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# Russian T34

by J. M. Brereton and Major Michael Norman, RTR



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*Edited by DUNCAN CROW*

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*T-34/76A with original turret. Note clumsy one-piece turret hatch (also used on later models)—and crew overalls.*

(RAC Tank Museum)

# Russian T-34/76

By J. M. Brereton

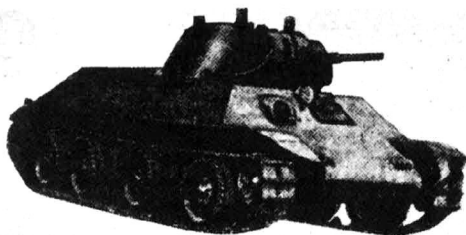
**“Numerous T-34s went into action and inflicted heavy losses on the German tanks. Up to this time we had enjoyed tank superiority, but from now on the situation was reversed. The prospect of rapid, decisive victories was fading in consequence. I made a report on this situation, which for us was a new one, and sent it to the Army Group; in this report I described in plain terms the marked superiority of the T-34 to our Panzer IV and drew the relevant conclusions as they must affect our future tank production. I concluded by urging that a commission be sent immediately to my sector of the front and that it consist of representatives of the Army Ordnance Office, the Armaments Ministry, the tank designers and the firms which built the tanks. . . . The officers at the front were of the opinion that the T-34 should simply be copied, since this would be the quickest way of putting to rights the most unhappy situation of the German Panzer troops.” General Heinz Guderian.**

UNHAPPY indeed. Only five months previously—on the dawn of Midsummer’s Day 1941—a mighty German force had launched itself across the Soviet frontier from Leningrad to the Ukraine, thus initiating Operation “Barbarossa” which was to become the bloodiest and most savage armed clash between two nations which the world has yet witnessed.

The events related by Guderian above took place at the end of October. Moscow had not fallen, nor Leningrad, and after its initial success the whole German advance had ground to a halt. It would be a facile exaggeration to claim that the T-34 medium tank was a direct cause of the German Army’s defeat on the Eastern front. But its significant contribution is denied by no one—least of all by its opponents. There are few weapons of war which have elicited such lavish and unstinted praise and respect from so many—particularly from foes. It was Guderian’s considered



*BT-7—an improved version of the Christie-type BT-5 retaining wheel-and-track feature. First introduced in 1935 with 45-mm. gun and 400 h.p. engine, it was up-gunned with a 76.2-mm. gun in 1938 and subsequently served as a test vehicle for the V2 500 h.p. diesel engine as installed in T-34 and later Soviet tanks. Weight: 13.8 tons (original vehicle), 14.6 tons (improved version). (Imperial War Museum)*



*The A-20 (1938)—direct predecessor of the T-34 with almost identical hull and turret shaping, the family likeness is unmistakable. Weighing 18 tons and armed with a 45-mm. gun, it had the same wheel-and-track system as the BT series. ("Soldat und Technik")*

verdict that the T-34 was "the best tank in any army up to 1943". Numerous other German Panzer leaders have added their praise:

"In 1941 we had nothing comparable with the T-34 with its 30 mm. maximum armour, 76 mm. high velocity gun, and relatively high speed with splendid cross-country performance. These tanks were not thrown into the battle in larger numbers until our spearheads were approaching Moscow; they then played a great part in saving the Russian capital." Maj.-Gen. F. W. von Mellenthin.

"Their equipment was very good even in 1941, especially the tanks. . . . Their T-34 tank was the finest in the world." F-M. von Kleist.

"This tank (T-34) adversely affected the morale of the German infantry." General G. Blumentritt.

Thus, in the T-34, Soviet tank technology had created one of the world's most remarkable fighting vehicles. Outstripping all its contemporaries in the principal battle desiderata of armament, armour and mobility, it remained, with relatively few modifications, an efficient and respected weapon until superseded by the new T-54 series in the 1950's. With the American M4 Sherman series and the British Centurion it shares the record for the longest service run of any armoured fighting vehicle. In fact, though conclusive evidence is difficult to come by, there is reason to believe that the developed T-34/85 was not finally taken out of production until 1964.

## EVOLUTION

In the early 1930's the American engineer-genius, J. Walter Christie, was busy developing his ideas for a completely novel conception of armoured fighting vehicle—a light, extremely fast tank with the ability to move on wheels or tracks. In 1931 Christie produced his T3 model. Weighing ten tons and achieving the remarkable speeds of 70 m.p.h. on wheels and 42 m.p.h. on tracks, this vehicle created something of a sensation. However, in 1931 the consensus of military thinking in the U.S.A.—as elsewhere—did not favour serious consideration of high-speed tanks. Despite the wilderness voices of Liddell Hart, Fuller and others, it was reasoned that the prime duty of tanks was to support the pedestrian infantry at marching pace. But at this period the Russians were relatively unbiased regarding the employment of tanks. Soviet military observers attended the demonstration of the Christie model and were so impressed that they persuaded the Kremlin to order two T3s which were duly delivered.

## THE BT SERIES

After thorough evaluation and testing of the Christie vehicles the Russians produced an almost exact replica—the prototype of the notable BT\* series which remained in production until 1940. The series ran to seven production models, all of which combined the Christie suspension with large road wheels, the wheel-cum-track feature, well-sloped armour and a very high power-to-weight ratio. The earlier models were armed with a 37 mm. gun, subsequently increased to 45 mm. on the BT-5 of 1932 and to 76.2 mm. on the last of the series, the BT-7, which appeared in 1935. At this stage the Russians had not yet decided on any firm tank policy. While concentrating on the fast light type they were also experimenting with heavier vehicles—the traditional "infantry tank", which was exemplified by the multi-turret 45 ton T-35. However, by now a very talented team of designers had been assembled, led by M. I. Koshkin with A. Morozov as his chief assistant. It was primarily to these two men that the U.S.S.R. owed her successful tank policy of the war years.

## THE FAST/MEDIUM TANK

Realising that the BT light tanks were not sufficiently armoured to face up to the increasing power of anti-tank weapons, while the heavy types were too cumbersome and lacking in one of the main battle characteristics—mobility—the Soviet designers began to concentrate on a version which would combine firepower, armour protection and mobility: in other words—the fast medium tank. One of the first of this type was the A-20 of 1938. A glance at this is sufficient to reveal that here is the direct predecessor of the T-34 with its overhanging hull, sharply inclined side and glacis plates and the small but well-angled turret. Weighing only 18 tons, it had a maximum armour thickness of 25 mm. and was armed with a 45 mm. gun, one hull and one turret machine-gun. It retained the wheel-and-track characteristic of the BT series, with four pairs of road wheels. When moving on

\*BT—Bystrokhodniia Tankov. Lit. trans.: fast moving tanks.





A representative T-34/76B with "long" 76.2-mm. gun, 41.2 calibres. Armour thickness is improved but standard turret fittings of the "A" model are retained including side episcopes, pistol ports, back plate and single, forward opening roof hatch. (Imperial War Museum)



wheels the rear three pairs of wheels served as driving wheels, and the 450 b.h.p. diesel engine gave the vehicle a top speed of 50 m.p.h. In 1939 the A-20 was up-gunned with the 76.2 mm. weapon already used on the BT-7 and became the A-30.

The T-32 produced in 1939 was essentially similar to the A-20 and A-30, with the 76.2 mm. gun and two machine-guns, but moving on tracks alone, and with armour increased to 45 mm. The number of road wheels was also increased to five pairs. In the summer of 1939 comparative tests were made on A-20 and T-32 and, while both types performed satisfactorily in cross-country movement, the T-32 was preferred as having greater fire-power and armour protection.

### DIESEL BREAKTHROUGH

Both vehicles were powered by a 500 h.p. diesel engine, and at this juncture we may well glance a little more closely at this development. First, here is the Soviet version:\*

"The petrol engines normally used for motor vehicles and aircraft were relatively uneconomical when adopted for tanks. The increased power of such engines entailed a corresponding increase in fuel consumption; thus, in order to provide the vehicle with sufficient fuel, it was necessary to install enlarged fuel tanks, thereby increasing the size and weight of the vehicle. Moreover, the use of petrol in a fighting tank constituted a serious fire hazard. Finally, automobile and aircraft engines were not considered suitable for the more arduous operating

conditions of a tank. After a brief period of service, therefore, these engines came to be little used in tanks.

"Following a directive of the Soviet Government, work on the development of a tank diesel engine had already commenced by 1932. The evolution of a high-revolution low-compression engine suitable for tank work was not easy. Even Germany, with all her experience of diesel engineering, could not succeed in building a tank diesel unit. All the German tanks employed in World War II were powered by petrol engines. After much experimental work, in 1936 Soviet engineers produced the world's first tank diesel engine, type V2†. In 1939 the V2 engine successfully underwent trials in the BT tank. In terms of economy, the V2 engine was considerably superior to the petrol engines of foreign tanks: its fuel consumption was far less than that of any foreign engine. In 1939-40 Soviet tanks received this powerful, economic engine. The introduction of this unit enabled the new types of Soviet fighting vehicles to achieve the desired combination of armour-protection, fire-power and mobility."

But as with the T-34 itself, so with its power unit: the V2 diesel engine was not simply the unaided product of Soviet engineering. During the 1930's the Russians were busy copying and adapting numerous foreign aero engines including Bristol, Hispano-Suiza, Gnome-Rhône and Wright. In 1936 they exhibited at the Paris Aero Show the M.34 aero engine, which is held by many to be the predecessor of the V2 tank engine. This is claimed by Western authorities to have been originally designed by the Fiat concern of Italy. There is a German theory that it was developed from an Hispano-Suiza design. But the available evidence points to Italian origin, since the V2 adheres very closely to their in-line aero engine practice. Whatever its origin, there is no gainsaying that the V2 finally mounted in T-34 was a credit to its designers and proved an efficient and reliable power unit. It was a well-designed, light-weight, V type 12 cylinder unit of 38 litres capacity, employing a number of aluminium alloy components, including cylinder block and head, crank-case, pistons and sump, and was economical of fuel. The change-over to compression-ignition was particularly well carried out. As originally tested in the BT-5 tank, in 1939, it had an output of 450 b.h.p. This was stepped up to 500 b.h.p. at 1,800 r.p.m. for the T-34. The same engine, up-rated to 600 b.h.p. at 2,000 r.p.m., was used in the KV tanks.

