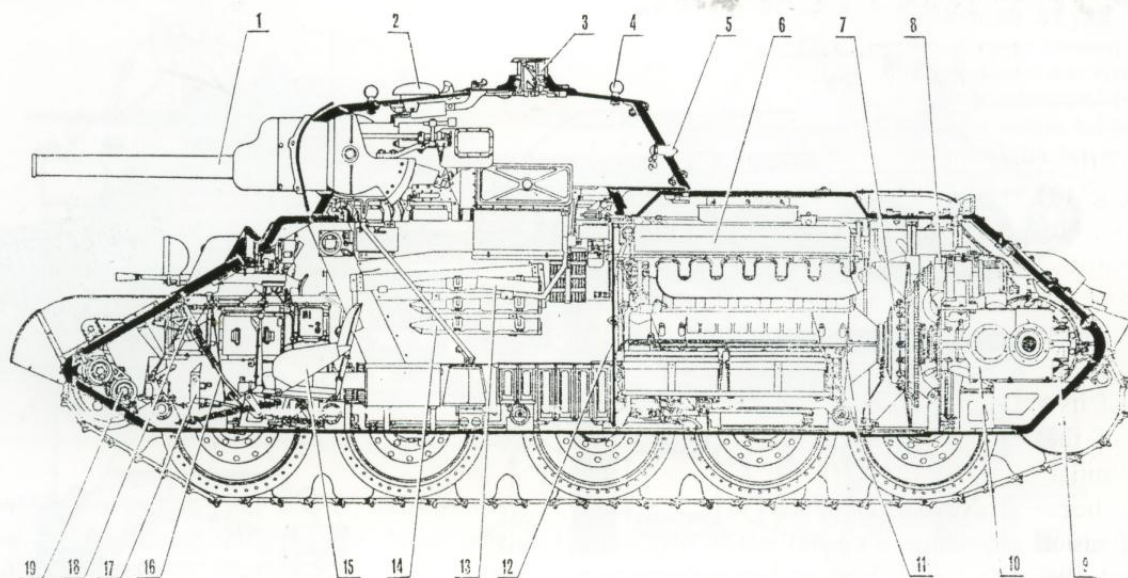
Series production of the T-34 Model 1939 was scheduled to begin in June 1940 at the KhPZ tank plant in Kharkov, and in October at the Barrikady Tractor Plant in Stalingrad. For 1940 a total production run of 500 T-34 tanks was authorised for Kharkov, with 100 coming from Stalingrad. Just as everything finally seemed to be running smoothly the T-34 project became embroiled in the political troubles that plagued the Red Army on the eve of war. The Deputy Peoples Commissar for Defence, Marshal K. Kulik, developed a strong dislike for the T-34 tank. He set up a special test-range manned by his own personnel, which sent out a stream of reports insisting that various changes be introduced on the T-34. As a result only three T-34 tanks had actually been delivered to Red Army units by 15 September 1940. Kulik's interference was eventually countered by Vyacheslav Malyshev, the new head of the Medium Machinery Production ministry responsible for tank production, with the support of GABTU and the Kharkov plant management. Despite Malyshev's efforts only 115 of the intended 600 tanks were produced in 1940.

#### Early modifications

The production order for 1941 totalled 2,800 T-34 tanks with 1,800 from Kharkov and 1,000 from Stalingrad. Although Malyshev had resisted Kulik's disruptive meddling with the original production of the T-34, there were good reasons to add gradual improvements to the design. For example, the original Christie suspension used bulky springs that took up internal space. The torsion bar suspension system which was used on the KV heavy tank and T-50 infantry tank was more efficient.

In May of 1941, the Council of People's Commissars ordered an improvement programme for the T-34, with an aim towards manufacturing 500 of the improved type out of the total 2,800 scheduled for production during 1941. Besides replacing the Christie suspension with the torsion bar system, the directive also called for an increase in the frontal armour from 45mm to 60mm, the side armour to 40mm and the turret diameter to 1600mm. The programme also called for the addition of a commander's cupola to the turret. Morozov's design bureau labelled this new version T-34M.





## T-34 Model 1940

### Key

- |                                 |                                |   |
|---------------------------------|--------------------------------|---|
| 1. L-11 76.2 mm gun             | 8. Engine starter              | 15. Driver's seat                         |
| 2. Turret ventilator dome       | 9. Final drive                 | 16. Braking lever                         |
| 3. Commander's vision periscope | 10. Gearbox                    | 17. Main brake pedal                      |
| 4. Turret lift ring             | 11. Engine and frame batteries | 18. Instrument panel                      |
| 5. Pistol port                  | 12. Firewell                   | 19. Engine starter compressed air bottles |
| 6. V-2 diesel engine            | 13. Commander's seat           |   |
| 7. Main fan                     | 14. Ammunition                 |   |

Several small scale modification programmes were already underway to improve the tank. To simplify production, a 52mm cast turret was developed by V. Nitsenko as an alternative to the cold-rolled welded turret. This entered production on a limited scale at one of the T-34 satellite plants in the late spring of 1941. The designers were generally dissatisfied with the L-11 76.2mm gun selected for the T-34 by the GABTU. Various weapons were considered as alternatives including the ZiS-4 57mm anti-tank gun, and the old 45mm tank gun. The KV heavy tank was being fitted with the new Grabin F-32 76.2mm gun which had better anti-armour performance due to its longer barrel. During the spring of 1940, V. Grabin of the Central Artillery Design Bureau began work on adapting the F-32 to the

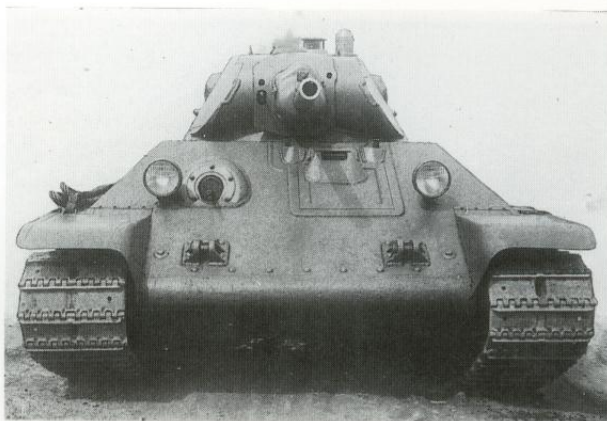
T-34 turret. By the end of the year, his team had developed a superior gun, the F-34, which was slightly longer, at 42 calibres. Unfortunately, neither the Main Artillery Directorate (GAU) under Kulik nor the GABTU would authorise the production of the new gun without official approval. In an uncharacteristic move, Grabin and the plant director, A. Elyan, acted on their own initiative and produced the F-34 alongside the L-11. The first F-34 guns were completed in January 1941, and began to appear on some T-34s in February 1941. This variant, usually called the T-34 Model 1941, was not officially approved until the summer of 1941 – after the outbreak of the war – when tank units in the field clamoured for more F-34 guns and the abandonment of the less effective L-11 gun.

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# OPERATIONAL HISTORY

When the Germans invaded the Soviet Union on 22 June 1941, T-34 production had reached 1,225 tanks. However, at the time of Operation 'Barbarossa', only 967 had actually been delivered to units. The remainder were still at the factory or in transit to units and training schools. In 1941, the Red Army was undergoing a major reorganisation of its armoured units in response to the success of the German panzer divisions in 1939-40. The initial formation of nine massive mechanised corps began in August 1940, and in April 1941, the decision was made to create another 21 by the end of 1942. These were enormous and ungainly formations, about the size of a German Panzergruppe with an intended strength of 1,031 tanks based around two tank divisions and a motorised division. Only five of these new corps received a significant number of the new T-34 medium and KV heavy tanks by the time war broke out. Two corps, the 4th Mechanised Corps (MK) in the Kiev Special Military District and 6th Mechanised Corps in the Western Special Military District, received over half of the new tanks. Three other mechanised corps, the 3rd, 8th



*The T-34 Model 1940 entered full-scale production in the autumn of 1940. These early T-34s enjoyed a*

*high level of craftsmanship in their manufacture, a quality that would disappear after the war began.*

and 15th, all received over 100 new KV and T-34 tanks.<sup>1</sup> The reorganisation plan proved overly ambitious and in May 1941, the head of the armoured force recommended equipping at least 50 of the tank regiments with towed anti-tank guns, since it appeared that it would be at least a year before any tanks would be available for them.

At the time of 'Barbarossa', the mechanised corps were equipped with 19,221 tanks, the vast

<sup>1</sup>The 4th Mechanised Corps received 313 T-34s, and 6th Mechanised Corps had 238 T-34s by 22 June 1941. Figures for 3rd, 8th, 15th and 2nd Mechanised Corps were 52, 100, 71 and 50 respectively.



*A T-34 Model 1940 of Vlasov's 4th Mechanised Corps, abandoned on the streets of Lvov in western Ukraine in June 1941. Strapped to the back engine deck is a spare transmission, a reminder of the teething problems suffered by the new machines. (US National Archives)*



*An all too frequent fate of the T-34s during Operation 'Barbarossa' is seen here. This T-34 Model 1940 and T-34 Model 1941 in the background were lost in July 1941 when they were driven into the Toloshchin marsh near the Drut river east of Borisov in Byelorussia. (US National Archives)*

majority being the older T-26 light tank and BT cavalry tanks. This is a very impressive figure considering that the Germans only used about 3,350 of their 5,640 tanks during the invasion. However, the figures conceal the deep problems in the Red Army's tank force on the eve of war. It is often forgotten that tanks based on early 1930s technology were not very durable. On average, Soviet tanks of the T-26 and BT generation had a life expectancy of about 100 motor hours, after which they needed a major overhaul including an engine replacement. The enormous Soviet tank park was in a poor state of repair in 1941, with some 29 per cent requiring major overhaul and 44 per cent requiring rebuilding. These tanks were barely functional and quickly broke down in the first few days of fighting.

The new KV and T-34 tanks were an impressive addition to the strength of the new formations, but even here there were problems. Due to the incompetent leadership of Marshal K. Kulik, ammunition production for the new 76.2mm tank guns had been delayed and only about 12 per cent of the rounds required were available when war broke out. Most T-34 tanks went into action without any armour piercing shells, only high-explo-

sive, while many tanks did not have even a full load of ammunition. Both tanks types were new and unproven, and had significant technical problems associated with their clutch and gearbox. The rush to produce new tanks meant that no attention was paid to spare parts. Most units had few spares, and few if any Voroshilovets recovery vehicles.

Besides the technical problems with the tanks themselves, the mechanised corps were far from ready. The only corps to have seen extensive manoeuvres was 4th Mechanised Corps, which conducted a special series of exercises from August to October 1940 to examine the new corps organisation and tactics. In April 1941, one of its experienced divisions, the 10th, was transferred to form the core of the new 15th Mechanised Corps, and a new division, the 32nd, had to be created. So many officers had been swept away by the purges that the corps only had between 45 and 55 per cent of its complement. The Red Army was so desperate for corps commanders that the roster included N.V. Feklenko with the 19th, who had been a complete failure as a rifle corps commander at Khalkin Gol, and I.N. Khabarov with the 17th who had been court-martialed for his perfor-

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*A factory fresh T-34 Model 1941 abandoned in Ukraine in the summer of 1941. The T-34 Model 1941 was fitted with the improved F-34 76.2mm gun. This particular vehicle is fitted with one of the new cast turrets which entered production shortly before the war began. The containers on the hull side are for fuel.*



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mance in Finland in 1940. The new corps commanders were generally younger and much less experienced than their German counterparts; the Soviet commanders were mainly in their forties and would have been divisional commanders in less chaotic times. The situation was even worse with non-commissioned officers; only between 19 and 36 per cent were available across all ranks. The T-34 was so new that many tank crews received their first glimpse of it only days before the war's outbreak. About a quarter of the troops came with the spring draft and had no military training whatsoever. Most commanders felt lucky to have T-34 drivers with three to five hours of instruction.

Although it has been widely reported that the Germans were unaware of the existence of the T-34 before the 1941 invasion, a number of their intelligence reports mentioned it.<sup>1</sup> The problem was two-fold: the intelligence community withheld information from the tactical commanders, while German officers were generally dismissive when it came to evaluating their Russian counterparts,

<sup>1</sup> For example, a German OKH (High Command) study from March 1941 noted the production of a new 34-ton tank, identified as the T-32, at Stalingrad, Kharkov and several other Soviet tank plants.

especially after their own incredible victories in France in 1940 and the dismal performance of the Red Army in Finland in 1939-40. During the 1940 campaign, German tanks had been out-matched by types such as the French Char B1bis, but managed to overcome them using superior training and tactics. This situation would be repeated in 1941 in the western Soviet Union.

### 'Barbarossa'

The Germans began encountering T-34 tanks from the first day of the campaign. They came as a great shock to the German infantry, as their 37mm anti-tank gun projectiles simply bounced off its thick armour at ranges over 300 metres. In the Army Group Centre area, Hoth's Panzergruppe 3 charged towards Minsk, speeding past the lethargic Soviet mechanised corps. General M.G. Khatskilevich's 6th Mechanised Corps, the most powerful armoured formation in Byelorussia with 238 T-34s and 114 KVs, did not begin moving into action until the evening of 24 June when it began attacking the infantry formations of the XXth Army Corps trailing after the Panzers to the west of Grodno. The German infantry quickly exhausted their ammunition try-



*A T-34 Model 1940 abandoned at Vinnitsa in western Ukraine following the Dubno-Brody tank battles at the end of June 1941. Small numbers of T-34s survived these battles, but many were abandoned due to breakdowns and lack of spare parts.*

ing to fend off repeated thrusts by T-34s and KVs, but attacks by Ju-87 Stuka dive-bombers on 25 June disrupted the Soviet raids, and Khatskilevich was killed. Hoth's Panzergruppe 3 managed to reach the Byelorussian capital of Minsk on 26 June without any serious opposition from 6th Mechanised Corps. Like many Red Army units of the 10th Army situated near the border, 6th Mechanised Corps was caught in an enormous pocket to the south-west of Grodno. Few of its tanks managed to escape before being totally encircled at the end of the month. The most powerful armoured force of the Red Army's Western Front, containing almost a quarter of the Red Army's T-34s, disappeared without any major impact on the fighting.

In the north, near the Lithuanian capital of Vilnius, Gen. A.V. Kurkin's 3rd Mechanised Corps had 109 T-34 and KV tanks. Its 5th Tank Division had attempted to halt the advance of the 7th Panzer Division at the Alitus bridges over the Nieman river on 22 June. The T-34s clearly out-matched the German PzKpfw 38(t) tanks, but the 5th was finally overcome after it had been decimated by German air attacks. A planned counter-attack the next day near Rasienai never materialised due to the speed of the German advance. On 24 June, the surviving 2nd Tank Division struck at the 100th Motorised Rifle Regt. of the 6th Panzer Division, causing some damage. Further action was prevented by a lack of fuel and ammunition. Tank battles continued for the next

two days, but by 26 June, few of 3rd Mechanised Corps' T-34s survived.

Most of the earliest engagements with the T-34 tank were not tank-vs-tank duels, but occurred with towed 37mm anti-tank guns from infantry division Panzerjäger units. Accounts from German infantry give a taste of their first horrifying encounters with the T-34. A 37mm anti-tank gun battery of Panzerjäger Abt. 42 reported on 8 July 1941: 'A completely unknown type of tank appeared before us. We opened fire immediately, but the armour was not penetrated until the range was 100 metres. Armour piercing projectiles stuck in the armour plating at 200 metres.' Another reported: 'Half a dozen anti-tank guns fire at the T-34, which sound like a drum-roll. But he drives staunchly through our lines like an impregnable prehistoric monster.' The 37mm gun was derisively dubbed 'the door-knocker' after these encounters. In their dispatches, German field commanders began to mention the 'tank terror' that struck the infantry when Red Army tanks appeared. Soviet officers noted with satisfaction that the appearance of the new tanks, especially the heavy KV tank, caused German infantry units to flee. Remarkably enough, one determined 37mm gun crew reported firing 23 times against a single T-34 tank, only managing to jam the tank's turret ring. But this particular incident also helps explain the disappointing performance of the T-34 during Operation 'Barbarossa'. Although they could terrorise the German infantry, T-34 crews were still

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*The earliest surviving example is this T-34 Model 1941 preserved at Aberdeen Proving Ground in the United States. Captured by the Wehrmacht in 1941, it was used for training in France where it was captured by the US Army in 1944. So far as is known, no T-34 Model 1940 still exists.*



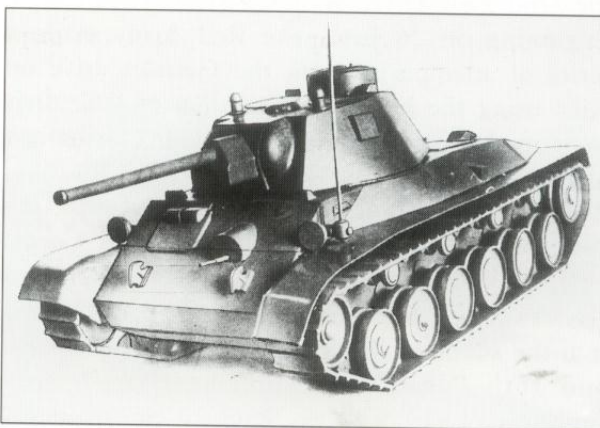
too inexperienced to use the new tank effectively. After being fired on 23 times, this particular T-34 crew didn't even manage to hit the anti-tank gun.

Many T-34 crews, either through poor training or lack of ammunition, preferred crushing the anti-tank guns under their tracks. The Wehrmacht learnt fast and often used the 88mm anti-aircraft gun and divisional artillery as expedient anti-tank weapons in 1941 to counter the threat posed by the T-34 and KV tanks. However, these weapons were relatively few in number, and spread very thinly along the front.

