A SHORT HISTORY OF TANK DEVELOPMENT PART 1

J. WHELDON

The French " Char B " designed in the mid-twenties, built in the thirties by Renault and used in 1940.

Seven tanks for armoured warfare

TANKS HAVE BEEN AROUND for more than half a century now. Familiar things, we take them for granted: they are just part of the scene, for soldiers as for war-gamers. How many of us ask what exactly they are supposed to do? Is what they are supposed to do now, what has always been expected of them?

Well, the work a tank has to do has some effect on its shape, and when we learn that during the period between the World Wars there were tanks as light as 2 tons and as heavy as 75; some with crews of one man and others crews of 13; that some large tanks were scarcely bullet-proof while some little ones could keep out most anti-tank shot; that some tanks would do 65 m.p.h. across country while others could do only 5 m.p.h.; and that weapons varied enormously, some having only machine guns, others howitzers, others general-purpose guns, and some cannon which fired only solid shot . . . when we see this great variety of machinery all classified under the word 'tanks', we see at once that they must have been designed for different kinds of action, by people who had differing notions of what tanks are supposed to do.

These differences date from the very dawn of tank history. The battles of 1914-18 cost so many lives because troops still advanced in close lines, which were accounted for by machine guns. Hence, tanks were invented to knock out the machine guns, and were in fact called Machine Gun Destroyers until Colonel E. D. Swinton gave them the name 'tank', to fool enemy spies.

Although this work seems straightforward, the French and British had very different ideas about it. The former thought that two types were needed—a self-propelled armoured gun carriage to " come into action when the attack had advanced to the point when wheeled artillery would have to limber-up and move forward "; and a small two-man vehicle armed with a machine gun, to accompany each infantry company.

The British thought this was putting the cart before the horse, and that if tanks were to save infantry lives, they must lead, not follow them. Hence, the great lozenge-shaped British tanks of World War One which could cross any obstacle, making paths for the infantry to follow, and fighting on their own if need be.

But none of these tanks was proof against any kind of artillery fire. They moved at walking speed, and while they protected their infantry from machine guns, the infantry were expected to protect them against field guns when they broke into the enemy's artillery zone, where the gunners could see them and take direct aim. If the infantry riflemen didn't take on the gunners, the latter could score hits on a slow tank before it could fire back effectively—the early tank weapons were inaccurate at long range, especially when the tank was lurching and sliding over rough ground. It was a hair-raising moment for a tank crew if they burst through a screen of trees to find themselves confronting a cool, well-served battery! But even so, there were occasions when a tank got right in amongst the guns and silenced the lot.

By 1918 anti-tank guns, small and easily hidden were all over the front and tanks were having a very difficult time. New designs were urgently needed and an Inter Allied Tank Committee was formed to provide them. But once again, ideas were divided. The French argued that tanks should carry shot-proof armour and be built in two sizes—small ones to accompany infantry as before, and large ones, " chars de rupture " as they were called, to take on the old British idea of leading the way through trenches and strong-points.

But in 1918 the British Tank Corps was looking ahead to an altogether new role for tanks! They thought it would be better if tanks were developed as vehicles to go much faster and farther—for this would enable them to by-pass the front of an enemy who still relied heavily on horse and railway transport, and hunt down his Generals and supply organisation—which would quickly collapse him. The Tank Corps called this ' Strategical Paralysis ', and knew they were well ahead of the rest of the world with it; they even designed and began to build their own fast long-range tank, as I described in my last article, " The World's First Fast Tank ".

Yet another line of development was put forward by the great American car manufacturer Henry Ford. In 1917 he had speeded-up the mechanisation of farming by producing the world's first cheap, mass-produced ' modern ' farm tractor; the same year, he turned his mind to fighting and suggested that if every two soldiers could be given a " tankette "—what we should call a mini-tank—the mass-production of these would prove a lot cheaper in the long-run than the cost of continuing with the ordinary type of fighting, since they could be guaranteed to end the war quickly. A few years after the war this idea was taken up enthusiastically by some Englishmen named Martel, Carden and Loyd, and some very good British tankettes were produced.

However, Germany was weaker than the Allies imagined, and the war ended suddenly in 1918 before any of these ideas could be tested.

And then another American, an engineer named J. Walter Christie, designed tanks that could swim, tanks that could motor across country much faster even than the British fast tanks, and finally, tanks that could be carried by aircraft deep into enemy territory.

So when Governments had to decide how they would spend the taxpayers' money to equip their peace-time armies, they had a bewildering variety of tanks to choose from, especially as some old-fashioned soldiers of high rank scoffed at all tanks, and ridiculed the enthusiasts of modernisation as " tank maniacs ". These old stagers were very sure of themselves, and told the politicians that the next war would be dominated by men on horses once again!

Well, there was one development simply inevitable as a result of this—a spate of theory and argument. Big industrialists, with an eye to the armament trade, notably Vickers in Britain and Skoda in Czechoslovakia, produced ' commercial ' tanks which looked modern and featured at least some of the attractions of each school of thought—and above all, were reliable vehicles and reasonably priced, in the popular ' light ' and ' light-medium ' sizes.

No doubt quite a few military advisors looked on these ' commercials ' with a sigh of relief; they saved the cost and risk of designing and building from scratch, and if they proved to be not much good for real fighting they could be re-classified as ' training machines ', and there would be no wasted production lines in the war factories.

So, in the twenty-five year period between the World Wars it was no real use to talk vaguely about tanks, for there were too many different kinds, all designed for different kinds of armoured warfare! It might be a good idea to draw up a list of them, and show who favoured which, and what happened to them. We'll start with the slowest and oldest, and end with the newest off-beat!