The Russians have continued to concentrate on diesel engines for their tanks to the present day. In fact, the power unit of the current T-55 and T-62 is no more than a slightly modified version of the V2. With this unit the T-34 was able to achieve the excellent power-weight ratio of 17.9 b.h.p./ton in the early models.

\*TAHK (The Tank). A. S. Antonov *et al.* The Military Publishing House, Moscow, 1954.

† The Japanese would dispute this claim. They produced a prototype diesel tank engine in 1933 which was tested during 1934 and officially adopted in 1936 and installed in Type 89 Medium tanks. See the *Profile* on Japanese Medium Tanks by Lieut.-General Tomio Hara.—Editor.

## T-34 TEAM IS NAMED

Mention has already been made of the two Soviet tank designers Koshkin and Morozov. In much Western literature on the development of the T-34 there is often some confusion in allotting credit for the design of this series. In order to clarify this point the writer approached Mr P. Derevyanko, Editor of *Sovetskoe Voennoe Obozrenie* ("Soviet Military Review"), Moscow, who kindly supplied the following "official" account specially prepared by Engineer Colonel V. D. Mostovenko:

"The designer-in-chief of the T-34 tank was Mikhail Ilyich Koshkin, who in 1936 was head of the Design Bureau in which this tank was evolved. M. I. Koshkin studied at one of the Leningrad institutes of technology, from which he graduated in 1934. While still a student he participated in the design work on the T-29 wheel-and-track tank, in which all the road wheels served as driving wheels during movement without tracks. For his work on the new types of tanks, Koshkin was awarded the Order of the Red Star.

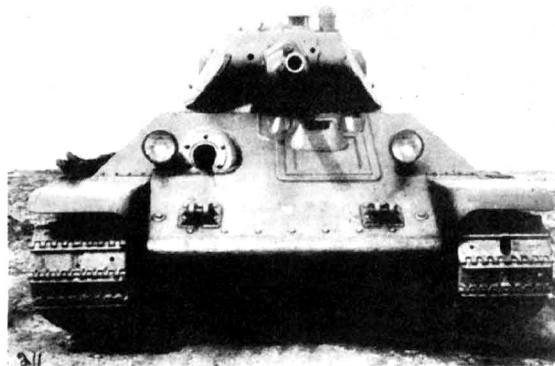
"When in October 1937 work began on the 18-ton wheel-and-track A-20 tank, Koshkin opposed the wheel-and-track feature. It was, in fact, he who initiated the idea of developing a medium tank using tracks only and armed with a heavier gun than the 45 mm. weapon of the A-20. The adoption of tracked movement exclusively led to simplification of design and, in cases of necessity, permitted increased output among factories with very varied types of plant and equipment. The designers' proposals to build the tracks-only T-32 was approved by the Supreme War Council in August 1938. The principal assistants to the chief designer in the work on this tank were Nikolai Alekseevich Kucherenko and Aleksandr Aleksandrovich Morozov. The latter headed the group responsible for the transmission.

"Starting work in the Design Bureau in 1929, A. A. Morozov was engaged on a number of designs which finally culminated in the creation of one of the most outstanding tracked fighting vehicles. The noteworthy configuration of the T-34 hull and its armour plating was developed by N. A. Kucherenko and M. I. Tarshinov. After the trial run of the two prototype T-34 models from Kharkov to Moscow in March 1940, Koshkin was taken ill with a lung infection. This affliction, combined with the stresses of his work over a number of years, told on his constitution, and he died in September 1940, in

his 42nd year. He was buried in Kharkov. In April 1942, Koshkin was posthumously awarded the State Prize, First Class, for his work on the T-34. Morozov and Kucherenko were similarly rewarded. Further development of this tank, which first went into production in June 1940, was carried on under the leadership of A. A. Morozov. However, the modifications of 1943, resulting in the appearance of the T-34/85, were directed by V. V. Krylov (who was killed in an air disaster on September 7, 1945)."

## PRODUCTION AT TANKOGRAD

Series production of the T-34 was carried out by a number of factories, initially at Leningrad, Kharkov and Stalingrad. When the Germans besieged Leningrad and advanced into the Ukraine, the Leningrad and Kharkov plants—together with other heavy industrial concerns—were evacuated to the safer location of Chelyabinsk, east of the Urals. Here the two factories combined with the Chelyabinsk Tractor Factory to form what became known as "Tankograd", the largest tank engineering combine in the U.S.S.R., which was responsible for the greater part of Soviet tank output during the war years, and is still one of the major tank production centres. The factory at Stalingrad—the Zerzhinski Tractor Works—achieved a remarkable performance. With the enemy at their very gates the workers carried on and the T-34's were driven unpainted and often incompletely equipped,



*T-34/76A—the first of the famous series, put into production in June 1940. "Short" 76.2-mm. gun, 30.5 calibres; weight: 26 tons. Note very narrow (and consequently cramped) two-man turret.*

(Above: Novosti Press Agency)  
(Below: Imperial War Museum)



*This T-34/76 with modified turret shows an odd combination of early type of perforated steel-tired wheels with the final rubber-tired disc type. There was no doubt a spares problem in the field.* (Warpics)

straight into action off the assembly lines. It is claimed that many of them were driven by the women factory workers.

### T-34 DEVELOPMENT

While the first T-34 came off the production line at Kharkov in June 1940, two prototypes had been ready in December 1939, and had undergone very stringent acceptance trials. These included the marathon trial run from Kharkov to Moscow and back, via Smolensk, Minsk and Kiev—a round trip of some 1,800 miles—in February and March of 1940, encountering the worst conditions of snow and mud. Apparently they passed this test with flying colours.

The T-34 as originally produced in 1940 has become known—in the West but not in Russia—as the T-34/76A; “76” of course signifying the calibre of the main armament. The Russians have not been precise about designating the T-34 types and generally refer to the vehicle simply as *Tridtsat’chetverka*—“The Thirty-Four”. In general configuration it was similar to the A-20—and T-32—from which it was directly descended. The most noteworthy feature was the admirable design of the hull armour, with its well-sloped plates offering maximum resistance to attack, and the small well-angled turret. The sloped armour was a characteristic noticeably lacking in contemporary German and British vehicles, with their slab-sided hulls and turrets, and it was not until 1943 that the Germans attempted anything similar, with the PzKpfw V Panther—their answer to the T-34. The maximum armour thickness was 45 mm. and the battle weight was 26.3 tons. The cramped, two-man turret was of rolled plate, welded—as was also the hull—and it exhibited a nasty rear overhang which the Germans found very convenient for affixing Teller mines and blowing off the turret complete. Main armament was the short 76.2 mm. gun, model 1938, with a length of

30.5 calibres, which proved a serious challenge to the short 75 mm. weapon of the PzKpfw IV. Performance figures were very impressive: top speed, 32 m.p.h.; power/weight ratio, 17.9 b.h.p./ton; ground pressure, 9.1 lb./in.<sup>2</sup>

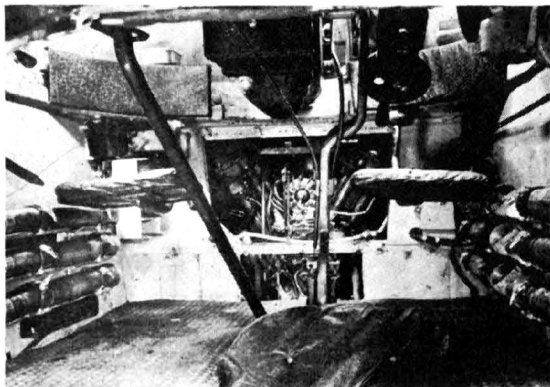
### MARKS A, B AND C

During succeeding years several modifications were made to the 76A version. In 1941 the maximum hull armour was increased to 47 mm. and that of the turret to 60 mm. primarily as an answer to the Germans’ 50 mm. Pak gun which had proved troublesome at close range. About the same time rubber-tired wheels became standard; previously some models “A” had plain steel tyres, allegedly owing to rubber shortage in the U.S.S.R. In 1942 an improved cast turret was fitted, and the length of the 76.2 mm. gun was increased to 41.2 calibres. This model was usually designated (in the West) as T-34/76B, and is the version fully described in the next section of this

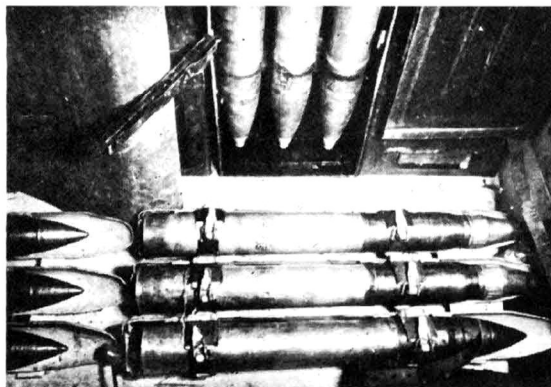
*T-34/76C with commander’s cupola and welded turret.* (F. M. von Senger und Etterlin)



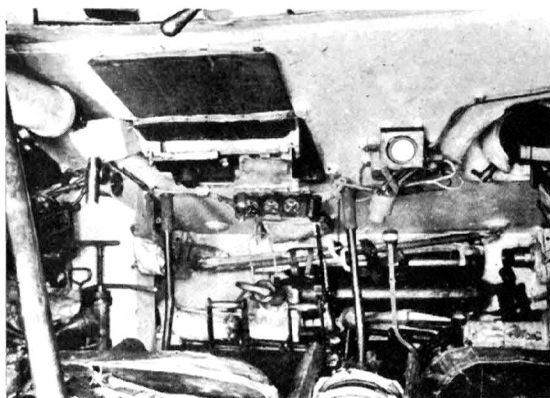




Fighting compartment, with commander/gunner's seat, right, and loader's left. The V2 engine banks can be seen through the bulkhead hatch. Nine rounds of gun ammunition is stowed at sides, remainder (68 rds.) under floor. (RAC Tank Museum)



Gun ammunition storage in the forward fighting compartment. 68 rds. were stowed in bins, the lids of which formed the turret floor. The remaining 9 rds. were strapped in racks on the walls. (RAC Tank Museum)



Interior of driver's compartment, showing steering levers, gear lever and foot pedals. On extreme right is the hull machine-gun with magazine mounted. (RAC Tank Museum)

*Profile.* A commander's cupola was added to the hexagonal cast turret of 1943; this vehicle has also appeared with a welded turret and may be designated T-34/76C. Finally, in December 1943, came a more radical change. The T-34 was up-gunned with an 85 mm. weapon fitted in an improved and enlarged turret accommodating three men, and thus freeing the commander of his secondary (or primary?) rôle as gunner. This was the T-34/85—the ultimate in the series, destined to remain in service for more than 20 years. It must be emphasised that modifications, including the major change from a single turret roof hatch—the most common version—to separate circular hatches and the addition of infantry hand-rails, occurred on the so-called A, B and C versions, as also did considerable variations in the type and pitch of track plates. Details were by no means standardised between the various production centres, depending on availability of materials.

