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World War I

Circumstances

History is a frantic mix of cause and effect events and random ones. On July 28, 1914, World War I launched with something that happened exactly a month earlier: the June 28, 1914 assassinations of the Archduke Ferdinand, age 50, heir to the throne of Austria-Hungary, and his wife Sophie, age 46. Their deaths were sad, but hardly worth over four years of global war, which consumed millions of lives and altered millions more. This ghastly conflict advanced new technologies such as barbed wire, machineguns, submarines, dirigibles, quick fire artillery and airplanes. It also pioneered gas attacks, aircraft carriers, storm troopers and tanks. The following is a very quick overview of the latter.

In some ways, tanks frame World War I and World War II. Tank development started in early 1915. Gestation was slow as the UK and France stumbled through developing and using the steel leviathans, but by June 1918, the Allies realized how to combine massed tanks, air superiority and precise artillery barrages on the Western Front. Using this combination, they broke through the German trenches and went on the offensive. After more than four long, brutal years of war, World War I finally ended on November 11, 1918. In contrast, World War II had tanks from beginning to end. They were in almost every major land battle on every front and were used by most combatant nations.

Tanks were as much a product of World War I trench warfare as they were a confluence of new technologies. On July 28, 1914, Austria-Hungary invaded tiny Serbia, which had nothing to do with the Archduke's death. Germany was allied to Austria-Hungary, Russia to Serbia, France to Russia, etc. Honoring their alliances, all were pulled inexorably into conflict. By early August, six million German, Austro-Hungarian, Russian, Serbian, French, British and Belgian troops had been catapulted into fighting each other. This was no Phony War or Cold War, but a massive conflagration unprecedented in magnitude.

The Eastern Front, where the Germans and Austro-Hungarians fought Russia, mostly remained fluid. The Russians mobilized the most troops and suffered the greatest losses. For three and a half years, they fought courageously and valiantly. Their contributions were vastly underrated and largely forgotten outside of Russia. Finally, wracked by famine, low morale and Communist subterfuge, they surrendered to the Germans in March 1918. This fluid front had little that would have required the invention of tanks.

From 1915 to 1918, Austria-Hungary and Italy also fought relentlessly. Much of the combat was in the cold and high altitudes of the Alps. And while there was some fighting on the verdant flatlands northeast of Venice, traversing tanks through the Alps would have been nearly impossible for the Austro-Hungarians, and there were no real trenches to breakthrough. There was also sparse and fluid fighting in Africa and the Middle East. And there was no real land combat in the Pacific. Thus there was no need for tanks in these places.

The Western Front was different. From almost the first days of World War I, the once vaunted French and British armies quickly found themselves the underdogs as they and the Belgians were steamrolled by the powerful German army. The Germans flowed pyroclastically through most of Belgium and around its fortress towns, continued south into France and arrived within 30 miles of Paris. Miraculously, starting September 5, 1914 the French and British counterattacked. This, the Battle of the Marne, pushed the Germans back dozens of miles. Furthermore, in some cases, they voluntarily retreated to high-ground ridges such as the Chemin des Dames. From there, both sides raced to the North Sea, each trying to outflank the other, but to no avail.

Quickly, the soldiers dug deep trenches and faced each other along a sinewy 400 mile line from the French/Swiss/German border all the way up to the North Sea in Belgium. In between was No Man's Land: typically just a few hundred feet wide. Artillery quickly made it desolate, muddy and cratered. Men made sad, futile charges, and died in droves, extinguished forever by a few grams of cheap metal spat out from machineguns or in the form of artillery shrapnel. The numbers of dead were so massive as to be almost incomprehensible.

Germany, fighting a two-front land war and having enormous holdings of enemy territory, decided to fight defensively. Man for man, the Germans were the world's finest soldiers. They had great weapons, excellent generals and superb tactics. Their pilots were fantastic. The German Navy even had the world's best battleships although the Royal Navy had more of them. And German U-boats terrorized Allied surface fleets.

Both sides innovated, but since Germany held a vast swath of French and Belgian territory and was playing defensively, it fell on the British and French to innovate more. Struggling to break across No Man's Land and its pocked landscape, wicked machineguns, lines of thick, rolled barbed wire, trenches and deadly artillery, the two Allies independently hit on the same solution: they would combine caterpillar tracks, motors, armor and guns to end the stalemate.

In an ideal world, men, protected by bulletproof metal plates, would advance with their own guns, machineguns and artillery to take the war to the enemy hidden in the trenches. France and others experimented with arm-held personal shields and even larger waist-high wheeled bulletproof personal shields that protected on top, in front and to the sides. They resembled inverted armored wheelbarrows. But these were too heavy for a man to advance effectively across the terrain. Something so heavy would need a motor. And caterpillar traction. And it would need enough room and power to carry the weapons and enough men to crew the weapons, the motor and everything else.

The idea of tanks came quickly. In mid-August 1914, just 20 days after France joined the war, Colonel Jean Baptiste Estienne, the pioneer of indirect artillery fire and later considered the French "father" of tanks, declared that victory would belong to the first belligerent to mount a 75 mm cannon on an all-terrain vehicle. Two months later, Britain's visionary, Major Ernest D. Swinton, the official British war correspondent in France in 1914 envisioned using a caterpillar tracked vehicle to move an armored vehicle about the battlefield.

American Holt tractors with their all-terrain caterpillar treads were used quite early in the war.¹ They neatly towed wheeled artillery across the muddy, cratered and watery landscape. In that hell, the little Holts got around better than anything else.

The French started envisioning using their Holts for mounting weapons in 1914, and the British were inspired by their Holts as well. Quickly, both moved beyond theoretical, and in early 1915, each tried to make the different components fit together just right. The game wasn't simply assembling a jig-saw puzzle but also designing it in the first place.

The British, Swinton, Little Willie, Mother and More

In Britain, the skeptics prevailed initially, sensing impossibility in Major Swinton's audacious ideas. But he and others pushed forward. First Lord of the Admiralty (and future Prime Minister) Winston Churchill was an advocate. The result was the Landship Committee. An early idea was the Pedrail, a gigantic metal container mounted atop two tractor chassis! It would have carried 50 men into battle. This was too big to be practical, but it showed brilliance and vision.