The heaviest concentrations of T-34s were in three mechanised corps in Ukraine: Gen. A.A. Vlasov's 4th Mechanised Corps near Lvov, Gen. D.I. Ryabyshev's 8th Mechanised Corps near Dubno and Gen. I.I. Karpezo's 15th Mechanised Corps near Zhytomir. Vlasov's 4th Mechanised Corps was the most powerful, with 414 T-34 and KV tanks, and it was by far the best trained. In spite of its enormous power, Vlasov's corps was quickly bypassed by the racing German tank columns. Gen. I.I. Karpezo's 15th Mechanised Corps clanked forward with its 131 T-34s and KVs. But Karpezo's unit had the thankless task of fighting in difficult terrain, losing many of its T-34s in forced river crossings and in bogs.

The first encounter with the new T-34 in Ukraine occurred on 22 June 1941 when a column

from the 15th Panzer Regiment (11th Panzer Division) was subjected to a flank attack by 30 T-34 tanks of the Lvov Tank Training Regiment. A total of three PzKpfw IV and two PzKpfw III were lost. The 10th Tank Division of Karpezo's 15th Mechanised Corps tangled with the 11th Panzer Division over the next few days. The first large-scale tank clash in Ukraine took place south of the town of Radzkehuv beginning on the night of 23 June. Two battalions of PzKpfw III tanks



*It was planned to halt T-34 manufacture in the autumn of 1941 in favour of the T-34M. After the war broke out, the programme was abandoned over concern that it would disrupt vitally*

*needed tank production. As is evident from this model, the T-34M would have corrected one of the main shortcomings of the T-34 – its two man turret.*



*The main T-34 plant at Kharkov was moved to Nizhni Tagil in the Urals starting in August 1941. The first vehicles produced*

*at the Uralvagon Zavod were fitted with cast turrets as the tooling for the rolled plate turrets was lost for a time during the evacuation.*

mauled a tank column from 10th Tank Division, destroying 46 BT-7 tanks but losing several tanks themselves when attacked by another column from the 32nd Tank Division of 4th Mechanised Corps. Beginning on 26 June, the Red Army made a series of attempts to stem the German drive on Kiev using the heavy concentration of tank divisions in the area. In what would prove to be one of the largest tank battles of the 1941 invasion, Ryabyshev's powerful 8th Mechanised Corps, the survivors of Karpezo's 15th Mechanised Corps, parts of Vlasov's 4th Mechanised Corps and Kondrusev's 22nd Mechanised Corps, smashed into the southern flank of Panzer Gruppe 1 (11th and 16th Panzer Divisions) near Brody and Dubno. The weaker mechanised corps, Rokossovskiy's 9th, Feklenko's 19th and Chistyakov's 24th, all grossly understrength and equipped only with old T-26 and BT-7 'sparrowshooters', was given the task of attacking infantry divisions on the northern flanks of the German advance.

The T-34 proved to be a tough opponent for the poorly armed German tanks. A PzKpfw III crew reported: 'Quite remarkably, Lt. Steup's tank made hits on a T-34, once at about 20 metres and four times at 50 metres with the PzGr. 40 projectile without any noticeable effect... The T-34's came nearer and nearer although they were constantly under fire. The projectiles did not penetrate but sprayed off the side.' A German tank officer from Pz.Abt.4 reported: 'Time and time again our tanks have been split right open by frontal hits. The commander's cupolas on the PzKpfw III and PzKpfw IV have been completely blown off, proof that the armour is inadequate and the attachment of the cupolas is faulty. It is also proof of the great accuracy and penetration of the Russian T-34's 76.2mm gun... The former pace and offensive spirit (of the Panzer force) will evaporate and be replaced by a feeling of inferiority since the crews know they can be knocked out by enemy tanks while they are still a great distance away.' Although the superior skill of the panzer crews compensated for their mount's technical inferiority, it was demoralising when only 'hits against the rear drive-sprocket were successful, along with chance hits on the turret ring.'

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34s and KVs, the Soviet counter-attack at Brody-Dubno fizzled out. Gen.Maj. Morgunov, GABTU armoured force commander in the Ukraine, wrote this damning assessment shortly after the battles in 1941: 'The lack of recovery vehicles and spare parts for the KV and T-34 combined with production defects and inept use by poorly trained crews. Reconnaissance of enemy anti-tank positions was weak. Units were systematically bombed while on the march, while preparing for action and during the attack itself. Large scale movements of 800 to 900 km were conducted without any sign of our own air force. Co-ordination with artillery was poor. Woody and swampy areas in the region were impassable to tanks. The resistance of the numerous enemy forces was stubborn. There was a lack of anti-armour ammunition for the T-34 and KV tanks. All this caused the mechanised corps horrible casualties and the loss of a substantial portion of their equipment.'

The German Panzer units brushed off the attacks and continued to push eastward to the Ukrainian capital of Kiev. During the fighting, the 16th Panzer Division alone claimed to have destroyed 293 Soviet tanks. The Brody-Dubno battles cost the Germans more tank casualties than any other in 1941, but by the end of the month,

the Soviet tank units were in desperate circumstances. 8th, 15th and 22nd Mechanised Corps had lost 85-90 per cent of their tanks. 9th, 19th and 24th Mechanised Corps were so weak in tanks they were used as infantry units. Vlasov's powerful 4th Mechanised Corps, although still having almost 400 tanks, was broken in two, its 8th Tank Division encircled east of Kamenka-Bugskaya and its 32nd Tank Division retreating near Tarnopol. The 32nd Tank Division was the last Red Army tank formation with any significant number of T-34s, and by the middle of July, its total strength was reduced to a single T-34, five BT-7s and 11 BA-10 armoured cars.

The Germans continued to encounter T-34 tanks throughout the summer, but almost invariably in small numbers and manned by inexperienced crews.

### 32nd Tank Division

To better appreciate why the T-34 did so badly in 1941, it's worth taking a more detailed look at a specific Soviet tank unit, the 32nd Tank Division. Commanded by 42-year old Col. Yefim Pushkin and political commissar Chepyga, the 32nd Tank Division was formed in April 1941 on the basis of the old 30th Light Tank Brigade. Pushkin was a

*The transfer of the Kharkov Locomotive Works to Nizhni Tagil put the burden of T-34 production on the Stalingrad Tractor Plant (STZ). Here, T-34 Model 41/42s sit in the marshalling yard outside the STZ plant while awaiting rail shipment to the front.*







*The STZ T-34s had many small differences from those at other factories, including the use of an interlocked glacis plate. These T-34 Model 41/42 tanks were rebuilt by Zavod No 27 in Leningrad with additional armour plate to better protect them against newer German anti-tank guns. Surprisingly, these were still in service at Leningrad in June 1944. (Sovfoto)*

veteran of the Civil War, and had served in the armoured forces since 1932. The 30th Tank Bde. was considerably smaller than a division, so when reformed, it had only half of the necessary senior commanders and only 43 per cent of the junior officers required. This was exacerbated by the fact that most of the enlisted men were new recruits from the spring 1941 draft, entering service only in April and May 1941. The first new T-34 tanks began arriving on 25 April with the last arriving on 25 May 1941. In total, the division received 173 T-34 tanks and 49 KV tanks, making it the best equipped tank division in the Red Army (the official table of equipment for a tank division was 210 T-34 and 63 KV, but no division in 1941 reached this level). However, it had serious shortcomings in other areas. It received only 30 per cent of the radios, 28 per cent of the engineer and bridging equipment, 22 per cent of the wheeled vehicles, 13 per cent of the repair equipment, and only two per cent of the spare parts needed. The tank drivers seldom had more than five hours of actual driving experience, and many of the crews had not fired a tank gun before the war broke out in June.

The division began the war a few kilometres east of the city of Lvov. The division's first engagement took place on 23 June 1941 near Kamenka Strumilova where 18 German tanks and five anti-tank guns were destroyed for the loss of 11 Soviet tanks. During a night battle on 24 June, 16 German tanks were claimed for 15 Soviet. The division saw fighting nearly every day over the next two weeks, but during the Brody-Dubno fighting it often engaged German infantry, losing fewer tanks than those Red Army units tangling with the 11th and 16th Panzer Divisions.

The front commanders had very poor intelligence on German movements, so the division was often sent on forced road marches to battle with phantom paratroopers or tank columns. The forced marches were a horror; the region was full of rivers and swamps which were impassable to tanks and the roads were a frequent target for Stukas. The division's T-34 drivers were inexperienced, and there were frequent breakdowns. During lulls in the fighting, the division's officers were forced to conduct special training sessions on the most elementary aspects of crew drill such as driving, and firing the main gun.

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Another of the changes introduced at the Stalingrad Tractor Plant in late 1941 was this modified turret which had a simple flat plate at the rear, without the usual rounded corners, to expedite production. This particular tank is named after Ordzonikidze, a popular Bolshevik leader from the 1930s.



During the first month of fighting, the 32nd Division lost 37 of its 49 KV tanks and 146 of its 173 T-34 tanks, with casualties totalling 103 dead and 259 wounded. Half of the tank losses were due to mechanical breakdowns and a lack of spare parts or recovery vehicles, and a further ten per cent were shipped back to the factory for repair by rail. Only 30 per cent of the losses were due to combat, and ten per cent were lost when they became stuck in bogs. The division claimed to have destroyed 113 tanks and 96 anti-tank guns, but these figures appear to be excessive when compared to German accounts. A striking feature of the division was the disparity between its assets and its results. Even though it was one of the best equipped divisions in the Red Army, its combat record was hugely disappointing. The enormous shortcomings in training and tactics demonstrated by Red Army tank units rendered the T-34 a very blunt sword during Operation 'Barbarossa'.

#### The German reaction – the Panther

Although it initially failed to realise its full potential on the battlefield, the T-34 had a profound effect on German tank design. Despite encounters with the redoubtable French Char B1bis in 1940, German tank design had continued to stagnate. The T-34 finally forced the German tankers out

of their complacency. The technical superiority of the T-34 over the PzKpfw III and PzKpfw IV led to some hysterical calls for German industry to begin making copies. After examining some captured examples, engineers noted that the aluminium engine used in the T-34 could not be mass-produced in Germany. Furthermore, the prospect of a tank designed by the 'sub-human' Slavs being manufactured by Hitler's Third Reich was inconceivable. Instead, a new design was begun which took two years to complete. The resultant Panther didn't emerge on the battlefield until the summer of 1943; in the meantime, Panzer units had to make do with a series of incremental improvements to their existing medium tanks.

#### The Battle of the Factories

The staggering losses of the Red Army nearly led to a German victory in 1941. At enormous cost, the Red Army finally halted the German advance in the late autumn of 1941 almost literally in the suburbs of Moscow. The attention of the tank factories shifted from improving the T-34 to simply keeping the assembly lines open. The plan to replace the T-34 with the T-34M was cancelled since it would have disrupted production.

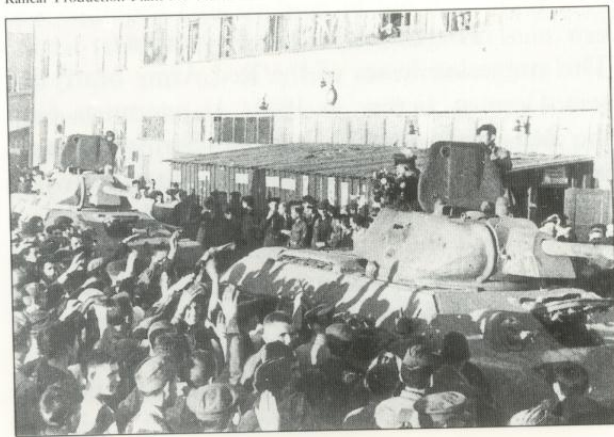
In July 1941, a programme began to transfer key factories from the western Soviet Union to



*A T-34 Model 41/42 abandoned in a river during the summer of 1942. Note the features of this interim model produced at the Stalingrad Tractor Plant: the new pattern driver's hatch, the interlocked glacis armour, the chisel-shaped gun recuperator housing, the undercut turret front and the flat turret rear plate.*

new industrial cities in the distant Urals mountain region to prevent their capture by the Germans. In late August 1941, the main T-34 production plant, the Kharkov Locomotive Plant (KhPZ Zavod No 183), began to be evacuated to Nizhni Tagil where it was renamed the Uralvagon Plant No 183.<sup>1</sup> The first tank from the new production plant was not ready until 20 December 1941. To compensate for the temporary loss of the Kharkov plant, the Krasnoye Sormovo factory in Gorkii was ordered to begin preparing to manufacture the T-34 in July 1941; the first were delivered to the Moscow Front in November 1941. Plans to build the T-50 infantry tank as a replacement for the

<sup>1</sup> Its name in full was Uralskii Vagonstroitel'nyi Zavod No 183 Imeni I.V. Stalina (Ural Railcar Production Plant No 183 named for I.V. Stalin).



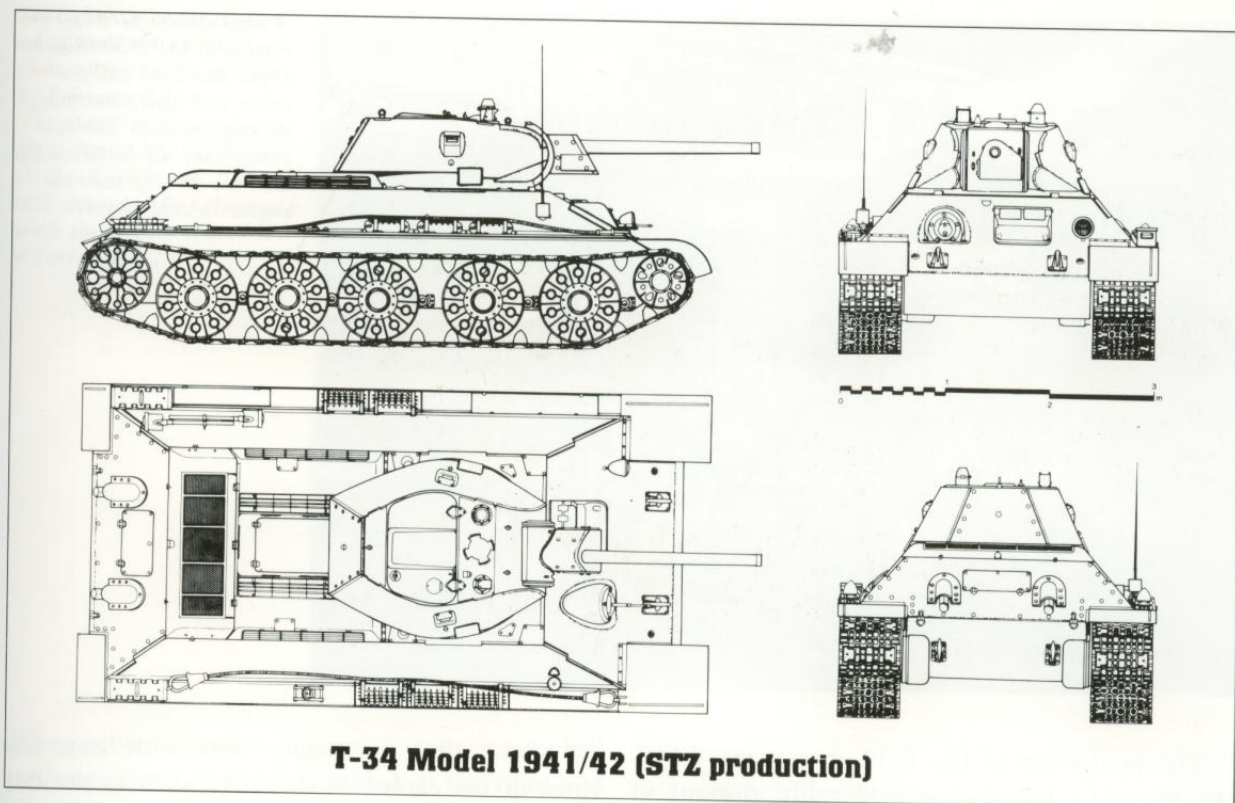
old T-26 were cancelled and instead Plant No. 174 in Omsk was switched to the manufacture of T-34 components.<sup>2</sup> A total of 1,886 T-34s were manufactured in the second half of 1941, mainly at Stalingrad. Production actually decreased as the year went on due to the disruption caused by factory relocations, with 1,121 T-34s in the third quarter and only 765 in the final quarter of 1941. Shortages of V-2 diesels led to some tanks being manufactured with the older M-17 petrol engine, and others received the shorter F-32 76.2mm gun when supplies of the standard F-34 ran low.

With the Red Army barely surviving in the winter of 1941-42, every effort was made to increase tank production. Morozov's T-34 Main Design Bureau, the GKB-T-34 in Nizhni Tagil, set about trying to simplify sub-assemblies as much as possible. For example, the original 1941

<sup>2</sup> This plant's official name was Krasnoye Sormovo Zavod No. 112 Imeni A.A. Zhdanov.

*Left: The Stalingrad Tractor Plant remained open until September 1942, even after German troops had reached the outskirts of the city. There are stories of unpainted tanks being sent into action straight from the production line. Here, the citizens of Stalingrad*

*wave to a T-34 unit being dispatched from the factory to the front in August 1942. The lead vehicle, one of the less common types with a cast turret, sports the chisel-nosed gun mantlet characteristic of the Barrikady Plant in Stalingrad. (Sovfoto)*



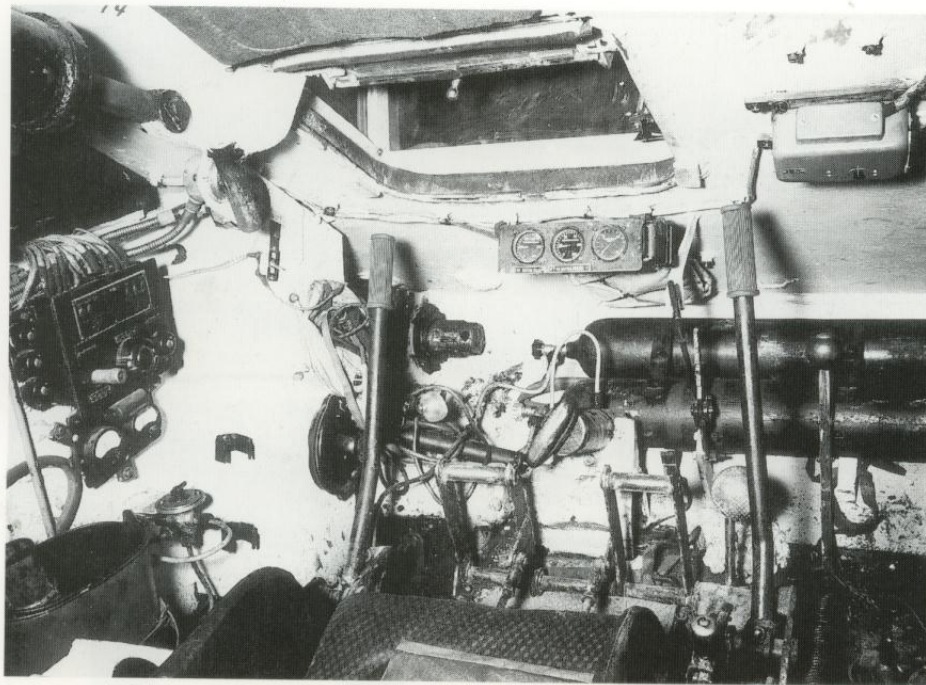
**T-34 Model 1941/42 (STZ production)**

version of the F-34 76.2mm gun had 861 parts, whereas the 1942 production version only had 614. The high level of craftsmanship disappeared but production time of the T-34 was cut in half and the cost was driven down from 269,500 roubles in 1941 to 193,000 in 1942. Many of the hull fittings were simplified and some features, such as a second roof periscope for the loader, were simply omitted.