### T-34 PRODUCTION

Output figures for Soviet fighting vehicles during World War II can be little more than "guesstimates" because the Russians still maintain a secretive attitude to such information. Consequently, figures quoted in Western sources vary wildly. A generally accepted

authority is von Senger und Etterlin's *Kampfpanser von 1916 bis 1966* in which the following figures are quoted for all T-34 models:

Year:	1940	1941	1942
Number:	115	2,810	ca. 5,000
Year:	1943	1944	1945
Number:	ca. 10,000	11,758	ca. 10,000
Total, all models:	39,683.		

After the war the T-34 (at first the 76 and later the 85 model) was supplied to a number of Soviet satellites including the Warsaw Pact countries, and to Egypt and North Korea, for both of which countries they were again to see action.

### THE STANDARD T-34/76B

The general design of the tank followed conventional practice as regards layout of hull and turret and rear-mounted engine. The turret was of cast armour plate, with accommodation for commander/gunner and loader. The hull was all-welded, a noteworthy feature being the efficient use of angled plates to increase resistance to AP attack. The Christie-type suspension employed five pairs of large-diameter double road wheels with a noticeably larger spacing between the second and third pairs.

The hull interior comprised the usual three compartments—driver's, fighting and engine. The driver's compartment accommodated the driver, on the nearside, with the hull gunner/wireless operator on his right. Their identical seats were adequately padded, with arms and folding back rests, but were not adjustable. The driver's controls consisted of conventional clutch pedal (left), footbrake (centre) and accelerator (right). On each side of him were the steering levers, with the gear-change lever to the right. He had a rear-hinged access hatch in the glacis plate. The hatch cover carried two episcopes mounted vertically. Visibility was poor when closed down, partly because of poor-quality optical glass.

The hull gunner's 7-62 mm. DT machine-gun was mounted on an armoured hood on the off-side of the glacis plate, with an internal ball. Ammunition was stowed in magazines to the left of gunner's and driver's seats. When wireless was fitted (only in

company commanders' tanks) this was installed in a pannier to the right of the hull gunner, who also acted as operator. He was provided with an escape hatch in the floor immediately in front of his seat. There was no bulkhead separating forward and fighting compartments and direct access between the two was possible.

### TURRET

The turret was of hexagonal shape and accommodated only two men, the crew space being undesirably restricted. Essentially of cast construction, it incorporated some minor rolled plates on the roof. An unusual feature was the detachable rolled plate secured to the rear exterior by set screws. This was a legacy of Soviet requirements for provision of a rear-mounted turret machine-gun. Although this was fitted in the heavy KV series, it was never adopted in the T-34. Other sources have described this plate as an access for mounting the gun but it does not appear on later "B" models.

The turret hatch was of relatively clumsy design—consisting of a single large cover, hinged forward. Thus, when opened up, the whole of the turret interior was exposed, which must have been unpleasant for the crew in the Russian winter. Moreover the size was such that when opened up it severely restricted forward visibility, so that the commander was obliged to peer round the sides. More serious was the poor visibility closed down. Apart from the commander/gunner's periscope dial sight, there were two episcopes, one for commander/gunner and one for loader, in the turret side walls. These were of similar type to those of the driver, and were similarly inferior. Below each episcopes was a pistol port—a feature which the Russians adhered to long after it had been abandoned by other nations. The pistol port was simply a conical aperture in the turret wall, closed by a close-fitting steel plug anchored by a chain, and removed by a hard blow. A similar port was fitted in the turret rear wall, but since in most models the space behind it was occupied by machine-gun magazines its usefulness was doubtful. On some T-34/76B models a small circular hatch was provided in the turret roof immediately above the loader's seat (off-side) for use of the signal flag. Both the side wall episcopes and the three

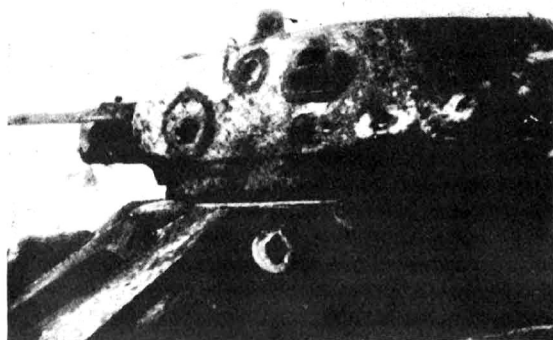


*In action on the Eastern Front 1943, these T-34/76B's show the modified turret with twin hatches for commander/gunner and loader. Note absence of pistol ports in turret sides, also non-standard stowage bins at rear. The grab rails on turret and hull sides (for infantry) were also a modification. (RAC Tank Museum)*



*A T-34/76 moves forward with supporting infantry, past the burning wreck of a long-gunned PzKpfw IV: First Byelorussian Front, September 1944. Note stores and spare track plates carried on hull and turret. (Imperial War Museum)*

*Armour immunity is relative and this quality of the T-34 was soon mastered by the Germans. (The Author)*



pistol ports were abandoned on later models.

The fighting compartment contained the seats for the commander/gunner (left) and loader (right) separated by the breech of the main armament. Both seats had backrests and were adjustable fore-and-aft and vertically. A recoil deflector guard of steel tubing was mounted round the breech, with a detachable canvas empty case bag. Immediately in front of the commander was the eyepiece of the periscopic sight, and to his left the manual traverse handwheel. This was very poorly located since it was too close to the gunner to be operated by his left hand and could only be efficiently operated by the use of the right hand across the body. The power traverse control was located on top of the motor casing to the gunner's



*Close co-operation with infantry! Until the introduction of APCs it was customary for the infantry to ride into action on their supporting tanks. This T-34/76 has the normal winter livery of a coat of white paint.*

(Imperial War Museum)

left. To the right of the gunner, on the near-side trunnion bearing was the hand-elevating handwheel mounted on a longitudinal axis. There was no power elevation. The floor did not rotate with the turret, the crew's seats being secured to the turret ring.

### ARMAMENT

The main armament of T-34/76B was the 76.2 mm. gun, of 41.2 calibre length. This was originally developed as a tank gun in the 1930's, when it was used in the multi-turret T-28 and T-35. The original length was only 16.5 calibres and this was progressively increased; to 26.5, 30.5 (as used in T-34/76A) and finally to 41.2, at which it remained until superseded by the 85 mm. gun in late 1943. With a muzzle velocity of 2,172 ft./sec. in the "long" version it proved more than a match for the 37 mm. gun of the PzKpfw III and the short 75 mm. weapon of PzKpfw IV. Its armour penetration with AP rounds at various ranges was reported to be: 500 m./69 mm.; 1,000 m./61 mm.; 1,500 m./54 mm.; 2,000 m./48 mm. The piece was fitted with a breech mechanism with either hand or semi-automatic operation, the latter being of similar construction to that of the American Sherman M.3 75 mm. gun. The breech block was of falling wedge type. Even though muzzle heaviness was reduced by mounting four cast iron blocks (totalling approximately 168 lb. in weight) on the underside of the cradle, the gun was still reputed to be muzzle-heavy. It could be fired either by hand or foot, as could the co-axial machine-gun.

The co-axial machine-gun, mounted to the right of the main armament, was the well-proven 7.62 mm. weapon, which had been developed in the 1930's by V. A. Degtyarev, and is hence known as the DT gun. It was gas-operated, and fed from drum-type magazines, each holding 63 rounds. Nominal rate of fire was about 600 rds./min., and the maximum sighted range was 1,000 metres. It was demountable and could serve as a ground weapon for which purpose a bipod was included in the stowage.

### SUSPENSION

The suspension system, evolved from the original Christie design, comprised five independently sprung

road wheels on each side. The wheels were of solid, double-disc type, the track guide horns running between the discs, so that no return rollers were necessary. Double concentric coil springs were employed on the leading wheels, while the remainder had two single coil springs each. The springs were fully armour protected, being housed within the hull plates. Tracks, 19 in. wide, were of cast manganese steel, each alternate shoe carrying a central guide horn. The plain shoes could be fitted with grousers, their centres being drilled for their attachment. A unique feature was the method of retaining the track pins. Welded to each side of the rear hull of the vehicle, level with the upper track, was a curved "wiper" plate. The round-headed pins were inserted from the inner side of the tracks, with no retention device at the outer end. As the tracks moved round, any pin projecting inwards engaged the wiper plate and was effectively pushed home as it passed over it.

The T-34 was never specially equipped for wading or submersion; its normal unprepared capability was about 4 ft. 6 in. No special equipment was carried; the normal stowage included spare track shoes and grousers lashed to the dust guards and one or two tow chains. Two towing and lifting hooks were welded to the front glacis plate and two towing eyes to the bottom rear hull plate, while three lifting eyes were fitted to the turret roof.

### T-34 IN SERVICE

T-34 was by no means a paragon among tanks. Tactical defects included the two-man turret which meant that the commander/gunner could fulfil neither rôle efficiently. Wireless was only carried in company commanders' tanks, or platoon commanders' in exceptional circumstances, so that battle and movement control had to be carried out by hand signals with flags. The low turret permitted gun depression of only 3°—a disadvantage when engaging targets at close range or from hull-down or reverse slope positions. Mechanically, there were persistent reports of unreliable transmission; and the gearbox was rough. The steering system was also of the primitive clutch-and-brake type. The excellent cross-country performance of the Christie suspension also had the disadvantage of providing a rolling, unstable gun platform. And, finally, the T-34 is often criticised in the West for lack of attention to crew comfort, although it is debatable whether the Red Army soldier noticed any shortcomings in this respect.