After a few early failures, the British started Little Willie in August 1915. Little Willie, designed by William A. Tritton and Walter G. Wilson, was essentially a big armored box on two tracks powered by a 105 hp engine. The prototype included a circular metal roof panel where a turret could have been added, but this would have increased the vehicle's cost, complexity and its height. The turret idea was dropped.

In December 1915, Little Willie was ready. With long caterpillar tracks and an armored shoebox structure between the tracks, it showed significant promise. Though unarmed and unable to cross the test trenches, it was cleverly designed with sloped frontal armor and no overhangs.

In January 1916, the British finished "Mother," a giant lozenge-shaped prototype. Also called Big Willie and more, "Mother" was designed by Tritton and Wilson who carried over the same engine and transmission as Little

¹ Though the Holts were American, caterpillar treads were a much earlier British invention.

Willie. The world had never seen anything like it: a giant smoke belching steel monster, 31' long, 13' across, 8' high and weighing 31 tons. Its tracks went all the way around it. It lacked a rotating turret. It was slow, but seemingly unstoppable. And most importantly, it carried a pair of 6 pound (57 mm) guns in sponsons, box structures on either side of the tank.

The British tested both across their beautiful gently rolling countryside. Little Willie was judged inferior to "Mother." Further testing with "Mother" went well and soon the British had 150 on order as the Mark I.

This prototype fathered, or mothered, all future large British World War I tanks, all of which were gentle evolutions of this tank. It would also influence British post-war heavy tank designs.

First Blood

The Mark I was the world's first mass produced tank; 150 were built. Their function was kept secret. "Landship" would have been too obvious, so the code word "tank" was used to make observers think they would be transporting water. The production models were essentially the same as the prototype. Half had two 6 pound naval guns covering the two front quadrants of the tank and two rear-facing machineguns covering the back quadrants. These were called males. The other half, called females, had four 7.7 mm Hotchkiss machineguns, one per quadrant. Both genders carried an additional forward-facing machinegun in a tiny non-rotating roof-top superstructure called a turret. Having males and females provided balance, but actually there just weren't enough 6 pound guns to outfit all 150 Mark Is. Both genders had a crew of eight, 10 mm thick frontal armor and 8 mm side armor.

All 150 shipped to France. On September 15, 1916 at the Battle of Flers-Courcelette in the Somme in northern France, 49 Mark Is rolled forward. In charge was Major Ernest D. Swinton. Many tanks broke down simply getting to the jumping off point. But once the attack started in the morning, the rest advanced. The result was a surprise. Many Germans fled in terror. The male tanks fired their cannons and the female tanks fired their machineguns. The result was a 1.4 mile penetration of the German lines. This was almost unheard of, and it cost very few casualties. The Germans counterattacked later in the day and recouped their losses, but a precedent had been set: armored vehicles could help win battles where infantry on their own could not.

Next the British built 50 Mark IIs; once again, half were male and half female. These were Mark Is with minor improvements based on battlefield experience. These too saw combat but proved vulnerable to German armor-piercing bullets. After this came 50 Mark IIIs. These were armed with Lewis guns and used domestically for training.

The Mark IV gained two millimeters of frontal plate, Lewis machineguns instead of Hotchkiss guns and a ton of weight. It used electric signaling between the driver and commander and a compass for navigation. New rails atop the superstructure carried fascines, large chained bundles of tree limbs to drop into trenches which tanks could then use to cross. A squared log atop the tank could be unchained for the treads to pull it forward until it dropped in front of the tank allowing Mark IVs to extricate themselves from the mud.

Unfortunately, using Lewis guns meant larger holes in the armor, permitting more enemy bullets and shrapnel inside. Later Mark IVs reverted to the Hotchkiss guns. The British built 420 Mark IV males and 595 females.

All versions had the same dimensions: 32' 6" length, 7' 11" to the top of the superstructure, and 13' 9" width. All had a Daimler 105 hp six-cylinder good for about 3.7 mph.

Eight men operated all of the machinery and the weapons. Looking out from the small casemate atop the superstructure were the commander and driver. The driver also operated the front machinegun. At each side were two men who operated the weapons in the sponsons. The last two crew members sat in back and operated the running gear.

In between the crew members and in the same compartment as them was the engine. The men were exposed to extremely loud and hot machinery and moving parts as the tanks knocked about along uneven pockmarked

battlefields. These tanks lacked springs, so the crew were jostled around making even non-combat operations stressful, tiring and dangerous.

Regardless, the Mark IV was further improved into the Mark V and the post-war Anglo-American Mark VIII. But these tanks were essentially the end of the road for the turretless giants. The real future of tanks would be those with revolving turrets.

French Developments

French and British tank developments were largely independent of one another and top secret. Both Allies had similar constraints and industrial power. Both wished to protect their men while giving them enough firepower to rupture German defenses. So it's not surprising that both hit upon the tank nearly simultaneously.

Developed from December 1914 to March 1915, the ten-ton Frot-Laffly land ship was a big metal box, crewed by nine, sporting four machineguns and 9 mm thick armor. Twenty-two feet long, 6.5' wide and just over 7' tall, it only had 20 hp, and moved on large grooved wheels instead of tracks. It was a good early concept marred by being tremendously underpowered and lacking good traction. It was also top-heavy, and would have failed on anything other than perfectly flat terrain. By then, the more promising Schneider tank was in development, so the Frot-Laffly was cancelled. The prototype was sent to Great Britain, where it may have influenced British tank design.

The French produced three tanks that saw action in World War I: the Schneider, Saint Chamond and FT. In March 1916, the French ordered 400 Schneider CA-1 tanks and a bit later, 400 Saint Chamond tanks. Both broke down frequently on route to battle, while those getting there were often easily knocked out by German anti-tank weapons or got stuck in ditches or crossing trenches. Of the two, Schneiders were more successful and used more frequently, yet neither was ideal. The French went back to the drawing board and later emerged with the FT.