1. The large, slow, heavy assault tank

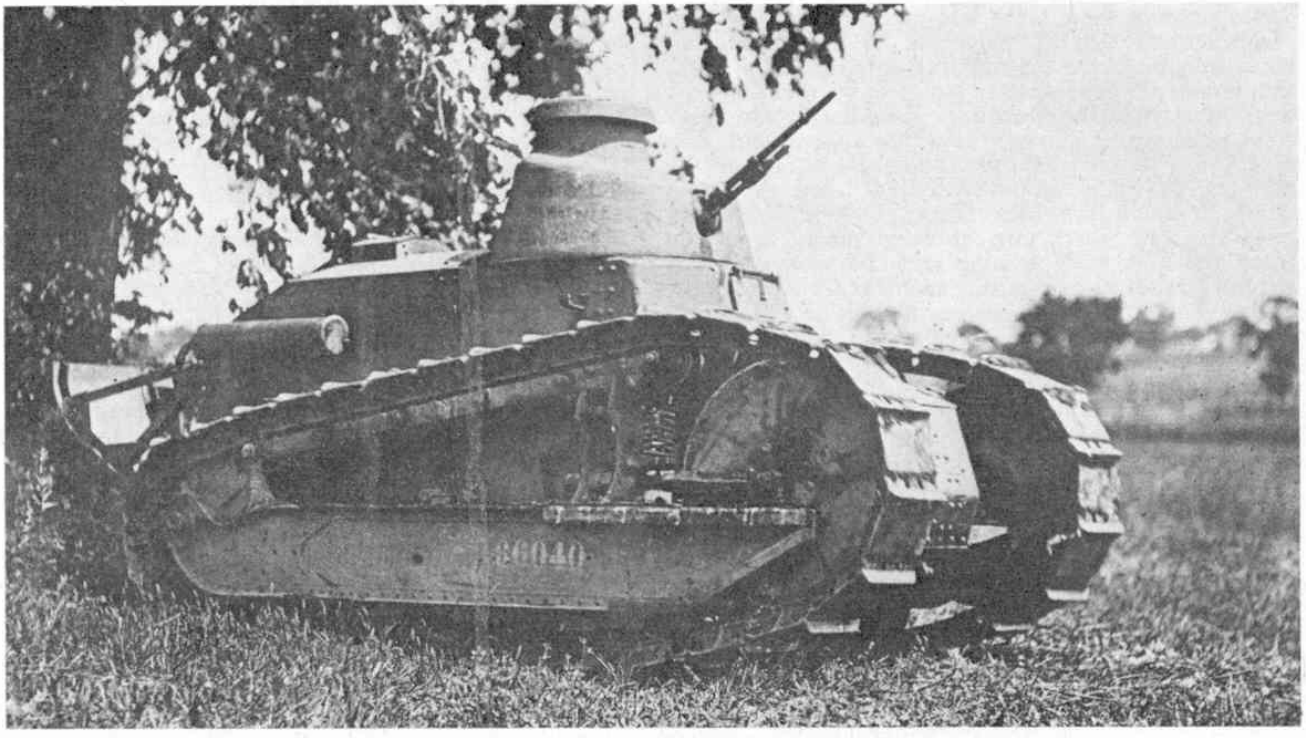
This was meant to plough through enemy positions just ahead of the main infantry attack. It is also known as a ' leading ' tank, ' char lourd de rupture ', and ' Durchbruchwagen '. It was a British idea of 1916, but as we have seen, by 1918 the British Tank Corps was thinking of much faster vehicles rupturing not the enemy's front, but his command system. The French stuck to the heavy assault tank until 1940, the British re-adopted it in the late 'thirties, with the ' Churchill ' and ' TOG '. The Americans took it up in 1919, dropped it a few years later, took it up again in 1939, and dropped it again when the Germans showed what fast, light tanks could do. The Germans experimented secretly with a durchbruchwagen in the 'twenties, then dropped it in favour of the British long-range ' paralysis ' idea. However, the German infantry chiefs and some industrialists thought this too chancy by far, and several designs for heavy tanks were pushed ahead; they lay unused until 1942 when the fighting became less mobile, and then served as groundwork for the Tiger and other super-heavy tanks.

2. The small infantry escort

A slow, two-man tank to accompany infantry at walking pace, originating with the French, who stuck to it until 1940. The British adopted it in 1936, but believed that a tank should be crewed by more than two men, so created the three-man Matilda, which for a short time proved to be absolutely invincible. At the same time, the German infantry wanted to take up this type of tank, but were over-ruled by the Panzer forces, who wanted fast, long-range machines. The Americans adopted slow infantry-escorts in 1918, but dropped them in the 'thirties, as did the Russians and Italians.

3. The fast, long-range medium

Here was Britain's most notable contribution to modern armour, the beginnings of which I described in my last article. Its original aim was to by-pass slow, costly frontal fighting, and collapse an enemy swiftly and cheaply by paralysing his command system. But only a few soldiers were able to grasp this idea, because it was so different from the soldiering they were used to. It was rejected in Britain, and the men



Although built in America, this small infantry escort tank was a close copy of the French Renault F.T. *Photo by courtesy of the National Archives.*

who strongly supported it, General Fuller and Captain Liddell Hart were forced out of the Service. The British Army chiefs would allow only that fast tanks could be used for skirmishing, guarding flanks, and pursuing an enemy who had been defeated in a pitched battle. They renamed fast medium tanks, calling them 'cruiser' tanks. But some far-sighted soldiers in Russia and Germany took up the idea. In the Red Army, Marshal Tukhachevski and Colonel Kalinowski built up a large, fast Mechanised Corps in the early 'thirties. Unluckily for them, they fell out of favour with the great Russian Dictator Stalin, who had them both shot. The Mechanised Corps was then broken up, as Stalin had decided that all tanks should be usable in pitched battles. In Germany, Generals Lutz and Guderian created a similar mechanised force, but gained the favour of the German dictator, Hitler, and so were able to build up a number of Panzer (Armoured) Divisions—which gave Germany her lightning successes in Europe, Russia and Africa between 1939 and 1941.

In America, a civilian engineer named J. Walter Christie saw that this type of tank—speedy and long-ranged—would be vital to the U.S.A.'s transcontinental defence organisation. He built several very fast medium tanks, but the U.S. Army would have none of them. The Red Army, however, copied them in large numbers for its short-lived Mechanised Force—and these subsequently became the basis of the T 34 general purpose tank. The British Army also took them up as 'cruiser' tanks in preference to Vickers designs.

The first, fast, thinly-armoured, long-range mediums were of course British designs, but they were not developed, and as hinted in the last paragraph, were soon overtaken by Christie's designs in the U.S.A. The Germans then built their own entirely original machines, the Panzers 3 and 4. The U.S. Ordnance Department also produced an interesting one called the M2, which however was developed like the Russian Christies into a general-purpose tank.