In spite of its many technical advantages over the contemporary German tanks, the T-34 displayed a number of inherent shortcomings which significantly affected its combat performance. The use of a cramped two-man turret and the lack of radios were serious drawbacks. These were difficult problems to correct in the short-term. Other problems could be dealt with more readily. Often cited in after-action reports were the unreliable clutch/gearbox, the vulnerability of the driver's front hatch to enemy fire, and the vulnerability of the hull side armour. The smooth plate tracks were unpopular as they gave poor traction in muddy conditions, and they were excessively prone to breaking under enemy fire; nevertheless,

compared to the KV, the T-34 had proven to be a more dependable vehicle. For example, in the 10th Tank Division, only 16 per cent of the T-34s were abandoned to the Germans due to mechanical problems, with the rest lost in combat. In contrast, 44 per cent of the KVs succumbed to breakdowns.

As a result of combat experience, some modest improvements in the T-34 took place. The hull side armour thickness was increased from 40mm to 45mm. A new style of driver's hatch was introduced, the rectangular transmission access hatch on the rear plate gave way to a circular hatch, and the engine grill-work was simplified. A new, wider 500mm track with a waffle pattern cast on the front improved traction. Vehicles with this modified hull are referred to here as T-34 Model 1942. It should be noted that the Red Army never had a consistent policy for designating the many sub-variants of the T-34 tank. Some Russian histories refer to the original version as the T-34 Model 1939, rather than T-34 Model 1940 as used here, or T-34 Model 1942 for the variant called T-34 Model 1943 here.



*A view inside the driver's station of the T-34 Model 1942. The T-34 had few frills, and used elementary driving controls. The two compressed air bottles in the nose are to help start the engine in cold weather.*

The production of the T-34 at so many different locations led to a considerable amount of detail variation. For example, the T-34 Model 1941s manufactured at the STZ plant in Stalingrad had a glacis plate which interlocked with the side hull plates, and the rear turret panel was a larger, separate item. The STZ plant did not immediately transfer all the features of the T-



*The T-34 Model 1942 was a simplified version of the Model 1941, introducing a new pattern of tracks, new driver's hatch and many other small features. This is a T-34 Model 1942 knocked*

*out in the summer of 1942. The pattern of hand-holds on the tank are typical of the Krasnoye Sormovo Factory in Gorki. (US National Archives)*

34 Model 1942, producing tanks with some features of the earlier Model 1941 such as the rear access hatch. Here, this intermediate version is called T-34 Model 41/42. The *Barrikady* Plant in Stalingrad which manufactured the guns for STZ eventually simplified the gun housing, giving it a chisel-nosed appearance. The Stalingrad Ship Plant, which fabricated the turrets, modified the cold-rolled, welded turret in 1942 by chopping off the lower corner of the turret front, another distinctive feature of the later STZ-manufactured tanks.

The cold rolling presses used at Kharkov were temporarily lost when the plant was moved to Nizhni Tagil, so the first Uralvagon T-34s used a new cast turret developed by M. Nabutovskiy. The cast turrets used by the Krasnoye Sormovo plant used a slightly different shape and thicker armour, about 60mm vs 52mm compared to the Uralvagon plant. By 1942, there were serious shortages of rubber at many of the Soviet tank plants so a new all-steel wheel was introduced as a temporary expedient. This wheel was not popular in the field, as contact against the metal track at high speeds set up harmonic vibrations that were noisy and unpleasant for the crew, and could cause damage to the tank itself by loosening parts.

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When rubber supplies improved, some tanks had rubber rimmed roadwheels added to the front and rear, leaving three metal wheels in the centre where they caused fewer problems. By 1943, the all-steel wheel had disappeared completely.

#### Reviving the Red Army Tank Force

The addition of the new tank plants helped the Red Army build up its tank strength for the summer 1942 campaigns. The army had undergone considerable reorganisation since June 1941. On 15 July 1941, the mechanised corps were disbanded, in no small measure due to the enormous tank losses. The tank divisions in these corps were reorganised as tank brigades, which were viewed as more easily manageable for the new and inexperienced commanders. The August 1941 tank brigade had a strength of 93 tanks consisting of a company of seven KV heavy tanks, two companies of T-34 tanks and six companies with 64 light tanks such as T-26, BT-7 or Lend-Lease types. Heavy tank losses and low production in the autumn months led to the reduction in size of the tank brigade to 67 tanks in September 1941.

The new tank brigades were intended for independent action in support of army or front operations. For direct support of the infantry, separate



The T-34 Model 1943 introduced a new hexagonal turret and was produced in small numbers in the spring of 1942. This is a particularly early example, lacking the later armoured mantlet for the hull DT MG and

the radio plug on the hull side. The slogan on the turret side, in Ukrainian, reads 'За радянську Україну!', 'For the Soviet Ukraine!'. (US National Archives)



*In the autumn of 1942, T-34s began to be fitted with external 40-litre fuel containers on the hull rear. This particular T-34 Model 1943, named 'Moskovskiy Khokolznik', appears to have had its right side container knocked off in combat. (National Archives)*

tank battalions were eventually organised, equipped mainly with older designs and Lend-Lease tanks. Tank brigade strength continued to drop through the winter due to the production shortfalls. The official organisation in December 1941 was only 46 tanks, down to only 27 in February 1942. Many brigades didn't even reach these official figures. However, the surge in tank production in early 1942 allowed the tank brigades to grow again. The April 1942 table of equipment saw the strength rise to 46 tanks: 16 T-34s, 10 KV-1s and 20 light tanks.

As Red Army commanders grew more confident in their handling of armour, steps were underway to rebuild the large tank formations. In March 1942, the first of the new tank corps was formed. The term 'corps' is rather misleading; in fact they were what would be called armoured divisions in the West. The first of these had two tank brigades and a motor rifle brigade with 20 KV-1s, 40 T-34s and 40 light tanks, raised again in mid-April 1942 to three tank brigades totalling 150 tanks. They were first committed to action in May 1942 and suffered serious losses in the Kharkov operation. Evidently, Soviet commanders

were still not very adept at using the armoured force, often breaking the corps up into separate sub-units to support the infantry. Tank losses in May alone were nearly 1,500.

The Kharkov battles led to a serious reassessment of the Red Army tank forces. The tank brigades were heterogeneous units with T-34s, KV-1s and T-60s. The KV-1 heavy tanks were a frequent source of difficulty, being considerably slower than the T-34 and T-60 light tanks, having a propensity to crush bridges because it was so slow and thus become isolated from the rest of the brigade. Although the KV had emerged from the 1941 onslaught as a 'wonder weapon', it was no longer invulnerable by 1942. By then the more experienced Soviet tank commanders preferred the faster and more reliable T-34, and would have preferred to see KV heavy tank and T-60 light tank production end altogether. Although plans were considered to end all light and heavy tank production, this would have disrupted the armament industry just as it was beginning to rise to the challenge of meeting the Red Army's production requirements. As a compromise, the KV was removed from the tank brigades, and reorganised

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*A fine example of a typical 1943 production machine. This T-34 Model 1943 has the hexagonal turret, the hull MG mantlet, and the mid-war infantry hand-holds. The slogan on the turret side is 'From the Trade Union of the Co-Operative Centres'.*



in separate tank regiments to support the infantry. Part of the KV production line capabilities at Chelyabinsk was reallocated to the T-34. The new July 1942 tank brigade establishment had three companies with 32 T-34s and one company with 21 light tanks.<sup>1</sup>

The reorganisations did not come in time to have any effect on the late summer battles at Voronezh and on the Don River. Losses were staggering, almost 8,000 tanks from July through September 1942. The German 6th Army pushed into Stalingrad, the high water mark of the Wehrmacht advance on the Eastern Front.

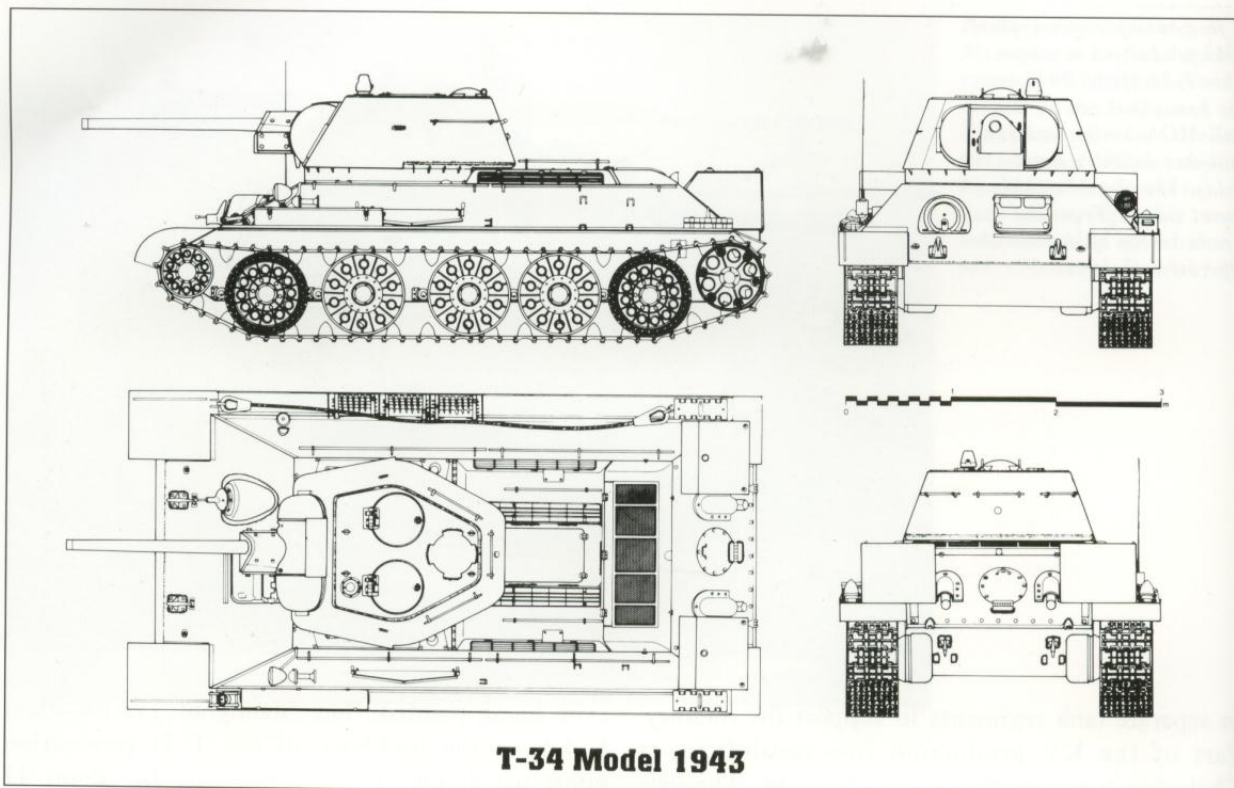
With the Wehrmacht approaching Stalingrad and its key tank plant, efforts were begun to lessen the impact on T-34 production should the city fall to the Germans. In August 1942, the massive Tankograd complex at Chelyabinsk, which had been building the unpopular KV-1, began shifting part of its production to T-34s. Remarkably, the Stalingrad plant continued to produce tanks until September 1942 as the Germans were fighting in the outskirts of the city. There is a popular story that the final batches were rushed out into the street fighting without

even being painted. The Stalingrad Tractor Plant had been the backbone of the T-34 production effort up to that point, accounting for about 42 per cent of all T-34s built. The Uralmash plant in Sverdlovsk, which had been manufacturing KV and T-34 hulls and turrets, concentrated solely on the assembly of T-34s from October 1942 to help make up for the loss of the critical Stalingrad plant.

Although the primary effort in 1942 was simply increasing T-34 production, some modest efforts were made to improve the design. One of the offshoots of the short-lived T-34M programme was a new hexagonal turret design introduced on the T-34 Model 1943. This was larger and more spacious than the early type, with 70mm frontal armour and 52mm side armour. Ammunition stowage was increased from 77 rounds to 100 rounds, and the turrets were generally manufactured by casting, with a rolled-plate roof. However, those produced at Uralmash with a special 5,000-ton forge had a distinctly rounder appearance. A total of 2,670 of these drop-forged turrets were manufactured, and they were used on tanks assembled on the new production lines at Tankograd in Chelyabinsk and at Uralmash in Sverdlovsk. Not all turret production facilities switched to the new hexagonal turret. One of the

<sup>1</sup> These organisational guidelines are called *shtat* in Russian, or Tables of Organisation and Equipment (TO&E) in the West. It should be remembered that they represented a norm, and few brigades actually had so many tanks except when newly formed.





**T-34 Model 1943**

plants supplying Krasnoye Sormovo in Gorkii continued to produce the smaller Model 1942 type until the end of 1942, and both turret types were mounted on hulls concurrently. Other improvements were incorporated into the T-34 Model 1943 design, including a new 'Tsiklon' air filter, a new five-speed gearbox and many other detail changes. By the summer of 1942, a new style of 40-litre exterior fuel box was manufactured for the T-34 in at least two patterns, and mounted in pairs on the rear plate. Early in 1943, a new style of external fuel stowage was adopted, using three cylindrical fuel canisters on the hull side. These containers did not directly feed into the tank's fuel system. The crew used a small electrical pump or a hand pump to transfer fuel into the internal fuel cells.

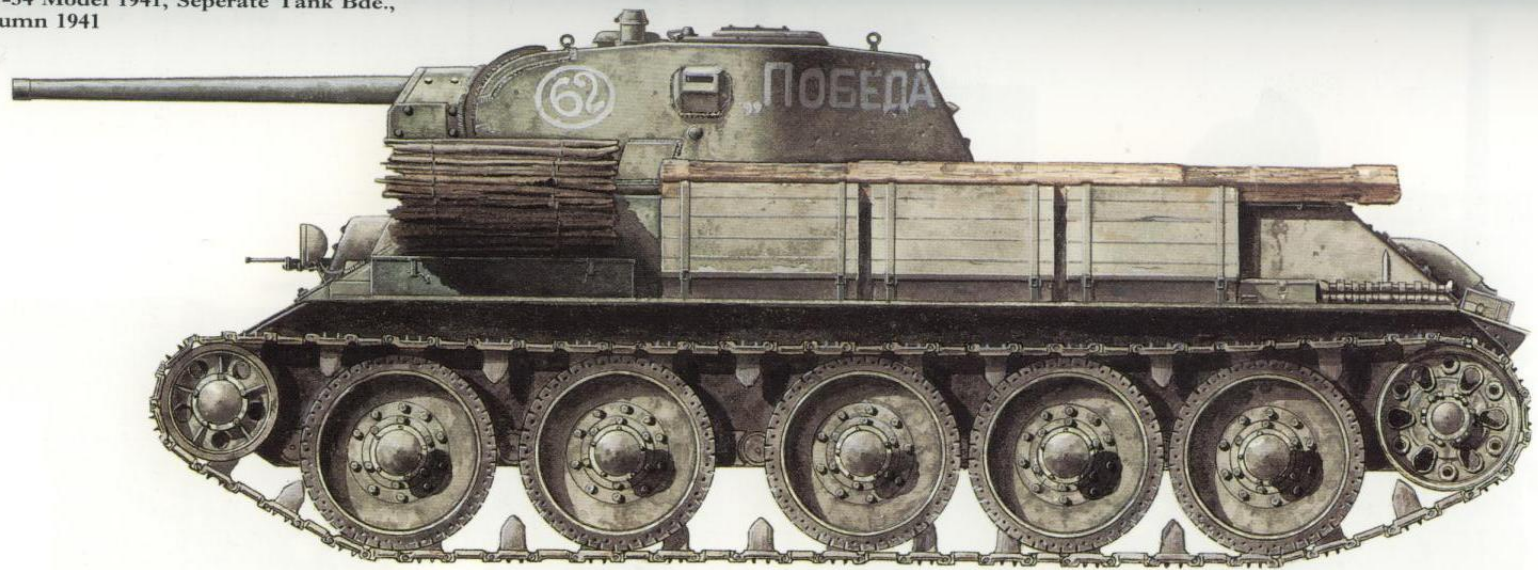
#### Universal Tank

In June 1943, the GABTU issued a technical requirement document to both the GKB-T-34 at the Uralvagon plant in Nizhni Tagil and the SKB-2 heavy tank design bureau at Tankograd in Chelyabinsk for the development of a new 'uni-

versal tank'. The idea was to combine the best features of heavy tanks, namely their thicker armour, with the desirable features of medium tanks, namely their greater mobility and lower weight. Two competitive designs were developed, the T-43 at Nizhni Tagil and the KV-13 at Chelyabinsk.