The Influential Renault FT

The flaws of the Schneider and Saint Chamond led to their antithesis, the little two-man Renault FT, perhaps the most influential tank ever. The 6.5-ton FT (often called FT-17 after its Renault code letters and its 1917 design year) was the first and only World War I production tank with a revolving turret. Also different: its 35 hp engine was in a separate compartment at the back, increasing crew safety, and the tank had an actual suspension, increasing crew comfort. FTs sported either a machinegun or an L/21 37 mm gun.² The 37 mm could knock out enemy pillboxes half a mile away providing badly needed infantry support.

Its 22 mm turret armor and 16 mm frontal armor bettered all British tanks and the French St. Chamond. Only the French Schneider and German A7Vs, both with 25 mm of frontal armor, had more. However, the A7V was a 32-ton monster crewed by 18. Since only 20 were made, its impact was nearly imperceptible. And the Schneider was unreliable and had poor trench crossing abilities.

By World War I's standards, the FT was mobile, generally reliable and mass produced. Tanks moving on their own were very fuel inefficient, slow and more likely to break down. However, a truck could carry one FT while pulling another on a trailer, giving the French tremendous flexibility in their deployment. The FT originated many tank-variants: bridge-layer, cargo carrier, amphibious, mine-clearing, bulldozer, smoke-layer and communications tanks. Some even had 75 mm guns.

The French built over 3,000 by war's end. The Americans made nearly 1,000, mostly post-war. Ten arrived in Europe by war's end, but none did battle. The Soviets made about 15 of their own version. From 1920 to 1923, the Italians built 100 improved FTs, christened FIAT 3000s, with 50 hp and longer 37 mm guns. The Italians even mounted a 105 mm gun in one, and some FIAT 3000s served Italy until 1943. The FT was also used,

² The L/21 designation meant that the gun was 21 times longer than the inside diameter of its gun barrel, i.e. 21 times 37 mm, or 771 mm (30.5") long.

mostly post-war, by Belgium, Canada, Japan, Yugoslavia, Manchuria, Poland, Holland, Romania, Spain, Finland, Greece, Czechoslovakia, Great Britain, China, Finland and Brazil.

German Developments

The Germans only produced one type of tank in World War I: the massive A7V. Reaching a height of 10' 10", it was taller than the Mark IV, but shorter and narrower, making it top heavy and a chore to maneuver on slopes. Its main gun was a lone 57 mm cannon. It also had six machineguns and a pair of powerful 100 hp Daimler-Benz engines totaling 200 hp, almost twice the Mark IV's 105 hp. However, it weighed 32 tons and needed a crew of 18. Thus it was very expensive to build and maintain; only 20 were built.

Ironically, the most numerous German tank were its 100 or so captured British Mark IVs. Peak strength was about 40, which the Germans organized into four companies and crewed with 12 men apiece. These fought the British with some success.

The Germans also built two prototype light LK II tanks. The LK II had a crew of three, a 37 mm cannon, no machineguns and an impressive 10 mph top speed. It resembled the British Whippet, and had the same engine in front, crew in back arrangement. It also had a modest turret atop the vehicle. The German army ordered hundreds, but the war ended before any were built. Post-war, parts for 10 tanks were sent to Sweden where they were assembled as Stridsvagn (Strv) M/21 tanks, thereby initiating that country's tank program.

Tidal Wave

While the British were eager to try their new weapons out as quickly as possible, the French wanted hundreds on hand for their first attacks. Schneiders first saw action at Berry-au-Bac/Chemin des Dames 8 miles NW of Reims in April 16, 1917. Some, but not all of the objectives were attained. Seventy six of 128 tanks were lost, but 24 were recovered. The next attack was in conjunction with new Saint Chamond tanks, at Laffaux, 80 miles NE of Paris on May 5, 1917. The attack attained all its objectives. Only three Schneiders and two Saint Chamonds were destroyed. For the rest of the war, Schneiders played a key role in many attacks or often in blunting German attacks.

On November 20, 1917, the British fought the Germans at the Battle of Cambrai. The British used 378, mostly Mark IVs, plus nearly 100 more unarmed support tanks. On the first day, at least, the combined arms offensive was a success as the large British tanks broke through the supposedly impenetrable German lines, forcing back their enemies. However, accurate German artillery knocked out many British tanks. For a week, the British advances continued, but then progressively decreased as their tanks were knocked out of action or broke down. And then the Germans began counterattacking, returning the front lines to nearly where they had started, but the British were greatly encouraged by what their tanks had accomplished.

In June 1918, the French used 150 tanks to counterattack the Germans in the midst of their Gneisenau offensive. The move worked; the Germans were stopped, at least temporarily. The real turning point of the war, however, was the Second Battle of the Marne, which started on July 15, 1918 not with a French offensive, but another German one designed to finally finish the Allies by striking the last several dozen miles toward Paris. However, the French found out about the impending attack due to start with a massive artillery barrage and preempted it with a massive barrage of their own. Additionally, the French, and their newly arrived American allies, also had excellent air cover and over 350 tanks. The Germans used eight A7V tanks and 20 Mark IVs captured from the British. In three weeks, the French and the Americans routed the Germans and pushed them back 20 miles. It was the greatest victory since the First Battle of the Marne of 1914. From now on, the Germans would have to retreat constantly until the war ended in mid-November.

Tanks were used in a continuous series of punches to put the Germans on the defensive and push them back toward Germany. Here are just a few examples. On August 8, the Allies attacked around Amiens with 10 divisions and 500 French and British tanks. Tanks broke through the German lines and then caused panic and chaos.

From September 12 to 15, 550,000 Americans and 110,000 French troops attacked approximately 50,000 Germans around St. Mihiel. The American-French force also had 419 tanks and almost 1,500 aircraft. Both the Americans and the French had Renault FTs, while the French also had 59 Schneider and Saint Chamond tanks in the mix. With such overwhelming force, it was a relatively easy victory.

From September 26 to November 11, the American Meuse-Argonne offensive used 380 tanks (mostly FTs), 840 aircraft and 1.2 million troops versus 450,000 Germans. Even now, many Germans had plenty of fight left in them, but the FTs countered German pillboxes and machinegun nests. The Germans were running out of manpower, supplies and food. They were also running out of partners, as Austria-Hungary and other Central Powers were forced out of the war. On November 11, 1918, with the Allies advancing all across the Western Front, the Germans surrendered. The war was over.