4. The tankette

We would call this a mini-tank nowadays! It was originally Henry Ford's idea, to overwhelm the German positions on the Western Front with infantry all protected inside little 15 m.p.h. vehicles. Later the British re-introduced the idea as a means of enabling infantry to keep up with fast tanks. But most army chiefs and governments saw the tankette as a means of saving money rather than time or lives—they bought them for issue not to the infantry, but to the tank forces, as cut-price tanks! Vickers did a brisk trade with them, selling them to money-saving War Departments all over the world. All the infantry got was a modified version to carry their heavy weapons for them—it became known as the Bren Carrier. The Artillery also asked for some, to use as field-gun tractors.

The actual tankettes were of course soon found to be pretty useless as tank-substitutes, so Vickers marketed a new alternative to it. . . .

5. The fast light tank

. . . which was very cheap, costing no more than a luxury motor-car (a good, full-scale medium tank in the late 'twenties cost £16,000), but had full protection, could carry a cannon and/or machine guns, had a speed of at least 20 m.p.h., and could travel a hundred miles or more. Vickers' great breakthrough in marketing fast light tanks was the invention of lightweight forged steel tracks, of open skeleton type, which would run great distances before wearing out. Basically, the same kind of track is still in use on tanks all over the world today. Vickers' commercial fast light tank weighed about 6 tons and could (with a little imagination) be classed suitable for a variety of roles. Some nations wanted them as infantry escorts. The Americans took up the Vickers layout, but went on to build their own machinery around it. The Japanese used them for any purpose because they were cheap. The Italians copied them for the same reason, but by adding a few inches here and there, turned the original into a sort of Medium tank. The Germans bought Vickers

chassis and built their own fighting bodies on to them, to serve as training tanks until their own Medium Tank building programme was under way. In fact, these little training tanks had a great part to play in the lightning conquests of Poland in 1939, and France in 1940! Britain used Vickers light tanks in considerable numbers, again, to save money, and there was talk of using them as ' cavalry ' tanks, especially when it was known that the new German armoured divisions used them a lot. It was not realised that the Germans kept them on because of a dire shortage of full-scale mediums! As soon as these became available, the Panzer forces promptly passed their light tanks to the Artillery, to be converted into gun-carriages.

6. The general purpose medium tank

Here, Soviet Russia stepped into the lead. When the armies of the West were bickering among themselves about the respective merits of Infantry and Cavalry tanks, and the uses of Light tanks, Stalin solved the problem by shooting the men who spoke in favour of fast, long-range, lightly armoured tanks, then ordering a new type of General Purpose Tank which would have a speed of around 30 m.p.h., wear enough armour to keep out most kinds of anti-tank shot, and carry a big gun useful in all kinds of action. Simple! Why had no one thought of it before ? Fortunately, for the Russians, they had two tanks, the T35 and the Christie, which were the right sort to build on, and by 1939 these had been worked and re-worked through a whole series of experimental models into the Klimenti Voroshilov Mark 1 and the T34. They were simple, in some ways they were crude, but they had huge diesel engines, 17 pounder cannons, bigger than any other tanks of their day, and wonderfully stout armour. They could be used in mobile war as well as in pitched battles, and they were very reliable. In spite of having such thick armour, the KV weighed only 45 tons, and the T34 28 tons—only 2 tons more than the British Matilda, which had only a 2-pounder solid-shot cannon, thinner armour, could do only 15 m.p.h., and was more costly to produce.

The Americans and Japanese were next with this sort of development. The U.S. Ordnance Dept. toughened up a light tank until it became the light-medium M3—known to the British as the " Stuart ", or " Honey ". It was a very reliable machine, but not as generally useful as the Russian machines. They then toughened up their M2 Medium, which became first the M3 " Grant ", and then the M4 " Sherman ".

A Russian T34/85 of 1943. This tank was ahead of its contemporaries in having a larger cannon; a diesel engine; very simple construction layout and a very low ground pressure.

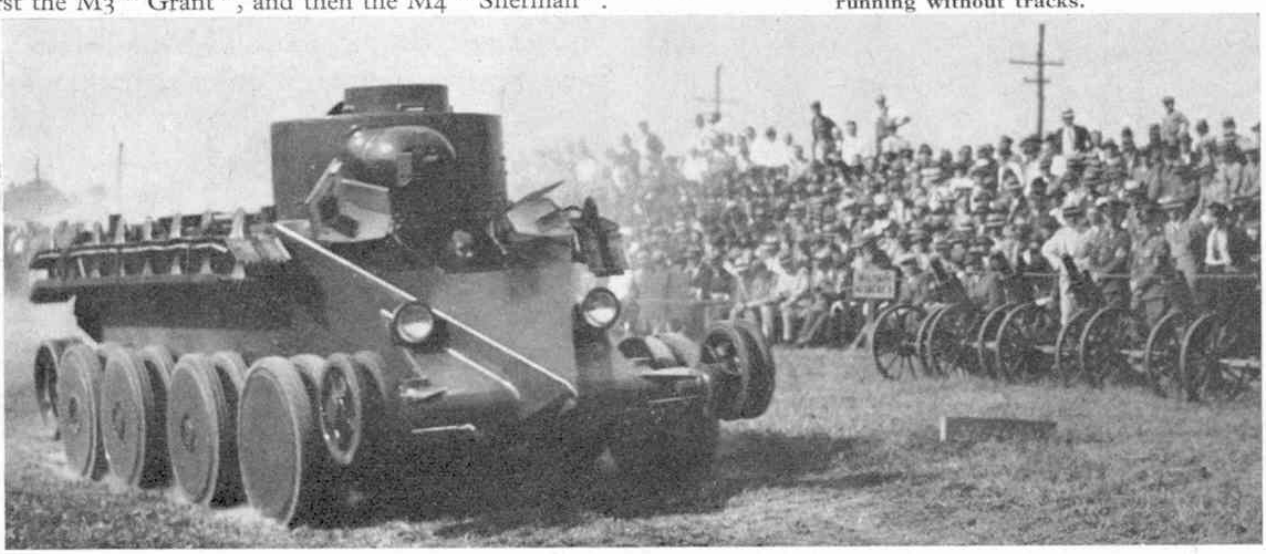
Although these are thought of as wartime tanks, their development started shortly before World War Two broke out. The Japanese did not give tank design so high a priority as, say Germany or Russia, and so their general-purpose medium tanks remained somewhat inferior. They had no influence on the course of international tank development.

7. Amphibians and airbornes

At first it seems unlikely that tanks could swim or fly, but when one thinks of the importance of water obstacles to an advancing army, one sees that tanks must be made to cross them somehow. The British were first in the field with the ' D ' fast tank; its designer, Colonel Johnson, made it very long so that it could cross trenches, then decided that the resulting empty spaces could be used to make the tank float.