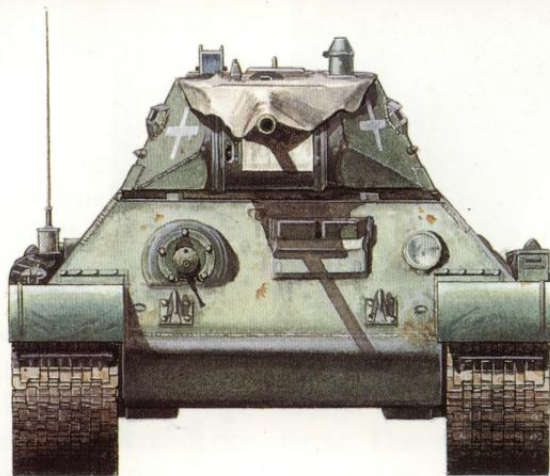
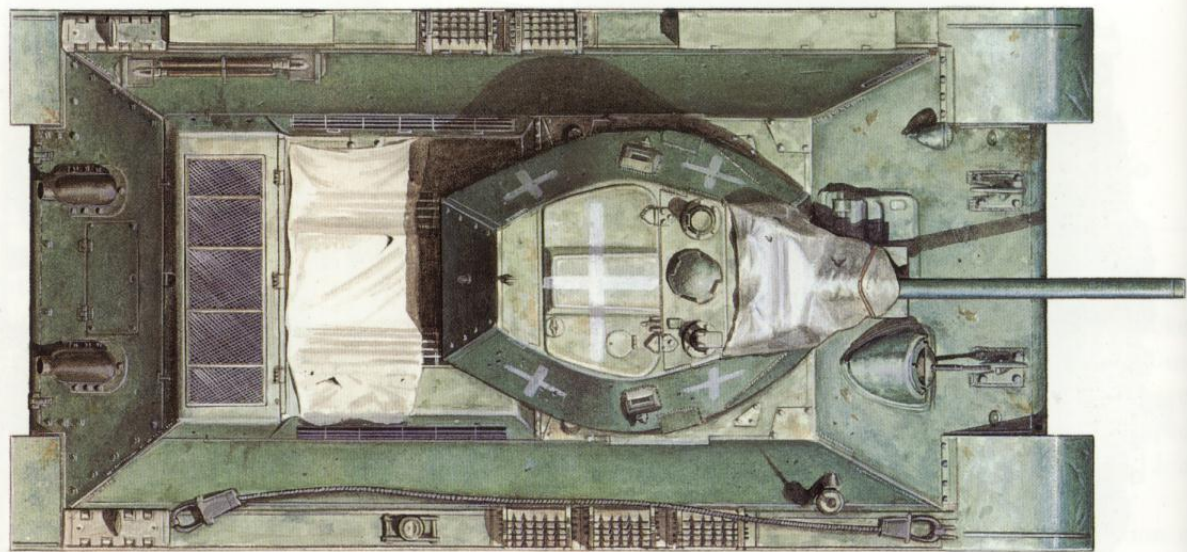
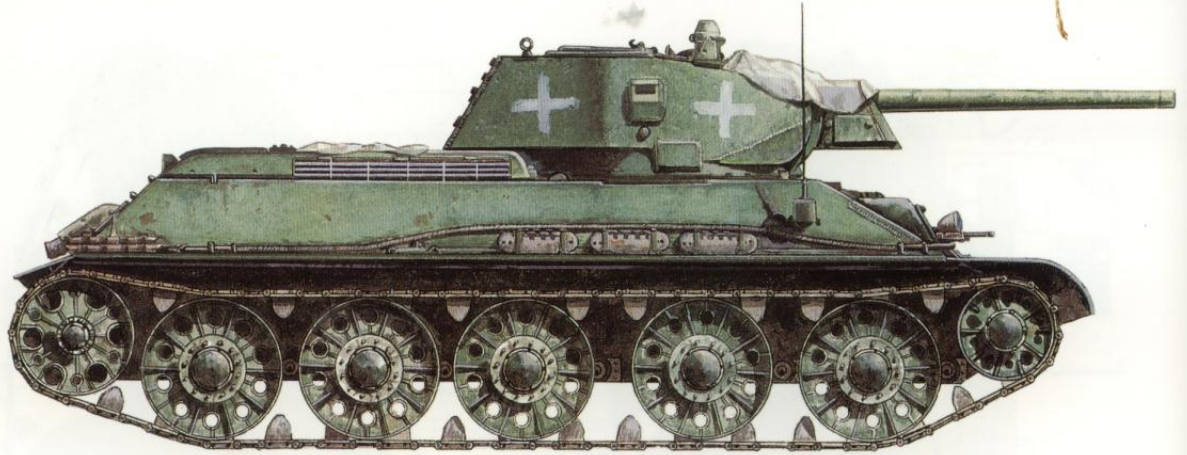
The T-43 was in many ways a resurrection of the short-lived T-34M project of 1941, except that more emphasis was placed on armour protection. The turret frontal armour was increased to 90mm, and the glacis and hull side armour was increased to 75mm. As on the T-34M, a torsion bar suspension was used instead of the Christie suspension, but the typical large roadwheels of the normal T-34 were retained. The T-43 introduced a new three-man turret, and the commander was provided with a cupola for all-around vision. About three-quarters of its internal components were identical to those on the T-34 Model 1943, though the hull and turret were considerably different. Due to the priority afforded to the T-34 programme, the prototypes were slow to reach completion and the first was not finished until

1: T-34 Model 1941, Seperate Tank Bde.,  
Autumn 1941



2: T-34 Model 1941, Seperate Tank Bde.,  
Autumn 1941

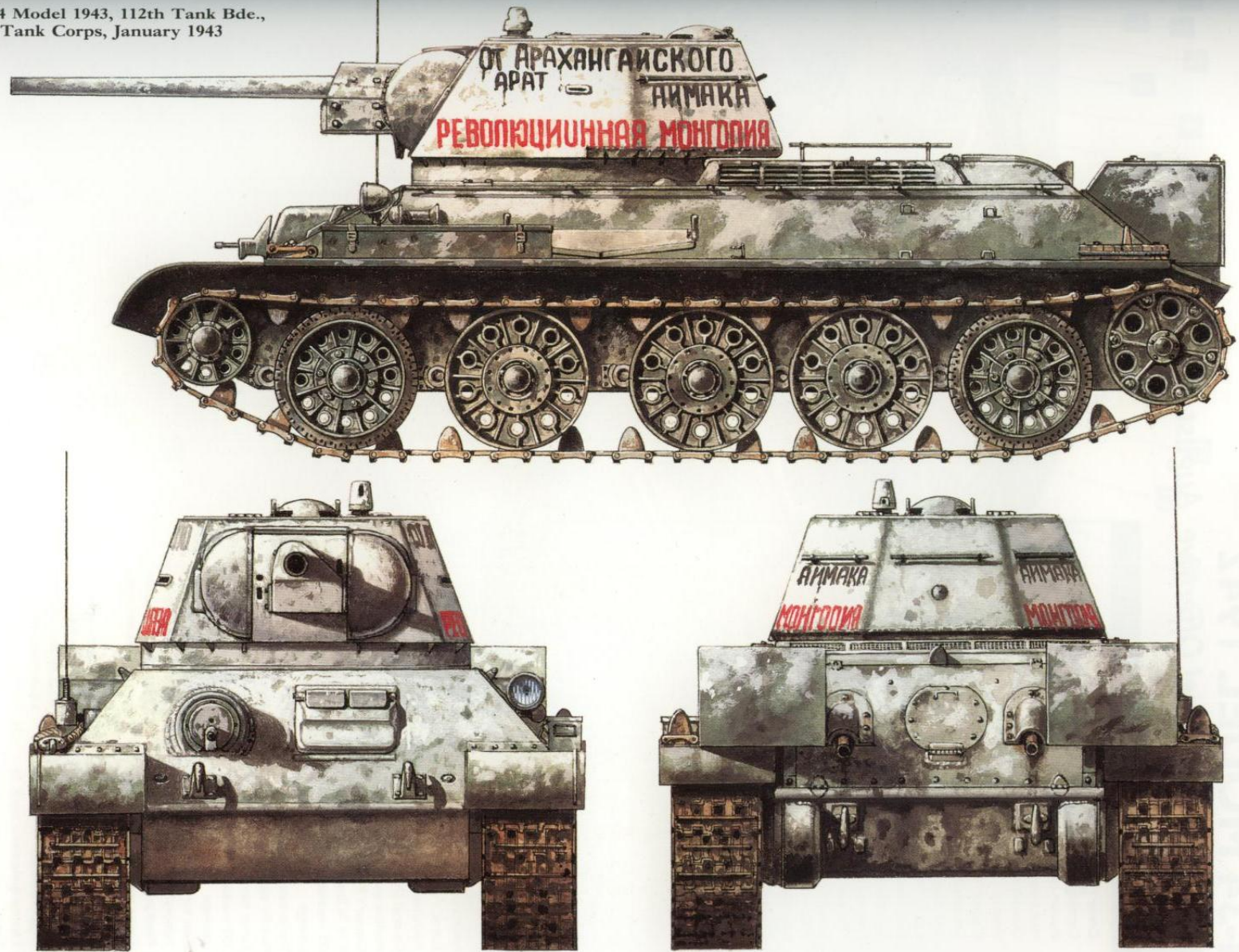




T-34 Model 1941/42, Italian  
62° Gruppo, 120° Reggimento  
d'Artiglieria, Southern Russia,  
Summer 1942

B

T-34 Model 1943, 112th Tank Bde.,  
6th Tank Corps, January 1943



# T-34 MODEL 1942

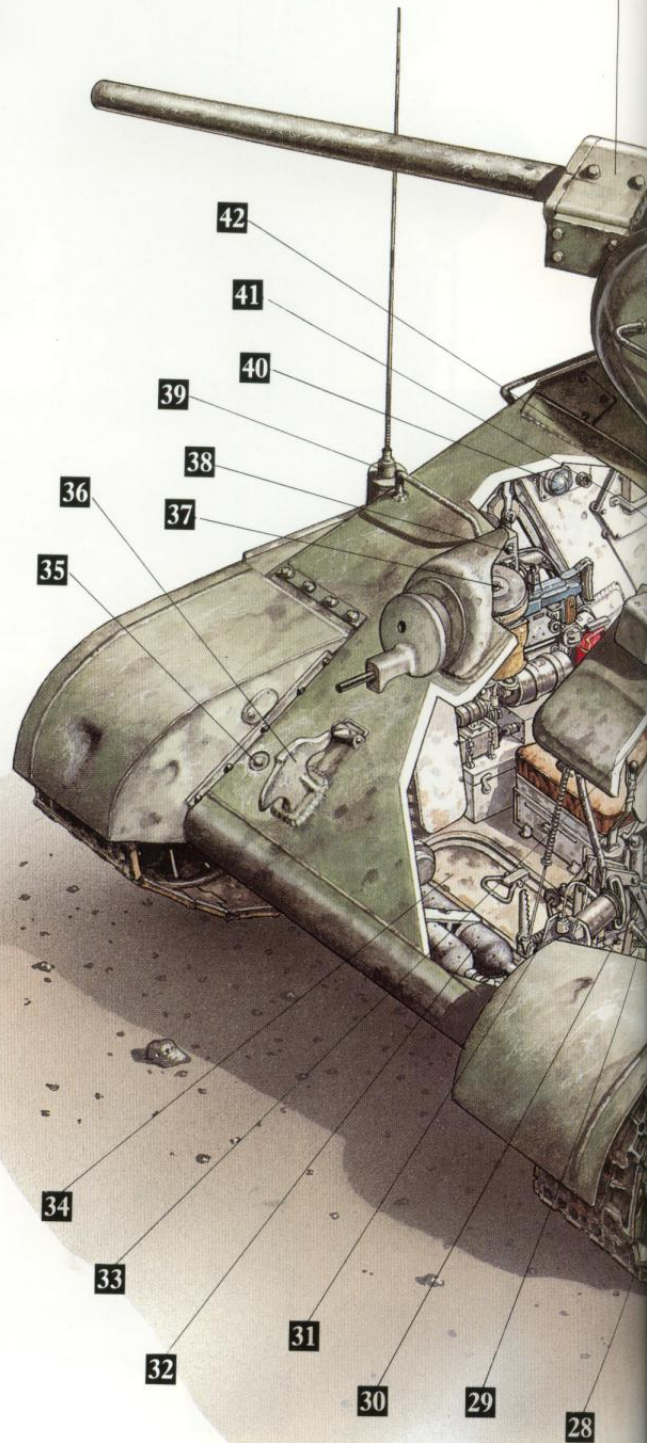
3rd Tank Army, Kozel Offensive, August 1942

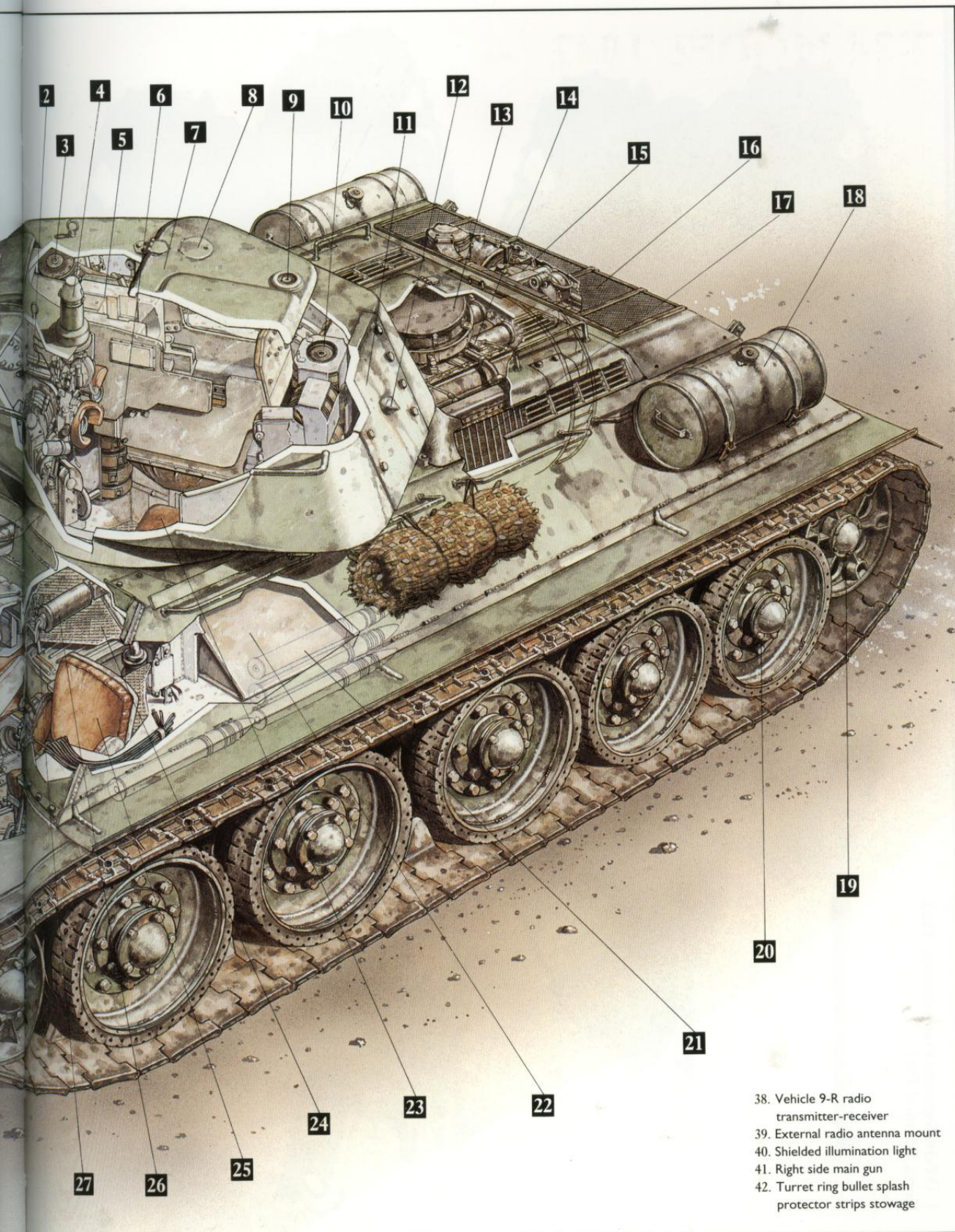
## SPECIFICATIONS

**Crew:** Four  
**Combat weight:** 28 tons  
**Power-to-weight ratio:** 17.5-19 hp/t  
**Hull length:** 6.10 m  
**Overall length:** 6.73 m  
**Width:** 2.92 m  
**Engine:** V-2-34 diesel, 4-stroke, 12 cylinder, 500 hp @ 180 rpm  
**Transmission:** dry multi-plate main clutch, mechanical gearbox, one stage side drives with side clutches and strap brakes, 4 gears forward, 1 reverse  
**Fuel capacity:** 148 gallons internal + two external 10 gallon fuel cells  
**Max speed (road):** 34 mph  
**Max speed (cross-country):** 16-25 mph  
**Cruising speed:** 18 mph  
**Max. range:** 290 miles  
**Fuel consumption:** 0.65 gallons per mile (average)  
**Fording depth:** 1.27 m  
**Armament:** F-34 76.2 mm tank gun (42 calibres long)  
**Main gun ammunition:** BR-350A armour-piercing/HE (19 rounds); OF-350 HE/frag (53 rounds); SH-350 shrapnel (5 rounds)  
**Muzzle velocity:** 2150 ft/sec (BR-350A APHE)  
**Max. effective range:** 1.5 miles  
**Stowed main gun rounds:** 77 rounds  
**Gun depression/elevation:** -3° +30°  
**Secondary armament:** Degtaryev DT 7.62mm machine gun, co-axial DT 7.62 mm machine gun  
**Armour:** 47mm (hull front); 45mm (hull sides); 45mm (hull rear); 65mm (turret front); 65mm (turret sides); 47mm (turret rear)