It has now become common to state that the role of tanks helping win World War I was exaggerated. This has been said so often that their role is now completely underrated. True, there were several key factors at play, such as fresh American manpower, superb French and British aircraft, etc. However, it was tanks that allowed Allied armies on the Western Front to go on the offensive and penetrate the powerful German defenses with plenty of firepower while reducing their own losses. The Germans learned their lesson, and their World War II campaigns would be largely defined by tanks.

Italian Developments

It is worth mentioning that the Italians built two Fiat 2000 prototype tanks in 1918. These large tanks were roughly the size of a British Mark V. They were innovative, mounting a powerful 65 mm cannon in a turret. The tracks around the lower hull foreshadowed tanks to come. However, their 4 kmph (2.6 mph) speed meant they could be outrun, or even outwalked, by almost anyone. Fifty Fiat 2000s were ordered, but the remaining 48 were cancelled with the end of the war.

Intra War

The peace of November 11, 1918 brought almost immediate demobilization, at least where men weren't awaiting in line to get on trains or ships to go home. The result was a mostly quiet period in between World War I and World War II as many nations immediately slashed their military spending to the bone, cut research and development, etc. Still, there were wars and tanks were used. For instance, various versions of the FT saw action in the Russian Civil War (1917-1922), Polish–Soviet War (1919-1921), the Moroccan Rif War (1920-1926), and other conflicts. The Americans deployed some of their FT copies to China to defend American interests, though it seems none saw combat.

In truth, few wanted another great war. It seemed unlikely that anyone could manage a war that would threaten Great Britain or France, the world's two great post-war tank powers. Thus those two nations had little incentive to develop tanks in any meaningful way. Still, they did.

The British

The British ended World War I still further developing the Mark V series of heavy tanks. The wartime Medium A Whippet tank was also quickly superseded by the rhomboidal Medium B, Medium C and Medium D, each featuring a fixed box superstructure. Each grew in size and looked more and more like a British heavy tank. All were turretless. Realizing this was an evolutionary dead end, the British finally started adding turrets to their mediums, resulting in the Vickers Medium I, II and III. The Medium I had a 3 pounder (47 mm) gun; just under 100 were built. The Medium II improved upon the Medium I, adding radios and better armor along with some other minor improvements.

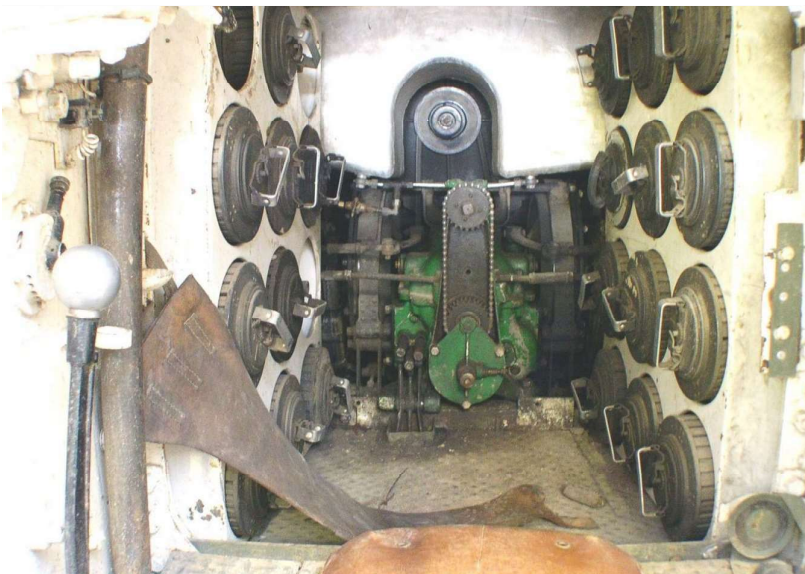
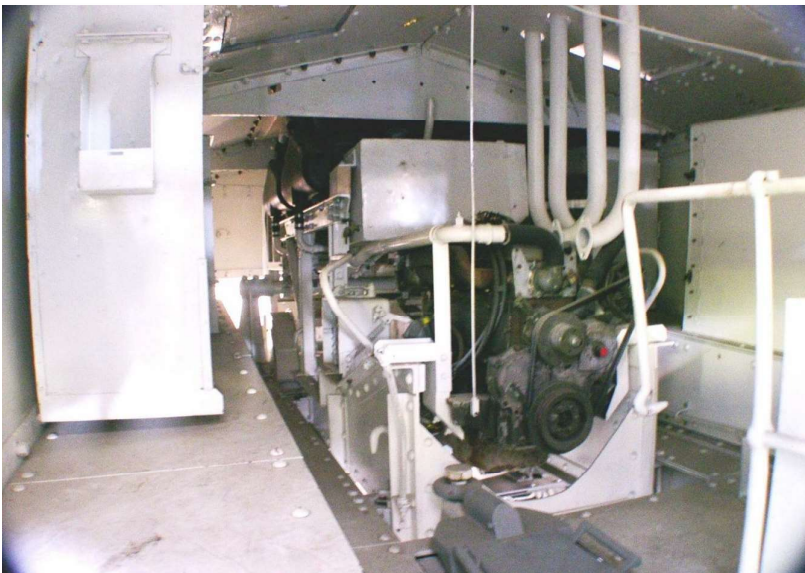
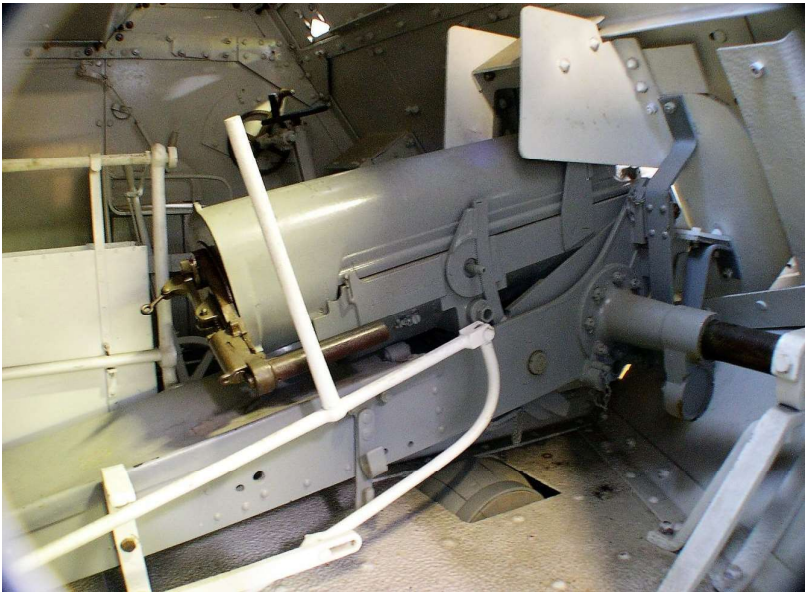
Between the Mark VIII and the start of World War II, the British only built one truly interesting heavy tank: 1926's Vickers A1E1 Independent prototype. It had one large hemispherical turret mounting a 3 pounder (47 mm) gun and four small turrets at its base, each with a Vickers machinegun. It was large, with a low hull rather than the giant rhomboid of prior large British tanks. Its engine and drive wheels were in back and the track area had large skirts. Armor was 8 to 25 mm, while the 370 hp V12 engine could propel its 32 tons at up to 20 mph. The vehicle's fatal flaws were difficulty in steering due to its great length to width ratio, its extravagant 4.5 gallons of oil per mile consumption to lubricate the engine (versus its mere 1 gallon of gasoline per mile fuel consumption), its great cost and complexity. The vehicle was never put into production, but it allegedly influenced the Soviet T-28 and T-35 multi-turreted tanks to come in the 1930s.