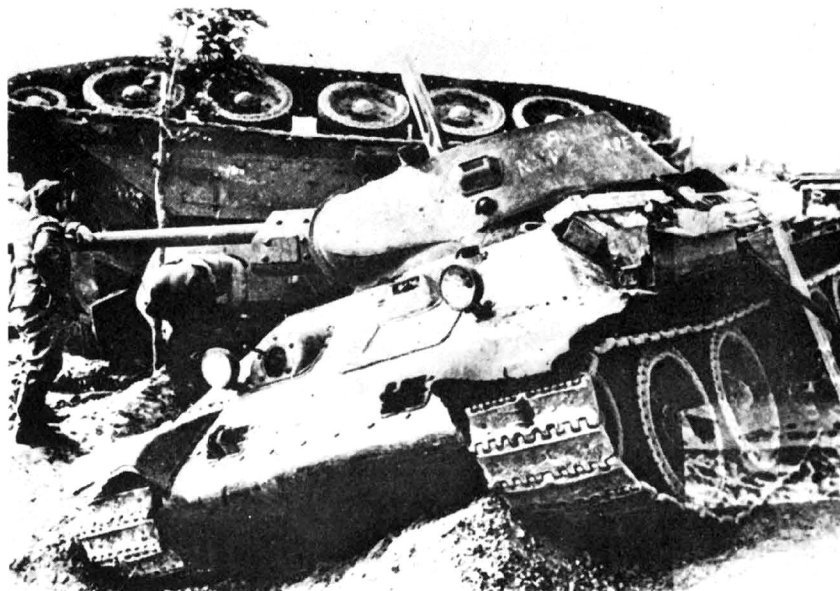
Tactical employment of T-34 is fully covered in the *Profile* of the T-34/85. Suffice it to conclude here that from a poor start, due to clumsy tactics in 1941-42, the Soviet tank arm was considered by 1944 to be "the most formidable offensive weapon of the war".\*

\*Maj.-Gen. F. W. von Mellenthin—Panzer Battles 1939-45—Cassell & Company Ltd., London, 1955.



Transmission was often troublesome and spare units were often carried. This photograph shows a final drive unit lashed to the rear decking. Note smooth track plates typical of the original Christie pattern.

(Imperial War Museum)



T-34/76B over-turned on top of another by a Stuka attack during off-loading from a rail flat.

(RAC Tank Museum)

#### SPECIFICATION T-34/76B

##### General

Crew: Four—Commander/gunner, loader, driver, hull gunner/wireless operator.

Battle weight: 27 tons 16 cwt. (fully stowed, without crew).

##### Dimensions

Length overall: 21 ft. 7 in. (gun front).  
19 ft. 11 in. (gun rear).

Height: 8 ft.

Width: 9 ft. 10 in.

Width over tracks: 9 ft. 6 in.

Track centres: 8 ft. 1 in.

Track width: 19 in.

Track contact length: 12 ft. 2 in.

Ground clearance: 1 ft. 4 in.

##### Armament

One 76.2 mm. gun mounted in turret, length 41.2 calibres.

One 7.62 mm. DT (Degtyarev) machine-gun, mounted co-axially, magazine fed.

One 7.62 mm. DT machine-gun in ball mounting on off-side glacis plate.

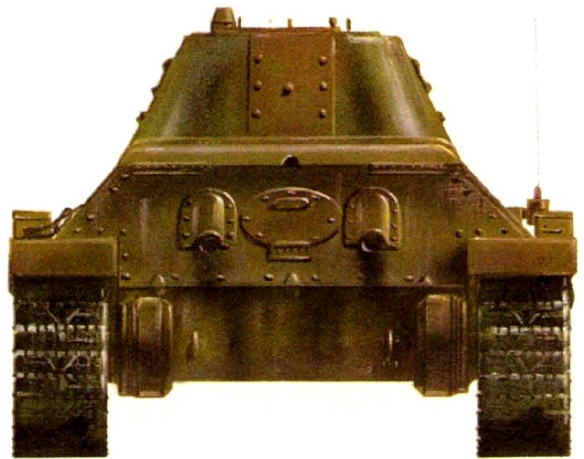
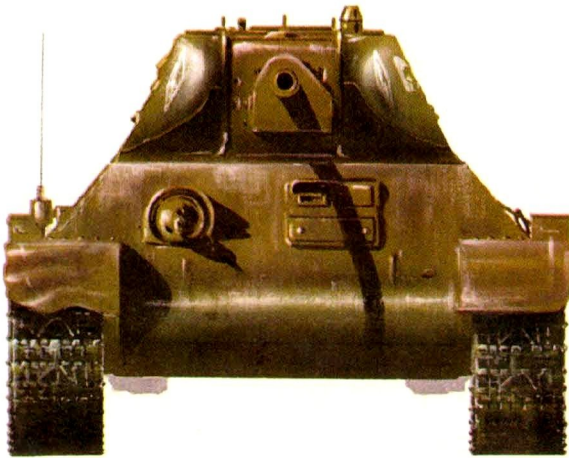
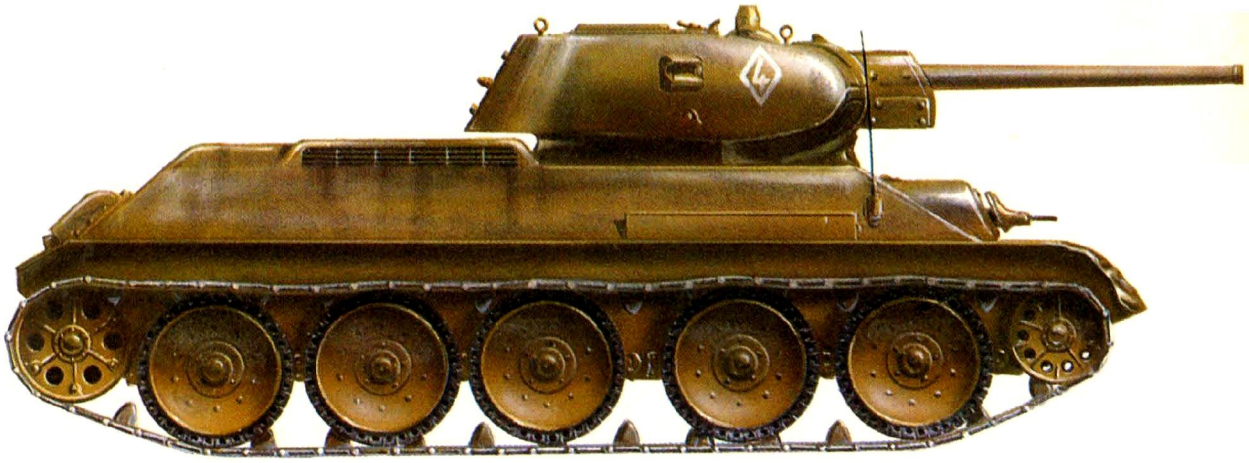
Personal weapons: Pistols (variable).

##### Fire Control

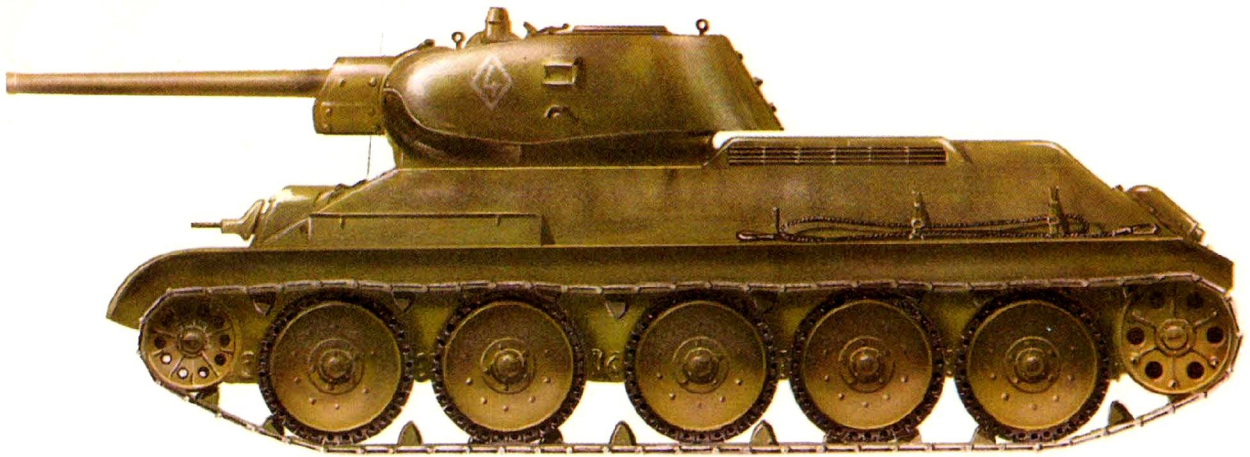
Turret traverse: 360°, hand, or electric power operated from vehicle batteries. Hand and power traverse by commander/gunner.

Elevation: Hand only, by commander/gunner. Pinion and sector type; maximum elevation: 30°; maximum depression: 3°.

Firing gear: Hand and foot mechanical firing system for 76.2 mm. gun. The 7.62 mm. co-axial machine-gun could be fired by commander/gunner by means of foot pedal or by loader from trigger on gun. Hull machine-gun fired by trigger on gun controlled by pistol grip.