But the ' D ' was not a true amphibian. The American designer Christie was the first to build one of these in the early 'twenties—it could swim in rough seas, without sinking, and it had screw propulsion. However, its boat-like body was unsuited to tank warfare, and so its combat roles were limited. The Japanese took it up in preparation for their invasion of South-East Asia.

The T3 fast medium was the last Christie designed for Warfare. This one was built in 1931, and is seen below running without tracks.



A SHORT HISTORY OF TANK DEVELOPMENT PART II

J. WELDON

This was the American M3, known as the 'Lee' (American turret) or 'Grant' (British turret). Comparison with the Soviet T34/85 shows it as an inferior machine in that its silhouette is higher; the main armament is not in the turret; construction is by riveting, not cast or welded.

The struggle for survival

LAST MONTH I DESCRIBED the tremendous variety of mechanised armour that passed under the name ' tanks ' in the 20 year period between the World Wars. In 7 main varieties this Heinz-like assemblage of war-cars entered the great struggle for survival in 1939 . . .but they did not all emerge at the other end in 1945. In this instalment, I shall describe how first one type, then another, failed the test of war—and which ones in the end proved to be the dominators.

Now we must point out that tanks were used in several wars before 1939, and that the chief lesson to be drawn from them, was that they could not be relied on to show a quick profit. The Japanese used tanks against the Chinese in the 'thirties, but found only that small numbers of tanks used without an overall plan in a vast country, had very little effect on the profit-and-loss of a campaign that looked like lasting for ever.

In the late 'thirties a Civil War broke out in Spain. Both sides—the Fascists and the Communists—we might call them—used small numbers of tanks, usually to support infantry in frontal attacks and were rather disappointed, because the tanks were mostly small, thin-skinned ' commercials ' which were not always able to cross the enemy's defence positions, and were never available in really large numbers.

Then, co-inciding with the outbreak of World War Two came a savage Russian attack upon Finland, and as was the case when the Russians smashed down Hungary and Czechoslovakia, the Red Army didn't waste time handling penny-packets of tanks—they were sent in in hordes. Stalin had only recently re-directed the Red Army's use of tanks. They were to lead and support infantry, but in a new way. Only a small area was to be attacked at one time, and it was to be simply overwhelmed by vast numbers of tanks and men. Actually, the British first demonstrated this

method of attack in 1918, against some particularly strong German positions at Hamel. It seemed a good method if plenty of tanks could be massed together—a series of tremendous short-arm jabs that would soon have the enemy shattered and collapsing, which is exactly what happened at Hamel. But a real big bully's method, as used by Russia against a little opponent like Finland. However, the clever Finns had constructed a deep belt of defences across the strip of land separating them from Russia, so to the Red Army's dismay, and since 1918, anti-tank guns had come a long way, their losses in trying to force these defences were immense ! There were so many Russians that they gradually wore the Finns away, of course, but they were quite glad to have peace talks instead of finishing off the Finns—because that might leave them in turn too weak to face Germany ! However, there was no sure lesson for the future here, because the tanks used were of older types, based on the Vickers or Christie designs. The new general-purpose tanks, T34 and KV1, were not yet ready. Indeed, the Finnish experience may only have confirmed Stalin in his belief that tank design was hopelessly on the wrong tracks until his ' reforms ' of 1937.

Then, Germany went to war, also with small and thin-skinned tanks. In 1939 her most numerous tank was the Panzer 1; in '40, the Panzer 2. Both were descended from the Vickers 6 Ton commercial of 1930. But the way they were used, for indirect attack on nerve-centres, resulted not in loss, but in immense profit ! They caused the swift collapse of Poland and France and the hurried retreat of the British force. It seemed as if Light Tanks were the ones to win wars cheaply !

So Britain, the USA and the USSR promptly renewed their interest in them, although Germany was actually ending their production ! The USSR kept building them until 1943, as did Britain; the USA kept producing new designs right through the war, although an American ' light tank ' such as the ' Chaffee ' of 1944 was very much like a ' medium ' of 1939 !

With regard to the larger tanks, the British army chiefs were flurried. They had been planning to rely heavily on slow, thickly armoured infantry tanks—but the fast German machines seemed to run rings round them. So after Dunkirk, priorities were switched right over; 78 per cent of tank production was to be ' fast tanks '. The Russians watched this war in the West—and did not alter their huge building programme of T34 and KV general purpose tanks. The Americans seemed unsure. They had a very good fast medium tank chassis—but their British adviser General Pratt told them the fighting top was poor. So they made it simpler, and gave it more armour and a bigger gun—and the results were the Grant and Sherman general-purpose tanks, not in the same league as the T34, but still very strong. The Germans, not knowing of these future dangers, went ahead with their fast, thin skinned 3s and 4s.