The imposing 1930 Vickers III medium, which was a completely new design and not an evolution of the Medium II, was built only in prototype form. Based a bit on the firm's own A1E1 Independent, it had one main turret and two smaller ones. Three were built, but it proved too expensive to put into production.

The 1930s

It was in the 1930s that tank development started to become quite interesting. By this point, other powers, notably the Union of Soviet Socialist Republics (USSR, but generally referred to here as the Soviet Union), Japan, Poland and Czechoslovakia were developing and producing tanks.

It was during the 1930s that the Soviet Union became the world's greatest tank power. In roughly a decade, the Soviets went from buying and modifying foreign tanks to producing what might be considered the world's best light tank, medium tank and heavy tank. Initial efforts were modest. At first, the Soviets reverse engineered the Renault FT and produced it as the Tank M. In the late 1920s, the Soviets developed the one-man one machinegun 2.4 ton T-17 tankette. Only three were built. Next was the 37 mm equipped T-18, an evolution of the FT, but smaller. Various problems rendered it ineffective, but it gave the Soviets more practical experience at developing indigenous tanks. The T-27 was a Soviet license-produced version of the British Carden-Loyd tankette. It weighed 2.7 tons, and had one machinegun as its armament.



Saint Chamond (FRANCE) - CONTINUED: The Saint Chamond had more horsepower and was faster than the Schneider. However, the Saint Chamond's additional length made it even more prone to catching its nose or tail in the trenches. The type first saw action at Laffaux, 80 miles NE of Paris on May 5, 1917. Three of sixteen were destroyed and some were caught in the trenches, but the attack was successful. Improved 1918 models had increased frontal armor and a slightly sloped roof to help enemy satchel charges slide off before they could blow through the roof. After Renault FT tanks became available in 1918 to lead attacks, the Saint Chamonds were generally held back and used as self-propelled artillery. This Saint Chamond is in Saumur, France and is the last one in the world.



Panzer I (GERMANY): Tank. Produced: 1934-1938. Crew: 2. Main Armament: -. Machineguns: 2. Max Armor: 12 mm. Horsepower: 57 hp. Weight: 5.5 tons. Max Speed: 22 mph. Range: 125 miles. Qty. Produced: 2,000. Pros: Allowed the Germans to practice operating tanks. Cons: Too light for WWII combat. Notes: This tank was designed for training rather than real combat. Nonetheless, it saw extensive service in the battles for Poland, France and elsewhere. Its quick speed allowed it to help create havoc and confusion once it penetrated enemy lines. This vehicle was photographed at Aberdeen Proving Ground, Maryland.



Hetzer (GERMANY): Late WWII Tank Destroyer. Crew: 4. Main Armament: 75 mm. Machineguns: 1. Max Armor: 60 mm. Horsepower: 158 hp. Weight: 15.75 tons. Max Speed: 26 mph. Range: 110 miles. Number Produced: 2,827. Pros: Inexpensively developed weapon using existing Panzer 38(t) chassis. Nicely sloped armor. Mechanically reliable. Relatively low 7' 1" profile. Unlike the Marders, the Hetzer (meaning "Agitator") was fully enclosed. Cons: Thin flank armor. Notes: Because of its small size and older Panzer 38(t) chassis, the Hetzer looks like an early to mid-war weapon. In fact, it was a late-war weapon produced in 1944 and 1945. Nonetheless, its small size, powerful L/48 (48 calibers long) 75 mm gun and decent production numbers made it a vehicle with an outsize impact on the war.