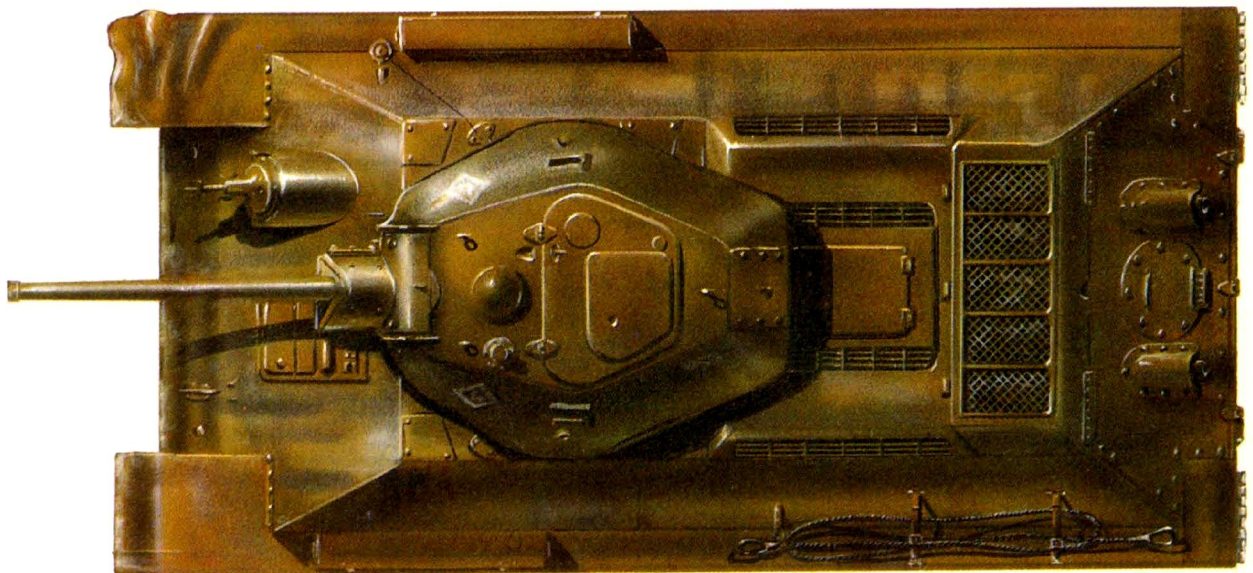




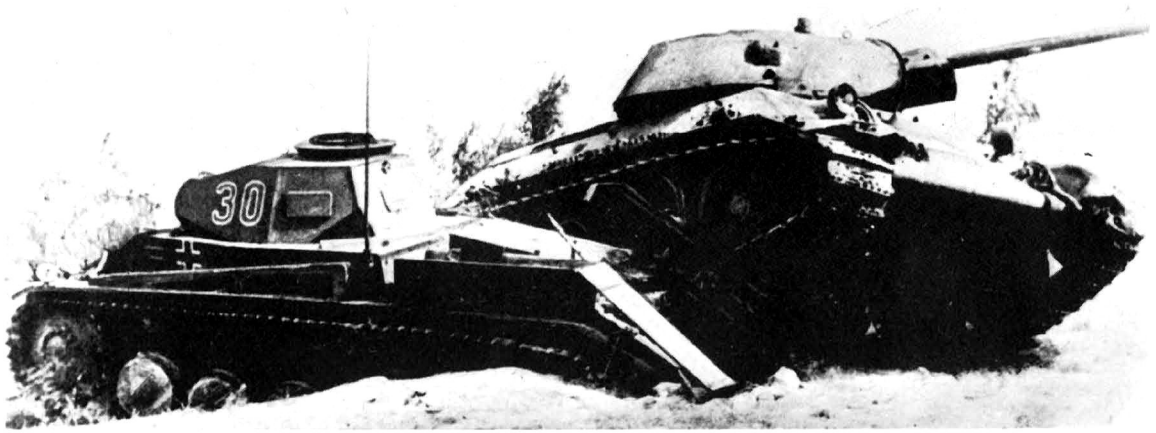
#### T-34/76B

This painting was based on a T-34 operating in the Kharkov area in the spring of 1943. It is identifiable as a T-34/76B, introduced in 1942, by the long – 41·2 calibre – 76·2 mm. gun. It has improved hull and cast turret armour. It is a company commander's tank for only these were fitted with radio. It should be noted that all other external features are the same as the short 76 mm. gun T-34/76A, including the large, one-piece turret hatch. The addition of a commander's cupola in 1943 identified the T-34/76C which also sometimes had a welded turret. The Red Army star insignia and the Guards insignia, a battle honour awarded to elite units and won by many Red Army armoured regiments, were only added to Soviet fighting vehicles on ceremonial occasions. They fought usually devoid of any unit or identification marks except, occasionally, a company number as seen on this specimen.

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*The T-34/76 had nothing to fear from the PzKpfw II, and this Soviet tank commander evidently believed in close combat, possibly because of the tank's very restricted gun depression at close range, or because if ammunition ran out during an attack Soviet tank commanders were taught to use the tank track as a potent weapon.* (RAC Tank Museum)

#### **Ammunition**

76.2 mm. gun: 77 rounds of mixed AP, HE and shrapnel in required proportions.

7.62 mm. machine-guns: 2,000–3,000 rounds in magazines, each holding 63 rounds.

Hand grenades: 20 in box.

Pistols: variable.

#### **Sighting and Vision**

Main armament: periscope dial sight PT4-7; cranked telescopic sight, TMFD.

Hull machine-gun: open sight.

Commander/gunner: one episcopes, with one pistol port below.

Loader: one episcopes, with pistol port below; one signal port in turret hatch.

Driver: two episcopes in escape hatch.

Hull gunner: open sight aperture in mantlet.

#### **Communications**

Whereas all tanks had intercommunication equipment, only those of company commanders (and in some cases, platoon commanders) were equipped with wireless. Normally, inter-vehicle communication was by flag signal. When fitted, the wireless comprised a receiver and transmitter installed to the right of the hull gunner, who also acted as operator.

#### **Armour**

Hull armour of rolled homogeneous plate of all-welded construction. Austenitic welding. Turret cast, sides and rear in one piece. Brinell hardness higher than comparable British or American plate, but finish somewhat inferior.

Hull: nose 45 mm./60°; lower sides 47 mm./vertical; upper sides 45 mm./41°; front glacis plate 47 mm./60°; top, front plate 20 mm./horizontal; top, rear plate 20 mm./horizontal; engine cover plate 20 mm./horizontal; upper tail plate 45 mm./49°; lower tail plate 45 mm./43°.

Turret: roof, front 15 mm./85°; roof, rear 30 mm./horizontal; sides 65 mm./31°; rear 47 mm./31°; front 65 mm./curved; gun mantlet 20–46 mm./curved.

#### **Engine**

Type V2. 60° V-12 cylinder. Diesel. Water-cooled. Capacity 38.9 litres. Compression ratio: 15:1 (articulated rods), 15.8:1 (master rods).

Rated output: 500 b.h.p. at 1800 r.p.m.

Fuel: 135 gallons in eight tanks disposed at sides of fighting and engine compartments.

#### **Transmission**

Gearbox: sliding mesh; four forward speeds, one reverse.

Engine clutch: multi-plate, dry.

Steering: clutch-and-brake. The gearbox secondary shaft carries the driving members of the steering clutches, which comprise 15 driving and 15 driven plates, the withdrawal mechanism being operated by the steering levers. Brake drum on driven member of each clutch. Inter-connected foot pedal operates on steering brakes. Final drive comprises single straight-spur reduction gears in armoured mountings at each side of tail.

#### **Suspension**

Christie type, with five pairs of rubber-tyred road wheels (some early models fitted with steel tyres). Wheels mounted on trailing suspension arms with independent springing by concentric double coil springs for leading bogie and two single close coil springs for each of remaining bogies. Springs housed within hull side plates.

Tracks: Cast manganese steel, with 72 links per track. Width 19 in., pitch 6 $\frac{3}{8}$  in. Unlubricated bushless pins inserted from inner side of track and retained by passing over curved shoulder plate on hull side.

#### **Electrical System**

Four 12-volt batteries, mounted each side of engine. System operated on two voltages: 12 volts for lighting and wireless and/or intercom, and 24 volts for starter and power traverse. Batteries charged by 4-pole dynamo of 1,000 watts output.

#### **Performance**

Maximum speed: 32 m.p.h.; cruising speed: 25 m.p.h.

Radius of action: 280 miles.

Turning circle: 25 ft.

Power/weight ratio: 17.9 b.h.p./ton.

Ground pressure: 9.1 lb./sq. in.

Trench crossing: 9 ft. 8 in.

Vertical obstacle: 2 ft. 4 in.

Maximum gradient: 35°.

Wading depth (unprepared): 4 ft. 6 in.



*Soviet infantry dismounting from a company of T-34/85s to assault an enemy position in the Odessa area. Reconnaissance troops mounted on motor-cycle combinations are associated with this sub-unit.* (Camera Press)

# T-34/85

by Major Michael Norman, Royal Tank Regiment

THE development of the T-34 tank from the original Christie design, and the discomfiture and surprise of the German Army in finding its Panzers outclassed by the T-34/76, has already been described by J. M. Brereton in the preceding pages.

Superior as the original T-34/76A had proved to be, changes in the design were necessary as a result of battle experience. Uparmouring of the turret and hull was the first major modification and an improved cast turret mounting a longer 76mm gun was produced in 1942 on what became known as the T-34/76B. A commander's cupola followed in 1943 and T-34/76C appeared with a welded turret. These changes were accompanied by improvements in the transmission, air filters, radius of action and production techniques.

But the introduction of the long-barrelled 75mm and better protection on the Panzer IV made an increase in firepower necessary, and this was accentuated by the arrival in 1943 of the Panzer V "Panther" with armour that owed much to the example of T-34 in its design and construction. The Soviet heavy tank KV-1 had been replaced that spring by the interim KV-85 which mounted an 85mm gun in a new design of cast turret. Production economics dictated that the same turret and gun should be mounted on the T-34, especially as experience had shown the inefficiency of a two-man turret crew, with one of them attempting to be commander and gunner

simultaneously. But although the turret ring diameter on the T-34 could be increased within the original hull width to that of the KV it seems likely that the extra weight of the new turret might have had an adverse effect on the suspension and performance. In any case T-34/85 emerged with a lighter turret of a somewhat less favourable shape than that on the KV-85.

The T-34/85 went into service on 15 December 1943 and, as was usual with new equipment, it was to one of the *élite* Guards' units that it went first. It is probable, however, that the T-34/76 continued in production for several months more.

## DESCRIPTION

Apart from the turret and fighting compartment there were no radical changes necessary to the basic vehicle. Thus the description of the hull, power train and suspension given for T-34/76 applies almost entirely to T-34/85.

The increases in weight and turret ring diameter, however, did necessitate a few minor alterations in these areas. Having extended the hull roof rearwards to accommodate the wider ring, the gearbox had to be lifted before the engine could be pulled back and removed. A change in the shape of the upper fuel tanks resulted in a small loss of capacity for the same reason. Stronger springs and other modifications were

necessary in the forward suspension units to accommodate the extra weight. A deflector strip welded in front of the driver's hatch, spare track links secured on the glacis plate, and brackets on the rear of the hull for the MDSH smoke containers were other visible changes made at this time.