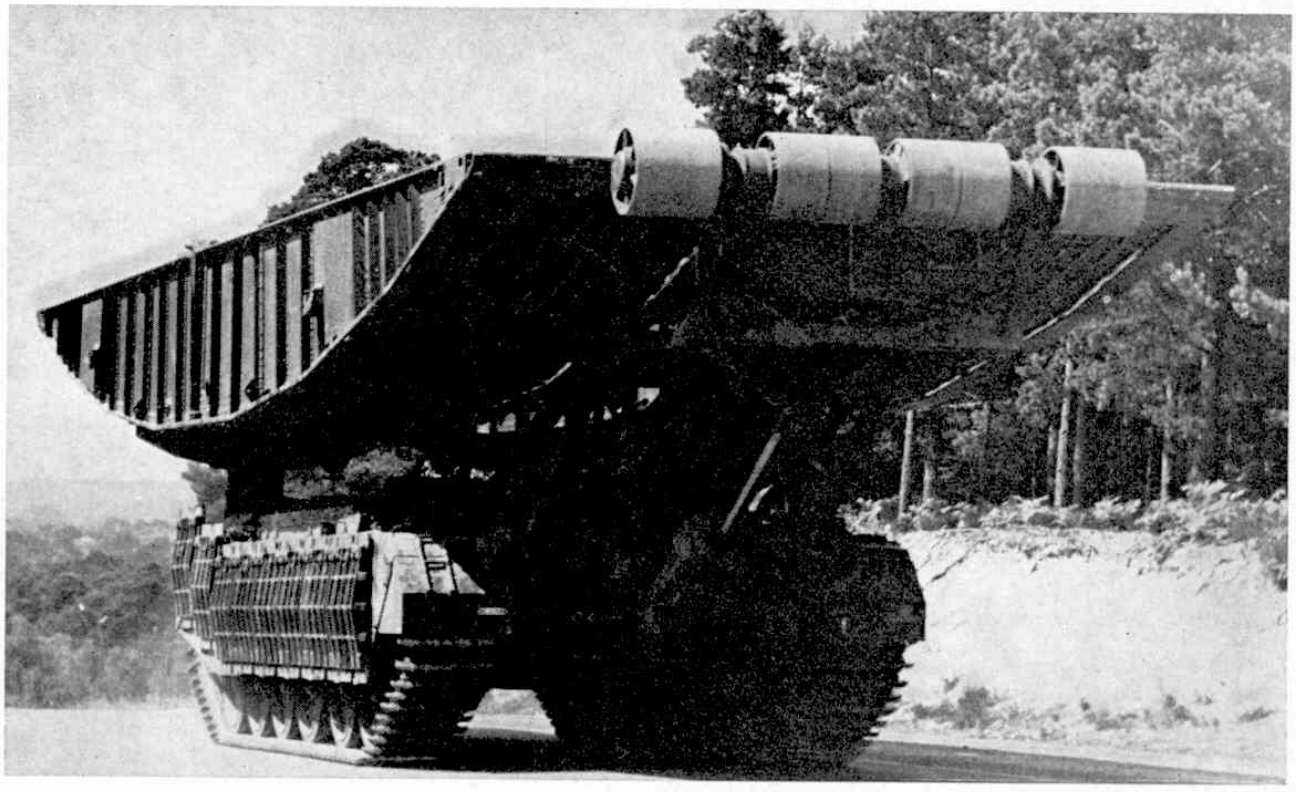
Came the invasion of Russia ! Hitler had overreached himself at last. The panzer armies had some great successes, ' paralysing ' much larger Russian forces, but they were too small for the job, and the much vaster Russian resources began to wear them down. And when the T34 and KV were first met at Borissov on 2nd July 1941, the panzer leaders saw at once that they needed a stronger tank—fast ! To add to their troubles, Hitler's over-reaching caused the war to become more static, which favoured heavily armed and armoured tanks. The T34 and KV showed that every tank had to be tough enough to take on any kind of combat job.

Upper: The " Comet " of 1945—the last of its type. It has grown very like the General Purpose Tank, but is still inferior to the T34/85.

Lower: U.S. Army M26 " Pershing " of 1945. This was the first Western tank built to rival the Soviet T.34 to enter active service. Note the close resemblance to the T34/85, but note also *cast* frontal armour and more sophisticated commander's cupola.

As soon as the effect of the T34 was known in the West, attempts were made to copy it. The Germans began design of the ' Panther ', and Hitler ordered a re-hashing of the pre-war heavy designs, which resulted in the ' Tiger ', which might be described as a tougher version of the Russian KV.

The Bristol Cruiser Tanks (left, A10; right, A9). Both are based upon the inter-war period Vickers designs, surviving in service until 1941. Note sub-turrets on the A9. These were a popular feature on many nations' tanks before 1939. War experience showed them to be excessively vulnerable, and some units used them as storage space. These tanks were said to " bounce like a pea on a drum ".



The Centurion Bridgelayer, which took 110 seconds to position. Although a post-war machine, it serves to illustrate the type of specialist armour evolved during World War 2 by the 79th Armoured Division, under Lt. Gen. Hobart. The tank is approaching—although this is not clear! Note the bridge plates hung on the tank sides.

The British top command began to quarrel among themselves as to the best course of action. Montgomery favoured a general-purpose tank, but the chief of the Royal Armoured Corps wanted to continue with improved 'infantry' and 'cruiser' tanks. As a result, all three types were developed, which resulted in some wasted effort. The 'Churchill' infantry tank was built in great numbers, but had to be given a lot of extra armour, and bigger guns, and eventually it became dreadfully slow. The fast cruiser tanks were given the same treatment, until by 1945 the 'Comet' was something like the T34 had been in 1940—but not quite so well armoured. The general-purpose tank wanted by Montgomery did not appear until 1945—it was designated A41, but will be more familiar to M.M. readers as the famous Centurion. It was too late to fight the Germans, but it has seen a lot of service over the last 25 years and it is still a good tank. It was the first one designed by the Fighting Vehicle Research and Development Establishment, with help from Vickers, and it had all the basic features of the T34 plus good old fashioned British quality, which gave its armour amazing protective power, and its armament a high degree of accuracy—the gun stays on target no matter how the tank lurches about. However, it was a bit slow.

The Americans kept their Sherman in production, and their copy of the T34 likewise appeared in 1945—just in time to fight. It was the M26 'Pershing', also a very good tank, but one which has not stood the test of time like the Centurion.

What of Germany? Thanks to Hitler's madness, tank design fell into confusion. Hitler demanded even more gigantic ones and plans went ahead to build monsters weighing nearly 200 tons! There was even a project for one weighing 1500 tons, powered by 4 U-boat diesel engines. Hitler monkeyed with the 'Panther' development, as a result of which it came out very heavy and unreliable. All this wasted effort meant that the Germans had to rely heavily on the Panzer 4, as the British relied on their cruisers and the Americans on their Shermans. The Russians were the ones who called the tune. All they had to do was put a bigger gun on the KV and T34, and build a 'streamlined' armoured case for the former—which was then renamed JS, or Josef Stalin. Their basic production was never changed—they continued to churn out their pair of winners by the thousand.

As for Italy and Japan—their rather inferior machines simply disappeared, and no one ever wanted to copy them, or regretted their departure. Italian tankmen used to call their M13 medium tank 'The Self-Propelled Coffin'.