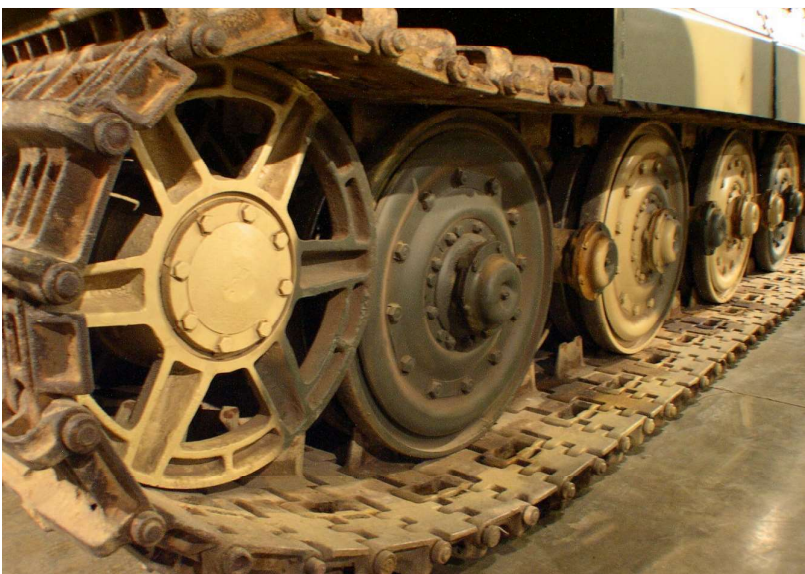
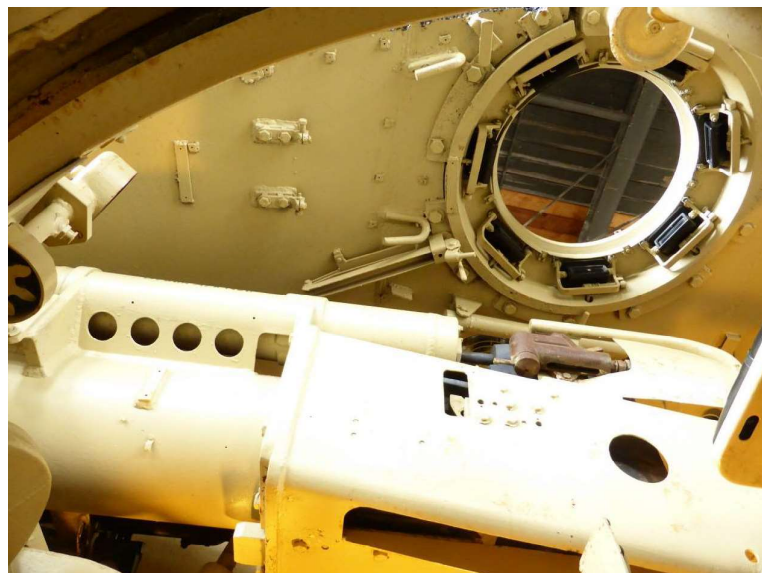
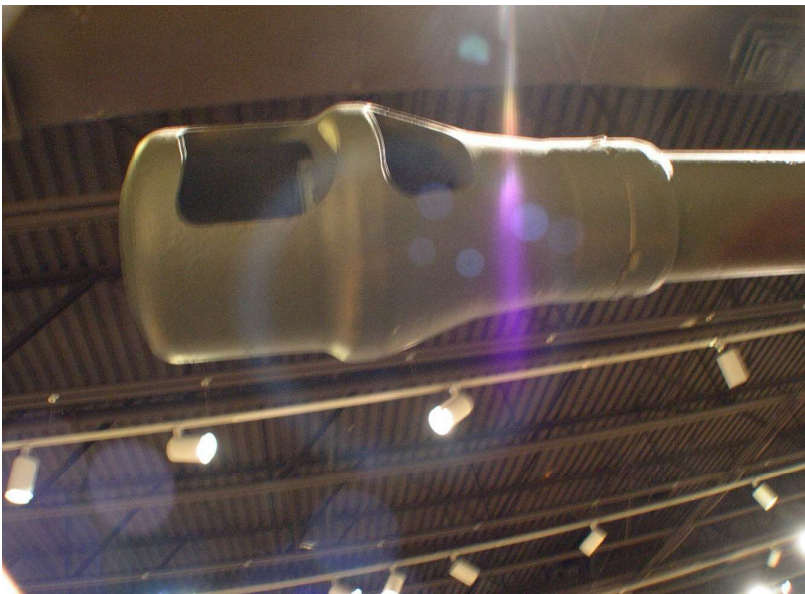
Sturmpanzers IV Brummbär (GERMANY): Mid-WWII Self Propelled Gun. Crew: 5. Main Armament: 150 mm. Machineguns: 1. Max Armor: 100 mm. Horsepower: 296 hp. Weight: 28.2 tons. Max Speed: 25 mph. Range: 130 miles. Number Produced: 306. Pros: Imposing, fully enclosed superstructure with up to 100 mm armor. Powerful infantry support 150 mm cannon. Cons: Not many other than slightly high profile, but even that was only 8' 3". Notes: The additional weight of the superstructure and cannon was too much for the Panzer IV chassis on which the vehicle was based. Later models had less armor and a redesigned, much lighter 15 cm L/12 cannon, which thus decreased strain on the suspension. This one was photographed at Aberdeen Proving Ground, Maryland.



Panzer V (Panther) (GERMANY): Mid-WWII Tank. Crew: 5. Main Armament: 75 mm. Machineguns: 2. Armor: 16-110 mm. Horsepower: 690 hp. Weight: 44.8 tons. Max Speed: 34 mph. Range: 160 miles. Number Produced: 6,000. Pros: Well-balanced tank: hard-hitting, excellent thick, sloped armor and superb 75 mm main gun. Cons: Not many, but some complexity in the interleaved road wheel design. Notes: The Panther is perhaps the overall most well-balanced tank that the Germans made. It was inspired by the Soviet T-34. In fact, the Germans initially discussed simply making direct copies of the T-34, but national pride forbade that.



Panzer VIb (King Tiger/Tiger II) (GERMANY): Late WWII Tank. Crew: 5. Main Armament: 88 mm. Machineguns: 2. Armor: 25-150 mm. Horsepower: 700 hp. Weight: 68.5 tons. Max Speed: 22 mph. Range: 75 miles. Number Produced: 485. Pros: Same gun, but more armor than a Tiger tank combined with a sloping turret and sloping hull. Armor was up to 6" thick in places. Cons: Heavy tank ran out of fuel quickly in large part because of the vast amount of fuel (228 gallons!) required to fill up. It was also incapable of crossing many bridges. Notes: This King Tiger is in Saumur, France. It is the only King Tiger that still runs.



Panzer VIb (King Tiger/Tiger II) (GERMANY) - CONTINUED: Like the Tiger, the capabilities of the King Tiger were prodigious. It is fortunate that it came late in the war and that it consumed so many resources. This meant that it was expensive and time consuming to produce. It also needed 228 gallons of fuel to fill up and reputedly consumed up to a staggering 7 gallons per mile cross country! On defense, it was seemingly impossible to defeat, at least in tank to tank combat. The main exception was perhaps the Soviet JS-2 tank, which was even harder hitting and which also had an excellent shape to its armor and turret. Even then, King Tigers claimed many JS-2s as well as hundreds of other tanks as victims. This King Tiger with the cutaway hull and turret was at Fort Knox, but is now at Fort Benning, Georgia.