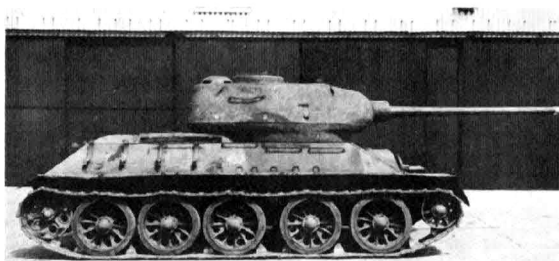
### The Turret and Armament

The turret consisted of a single casting of thicknesses varying from about 60 to 100mm, with a rolled roof plate 20mm thick. The need to maximise protection within a stringent weight limit has already been indicated and although the turret walls were sloped fairly well there was a distinctive "waist" which formed a shot trap. Deflector strips were welded on the hull roof to offset this defect. The appalling problems facing Soviet heavy industry at this time were reflected in the porosity and brittleness of the steel, poor finish, and the inefficient welding of the roof plate to the turret casting. Defective welding was also noticeable on the hull and often sprang under attack when the armour itself would have otherwise proved immune.

The commander was positioned to the left rear of the turret with the gunner in front of him, and the loader on the right hand side of the gun. The commander's cupola was a single casting welded onto the roof and all-round vision was provided by five equally spaced vision slits, protected by bullet-proof glass. There were three types of cupola hatches. In the probable order of introduction the first consisted of two leaf hatches which opened fore and aft; the second was a single hatch pivoting on a forward roof cover in which was mounted the MK-4 observation periscope, the whole assembly being traversable by hand. The third version (probably post-war) permitted the commander to locate and lay on a target for line with his periscope and then drive the main turret into alignment through the electrical power traverse using simple controls associated with the periscope mounting. The loader's hatch was to the right and slightly forward of the commander's cupola. Two dome-shaped ventilators were welded on the roof over fume extracting fans. On some vehicles one cover was forward, above the gun, but most appeared to have both side by side at the rear of the turret. Following previous practice there were two conical pistol ports on either side in the turret walls, and handrails for the 12 infantrymen usually allocated to the tank.

The main armament was an adaptation – as so often happens in Soviet AFV practice – of an earlier model, in this case the 85mm M-1939 anti-aircraft gun. Renamed the ZIS-S-53 (later ZIS-S-55) its tasks were listed as the destruction of enemy tanks and mechanised troops, the demolishing of artillery and defensive positions, and the annihilation of infantry.

The gun was of the quick firing type with a vertical wedge-type breech block which could be operated either by hand or semi-automatically. The ammunition was fired by percussion primer the mechanism being electrically or mechanically operated. The barrel was a monobloc forging 53 calibres long. No muzzle brake was fitted although a strengthening collar was machined onto the end of the barrel. The cradle



Four views of a T-34/85 captured in Korea and now in the Royal Armoured Corps Tank Museum, Bovington, Dorset. Noteworthy features are the poor ballistic shape of the turret base, the handrails for the supporting infantry, the brackets for the external fuel tanks, the well-sloped hull armour, and the wide tracks. (CCR MVEE)

was made as a single casting supported on trunnions which were themselves mounted in brackets welded to the turret wall. The roller-type mantlet was attached to the forward end of the cradle and the forward supporting bracket for the sighting telescope was connected to the cradle above and just in front of the left hand trunnion. The recoil system consisted of a hydraulic buffer and a hydro-pneumatic recuperator, both mounted below the gun, the piston rods being also secured to the cradle. A coaxial





*T-34/85 moving through a town in Poland. Extra fuel drums are carried on the rear deck because of the shortage of logistic transport. (RAC Centre)*

machine-gun, the 7-62mm Degtyarev, was mounted on the right hand side of the cradle. The entire 85mm gun, mounting, and ancillaries could be simply removed from the front of the turret in one assembly with a minimum of preparatory work.

The elevating gear consisted of a single arc and pinion mounted on the left of the gun and the hand-wheel incorporated the electrical triggers for both guns which could be fired simultaneously. The traverse gearbox was mounted on the left turret wall, the control handle having two positions; one for hand operation and the other for electrically powered traverse for large changes in azimuth. Later versions were modified on the introduction of the commander's target designating device and hand traverse may then have been used in emergencies only. The turret ring was graduated to measure azimuth switches.

The gunner's TMFD (later TSh-15) sight was articulated with the object lens tube located in the mantlet aperture while the rear was suspended by a bracket on the turret roof. Later versions incorporated a heater for the object glass to forestall frosting and condensation. The 85mm and coaxial MG were laid with reference to ballistic graticules. Both the gunner and loader had Mk-4 periscopes for general observation. The radio equipment, which when installed in the T-34/76 was in the hull, was moved to the turret wall on the left of the commander and a single whip antenna was mounted to the left front of the cupola. A laryngophone set was used for inter-crew com-

munication.

85mm rounds were stowed as follows: 35 in boxes on the floor of the fighting compartment, three vertically in the rear corners of the compartment, a further two in the right front corner, four against the right hand hull wall and the remaining 12 in racks in the turret bulge. Drum magazines of 7-62mm ammunition and grenades were also stowed internally.

Two MDSH smoke emitter boxes were sometimes fitted on the rear of the hull for the laying of smoke screens. The smoke compound was ignited electrically from inside the tank and the boxes could either be left to burn on the moving vehicle or ejected onto the ground. External fuel drums were sometimes mounted in place of these emitters.

### **T-34 VARIANTS**

A number of the Warsaw Pact countries, probably including Poland and Czechoslovakia, built T-34 tanks and derivatives under licence but there appeared to be no external national characteristics to distinguish them from the original design. Yugoslavia, however, produced a limited number with modified hull fronts to give greater obliquity to head-on attack and a domed turret of considerably better ballistic shape than the standard Soviet version.

In common with other tank-producing nations Russia adapted gun tanks for more specialised roles wherever possible. It seems likely that many of these designs were based on reconditioned vehicles and the



T-34/85 in Wenceslaus Square, Prague, 1945. (Imperial War Museum)



T-34/85 loaded on a rail flat preparatory to the Soviet withdrawal from Austria in August 1955. The forward-mounted turret ventilator can be clearly seen. The banner reads "Long live the Soviet Union that freed Austria." (Keystone)

types described below may have been derived from any of the T-34 tank models.

### The Turretless Tanks (Samokhodnaya Ustanovka)

These vehicles represented a relatively simple and cheap method of upgunning a tank chassis by the installation of a more powerful gun having only a limited traverse arc. They were generally used with conventional tank forces to provide direct HE and anti-tank fire support, although they were sometimes used as tanks in their own right. The SU-85 and SU-100, both on a T-34 chassis, are described in detail by Colonel E. F. Offord in another *Profile*. The earlier SU-122 mounted a 122mm howitzer, a short-barrelled weapon with a particularly clumsy looking protection for the recoil system, but being capable of firing only HE it was replaced by the SU-85 in late 1943.

A rather curious use for surplus turrets was in the arming of fast patrol boats – the 1125 type, for example, being equipped with two T-34/76 turrets.

### Armoured Recovery Vehicles

A large number of T-34 chassis were adapted for this role. In most cases the gap left by the removal of the turret was covered by light armoured plate but some vehicles incorporated a cupola from the T-34/85 gun tank. Others mounted a simple beam crane for the lifting of tank engines, transmissions, and armament in the field. SU vehicles were very suitable for this role as the removal of the gun freed a large volume under armour for the recovery crew and its equipment. For this reason some such vehicles were converted to armoured command posts.

### Bridgelayers

It seems likely that three distinct types of bridging equipment were based on the T-34 chassis. The earliest consisted of a bridge span mounted permanently on the vehicle. The principle of operation appeared to involve the vehicle driving into the

obstacle and then adjusting the height and attitude of the span to coincide with the banks of the obstacle. (It would therefore be comparable with the British Churchill ARK). This was probably replaced by a rigid span launched from the carrying vehicle by pivoting about a roller. The effective gapping width was about 37 feet and the load class about 40 tons. The most sophisticated version was Czechoslovakian in origin and consisted of a hydraulically operated scissors bridge some 65 feet long and capable of carrying vehicles of up to 35 tons weight.

### Minefield Clearance

Three types of mine-clearing devices have been fitted to the T-34 at various times. The most usual seemed to consist of a heavy frame, rigidly attached to the front of an otherwise standard tank, on which were mounted two rollers, one in line with each track. Less common were the so-called "Snake" tube charges which were either pushed or projected into minefields or obstacles. T-34s were also fitted with dozer blades and used for the digging of defensive positions as well as clearing mines and rubble.

### Flamethrowers

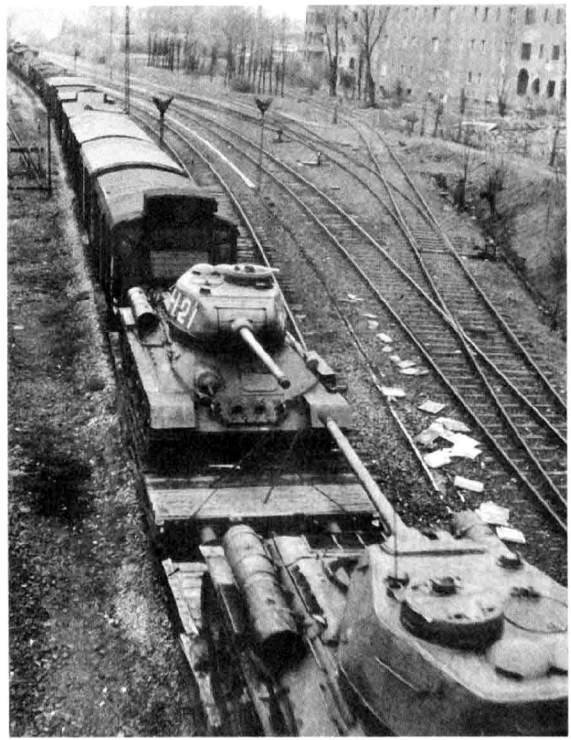
The Soviet Army has long been interested in the use of flamethrowers and the T-34 was modified by the substitution of a flame gun for the hull MG. Following trials on some British Churchill Crocodile flame tanks a version appeared which mounted the ATO-42 flame gun and was designated TO-34 (Tank Ognemetnyi). The fuel capacity was 44 gallons of petrol mixed with waste naphtha, projection was by compressed air, and the maximum range was about 100 yards in ideal conditions. The normal turret and armament was retained.