## KEY

- |   |   |
|---|---|
| 1. Armoured gun mantlet                     | 21. Left hull side main gun ammunition storage              |
| 2. Turret elevation and traverse mechanisms | 22. Left hull side fuel tank                                |
| 3. Co-axial Degtaryev DT 7.62mm machine gun | 23. Gunner's seat   |
| 4. Gunner's PT-5 periscopic sight           | 24. Floor mat over ammunition bins                          |
| 5. F-34 76.2mm tank gun                     | 25. Driver's seat   |
| 6. DT machine gun ammunition stowage        | 26. Hydraulic cylinder for front driver hatch               |
| 7. Turret hatch                             | 27. Floor main gun ammunition storage                       |
| 8. Port for signal flags and flare gun      | 28. Front idler wheel                                       |
| 9. Turret hatch lock                        | 29. DT 7.62mm ammunition storage                            |
| 10. DT machine gun ammunition stowage       | 30. Driver's controls                                       |
| 11. Rear turret access for gun removal      | 31. MG/radio operator's seat                                |
| 12. Pistol port tampon                      | 32. Compressed air bottles for cold weather engine starting |
| 13. Engine cyclone air filter               | 33. Driver's periscopes                                     |
| 14. V-2-34 diesel engine                    | 34. Belly escape hatch                                      |
| 15. Transmission and braking assemblies     | 35. Track tension adjustment bolt                           |
| 16. Screening over engine fan               | 36. Front towing shackle                                    |
| 17. Engine radiators                        | 37. Degtaryev DT 7.62mm machine gun                         |
| 18. External fuel tank                      |   |
| 19. Drive sprocket                          |   |
| 20. Main road wheel                         |   |

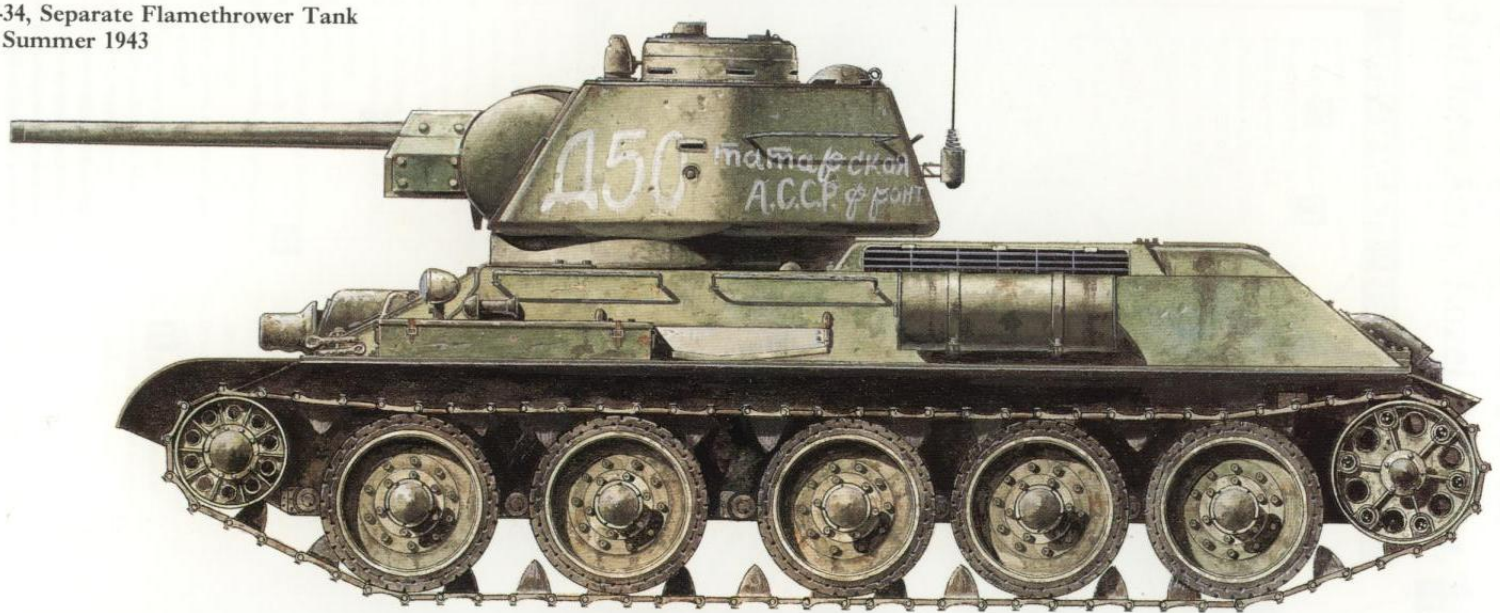




- 38. Vehicle 9-R radio transmitter-receiver
- 39. External radio antenna mount
- 40. Shielded illumination light
- 41. Right side main gun
- 42. Turret ring bullet splash protector strips stowage

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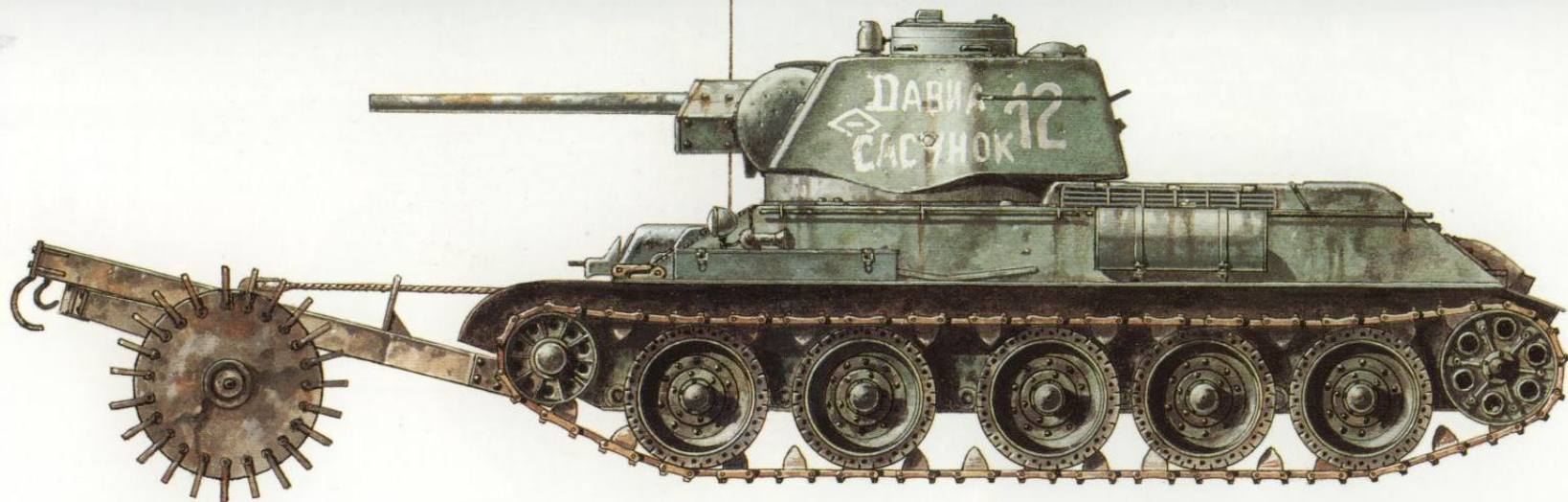
1: OT-34, Separate Flamethrower Tank  
Regt., Summer 1943



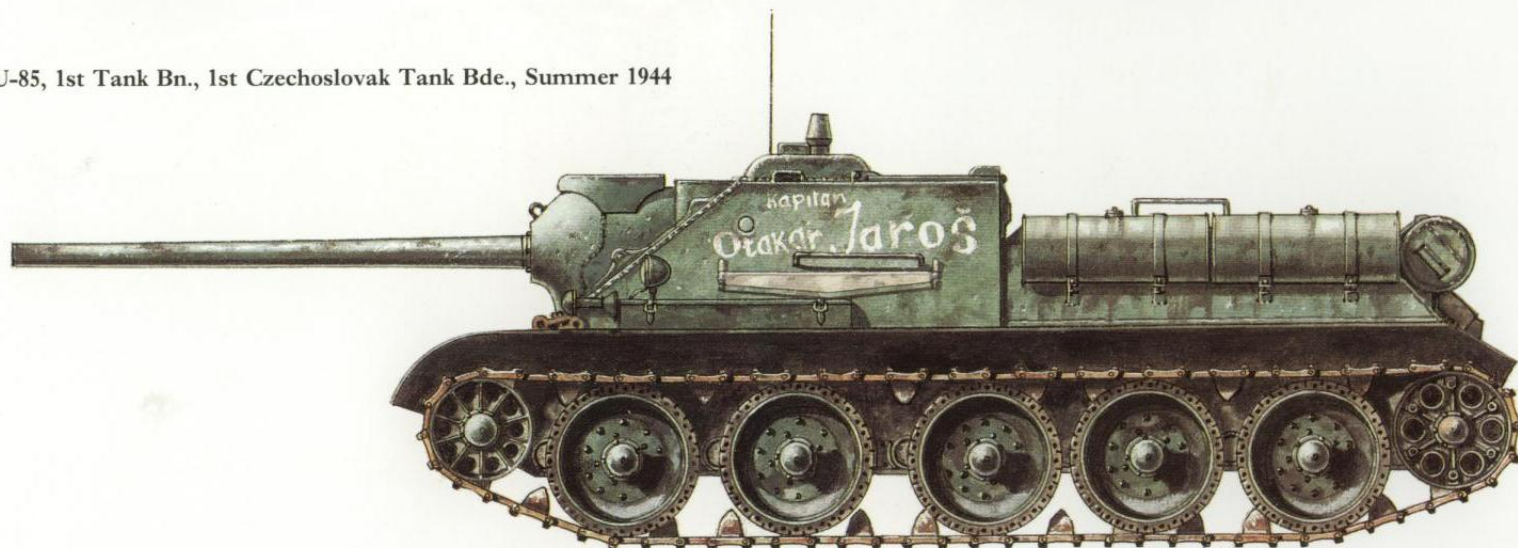
2: OT-34, Flamethrower Tank Regt., 1st  
Tank Army, March 1944



1: PT-34, 116th Separate Eng. Tank Regt., Byelorussia, June 1944



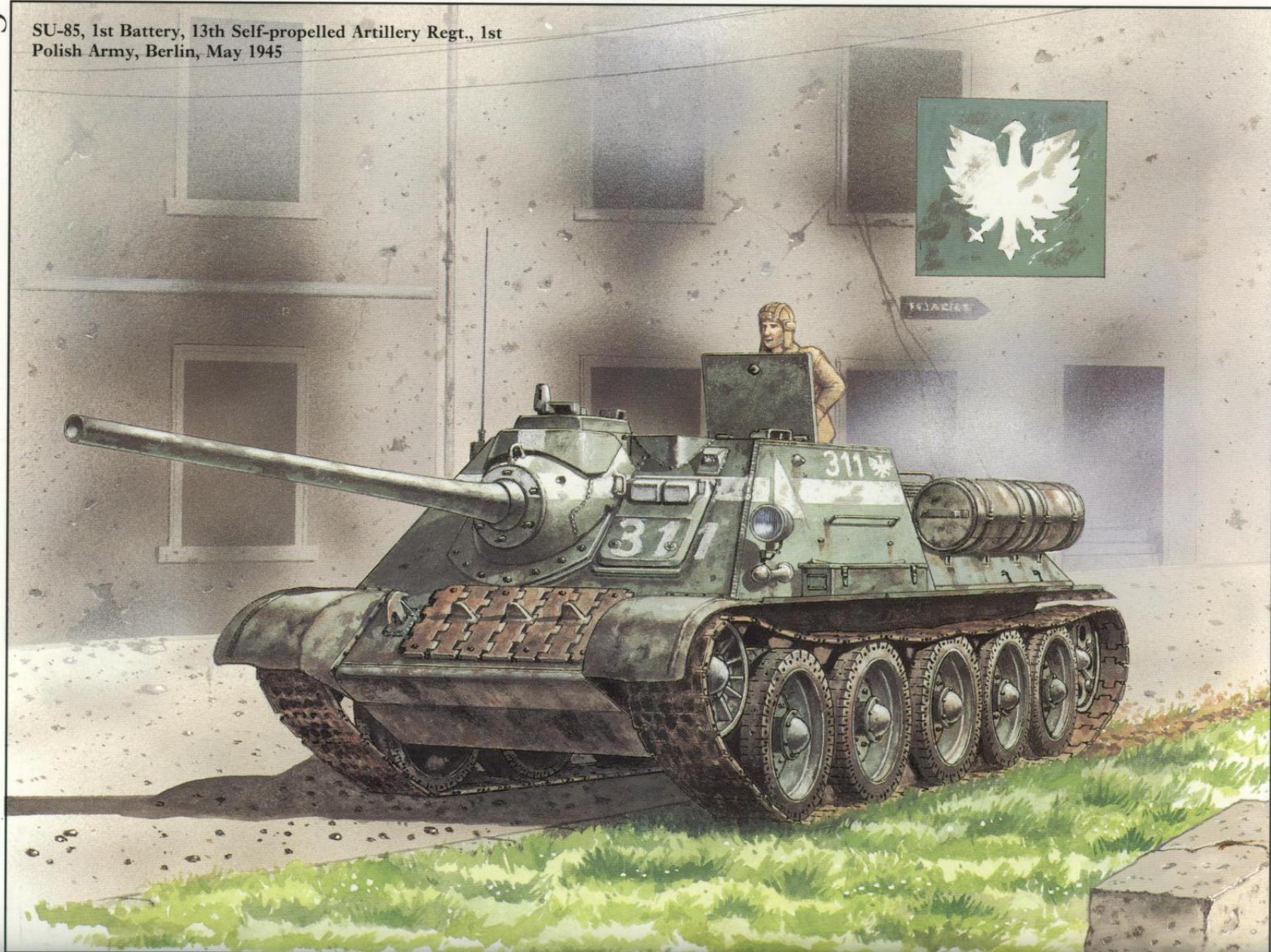
2: SU-85, 1st Tank Bn., 1st Czechoslovak Tank Bde., Summer 1944





G

SU-85, 1st Battery, 13th Self-propelled Artillery Regt., 1st  
Polish Army, Berlin, May 1945



Another T-34 Model 1943 from the 30th Gds. Tank Bde. near Krasnoye Selo during the battles to relieve the siege of Leningrad. This tank has the later style 40-litre fuel cells on the rear. Besides its name 'Leningradets', the tank is also decorated with the Order of the Red Banner. (Sovfoto)



March 1943. The T-43 prototypes underwent extensive road tests at Kubinka where it became evident that the heavier armour significantly decreased mobility in comparison with the T-34. No serious thought was given to series production of the T-43 as the upcoming summer campaign required all resources to be directed towards maximum production. The summer battles in the Kursk-Orel salient, followed by the Soviet counter-offensive, made it clear that the main failing of the T-34 was its gun, not its armour. As a result, a crash programme was begun to arm the T-34 with a new 85mm gun. (The full story of this variant, the T-34/85, will be covered in a subsequent New Vanguard.) As a result, the T-43 was dropped.

The final improvement to the T-34 in 1943 was the addition of a circular commander's cupola on the turret roof. This was a modest help to the commander, but still did not alleviate his excessive work-load. One of the most significant changes in the T-34 was the wider availability of radio sets. Production of tank radios was two and a half times greater than in 1942. As a result, all new tanks were supposed to be equipped with radios, making co-ordinated tank tactics easier to accomplish. In practice, about 75 to 80 per cent had functional radios by the summer of 1943, but even this was a vast improvement.

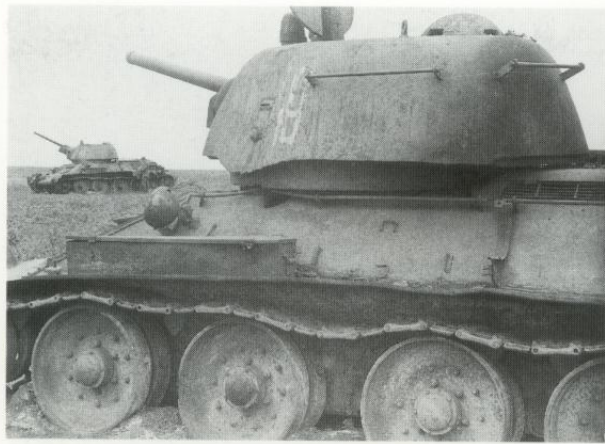
### Kursk-Orel

The heyday of the T-34 would come in the summer of 1943 during the battles in the Kursk-Orel salient. By this time, the T-34 had lost much of its technical superiority. New German tanks, notably the Tiger and Panther, were better armoured and armed. The most common German



*There was considerable variation in the turrets of the T-34 Model 1943s due to the large number of factories involved in their manufacture. The Uralmash Plant in Sverdlovsk used a special forge to manufacture turrets*

*like this one, while most other plants used casting techniques. The Uralmash turrets were used on T-34s assembled at Uralmash and the Tankograd plant at Chelyabinsk. (National Archives)*



*A good example of the Uralmash turret on a T-34 Model 1943 knocked out during the summer of 1943.*

*The characteristic feature of this version was the very rounded shape of the turret. (National Archives)*

tank, the PzKpfw IV, was essentially equivalent to the T-34 in most respects; the T-34 enjoyed slightly better mobility, but the turret layout of the PzKpfw IV made it a more formidable opponent in tank combat. However the telling advantage was the sheer number of T-34s available.

The Red Army had gradually adopted a doctrine which avoided trying to match the Germans in either technical or tactical quality. Red Army tank technology, tanker training and tactics were



*The T-34 Model 1943 was the most common variant in service in the pivotal battles in the Kursk-Orel bulge in July 1943. This tank, named 'Stalinets', served with the 30th Guards Tank*

*Brigade. It was credited with eight tank kills when this photo was taken in the autumn of 1942. The female NCO is probably a medic; women tank drivers did not become common until 1943.*

not equal to German capabilities in a one-on-one tank duel. But the Red Army commanders had realised that mechanised combat was not determined by individual tank battles, but by the titanic clash of massive combined arms formations. At this level, the Red Army built up substantial advantages in numbers. Even if the Wehrmacht succeeded in destroying a disproportionate number of Soviet tanks, there would always be more tank formations to deal with. Furthermore, at an operational level, Red Army commanders were demonstrating a facility with large combined arms formations that was equal or superior to the over-extended German adversaries.