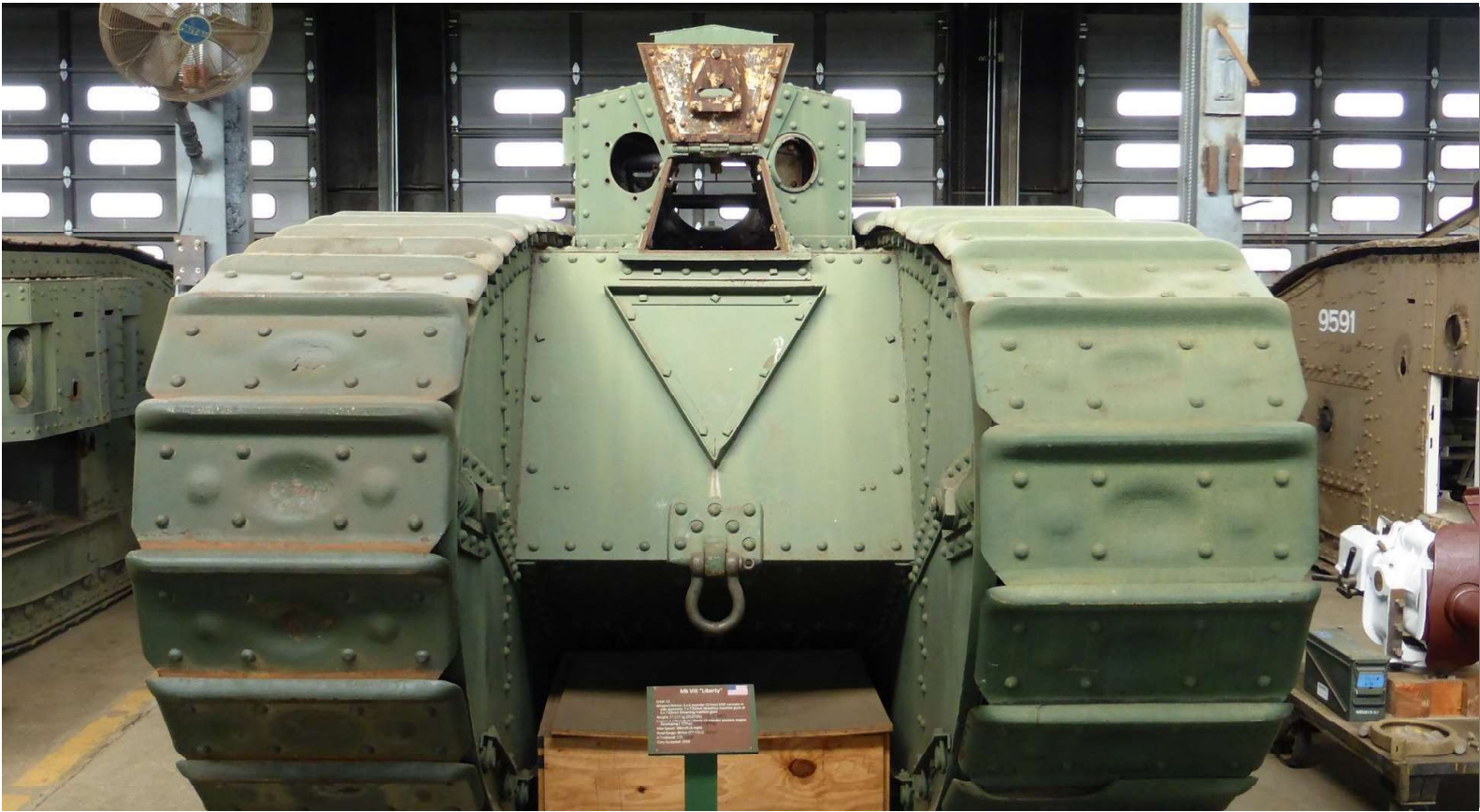
T-34/85 (USSR): Mid-WWII Tank. Crew: 5. Main Armament: 85 mm. Machineguns: 2. Max. Armor: 20-90 mm. Horsepower: 500 hp. Weight: 32 tons. Max Speed: 33 mph. Range: 150 miles. Number Produced: 29,430. Pros: Compared to earlier T-34/76, thicker armor, more powerful 85 mm gun and a three-man turret versus the earlier version's two-man turret. Cons: Compared to T-34/76, range 40% less. Notes: Above all, the Germans and Soviets constantly upgraded their tank designs in remarkable ways. The improved Panzer IVs, themselves created in response to the T-34/76, and the new Panther and Tiger tanks and various tank destroyers meant that the Soviets needed to improve the T-34. This they envisioned doing anyway. And with the T-34/85, they did.