### T-34 IN SERVICE

The Field Service Regulations of 1936 envisaged tanks supported by artillery and aircraft as being used *en masse* "... in simultaneous attacks on the enemy throughout the whole depth of his position to



Maintaining a watch on West Berlin from a T34 during the uprising in the Soviet sector in June 1953. The Christie-type of track plate is unmistakable. (Keystone)



Soviet T-34/85 tanks en route through the U.S. sector of Berlin on the railway system operated by the East Germans. (Keystone)

isolate him, encircle him completely and finally destroy him”; as such this concept of independent operations by a predominantly tank force was similar to that pursued in Britain at roughly the same time. The experience gained in the Spanish Civil War, however, and the realisation that Soviet industry was incapable of achieving the scale of re-equipment necessary to implement this policy led to its being shelved in 1940 in favour of concentrating on the support of infantry formations. But this decision had to be changed almost at once following the astonishing demonstration of the close cooperation of all arms in the German invasions of Poland and France.

Thus, at the start of Operation Barbarossa in 1941, the Soviet Army was in the throes of reorganization, most of the tanks were obsolescent, commanders were unfamiliar with their new tasks, and such armoured forces as were available were dispersed linearly across the front without reserves. This piecemeal use of armour was no match for the well-proven *blitzkrieg* techniques, and although the Germans were unaccountably taken by surprise by the appearance of the KVs and T-34, the Soviet nominal superiority of about four to one in tanks was of little avail. By the winter of 1941 there were practically no large armoured formations still operational.

The stabilisation of the front in 1941-42 gave a respite in which new units could be founded and the hastily redeployed tank industry could start making good the losses in equipment. Rebuilding was necessarily somewhat protracted but the new organizations indicated a better understanding of the interdependence of armour, infantry and fire support. A

tank corps, for example, normally consisted of three tank brigades equipped with T-34s and one motor rifle brigade, all supported by heavy tanks, SU and anti-tank units, reconnaissance and towed artillery. At full strength it would correspond roughly to a Western Allied armoured division, and had a similar role. The mechanised corps consisted largely of motorised infantry with tanks in support and was used to follow up the tank corps. Independent tank brigades, again equipped mainly with T-34s, were intended for the support of infantry formations with no generic armoured units.

An acute shortage of suitable motor transport often meant that the infantry were unable to keep pace with the tanks, which often suffered heavy losses as a result, and special “tank landing troops” were organised to ride into battle on their backs and sides.

Despite their spectacular successes in the later part of the war it is interesting to note that the Soviet armoured forces were then still greatly outnumbered by purely infantry formations and that the Red Army as a whole was relatively far less mechanised than those of the Allies. It was largely the drastic reduction in Western tank strength in the immediate post-war period, at a time when their new opponents had no intention of following suit, that assured the Soviet armoured formations of a significant place in the balance of power in Europe. This predominance was accentuated by a relative increase in numbers of these compared with their purely infantry counterparts.

The T-34 tank in one form or another was central to most operations from 1941 onwards. In set-piece attacks they would follow the first wave of heavy





*Stones being thrown at a T-34/85 during the uprising in the Soviet sector of Berlin. June 17, 1953.* (dpa)



*Soviet T-34/85s in East Berlin on June 17, 1953 when they were called in after martial law had been declared by the Soviet authorities.* (Associated Press)

tanks onto the objective, supported by their own infantry. A further wave of T-34s would then move through the objective with the aim of exploiting the break-in as soon as possible, they too having infantry assigned to ride on them. The importance of firing on the move was emphasised because, although accurate fire was difficult, the effect on the enemy's morale of a moving mass of armour, firing as it came, was of greater value. If ammunition became exhausted during such an attack the tank crews were reminded that the tank track was also a potent weapon and this often led to a complete intermingling of forces where citations were awarded for the disablement of the enemy by ramming.

In the defence, tanks were usually concealed behind the infantry positions. While the enemy infantry was being engaged his armour was permitted to pass through, only to be destroyed by the tanks in depth or by mobile reserves. T-34s often worked in ones and twos with SUs in this type of ambush action. For example, a team could also be used to provoke enemy defences into disclosing their position, the T-34s acting as mobile bait while the SUs would engage from concealed positions.

Operations in poor visibility and night were frequently necessary because of the short period of daylight in the winter months in the north. Such actions would be preceded by detailed reconnaissance wherever possible, the artillery would assist in direction-keeping by firing on fixed lines, and the advance would be made in echelon to make control easier. Once behind the enemy lines there would be no compunction about using vehicle lights in the interests of maintaining the momentum of attack, and a temporary loss of contact with rear echelons would be accepted. Similarly, in snow or mud, the excellent flotation of the T-34 was exploited to out-maneuvre the less mobile German tanks.

The superiority of the T-34/76 over the German Pz III and IV was very marked, not only in its agility, but also in terms of gunpower and armour protection. The 76mm ammunition could penetrate both German tanks in their original forms at all normal fighting ranges while the armour was immune from their guns. The first serious challenge came when the Pz IV was upgunned with a long-barrelled 75mm, but the

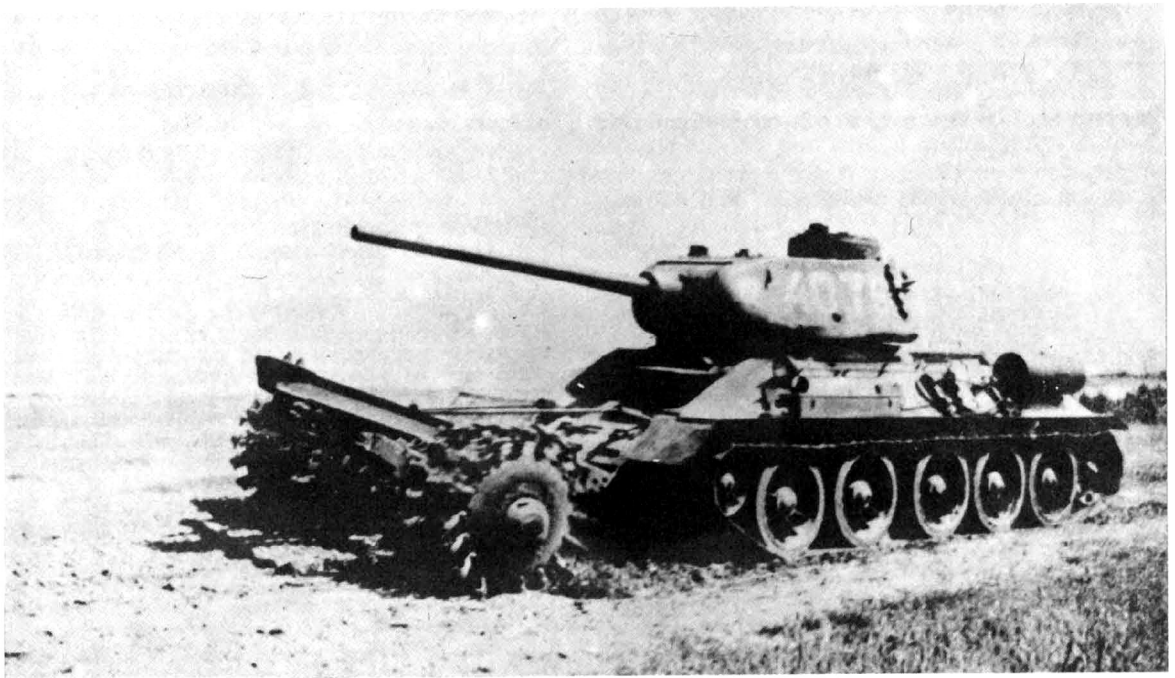
gap was narrowed with the introduction of the Panther, and closed by the Tiger. The replacement of the 76mm by the 85mm in the T-34/85 only partially restored the situation although the performance of the new gun was roughly comparable to that of the model 36 88mm in Tiger I. The task of defeating these heavier German tanks fell increasingly to the SUs and the new tanks in the IS series.

After the war the T-34 remained as the standard medium tank in Soviet and satellite armies until the fifties when it was replaced by its logical derivative the T-54. It saw action again, however, in Korea in the hands of the North Koreans and Chinese and was used in the dispersal of rioting crowds in the uprisings in East Germany in 1953 and in Hungary in 1956. Some T-34s and SUs 100 were also used by the UAR against Israel although they were, by this time, almost completely out-matched.

It is difficult to make an accurate estimate of the number of T-34 tanks produced. Indeed, it is by no means clear when production finally stopped or how many were produced by the satellite countries. About 50,000 were probably made up to the end of 1945. Despite the obsolescence of the design a large number were still in service as late as 1969, possibly including the Soviet Union itself where they may still have been used for training. Other countries thought to retain some include Afghanistan, Albania, Algeria, China,

*A trainload of twenty-three Russian T-34/85 tanks arriving at Vienna in October 1955 as a gift from the Soviet Union to the new Austrian Army. The United States also provided military equipment.* (Associated Press)





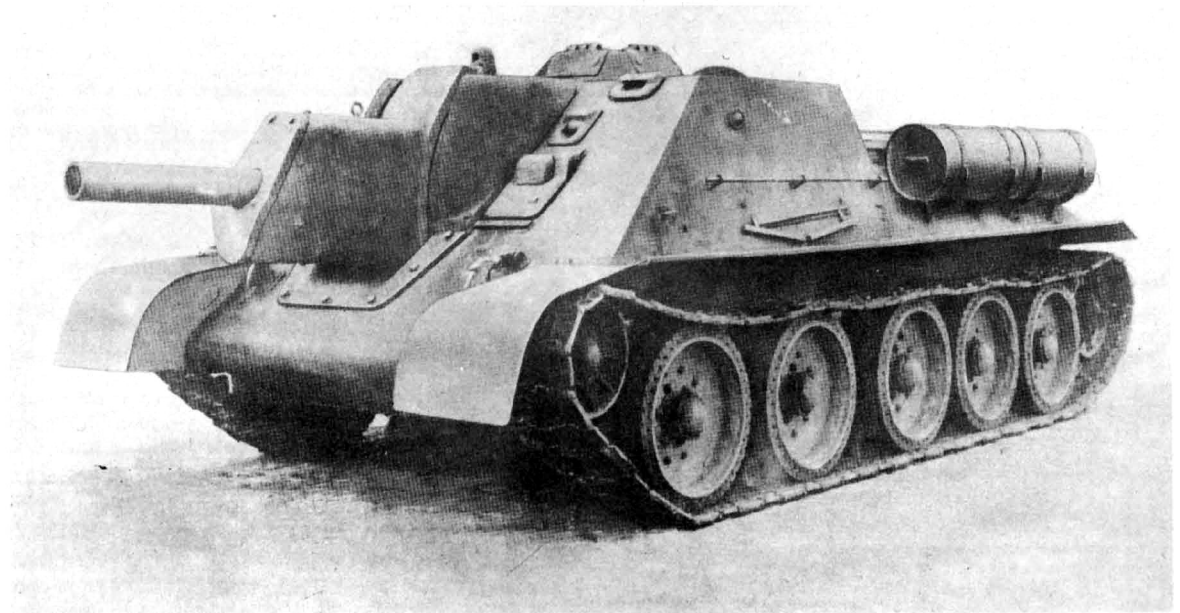
*Mine-clearing roller mounted on T-34/85.*

Cuba, Cyprus, Guinea, Iraq, Mali, Mongolia, North Korea, North Vietnam, North Yemen, Somalia, Syria, the UAR, Yugoslavia, as well as a number of the members of the Warsaw Pact.