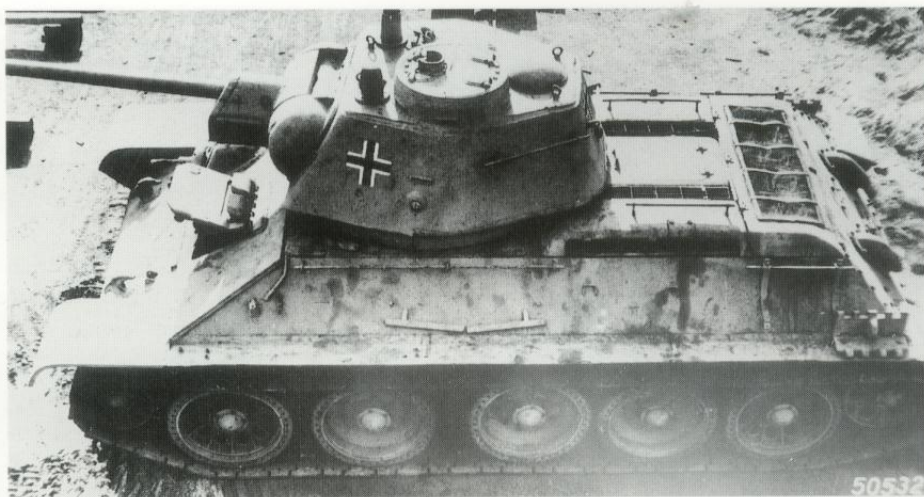
During the battles of the Kursk-Orel salient Soviet tankers used the rolling terrain in some sectors to mask their approach. By attacking at close range, the T-34s had a better chance of penetrating the thicker armour of the new German tanks. Some of the Panzers, especially the Panther, were plagued with teething problems. Fortunately for the Red Army, Panthers and Tigers were still in the minority, and the bulk of the German tank force was still made up of PzKpfw III and PzKpfw IV medium tanks. Soviet tank casualties in the summer 1943 fighting were staggering, about 9,000 tanks from July through September.<sup>2</sup> German armoured vehicle losses during the summer fighting were about 2,200. However, with Soviet tank production finally stabilising, these losses could be endured. Furthermore, as the Red Army was in control of the battlefield, many tanks were recovered; each Soviet tank was rebuilt on average four times due to combat damage and mechanical breakdown.

The T-34 remained in service until the end of the war, though it formed an ever shrinking percentage of the total force due to attrition and the switch to T-34/85 production. Peak production for the T-34 came in 1943, with 15,712 manufactured. In 1944, output shrank to only 3,723 as the T-34/85 came on line. T-34 production totalled

<sup>1</sup> During Operation Citadel, the German armoured units taking part had 196 Panthers and 181 Tiger I tanks; there were 597 PzKpfw IIIs and 615 PzKpfw IVs out of about 2,000 tanks. There were a further 520 assault guns. The Red Army's Central and Voronezh Fronts had 3,444 tanks, of which 900 were light tanks (mostly Lend-Lease types). However, the Red Army had a substantial reserve force for a planned counter-offensive which more than doubled these numbers.

<sup>2</sup> These are estimates by the German Fremde Heere Ost, but they seem plausible. Some 18,500 Soviet tanks were claimed as destroyed during the same period, but this figure is discounted by German intelligence.

In 1943, the hexagonal turret was modified by the addition of a vision cupola for the tank commander. This particular vehicle was captured by the Wehrmacht in 1943 and sent to occupied Czechoslovakia for technical evaluation.



35,120, exceeding total German wartime tank production of all types by a healthy margin. A further 19,430 T-34/85s were built, the T-34 thus becoming the most widely produced tank of the Second World War. T-34 tanks armed with 76mm guns were gradually retired from Soviet Army service after the war, remaining examples being scrapped or converted to recovery vehicles. So far as is known, no 76mm-armed T-34 tanks saw action after 1945.

## INSIDE THE T-34

A wartime British Army technical assessment of the T-34 is worth quoting: 'The (T-34) design shows a clear-headed appreciation of the essentials of an effective tank and the requirements of war, duly adjusted to the particular characteristics of the Russian soldier, the terrain, and the manufacturing facilities available. When it is considered how recently Russia has become industrialised and how great a proportion of the industrialised regions have been over-run by the enemy with the consequent loss or hurried evacuation of plant and workers, the design and production of such useful tanks in such great numbers stands out as an engineering achievement of the first magnitude.'

### The basic arrangement

The T-34 was arranged in a conventional fashion for Second World War tanks. The fighting com-

partment was completely open as there was no turret basket, only a single metal conduit pipe which brought in electricity. Behind the engine firewall was the V-2 diesel engine flanked by cooling radiators on either side, a cooling fan in the centre and the transmission at the rear. Fuel was stored in cells located in the angled portions of the hull side. By placing the transmission at the rear of the vehicle, the fighting compartment was not burdened by a drive train running to the front of the tank, as was the case with many Western tanks including the M4 Sherman and the German PzKpfw IV. This allowed the Soviet designers to keep the overall height of the T-34 lower than



T-34 tanks were employed in small numbers by the Wehrmacht on the Eastern Front. This T-34 Model 1943 served in Romania in 1944. Visible modifications

include a German radio aerial, side skirts, note driving light and new stowage bins. (US National Archives)



*The OT-34 flamethrower tank resembled the normal version, but had a flamegun in place of the hull MG. The other distinctive feature is the location of the radio aerial pot at the rear of the*

*turret. This battalion, named after Prince Dimitri Donskoi, was purchased with donations from the Russian Orthodox Church. (Sovfoto)*

comparable Western tanks. Unless noted otherwise, this description covers the standard T-34 Model 1942 version.

#### The hull

The hull of the basic T-34 Model 1942 was constructed using homogenous rolled steel armour plate of a rougher finish than comparable British or American armour but of greater strength, with the 45mm glacis plate having a Brinell hardness of 354 to 400. The early T-34 Model 1940 tanks were built to a standard which was on a par with western European or American designs. By the middle of the war, the workmanship had declined, though the plant inspectors were careful not to permit this to affect the combat performance of the tank. The welding was mediocre, though not so poor as to result in weld failures. The cast turret was not to Western standards, with some porosity evident on the turret surface. However, this did not necessarily reduce the effectiveness of

the armour, and British tests found that the turret casting had a high degree of hardness, on the order of 370-375 Brinell.

#### Armour

The T-34's armour was to prove more than adequate throughout 1941. The glacis plate, although only 45mm thick, had an effective thickness of 75mm due to its extreme angle. Likewise, the extreme sloping of the turret front gave it excellent ballistic protection, even though it was only 45mm thick, (52mm on the Model 1941 cast turret). This made the T-34 virtually invulnerable to the standard German infantry anti-tank weapon of the period, the 37mm gun, as well as the short-barrelled 75mm gun on the PzKpfw IV. The T-34 was generally invulnerable in frontal engagements with the PzKpfw III until the 50mm KwK 39 gun was introduced on the PzKpfw III Ausf. J in the spring of 1942. This could penetrate the T-34 frontally at ranges under 500 metres. The first anti-tank weapon which could deal effectively with the T-34 was the PaK40 towed 75mm gun, introduced late in 1941, and the related KwK 40 75mm gun on the PzKpfw IV Ausf. F which began appearing in the spring of 1942. By the summer of 1943, the PzKpfw IV Ausf. G was entering service with its lengthened KwK 40

*An OT-34 flamethrower tank knocked out in 1944. Aside from the flamethrower head fitted on the hull front in place of the usual defensive MG, this version had the right hull radio socket plugged since the radio was moved into the turret rear. This is a late production tank, probably from 1944, with the angled hull front and late pattern hand-holds.*



L/48 gun which further improved the gun balance in favour of the Germans. The continual upgrading of German tank and anti-tank guns led some Soviet units to add appliqué armour to the T-34. However, this was not adopted as a standard feature as it strained the powerplant and suspension.

#### **The crew**

The crew of the T-34 consisted of four: a driver/mechanic in the left front of the hull, a MG/radio operator in the right front hull, a commander/gun aimer in the left side of the turret and a loader in the right side of the turret. The driver had a large hatch in front of his station. Access to the turret was through a sizeable, one piece hatch that hinged forward. There was a single escape hatch in the floor of the vehicle, under the machine gunner's station. The fighting compartment was cramped, especially when fully loaded with ammunition, due to the low silhouette of the tank.

The driver steered the tank using a set of conventional tractor-style brake levers. The controls were mechanically linked to metal rods running on the floor of the vehicle back to the transmission in the rear. This meant that the braking controls required more strength to operate than on Western tanks where the transmission and gear

box were close together. T-34 drivers frequently kept a small mallet nearby to help move the controls when they jammed up. At the driver's feet was a pair of compressed air bottles. These were used to help start the diesel engine in particularly cold weather. Features such as this enabled the T-34 to operate in winter, when German tank crews found it extremely difficult to even start their tanks.

The MG/radio operator sat in the front right side of the hull. In combat, he had two primary responsibilities: operating the 7.62mm Degtaryev DT MG, and operating the vehicle radio. As we have seen, not all T-34 tanks were equipped with radios, though the proportion grew as the war progressed. At the beginning of the war, the company commander's tank was nearly always fitted with a 71-TK-3 transmitter/receiver, and efforts were made to provide a similar set to platoon leaders. In 1941 and 1942, the 71-TK-1 set was sometimes used. Eventually, the 9-R radio was introduced later in 1942. This was a modular AM transmitter-receiver type with a power output of five watts and used pre-selected channels. When the tank was on the move, it had an effective voice range of about five miles. Communication inside the tank was by means of a TPU-3 inter-phone system. The crew's cloth helmet contained earphones and a small throat mike. Soviet tank



*Although T-34 Model 1943 production ended in 1944 with the advent of the T-34/85, examples of the type remained in service until the end of the war and for some time afterwards. Here a pair of late production vehicles drive through Leipzig, Germany, in July 1945. In 1943, the T-34 Model 1943 was modified by the addition of a commander's cupola and the substitution of cylindrical fuel tanks for the earlier 40-litre containers. (US Army)*

units were frequently undermanned during the war due to casualties and the general shortage of trained crews, which often meant that the MG/radio operator position was frequently left vacant.

#### Communication systems

The lack of radios in Soviet tanks was one of the reasons for the poor tactics evident in the early years of the war. Tanks could not communicate with one another easily, and it proved difficult to co-ordinate their actions in combat. In contrast, the Germans placed considerable importance on

providing each tank with a radio transmitter-receiver. Due to the shortages of radios, Soviet tankers relied on flag signalling. There was an elaborate set of well-rehearsed signals, and there was a special hatch in the main turret hatch to allow commanders to signal even when buttoned up. However, it was virtually impossible for the platoon commander to actually signal to other tanks during combat, as he was preoccupied with manning his own tank's gun. As a result, platoon tactics usually revolved around the other tanks in the unit following the example of the platoon leader. This helped the overburdened platoon commander keep control of his unit, but limited the effectiveness of the platoon in action.

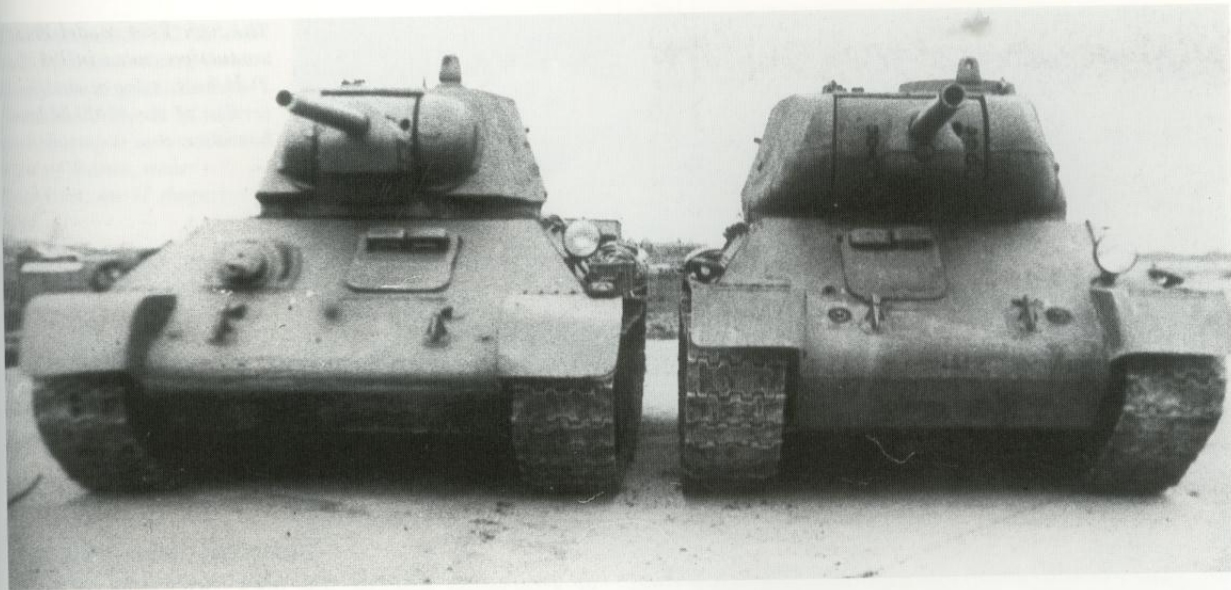


*A second attempt to replace the T-34 was undertaken in 1942, under the designation T-43. Although closely resembling the T-34, it used torsion bar suspension,*

*heavier armour and a three-man turret. The project was dropped in 1943 when it was realised that a new gun was more important than additional armour.*

#### The turret

The turret on the T-34 was so tight and cramped that it hindered the effective servicing of the gun. The crew was provided with seats attached to the base of the turret. A turret basket was not used as the floor contained metal containers with most of the main gun ammunition. The tank commander doubled as the gunner. He aimed the gun using a TOD-6 telescopic sight on the earlier tanks and a TMFD on later production types. The telescope was 2.5x magnification and had illuminated grati- cules. For general viewing, the tank was fitted with a PT-6 panoramic periscopic sight on the early version, and a PT-4-7 or PT-5 on the later vehi-



*A comparison of the T-34 Model 1943 and the T-43. The larger size of the T-43 turret allowed a third crewman to be carried, a feature*

*sadly lacking in the T-34. Much of the T-43 turret's design was incorporated in the T-34-85 in late 1943.*

was open, it exposed not only the commander, but the loader as well. The mediocre viewing optics of the T-34 also affected self-defence of the vehicle from infantry. German tank-hunter teams were taught to exploit dead-zones where the T-34's crew could not see them and place satchel charges and other anti-tank devices.

The T-34's most serious weakness was the decision to use a two-man turret crew. The commander spent most of his time in combat performing the gunner's function, that is aiming the main gun. This detracted from other command functions such as searching for targets and coordinating his tank's actions with those of other

cles such as the T-34 Model 1942. Initially, both the commander and loader were provided with sights, but many tanks only had a single periscopic sight due to wartime shortages. The sight could be linked to the gun as an alternative to the telescopic sight, as well as used for general observation. Both the commander and loader were provided with an armoured glass viewing port at shoulder level. There were pistol ports for vehicle self-defence under the viewing ports, as well as one on the turret rear.

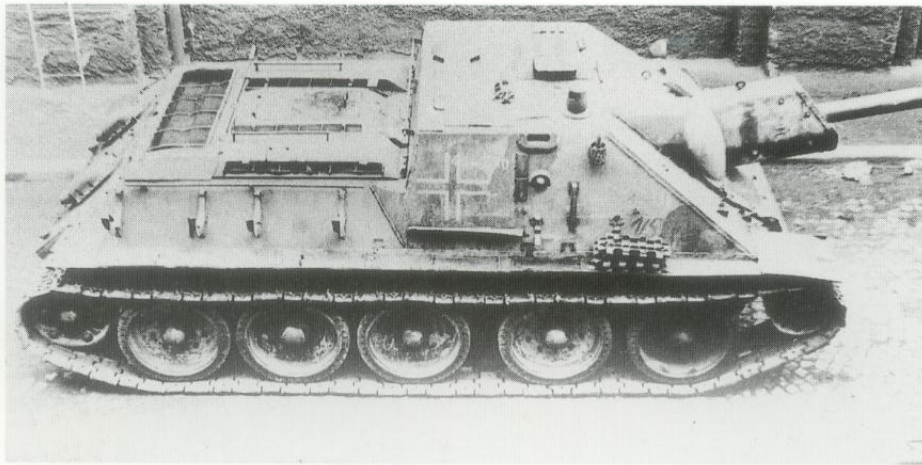
In general, the vision devices on the T-34 were distinctly inferior to those available to German tank commanders on the PzKpfw III or PzKpfw IV. The T-34 commander lacked any convenient way to obtain a good 360° view of his surroundings, lacking the vision cupola found on German tanks. Furthermore, it was impractical and dangerous for him to ride with his head outside of the tank as German commanders preferred, due to the positioning of the large, awkward turret hatch. This hatch pivoted forward, so when opened, it obstructed the forward view of the commander unless he completely exposed himself and sat on the turret roof. Furthermore, when the large hatch



*The PT-34 was a mine-roller tank fitted with the PT-3 mine tawl. This particular tawl, a T-34 Model*

*1943, served with the Polish LWP forces; note the tank's late-war spoked wheels.*

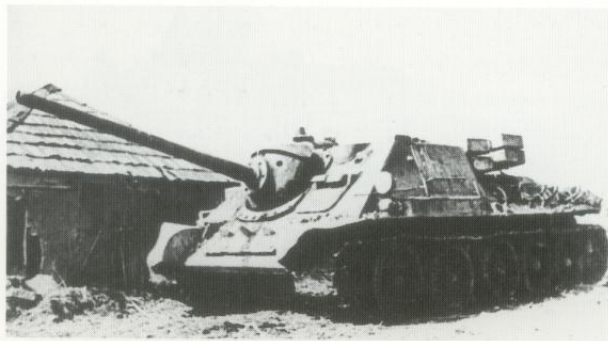




*The SU-122 was a medium assault gun mounted on the T-34 hull, using a modified version of the M-30 122mm howitzer.*

tanks in his unit. The situation was even worse for platoon and company commanders with their additional command functions. There appears to have been a degree of experimentation in some Soviet units with the commander substituting as the loader instead of gunner, but this did not cure the problem either. In German medium tanks the turret crew was three: commander, gunner and loader. This allowed the commander to concentrate on leadership functions in combat.