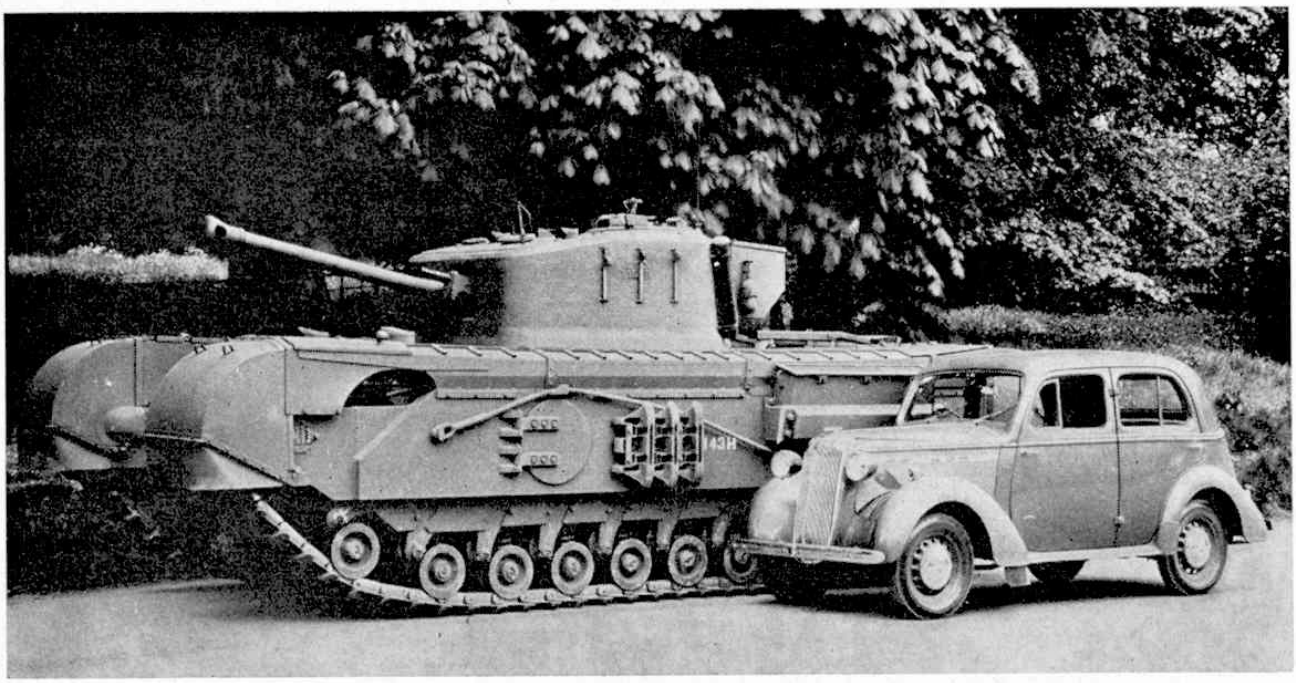
At this point we might try a summary.

i. *Slow infantry-escorts.* The French ones disappeared in 1940. The Germans used the hulls of those they captured to provide gun carriages. The British Matilda lasted until 1941.

ii. *Slow Heavy Assault tanks.* The French ones disappeared in 1940. The British kept their Churchill going until 1945. Various experimental machines were built but not put in service. Hitler, however, took up this type when everyone else was dropping it, and so dropped the German panzer forces in the mire.

iii. *Fast Light Tanks.* These were very useful for 'mobile' war at first, and helped to collapse several large armies, but proved too weak in a long struggle against really powerful giant nations. They disappeared, their chassis being used as gun carriages. Only the USA kept producing new designs—but no one really wanted them.

iv. *Fast thin-skinned Medium Tanks.* These had their heyday in the swirling tank battles of the 'mobile



The British Infantry Tank, Churchill 7, which was thickly armoured but very slow, and with a small gun (75 mm.) for the time (1944). Note the heavy tracks and small wheels, unsuited to speed.

war' period up to 1941. After that year, the war slowed down, and they were shown up as under-armoured and under-gunned. The best of them—the Panzer 4, and the British Cromwell/Comet series held on until 1945, being given thicker armour and bigger guns whenever possible. The poorer ones, such as the Italian and Japanese ones, the Panzer 3 and the British Vickers, vanished; destroyed or scrapped.

v. *General-Purpose Tanks.* The American Sherman remained in service until after 1945, but was reckoned inferior to the T34 and the Panther. The T34 was the best basic model. The Josef Stalin was now developed as a big-gun tank to support the T34. The Germans did something of this sort with the Tiger and Panther, but hadn't enough tanks to carry such a system out properly. The British and Americans did not catch on to this trend until after 1945. During the last years of the war, they supported the leading tanks with ground-attack aircraft. The Panther ended its career with Germany's defeat, of course, but a similar tank they had built in France, the A.R.L. of 1944, remained in service in liberated France for a while.

vi. *Amphibians and Airbornes.* After Japan's invasion of South East Asia, no Power built special swimming tanks, although quite a few amphibious load-carrying vehicles were developed.

In Germany, Hitler ordered that some tanks be made water-proof so that they could cross rivers by running over their beds, completely under the water. In the West, an invention of Mr. Straussler, a tank designer who associated with Alvis motors, was taken up. His idea was to give the tank a temporary 'ship's hull' of waterproof canvas. This was a large structure—and in the water, the tank hung at the bottom of it like a heavy keel, having twin screws driven by power take-off, so that it could make good speed and steer in the water. It worked splendidly for the liberation of France in 1944, and is still used.

Airborne tanks were not developed. In the West, it seemed that the army chiefs were suspicious of their novelty. So many promising looking tank ideas had fallen by the wayside in the test of war, that they were not willing to back this line. Christie continued to advocate them, but died disappointed in 1944. On D-day 1944, a few glider-borne tanks were dropped in the rearward parts of the German defences, but they landed in the area of a Panzer Division and were knocked about. The work Christie had suggested, of 'paralysis' deep in enemy territory, was never tried.

Funnies. These were mostly a British speciality, and were due largely to Generals Martel and Hobart of the Royal Armoured Corps. Martel was an engineer and Hobart an enthusiast of mobile war. Both were keen to provide all that a mechanised army could need to prevent it being stopped by obstacles. So the 79th Armoured Division under Hobart was given the job of creating all manner of highly specialised armoured vehicles; mine-sweepers, engineers' demolition tanks, bridge-layers of several types, flame-throwers, search-lights, recovery vehicles, etc., which it did upon the chassis of standard tanks. They were a peculiar looking lot and were nicknamed 'funnies', but their usefulness was immense—in saving time, which in war time meant saving life and materials. These inventions were taken up by other armies, but it is probably true that the British armoured forces still give this question more attention than do those of other nations.