T-34 was evolved as a result of a policy that called consistently for the best possible firepower, mobility and protection. The credit for the last two attributes, hailed as a manifestation of Soviet genius at the time,

must be more properly regarded as belonging to the American pioneer J. W. Christie, although it was the Russians who were the first to exploit his work to the full. As they had no illusions either about the need for maximum firepower the superiority of the T-34 over its earlier opponents was assured. It is hardly surprising, under the stress of invasion, that there were defects through the use of inferior materials and semi-

*General view of the SU-122 based on the T-34 chassis and mounting the M-1938 122-mm. howitzer. The ungainly protection for the recoil system and the short barrel distinguishes this vehicle from the more versatile SU-85 which replaced it.*



skilled labour working in very difficult conditions, but there seems little doubt that these hardships necessitated the discipline now called value engineering. Indeed, it has been claimed that the man-hours necessary to produce a T-34 were reduced between 1941 and 1943 by over 50%, often by the use of components common to several designs. It seems likely, too, that a number of defects and undesirable features from a

Western point of view were recognised but accepted because of the short expectancy of life of a tank in battle. But for all that, the design must be one of the very few that have had a profound effect on the design of tanks everywhere.

von Rundstedt described T-34 simply as the best tank in the world: it probably was.

## AFV/Weapons Series Editor: DUNCAN CROW

### SPECIFICATION FOR T-34/85

Weight: 32 long tons (combat loaded).  
Crew: 5 (commander, gunner, loader, driver and hull gunner).

#### Dimensions

Overall length: 24ft. 9in.  
Hull length: 19ft. 8in.  
Hull width: 6ft. 1in.  
Overall width: 9ft. 10in.  
Overall height: 7ft. 11in.  
Internal diameter of turret ring: 5ft. 2in.  
Track centres: 8ft. 2in.  
Ground clearance: 1ft. 4in.  
Track contact length: 12ft. 2in.

#### Armament

##### Main Armament: Model 1944 ZIS-S-53 or 55

Calibre: 85mm. (3.34in.)  
Overall length: 4420mm. (173.9in.)  
Barrel length: 4150mm. (163.2in.)  
Traverse: 360° (hand or electric)  
Elevation: minus 5° to plus 20°  
Firing mechanism: electrical by solenoid or mechanical  
Recoil system: buffer and recuperator below gun  
Breach mechanism: semi-automatic with vertical sliding block fixed; 55 or 56 rounds. Natures might include HE, APBC (total weight of round about 33lb.), APHE, HVAP and Sub-calibre AP  
Ammunition: Possible penetration for APBC at 1000 yards at 30° about 95mm. with muzzle velocity of 2600 ft./sec.  
Rate of fire: 7 – 3 r.p.m.

##### 7.62mm Degtyarev MG

Two: one mounted coaxially with 85mm., the other in a ball mounting on the right of the hull, and which could be fired by the driver in the absence of the hull gunner.  
Overall length: 49.8in.  
Weight: 18.4lb.  
Effective range: 880yd.  
Cyclic rate: 600 r.p.m.  
Feed system: horizontal drum magazine with a capacity of 63 rounds.  
Operation: gas.  
Ammunition: 2745 rounds in 45 magazines.

Grenades: 20.

#### Sights:

Commander: Mk-4 in rotating cupola roof. Later versions with line-up facility.  
Gunner: articulated telescopic sight TMFD or later TSh-15. Early versions may have had rotating dial sight PT4-7. Mk-4 observation periscope.  
Loader: Mk-4 periscope.  
Hull Gunner: open metal sight.

#### Armour

(Thicknesses and obliquity often varied appreciably from vehicle to vehicle).

(Cast turret with welded-on roof plate of rolled armour).  
Mantlet and turret front: 90 – 100mm. (rounded).  
Sides: 75 – 85mm. at 18 to 21°.  
Rear: 60 – 75mm. at 5 to 10°.

Roof: 18 – 20mm. (horizontal).  
(Welded hull).  
Glacis and nose plates: 47mm. at 60°.  
Sides: 47mm at 40° and vertical.  
Rear: 47mm. at 50° (upper) and 45° (lower).  
Roof: 30mm. (horizontal).  
Belly: 20mm.

#### Power Plant

Type: V-12, four stroke, water cooled, compression ignition, model V-2-34.  
Bore: 150mm.  
Stroke: 188mm.  
Swept volume: 38.9 litres.  
Output: 500b.h.p. at 1800 r.p.m.  
Power/weight ratio: 15.6h.p./ton.  
Types of fuel: summer and winter grades of fuel oil.  
Fuel consumption: 1.1m.p.g. approx.  
Fuel capacity: 130 gallons in six internal tanks and about 60 gallons in up to four external tanks which were drawn on first.  
Starting: electric with compressed air for emergencies and cold weather.

#### Transmission

Dry multi-plate clutch to four (sometimes five) forward and one reverse sliding mesh gears. Single spur reduction final drive to rear sprocket. Clutch and brake steering.

#### Running Gear

Cast manganese steel track plates, 72 in number, with centre guide horn on each alternate plate.  
Width: 19.6in. (could be increased for better flotation).  
Pitch: 6.9in.  
Orthodox Christie suspension design. Concentric double close-coiled springs on leading stations and single-coiled on rear. Five twin rubber-tyred road wheels on each side of varying designs.  
Diameter: 33in.  
Sprocket of two ribbed discs with six rollers which engage with the track horns.  
Pitch circle diameter: 19.4in.  
Idler wheel mounted on track adjusting arm.  
Diameter: 19.8in.

#### Performance

Maximum speed: 32 m.p.h. (approx).  
Fording depth: 4ft. 3in. (floating sleeves on exhausts used at least once to permit fording to turret top depth).  
Step: 28in.  
Gradient: 35°.  
Tilt: 25°.  
Maximum traversable depth of snow: 2ft. 7in.  
Trench: 8ft. 3in.  
Ground pressure: 12.3lb./sq. in.  
Radius of action (max.): 190 miles (about 220 using external fuel tanks)

#### Communication Equipment

Radio: 9-RS or 10RT or R113 transceivers.  
Intercom: TPU-3-4 or PPO laryngophone.



# AFV/Weapons Profiles

*Edited by DUNCAN CROW*

FORTHCOMING TITLES:

**45 Vickers Main Battle Tank**  
(publication delayed).

**48 PanzerKampfwagen VI - Tiger I and II**  
"Slow and heavy, large and cumbersome" the Tiger may have been, but it was a formidable tank to encounter and could stand tremendous punishment on its thick frontal armour. This Profile tells the story of the legendary Tiger – both the Tiger I (SdKfz 181) and the Tiger II or King Tiger (SdKfz 182). They had their drawbacks from the logistic and tactical points of view – faults that were rarely apparent to those who had to face them. Also included is the "tank hunter" version of the King Tiger – the Jagdtiger. (Tiger I is a revised Armour in Profile, the rest is new).

**49 Japanese Medium Tanks**  
Japanese tank development started from 1925. One of the officers of the Imperial Japanese Army concerned with this development from the very outset was Captain (now LIEUTENANT-GENERAL) TOMIO HARA. From his own unrivalled personal experience General Hara in this Profile describes the designing, building, and performance of Japanese medium tanks from Prototype No. 1 (1925-27) through Type 89 (1929), Type 97 (CHIHA) (1937), Type 1 (CHIHE) (1940), Type 3 (CHINU) (1943), Type 4 (CHITO) (1943), to Type 5 (CHIRI) (1944). Also included is a detailed explanation of the year/model designation given to Japanese tanks and the abbreviations used in nomenclatures.

**50 Swiss Battle Tanks**  
Prototypes of the Pz 61, the Swiss Army's Main Battle Tank, were built in 1958 and 1959 and pre-production vehicles with a 90mm gun appeared in 1961: they were designated Pz 58. The Pz 58 was then equipped with a 105mm gun and went into production as the Pz 61. The Pz 68 is a further development. The Profile also includes an account of Swiss tanks since World War I.

BY R. M. OGORKIEWICZ.

**51 The Abbot**  
The Abbot (FV 433 105mm Field Artillery Self-Propelled) is the first British gun designed specifically for the self-propelled role. It was produced to replace the 25pdr field gun and went into troop service in 1965 when the first regiment to be equipped with it was the 3rd Royal Horse Artillery. This Profile by CHRISTOPHER F. FOSS also includes the Value Engineered Abbot and the Falcon Anti-Aircraft System.

**52 M47 Patton**  
*by Colonel Robert J. Icks*  
The tank that missed Korea. M26 M46 } M47 M48  
M42 }

**53 FV 432**  
*by Christopher F. Foss*  
The British Army's APC developed from the earlier FV420 series, originally called Trojan.

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*by R. M. Ogorkiewicz*  
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**German Self-Propelled Weapons**  
*by Peter Chamberlain*  
An illustrated guide to all the SP weapons used by the Germans in World War II.

**French Infantry Tanks, Part I**  
*by Major James Bingham*

**French Infantry Tanks, Part II**  
*by Major James Bingham*  
Having described the tanks used by the French cavalry in AFV/Weapons 36 Major Bingham, in these two Profiles, now examines in equal detail the tanks used by the French infantry from 1919 to 1940.

**SdKfz 250 and 251**  
*by Walter Spielberger and P. Chamberlain*  
German half-track vehicles of World War II.

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*by Major-General N. W. Duncan*  
Their development and use in different armies.

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*by Colonel Farrerly, R.A.*  
The history of the British Army's famous field gun.

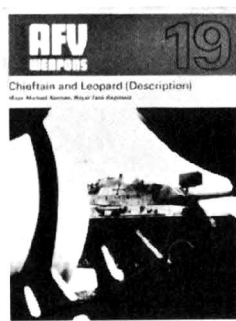
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