German tankers noted the effect of the poor turret layout and lack of radios when engaging Soviet tanks in combat. Soviet tank units operated in a disorganised fashion with little co-ordination, or else tended to clump together 'like a hen with its chicks', the less experienced tankers following the lead of the platoon or company commander. These tactics were also related to poor training.



*The SU-85 tank destroyer was the most successful variant of the T-34. Entering service in 1943, it was one of the few Soviet*

*vehicles capable of dealing with the German Panther until the T-34/85 and IS-2 Stalin heavy tank appeared in early 1944.*

The individual tank commanders lacked situational awareness due to the poor provision of vision devices and preoccupation with gunnery duties. A tank platoon would seldom be capable of engaging three separate targets, but would tend to focus on a single target selected by the platoon leader. As a result, Soviet tank platoons lost the greater firepower of three independently operating tanks. German tankers frequently commented that Soviet T-34s were very slow to find and engage targets. In the early years of the war, the Panzers could typically get off three rounds for every one fired by the Soviet T-34s. This disparity in crew training was greatly reduced later in the war.

It should be remembered that the function of a tank is not only to fight enemy tanks. Indeed, tanks are most effective when used against infantry and poorly defended objectives; in such engagements the T-34's deficiencies were much less important. The poor configuration of the turret layout of the T-34 was emphasised in tank-vs-tank fighting. The hexagonal turret on the T-34 Model 1943 could have helped by at least providing a hatch opening to the rear. Instead, split hatches were used, but both opening forward. There appears to have been some appreciation of this problem among Soviet tank designers as is evident in both the T-34M and T-43 designs. But it wasn't until 1943 that a commander's cupola was added to the T-34 Model 1943. An adequate three-man turret did not appear until the T-34-85 which was not available in significant quantities until early 1944.

On 20 August 1944, the 2nd and 3rd Ukrainian Fronts launched an offensive into Romania. Here, a SU-85 tank destroyer enters the town of Bacau, near Bucharest, on 31 August 1944.



### Firepower

The loader was located on the right side of the main gun. He was responsible for loading the main gun as well as the co-axial DT MG. The T-34 Model 1942 carried 77 rounds of 76.2mm ammunition; this was raised to 100 rounds on the T-34 Model 1943. There were three ready rounds stowed on the hull side near the loader's feet, and six more rounds on the opposite wall near the commander. The remaining 68 rounds were stowed in eight metal bins on the floor of the fighting compartment. The standard combat load was 19 rounds of BR-350A armour piercing, 53 rounds of F-354 or OF-350 high explosive and five rounds of shrapnel. The ammunition bins were covered with a piece of matting to prevent them being accidentally kicked open or damaged, and the loader would have to pull the cover back to gain access to the ammunition. This was not particularly convenient, and some crews developed a routine with the front machine-gunner helping the loader gain access to the forward bins. The 7.62mm ammunition for the co-axial and front hull MG was stowed in 35 drums with 65 rounds each. About half of this was stowed in racks at the rear of the turret, while the remainder was stowed in various racks in the forward portion of the fighting compartment.

The main gun on the T-34 was initially the L-11, a 76.2mm rifled gun with a length of 30.5 calibres, but this type soon disappeared in the wake of the 1941 débâcle and the longer F-34 76.2mm gun (42 calibre length) became the predominant type. As mentioned above, some tanks were fitted with the 39 calibre F-32 76.2mm gun on occasion, and this operated in the same fashion as the F-34. The F-34 used a conventional semi-automatic drop breech. It was ballistically similar to the ZiS-3 76.2mm divisional gun, but used a different recoil system more suitable for tanks, having a hydraulic buffer and hydro-pneumatic recuperator under the gun tube. The gun had an elevation of  $-3^{\circ}$  to  $+30^{\circ}$ , the modest depression being caused by the very low turret.<sup>1</sup> Turret traverse was provided on the commander's side of the turret, with both a manual handwheel or an electric traverse which turned the turret at  $26^{\circ}$  per second. There was considerable play and backlash in the traverse gearing which made precise aiming of the gun difficult at longer ranges. The commander could fire the main gun using a foot-pedal.

The standard anti-armour round for the first two years of the war was the BR-350A, which was fitted with a ballistic cap and contained a small

<sup>1</sup> The earlier L-11 gun had greater depression, down to  $-5^{\circ}$ , while the F-32 when mounted had restricted elevation, only to  $+28^{\circ}$ .



*The 13th Self-propelled Artillery Regiment of the Polish LWP took part in the Berlin campaign in April-May 1945. Notice that the vehicle has lost its front roadwheel, presumably to a land-mine.*

high explosive fill. At typical tank engagement ranges of 500 metres, it could penetrate 69mm of armour. This was adequate to deal with standard German medium tanks such as the PzKpfw IV Ausf. F which had 50mm frontal armour. The PzKpfw IV Ausf. H introduced in the spring of 1943 boosted the maximum frontal armour to 80mm. However, by this time, the new BR-350P APDS round, which could penetrate 92mm of armour at 500m, was introduced. The T-34's 76.2mm gun was far less effective against the new tanks introduced by the Wehrmacht in 1943. The Tiger first appeared on the Leningrad Front in January 1943, and could not be defeated frontally by the T-34. The Panther was first used in quantity at Kursk in the summer of 1943, and likewise, was largely invulnerable to the T-34 in frontal engagements at normal combat ranges. The only possibility of defeating these tanks was in side or rear engagement at close range. These new developments forced the Red Army to adopt the 85mm gun on the T-34-85 at the end of 1943.

## VARIANTS

### OT-34 Flamethrower

Red Army flamethrower tanks up to 1941 were

based on the T-26 light tank chassis. Heavy attrition in 1941 created the need for a new flamethrower vehicle, but the disruption of the tank industry delayed work on specialised designs until 1942. The new tank flamethrower was designated ATO-41 and could be mounted in either the T-34 or KV tank. Modified T-34 flamethrower tanks were designated OT-34 – Ognemetniy Tank-34 (Flamethrower Tank-34) – and carried 100 litres of fuel. These tanks were sometimes called T-O34. The ATO-41 system was mounted in the right front hull in place of the usual DT MG. It could fire three 10-litre bursts in ten seconds, and its range was 60 to 100 metres depending on the type of fuel used. The ATO-41 was mounted primarily on T-34 Model 1942 tanks. Later in 1942, an improved flamethrower system was introduced, the ATO-42. Mainly mounted on the T-34 Model 1943, and later on the T-34/85, the ATO-42 could fire more quickly, had a greater range and increased fuel storage (200 litres). Because of the volume of the flamethrower equipment, the radio in the T-34 had to be moved up into the rear turret bustle, another distinguishing feature.

Originally, the separate flamethrower battalions had two companies of KV-8 heavy flamethrowers with ten tanks, and one company with 11 OT-34

medium flamethrower tanks became so organised with two companies of standard support. The Red Army was primarily for offensive infantry. It was only those mounting a significant effect on enemy Soviet flamethrower tanks – largely due to the OT-34 with the ATO-42.

In 1942, Pavlov developed before in Nikolayev. sets of steel rollers swivelling girder of prototype systems trials on the experimental mine-roller. The first use of the Bn., 86th Tank Voronezh in an experimental PzKpfw Experimental unit Stalingrad. The PT-34s during the Guards Tank attack on the Stalingrad counter with the early to develop production introduction. In the northern German mine rollers for German positions.

In the summer tank units were the 166th Self which was planned for special breakthrough the Kursk battle.

medium flamethrower tanks. By 1943, the KV-8 tanks became scarce and the battalions were reorganised with two companies of OT-34 and one company of standard T-34 tanks for gunfire support. The Red Army used flamethrower tanks primarily for offensive operations against entrenched infantry. It was felt that flamethrowers, particularly those mounted in tanks, had a very demoralising effect on enemy infantry. German accounts of Soviet flamethrower tanks are more sceptical, largely due to the small fuel reservoirs in the tanks – only about ten bursts in the case of the OT-34 with the ATO-41, and twenty with the ATO-42.

#### **PT-34 Mine-Clearer**

In 1942, Pavel M. Mugalev began work on improving the PT-3 mine roller system he had developed before the war at the Dormashina plant in Nikolayev. The PT-3 trawl consisted of two sets of steel rollers, attached to the tank on a swivelling girder assembly. Following construction of prototype systems at the NKPS Plant in Tula, trials on the system were undertaken by experimental mine-rolling detachments in May 1942. The first use in combat was by the 233rd Tank Bn., 86th Tank Bde., in the fighting near Voronezh in August 1942, where at least two experimental PT-34 mine-rolling tanks were used. Experimental use of mine-rollers also took place at Stalingrad. The 109th Tank Brigade employed PT-34s during a counter-attack in November 1942 on the Don Front near Stalingrad, and the 16th Guards Tank Bde. used them during the famous attack on the Kantemirovets airfield during the Stalingrad counter-offensive. Technical problems with the early roller systems, as well as the need to develop proper tactics, led to delays in their introduction. In April and May 1943, tank units on the northern Caucasus Front were provided with mine rollers for trials against several heavily defended German positions.

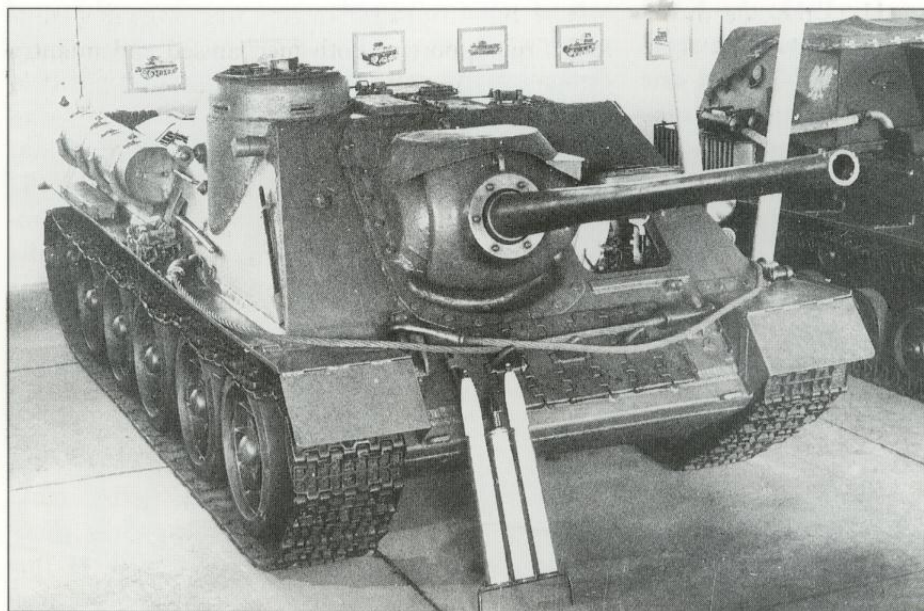
In the summer of 1943, the regular engineer tank units were organised. The first of these was the 166th Separate Eng. Tank Regt. (OITP), which was placed under high command control for special breakthrough operations at the time of the Kursk battles. It had 22 T-34 tanks and 18

sets of mine rollers. At the same time, additional units were being trained and organised at Tula. Some experiments were conducted using Lend-Lease tanks as well, including Shermans and Churchills. In combat, not all the PT-3 rollers were used at the same time. A portion of the T-34s in the unit would be left without them to provide fire support. The rollers could generally withstand five to ten detonations of anti-tank mines, after which they would have to be replaced. The 166th OITP continued to see extensive use including the offensive operations during the Dnepr river crossing and liberation of Kiev in the autumn of 1943.

The first full-scale use of mine rolling tanks took place during Operation 'Bagration', the offensive in Byelorussia in the summer of 1944 that destroyed German Army Group Centre. At least five of these OITP regiments were deployed, the 148th and 253rd with the 3rd Byelorussian Front, the 40th with the 3rd Shock Army, and the 119th and 166th Eng. Tank Regts. with the 1st Byelorussian Front. During the Vistula-Oder offensive, two such regiments were used, the 92nd and the 116th ITP. The PT-3 was the ancestor of modern Soviet and Russian mine-rolling systems, as well as Israeli derivatives. The mine-rollers used on US Army M1A1 Abrams tanks during Operation 'Desert Storm' are descended from the PT-3 system, via the Israeli types.

#### **SU-122 Assault Gun**

The success of German Sturmgeschutz assault guns used for infantry support interested the Red Army. These vehicles were less expensive than conventional tanks as they had no turret, and could mount weapons more suitable for direct fire with large high-explosive rounds. In April 1942, the Main Artillery Directorate (GAU – Glavniy Artilleriskoye Upravleniye) issued a requirement for such a vehicle to several of the armoured vehicle design bureaux in co-ordination with the People's Commissariat for the Tank Industry (NKTP). Several different weapons and chassis were considered, the selection including the 37mm anti-aircraft gun, the 76.2mm divisional gun and the 122mm howitzer. A design collective under G.I. Kashtanov developed a prototype medium



*The final production batch of SU-85 used the new superstructure developed for the SU-100. This was characterised by a new commander's cupola on the right side of the hull. (Janusz Magnuski)*

assault gun by mounting a M-30 122mm howitzer on a captured German PzKpfw III tank chassis. Trials of the vehicle, designated the SU-122I, were conducted in July 1942, but were judged unsuccessful.<sup>1</sup>

Nevertheless, the demand for a medium assault gun for infantry support continued, and in October 1942, the State Defence Committee (GKO) ordered another effort to begin, using the T-34 chassis. The assignment was allotted to the Uralmash plant in Sverdlovsk, and the engineering was undertaken by a design group headed by L. Gorlitskiy and E. Silnishchikov. The assault gun was designated SU-35, and consisted of a modified M-30 Model 1938 122mm howitzer mounted in a fully enclosed casemate on the front of a modified T-34 Model 1943 hull. The simple mantlet permitted elevation of  $-3^{\circ}$  to  $+26^{\circ}$  and the gun could be traversed  $10^{\circ}$  to either side. Ammunition stowage was 40 rounds. The vehicle was given additional range by the use of external fuel cells.

The success of the prototype in field trials in December 1942 led the GKO to order limited production of the SU-35 at Sverdlovsk as the SU-122 medium assault gun. A total of 25 were completed in December of that year.

<sup>1</sup> SU – Samokhodnaya Ustanovka, self-propelled mounting; I – Inostranniy, foreign.

The first self-propelled gun regiments were formed in December 1942, consisting of four batteries of SU-76 light assault guns (17 vehicles) and two batteries of SU-122 (eight vehicles). By the end of January 1943, the first two of these regiments were committed to the Volkov Front near Leningrad. In March 1943, two more regiments were deployed. These regiments were put at the disposal of army or front commanders for use during local breakthrough operations. The Red Army's reaction to the new units was mixed. Although the concept of assault guns was applauded, teaming the SU-76 with the SU-122 proved to be a problem. The early SU-76 had serious technical weaknesses. Although these were solved with the introduction of the SU-76M, the units were reconfigured as light and medium self-propelled regiments in May 1943. The medium SU-122 regiment had 16 SU-122 and one T-34 command tank, organised in four batteries.

The SU-122 proved to be a more popular infantry support weapon than the SU-76 due to its full armour protection and more powerful howitzer. In 1943, the new BP-460A shaped charge anti-tank round was introduced which gave the SU-122 improved self-defence capability against German tanks and armoured vehicles. To standardise production, in August 1944 the SU-122 Model 1943 mounted a modified version of the

M-30S howitzer in the new SU-85 tank destroyer hull, using the same ball mantlet as the SU-85. A small number of SU-122 were built in a similar fashion on the new SU-100 chassis in 1944, but this was not accepted for series production. Production of the SU-122 continued up to the summer of 1944 by which time about 1100 had been built.

### SU-85 Tank Destroyer

The capture of a damaged German Tiger I heavy tank in the Leningrad area in January 1943 came as a rude shock to the Red Army. The new tank was so thickly armoured that it could not be knocked out by the F-34 and ZIS-5 guns mounted on the T-34 and KV. As a result, a crash programme was begun to develop a tank destroyer suitable for combating the Tiger. Trials against the captured Tiger indicated that the only existing guns capable of penetrating it were the 85mm anti-aircraft gun and the 122mm A-19 corps gun. The design bureau under Gen. F.F. Petrov was assigned the mission of developing an armoured vehicle gun based around the ammunition used in the standard 85mm anti-aircraft gun. The resulting weapon, designated D-5S-85, was experimentally mounted on an SU-122 chassis by L. Gorlitskiy's team at Uralmash. Although the 85mm gun proved effective, the SU-122 gun mounting was not ideal as it lacked an adequate direct fire telescopic sight. A new ball mount with a TSh-15 telescopic sight was developed, and the superstructure was redesigned. The new configuration allowed 49 rounds to be carried, and the SU-85 was ready for production in August 1943. The SU-85 was deployed in two different organisations. The separate self-propelled battalions were equipped with 12 vehicles, and assigned to army and front level commands for specialised missions. In addition, larger regiments were formed in the same fashion as the SU-122. These medium self-propelled regiments had four batteries, totalling 16 SU-85 and one T-34 command tank. The regiments were first deployed in mechanised corps to provide them with additional anti-tank firepower. In 1944, some SU-85 regiments were also attached to special anti-tank artillery brigades.

The SU-85's *raison d'être* was providing anti-tank fire support to both mechanised and infantry formations. They were not intended to be used in close proximity to enemy infantry, as their lack of a self-defence MG made them vulnerable to close-quarter attack. They were intended to be employed at stand-off ranges, using their superior firepower to deal with German armoured vehicles and strongpoints.

The SU-85 was first used in the late summer 1943 campaign along the Dnepr River, and in the Ukraine. It proved to be popular with the Red Army, as it was one of the few vehicles that could deal with the Panther. For example, the 1021st SP Regt., which fought with the 1st Baltic Front in the summer 1944 offensive, was credited with the destruction of nearly 100 German armoured vehicles while supporting various infantry units.