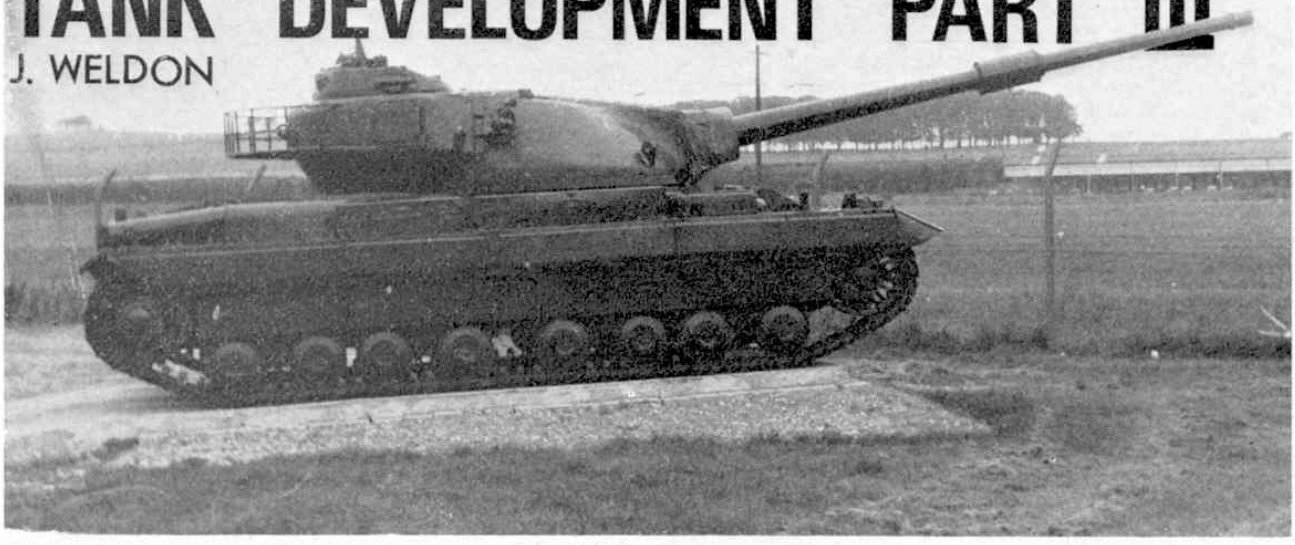
So the war ended, and of the host of tank varieties that took the field in 1939, only the general-purpose tank and its big-gun brother in support survived. Slow infantry tanks, nippy thin-skinned tanks, super-heavy slow assault tanks, all vanished.

The best general-purpose tanks were the Russian T34 and the British Centurion—both of which had been thoroughly worked out in detail by engineers in State research teams. . . . No doubt this research cost an awful lot of money, but for both nations, it proved a sound investment.

For, as I shall describe next month, these tank-types were to become the principal armoured champions of East and West during the coming Nuclear Age, until armoured forces learned to change and adapt themselves to the tactical nuclear weapon.

A SHORT HISTORY OF TANK DEVELOPMENT PART III

J. WELDON



The British big-gun tank of 1950, the Conqueror. This was slow, well armoured with powerful armament, but excessively short-ranged and careful parking was needed for accurate fire.

CONCLUSION

TANKS IN THE NUCLEAR AGE

MOST OF US HAVE the habit of dating things by the Second World War. Collectors of die-cast cars, or railway models, for example, nearly always do this, as you can see in the MM's advertisement columns. Things are 'pre-war' or 'post war'. Yet really, a whole quarter of a century has passed since that war ended.

When last month I ended my description of the "Struggle for Survival" with the arrival of the Centurion. I reached a point where time has appeared to stand still for tanks. For the Centurion is still very much with us, outwardly almost unchanged, 25 years after it entered service. A whole quarter of the 20th. century! The Centurion, indeed, appears to be immortal, as does the even older Sherman in its A 4 E8 modification. Just imagine a tank of 1918 still in use in 1943! Why, the very idea is fantastic. Who on earth could find a use for it? Yes, indeed, time seems to have stood still, or at least slowed down, for tanks after 1945: there are still plenty of Centurions in the British and foreign armies, and Shermans were used in Sinai in 1967.

However, if we study tanks closely we soon find that in this period of no-change there are 3 distinct periods, during which important changes were made both to their insides and to their employment.

The first was the period of the Nuclear Umbrella. For several years after World War Two, armour took time off from the military scene in the West, for many people really believed that big armies of World War 2 type would never fight again! If an enemy looked nasty —a threat of an Atomic Bomb would make him behave himself. One result of this, was that the U.S.A. and Britain tended to go slow on the development of tanks.

Of these, there were two main types, the Main Battle Tank and the Big Gun Tank, based upon the Soviet T44 and the Josef Stalin 3, both of which were improvements of pre-war designs, the T34/8S and KV, respectively. Both led current trends in that they housed big armament under a markedly lower silhouette, and the Josef Stalin introduced the idea of a near-prone closed-down driving position. Their equivalents in the West were the British Centurion and big-gun Conqueror; the French ARL 44 and big-gun AMX50; the American M46/47/48 Patton and big-gun M103. The Centurion, Patton and ARL44 were all wartime designs: the M103 began its life as the war ended, the Conqueror in 1948, and the AMX 50 about the same time, and of them all, the ARL (Ateliers de Rueil) was the most 'dated', having the highest silhouette and somewhat old-fashioned tracks.

All the MBTs had guns of between 83.4 mm calibre (Centurion) and 90 mm (ARL): the big gun boys, between 100 mm (AMX50) and 122 mm (Stalin). These may seem very much of a muchness, but a difference of a few millimetre in gun calibre means a big difference in weight of missile: a tank gun of 83 mm calibre throws about 20 lb: one of 120 mm throws 50 lb. The weight has gone up almost a pound for every millimetre diameter increase. And when you get up above 20 lb, you begin to leave the point at which the missile is "quick-firing"; that is, built like a pistol round, bullet and cartridge all in one package. Just try heaving a few 30 lb weights around in a confined space, and you'll see that the modern tank gunner needs strong arms! Above, say, 90 mm calibre, the ammunition must be loaded in 2 parts—first the

projectile, then the cartridge that sends it off, and this slows down the rate of fire, which is one of the reasons why the Russians made their big-gun tank as low and inconspicuous as possible.

In fact, they scored markedly here, with both MBT and BGT. Their T44 weighed only 35 tons against the Centurion's 50; and their Stalin only 45 tons against the Conqueror's 65. Except for the French tanks, those of the West were proportionately down on range and speed—the Conqueror, whose Rolls Royce engine gobbled 4 gallons of petrol per mile, had fuel for only 30 miles! It also had to stop to let its gun fire, and if it didn't park itself on the level, the fire was not very accurate.

The French AMX 50 differed from all the other big boys in having a much more powerful engine —1000 bhp—which pushed it around at speeds of up to 32 mph and gave it a range of action greater than any of its allies or potential enemies. It also had an interesting turret made in 2 parts. The gun was fixed immovable in the upper part, and this upper turret was hung on trunnions in the lower part. Thus, to aim the gun, the lower turret was rotated to get the right direction, and the upper turret tilted to get the right range. It was most ingenious, and gave steady shooting, but some NATO authorities said it would be liable to jamming, and its inside wasn't roomy enough.

Well, these tanks all soldiered on until the Second World War was eleven years behind—they had minor improvements, and the NATO powers were remarking that Russia hadn't improved her tanks for many years, and the current Western ones were really the better models, when—zip—the Hungarians tried to break out of Soviet slavery, the Red Army was sent in to crush them, and it was revealed that the Communists had been secretly developing a whole new approach to warfare—including armoured vehicles.

They had redesigned their MBT to serve in ' local nuclear war ', and now called it the T54. It now carried a cannon of 100 mm calibre, was adapted to night driving, had a lower silhouette (and a lie-down driving position), a sleek rounded turret, was supposedly resistant to nuclear flash, blast and fallout, but still weighed only 36 tons. You see, the Russians argued that ' nuclear ' war and ' conventionial ' war should be merged —the nuclear weapons being made small enough to use " locally ". This meant that the armoured and all-mechanised formation must become the most important kind—in order to move and fight in nuclear-devastated zones. And in the foreseeable future, a nuclear shell would be made in, say 100 mm calibre—suitable for firing from a tank cannon!

NATO had to jump to catch up again. Conferences were called in order to decide quickly on a design for a NATO tank—but alas, the Western powers could not agree—France, for example, held out for fairly thin armour, with high speed and long range; while Britain said that speed was not so important as protection and gun power. There is something to be said for both. As the British argued, tanks will have to move mostly by night—so high speed is not so essential. They will lie in ambush through the day—so gun power is needed to reach everything in sight. In turn, this allows the power reserve to be used to carry extra armour.

Well—there was no agreement, and each of the major powers built its own tank. The Americans quickly produced the M60 modification to their existing Patton series, and thus were first on the commercial market—getting quite a few sales that way. The other powers designed from scratch, and by the early sixties the prototype Chieftain (Britain), AMX 30 (France),

Above : This is the German " nuclear age " Main Battle Tank of the late sixties. Note the sleek lines, the range finding and night navigation equipment and the " dustbin ", fitted to enable the tank to deep-wade rivers etc.

Below : The " Chieftain " nuclear-age Main Battle Tank, which combined the armament of earlier big gun tanks with the dimensions and mobility of a main battle tank plus adaption to nuclear war. A very good protection against anti-tank weapons.

The French ARL 44, a little known tank of the years immediately after the end of World War Two.

The fast, well armoured French Big Gun Tank of 1950, the AMX 50. Note however the very high silhouette, and the complicated turret with cramped interior.

Standardpanzer Leopard (West Germany) were appearing, as well as the Swiss Panzer 62. And here, Britain got ahead, mounting the biggest cannon of the lot —the Conqueror's 122 mm—in a stabilised, target following mount, in a low vehicle of good shape, using the lie-down driving position. The American, French and German tanks used a British gun, bigger than the Russian one, but smaller than the Chieftain's. It was the latest gun developed for an improved Centurion.

And these are the tanks in service today! The Big Gun tank is a thing of the past, for the MBT now carries its gun, in a better mount, at a higher speed, suited to local nuclear war. The massive Conqueror now features as a rather expensive target on gunnery ranges—just imagine shooting at a target that cost £60,000 when new! I for one wouldn't dare hit it for fear of spoiling it. A few have survived in various army camps—to become monuments to modern armour. The Soviets are more careful with their old tanks. They hire them out to their satellites and allies like Egypt. A lot of Josef Stalins met a grim fate in the Arab-Israeli war of 1967. As for the nuclear age MBT, its inside resembles a space capsule with all its electronic and blind driving and target following equipment. One feels that if only the exhaust blast could be directed downwards, the Chieftain could be placed in orbit.

Now, what of the Light Tank ? During both the periods I have described, the French and the Americans continued to build them. The Americans were not very inventive. Their M41 was not very light. For all practical purposes it was a T34 of 1939 rehashed with American refinements. Gun, weight, engine were the same, but armour was a lot poorer. It was difficult to see a role for this tank, except as a commercial, sold to banana republics for internal security.

The French had also marketed a commercial ' light '. They got this on the market within three years of World War Two ending, and it sold well, for it carried a 75 mm gun while weighing only 14 tons. It was air-portable, and its chassis could be adapted to a number of roles—troop carrier, command vehicle, almost any type of self-propelled gun. As a tank it is now well out of date—although it fought in the 1967 Arab-Israeli war—but it is still a very good general-purpose chassis.

Obviously, a well thought out air-portable light tank might have been very useful to Britain and the USA in the various ' brush-fire ' wars that have broken out over the last 25 years. But no such tank was available, the M41 not being an airborne type. When the trouble in Cyprus hit the headlines, a British Member of Parliament demanded that " our heaviest tanks be sent to Cyprus ". How foolish! There was no work for the Conqueror there! But a fast airborne light tank would have been very useful—and there was no such vehicle. Which brings us to the third development phase.

In the mid-fifties the American Aircraft Armament had built a fast 18 tonner, armed with a 76.2 mm cannon mounted in an unusual way. However, it was a complex machine, the power reserve was not great, and the gun was of limited uses.

A better design came in the early 'sixties—the M551 Sheridan—a bit bigger, but lighter (made mostly of aluminium alloy), more powerful engine, and a much more useful gun of very large calibre, which fires everything from ordinary shells to guided missiles, and may have a nuclear potential. And it can be dropped by parachute, and motor straight into action. Its only drawbacks are said to be a rather high silhouette, and a smokey exhaust which can betray its movements. Britain has followed suit with this class of vehicle, and the aluminium Scorpion, very like the Sheridan, is under test. A tank long overdue!

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