The decision to fit an 85mm gun on the T-34 tank led to a programme to increase the lethality of the SU-85 by mounting a 100mm gun instead. As a result, production of the SU-85 was halted in September 1944 after 2,050 had been built. The final production batches of the SU-85 used the modified SU-100 superstructure with its prominent commander's cupola. The SU-100 will be covered in the New Vanguard title on the T-34/85.

### T-34 Tank Recovery Vehicles.

By 1944, there was a growing need for armoured recovery vehicles. Tanks were in such short supply that there was a reluctance to use them in this role. Nevertheless, some improvised recovery vehicles were fielded, using turretless T-34 hulls. In the post-war years, with the T-34/85 replacing the T-34 and the SU-100 replacing the SU-85, there was a more abundant supply of vehicles. At first, these were local depot conversions. However, in 1958, the T-34 was declared surplus, and a factory rebuild programme was begun. The turret was removed, and a tool platform was added over the engine deck. Large tool stowage boxes were added on the side, as well as a simple three-ton crane. Designated T-34-T, these vehicles were usually fitted with active IR night vision equipment. There were many variations, local depots often adding winches, push-bars, and other fea-

tures. A small number of T-34s were also converted to heavy duty cranes (SPK-5) in 1955. The SU-85-T conversions mostly took place at depot level and were not as extensive. Generally, the gun assembly and internal stowage racks were removed and the vehicles used mainly for towing or light repair. A few SU-85/Ts remained in use by the East German NVA army as late as 1990.

## THE PLATES

### Plate A1: *T-34 Model 1941, Separate Tank Brigade, autumn 1941*

During the Second World War Soviet tanks were uniformly painted very dark green. Markings usually appeared in white. T-34 tanks during the 1941 campaign seldom carried any markings, due in part to traditional Soviet secrecy as well as the incomplete organisation of the new mechanised corps. By the autumn of 1941, with the formation of new tank brigades, some limited tactical markings were occasionally seen. The significance of this marking, a '62' in a circle, is not known. By August 1941, efforts were being made by the brigade political officers to increase morale. One aspect of this effort was the decision to encourage units to paint political or patriotic slogans on the sides of tanks. In this case, the Russian word is 'Pobeda', 'Victory'. This vehicle is heavily stowed on the front sides with fascines for crossing trenches, three cases of additional 76mm ammunition, and an unditching beam.

### Plate A2: *T-34 Model 1941, Separate Tank Brigade, autumn 1941*

Another example of the political slogans and patriotic messages which were increasingly becoming a feature of Soviet tanks. This particular example 'Bei fashistov' means 'Crush the Fascists!'. This type of slogan was more popular in the early years of the war; later, the style became more commemorative, acknowledging the public donations to purchase tanks. The numerous minor differences between this tank and A1, ostensibly the same model, are the result of variations in the methods used by different factories.

### Plate B: *T-34 Model 1941/42, Italian 62° Gruppo, 120° Reggimento d'Artiglieria, Southern Russia, summer 1942*

During the fighting in southern Russia in 1942, the Italian Army captured small numbers of T-34 tanks. Italian formations were so ill-equipped with armour that these were often pushed into service. The Italians frequently marked captured tanks with German crosses, since German anti-tank crews presented as much of a threat as Russian gunners. The markings on this tank are white crosses on the sides and rear of the turret, and on the turret roof hatch. The vehicle has two white sheets on the turret and engine deck, a local means of air identification. Although some units displayed Nazi flags for air identification, in some sectors coloured sheets were used periodically during offensive operations since the Soviets occasionally used Nazi flags to prevent German air attack on their own units. The Germans also used captured T-34 tanks, but the practice was limited due to the tendency of anti-tank gunners to mistake them for Soviet vehicles, even when properly marked.

### Plate C: *T-34 Model 1943, 112th Tank Brigade, 6th Tank Corps, January 1943*

Workers were encouraged to contribute part of their salaries towards the purchase of weapons. Often, once a certain sum was collected, a ceremony would be held to commemorate the donations. In this case, the 112th Tank Brigade was re-equipped with T-34 Model 1943 tanks in January 1943 bought by Mongolia. The slogan in red on the bottom reads 'Revolutionary Mongolia' in Russian, and above, 'From the Arakhangaiskiy Arat Aimaka' in black. This vehicle is painted in the typical finish of whitewash over dark green.

### Plate D: *T-34 Model 1942, 3rd Tank Army, Kozel Offensive, August 1942.*

The interior of the T-34 was relatively simple compared to many wartime medium tank designs due to the lack of a turret basket. The fighting compartment was completely open between the front of the hull and the turret area. In the front of the hull, the driver/mechanic sat in the left side and the MG/radio-operator in the right. In



*One of the last T-34s, an East German SU-85-T recovery vehicle being used in 1990. Most of the recovered vehicles based on the*

the turret, the side, and the left side, and the left side, ready rounds, ammunition for the turret bins on the hull. The interior of the turret is white, with some parts of aluminium, and a heavy overcoat of melonite. The turret had three air fans, and the turret was itself flanked on the left by an air fan, and the

### Plate E1: *OT-34, 1st Tank Army, summer 1942*

This flamethrower tank was used in the middle of the war. It was a type of Soviet tank used in offensive operations. It carried tactical markings, a vehicle radio, and a tactical number. The turret is the dedicated turret for the A.S.S.R. to the

### Plate E2: *OT-34, 1st Tank Army, summer 1942*

In March 1942, the 1st Tank Army was equipped with



One of the last T-34 derivatives, an East German SU-85-T recovery vehicle still being used in 1990. Like most of the recovery vehicles based on the T-34 and

SU-85, this is a simple conversion involving the removal of the gun and the addition of simple towing aids. (Michael Jerchel)

the turret, the commander/gunner sat on the left side, and the loader on the right. Aside from nine ready rounds on the hull sides, the 76.2mm ammunition for the F-34 gun was stowed in metal bins on the hull floor, protected by a rubber mat. The interior of the turret was painted in gloss white, with some small fittings left in bare steel, or aluminium, or in some cases, given a protective overcoat of medium green. The engine compartment had three main elements, the V-2 diesel itself flanked on either side by radiators, a circular air fan, and the gearbox and braking system.

**Plate E1:** *OT-34, Separate Flamethrower Tank Regiment, summer 1943*

This flamethrower tank carries markings typical of the middle of the war. With the growing complexity of Soviet tank units, and the gradual switch to offensive operations, there was a growing need for tactical markings for both traffic control and inter-vehicle radio communication. This tank has the tactical number 'D-50', and on the rear of the turret is the dedication slogan 'From the Tatarskiy A.S.S.R. to the Front'.

**Plate E2:** *OT-34, Flamethrower Tank Regiment, 1st Tank Army, March 1944*

In March 1944, a tank regiment of the 1st Tank Army commanded by I.A. Gorlach was re-equipped with new T-34/85 and OT-34

flamethrower tanks. Funds for the vehicles were provided by Metropolitan Nikolai of the Russian Orthodox Church. All the vehicles were named after the popular 14th Century Russian historical figure, Prince Dimitriy Donskoi. Reportedly, some tanks were painted with the Orthodox cross, but no photos of these have been published to the author's knowledge. This particular regiment was first committed to action in the Umanskiy-Botashevskiy operation in late March 1944 in the campaign to force the Dnestr river.

**Plate F1:** *PT-34, 116th Separate Engineer Tank Regiment, Byelorussia, June 1944*

One of the more common markings to appear on Soviet tanks was the diamond shape seen here on a mine-rolling trawl tank. This marking was the standard Red Army map symbol for tanks. In some cases, numbers or symbols were painted within the diamond to amplify its meaning. This particular tank was named in honour of David Sasunskiy, no doubt a soldier who had died in combat while serving with the Regiment.

**Plate F2:** *SU-85, 1st Tank Battalion, 1st Czechoslovak Tank Brigade, summer 1944*

A single armoured unit was formed in the Soviet Union during the Second World War, manned by Czechoslovak volunteers. The brigade went into action in 1943, and was brought up to brigade strength in 1944. The brigade's organisation was not entirely typical: its 1st Bn. received two SU-85s in the summer of 1944, which was not a regulation configuration. Many of the brigade's tanks and armoured vehicles received names of historical or contemporary Czechoslovak heroes such as Janosik, Zizka, Zakarpatsky Partyzan, or Kapitan Otakar Jaros as seen here. Others were named after cities or towns such as Sokolovo, Lezaky, Lidice, Praha, Zborov, and Bachmac. In Czechoslovak service the SU-85s were called SD-85 (Samohybneho Dela).

**Plate G:** *SU-85, 1st Battery, 13th Self-propelled Artillery Regiment, 1st Polish Army, Berlin, May 1945*

The Polish Peoples Army (LWP) formed in the Soviet Union in 1943 had deployed a significant



number of armoured formations by 1945. The 13th SP Arty. Regt. was formed on the basis of an existing Red Army regiment which was transferred to the Poles in April 1944. The unit fought during the summer 1944 campaign in central Poland, and later in Pomerania and in Berlin. The markings here show insignia from the Berlin operation, white superstructure stripes and a white roof cross, intended to prevent Anglo-American fighter-bombers from accidentally strafing Red Army formations. The white triangle marking was

one of the modified tactical insignia ordered in late April and early May 1945, when it was found that German tank units were painting their vehicles with the white allied roof cross. Two other markings are evident on this vehicle: the white Piast eagle national insignia and the vehicle number, '311'. In the case of this particular SU-85, '311' had no tactical significance, being simply the last three digits of its factory production number. Poland received 70 SU-85s, of which 48 survived the war.

#### Notes sur les planches en couleurs

**A1** Durant la seconde guerre mondiale les chars soviétiques étaient peints en vert très foncé et les estampilles étaient généralement en blanc. Durant la campagne de 1941, de nombreux chars T-34 n'avaient pas d'estampilles. La signification de l'estampille ('62' dans un cercle) n'est pas connue. Le slogan patriotique peint sur le côté est 'Victoire'. Fascines latérales à l'avant pour traverser les tranchées, trois caisses de munitions de 76mm et une poutrelle de désam-bourbement. **A2** Le slogan de ce char et 'Bei fashistov' c'est-à-dire 'Ecrasons les fascistes'.

**B** Les formations italiennes étaient tellement mal équipées qu'elles mettaient souvent en service les véhicules capturés. Les unités italiennes mettaient souvent des estampilles allemandes sur les chars capturés car les canonniers anti-chars allemands représentaient un danger tout aussi grand que les canonniers italiens. Ce char porte des croix allemandes en blanc sur les flancs et à l'arrière de la tourelle et sur le panneau de la tourelle. Il porte aussi deux draps blancs, moyen local d'identification aérienne.

**C** On encourageait les travailleurs à utiliser une partie de leur salaire pour acheter des armes. Par conséquent, cette brigade reçut de nouveaux chars en 1943, achetés par la Mongolie. Le slogan en rouge en bas est 'Mongolie Révolutionnaire' en russe et, en noir 'Contribution d'Arakhganskii Arat Aimaka'. Couleurs typiques d'un badgeon sur du vert foncé.

**D** L'intérieur du T-34 était relativement simple à cause de l'absence d'une nacelle de tourelle. Le compartiment de combat était complètement ouvert entre l'avant de la caisse et la zone de la tourelle. A l'avant de la coque le chauffeur/mécanicien était assis à gauche et le MG/opérateur radio à droite. A part neuf cartouches se trouvant sur les côtés de la coque, les munitions de 76,2mm étaient stockées dans des caisses métalliques sur le sol de la coque. L'intérieur de la tourelle était peint en blanc brillant et certains éléments étaient laissés en acier brut. Le compartiment du moteur possédait trois éléments principaux : le diesel V-2 flanqué de radiateurs, un ventilateur circulaire et la boîte à vitesses et le système de freinage.

**E1** Estampilles typiques du milieu de la guerre. Alors que les unités de chars soviétiques devenaient de plus en plus complexes, il était nécessaire d'avoir des estampilles tactiques pour le contrôle du trafic et la communication entre les véhicules. Numéro stratégique 'D-50' sur la tourelle slogan 'Contribution au Front de Tatarskiy A.S.S.R.'. **E2** En mars 1944 un régiment de la 1ère armée de chars reçut de nouveaux chars T-34/85 et OT-34 lance-flammes. Les fonds nécessaires aux nouveaux véhicules étaient fournis par le Metropolitan Nikolai de l'Église Orthodoxe russe. Tous les véhicules portaient le nom du héros russe du 14ème siècle, Prince Dimitriy Donski. On dit que certains portaient une croix orthodoxe peinte.

**F1** Le diamant peint sur ce char poseur de mines est l'une des estampilles les plus courantes à apparaître sur les chars soviétiques. Dans certains cas des numéros ou symboles apparaissaient dans le diamant. Ce véhicule fut nommé en l'honneur de David Sasunkiy, sans aucun doute un soldat mort alors qu'il servait dans ce Régiment. **F2** Cette unité blindée était composée de volontaires tchécoslovaques. de nombreux chars de la brigade portaient le nom de héros tchèques historiques ou contemporains, dans ce cas Kapitán Otakar Jaros. D'autres portaient un nom de ville.

**G** Les estampilles comportent les insignes de l'opération de Berlin (rayures blanches aux arêtes du châssis et une croix blanche sur le toit. Leur but était d'éviter que les bombardiers anglo-américains ne mitraillent pas par accident des formations de l'armée rouge. Le triangle blanc est une estampille modifiée introduite fin avril et début mai 1945 lorsqu'on se rendit compte que les véhicules allemands avaient été peints avec la croix blanche des alliés sur le toit. Les autres insignes sont l'insigne national de l'aigle Piast et le numéro de véhicule, '311'.

#### Farbtafeln

**A1** Im Zweiten Weltkrieg waren die sowjetischen Panzer in sehr dunklem Grün gestrichen, mit weißen Markierungen. Im Feldzug von 1941 hatten viele T-34-Panzer keine Markierungen. Die Bedeutung dieser Markierung ('62' in einem Kreis) ist nicht bekannt. Die patriotische Aufschrift an der Seite bedeutet 'Sieg'. Fascinen an den Vorderseiten für das Überqueren von Schützengraben, drei Kisten für 76mm-Munition und ein Kippschutz-Balken. **A2** Der Slogan an diesem Panzer lautet: 'Nieder mit den Faschisten'!

**B** Italienische Einheiten waren so schlecht ausgerüstet, daß sie oft erbeutete Fahrzeuge in Dienst stellten; oft versahen sie erbeutete Panzer mit deutschen Markierungen, um deutsche Panzerabwehrkanoniere irreführen zu können, die eine ebensolche Gefahr darstellten wie die italienischen. Der Panzer ist an den Seiten, am Turm und auf der Turmluke mit deutschen Kreuzen in Weiß markiert und zeigt auch zwei weiße Tücher - eine lokale Identifizierungsmethode.

**C** Arbeiter wurden aufgefordert, einen Teil ihrer Löhne für den Einkauf von Waffen zu spenden. Als Ergebnis davon wurde diese Brigade 1943 neu mit Panzern ausgerüstet, die von der Mongolei gekauft worden waren. Die russische rote Aufschrift unten lautet: 'Revolutionäre Mongolei', die in Schwarz: 'Von Arachganskii Arat Aimaka'. Typische Farbgebung: weißgetüncht über dunkelgrün.

**D** Der Innenraum des T-34 war aufgrund des fehlenden Turmkorbs relativ einfach. Der Betriebsraum war zwischen der Tankvorderseite und dem Turmabteil völlig offen. Im Vorderteil des Panzers saß links der Fahrer/Mechaniker, rechts der MG-Schütze/Funker. Der Kommandant/Kanonier saß links vom Turm, der Lader rechts davon. Außer neun schubfertigen Patronen an den Seiten wurde die 76,2mm-Munition in Metallboxen am Boden des Innenraums aufbewahrt. Das Turm-Innere war glänzend-weiß gestrichen, mit nur einigen kleineren Fittings in ungestricheltem Stahl belassen. Der Motorraum enthielt drei Hauptelemente: den Zweizylinder-Diesel, flankiert von Radiatoren, einen Radialventilator und das Getriebe- und Bremssystem.

**E1** Typische Markierungen in der mittleren Kriegszeit. Die sowjetischen PanzerEinheiten wurden komplexer, und taktische Markierungen für Verkehrsregelung und für Funkverkehr zwischen den Panzern wurden erforderlich. Hier die taktische Nummer 'D-50' und der Slogan am Turm: 'Von Tatarskiy A.S.S.R. für die Front'. **E2** Im März 1944 wurde ein Regiment der 1. Panzer-Armee mit neuen T-34/85 und Flammenwerfer-Tanks OT-34 neu ausgestattet. Die Mittel für die neuen Panzer wurden von dem russisch-orthodoxen Metropolitan Nikolai aufgebracht. Alle Panzer wurden nach einem russischen Helden des 14. Jahrhunderts benannt, dem Fürsten Dimitri Donski; manche sollen mit dem orthodoxen Kreuz versehen worden sein.

**F1** Das diamantförmige Abzeichen auf diesem Minenräumpanzer gehörte zu den alltäglicheren Markierungen sowjetischer Panzer; manchmal waren darin Nummern oder Symbole abgebildet. Dieser Panzer wurde nach David Sasunkiy benannt - zweifellos ein Soldat, der im Dienst dieses Regiments gefallen war. **F2** Diese PanzerEinheit war von tschechoslowakischen Freiwilligen bemannt. Viele Panzer der Brigade wurden nach historischen oder zeitgenössischen tschechischen Helden benannt - in diesem Falle nach Kapitán Otakar Jaros; andere wurden auch nach Städten benannt.

**G** Die Markierungen zeigen Abzeichen der Operation Berlin -weißer Aufbau und ein weißes Dachkreuz; dadurch sollten anglo-amerikanische Kampfflugzeuge informiert werden, daß es sich hier um Formationen der Roten Armee handelte. Das weiße Dreieck war eine modifizierte Markierung von Ende April, Anfang Mai 1945, als bekannt wurde, daß deutsche Fahrzeuge das weiße Dachkreuz der Alliierten aufwiesen. Die anderen Abzeichen sind der nationale weiße Piast-Adler und die Fahrzeugnummer '311'.

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