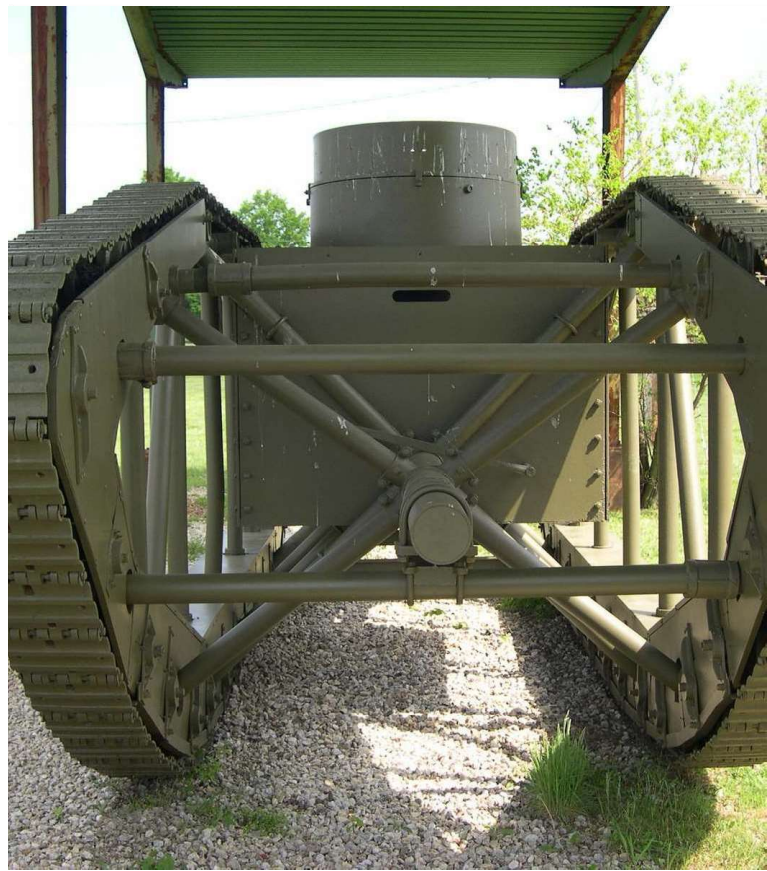
IS-3 (USSR): Late WWII Tank. Crew: 4. Main Armament: 122 mm. Machineguns: 2. Max. Armor: 230 mm. Horsepower: 600 hp. Weight: 46.5 tons. Max Speed: 23 mph. Range: 192 miles. Number Produced: 2,311. Pros: The overall best combination of armor, gun and speed of any tank in the war. Cons: Appeared too late to fight. Notes: The IS-3 was WWII's ultimate progression of the KV tank (KV-1, KV-1S, KV-85, IS-1, IS-2 and IS-3). It was named after Joseph Stalin (Iosef Stalin in Russian), hence the frequent usage of JS-1, JS-2, and JS-3 for the series in English. The shape of its "inverted frying pan" turret was revolutionary and influenced so many of the post-war tanks.



IS-3 (USSR) - CONTINUED: The Stalin IS-3 tank is certainly one of the most influential tanks of all time, having overnight obsoleted every other tank in the world. Low slung, perfectly shaped, heavily armored and heavily armed with a 122 mm gun were tremendous attributes. However, the IS-3 was not always practical: its turret was very cramped for the crew. The rounds were too big and had to be assembled from two parts prior to firing, etc. Though several hundred were built before the war ended, it never saw combat in World War II. Still, the vehicle evolved through several variations culminating in the post-war T-10.



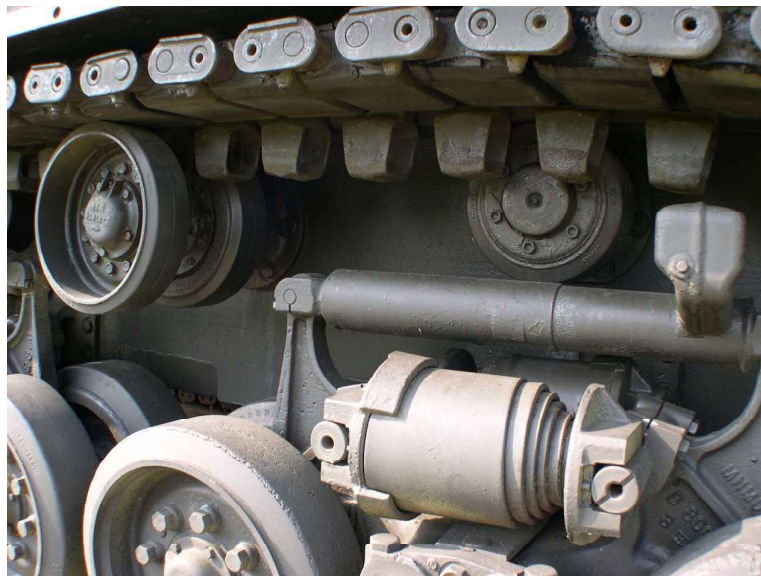
Mark VIII (UNITED KINGDOM/UNITED STATES): Tank. Produced: Late 1918-1920. Crew: 8. Main Armament: 2x57 mm. Machineguns: 7. Armor: 16 mm. Horsepower: 300 hp. Weight: 37 tons. Max Speed: 6 mph. Range: 50 miles. Number Produced: 125. Pros: Could have crossed most trenches. Cons: Unavailable in time for war. Notes: The Anglo-American Mark VIII was meant to be the culmination of all things the British had learned with their heavy tanks to date. It would be produced by both the UK and the USA, albeit each with their own engines. To date, this is the only tank ever produced in a collaboration between two or more countries. The British tank, named "International," had a Ricardo 300 hp, while the American had a detuned 300 hp Liberty engine, hence its American name "Liberty."



Skelton (UNITED STATES): Late WWI Tank. Crew: 2. Main Armament: 0. Machineguns: 1. Max. Armor: 13 mm. Horsepower: 100 hp. Weight: 9 tons. Max Speed: 5 mph. Range: 34 miles. Number Produced: 1. Pros: Light weight, long track for crossing wide trenches. Smaller target than other large tanks. Cons: Crew and engine in the small box compartment. Notes: This prototype is another example of American attempts to produce a decent tank. Its rhomboid track echoed that of the British heavy tanks, but the crew and engine compartment was a box suspended in the middle. This approach would have permitted the two man crew to cross large trenches to advance a machinegun closer to the enemy. But since the compartment wasn't large enough for larger weapons, the Skelton was never put into production.



M4 (76 mm) (Sherman) (UNITED STATES): Mid-WWII Tank. Crew: 5. Main Armament: 76 mm. Machineguns: 3. Armor: 12-62 mm. Horsepower: 500 hp. Weight: 35 tons. Max Speed: 24 mph. Range: 100 miles. Number Produced: 6,936. Pros: Easily produced, reliable, easily transported by sea. New 76 mm gun and HVSS suspension. Cons: Armor still thinner than later German tanks. Notes: The early M4's 75 mm gun was largely ineffective against the later German Panther, Tiger and King Tiger tanks. Later M4s thus had a bigger turret capable of handling the vastly more powerful 76 mm gun. More armor was added too. The additional weight of the gun, turret and armor required a better suspension, which led to the HVSS (horizontal volute suspension system) for these models.



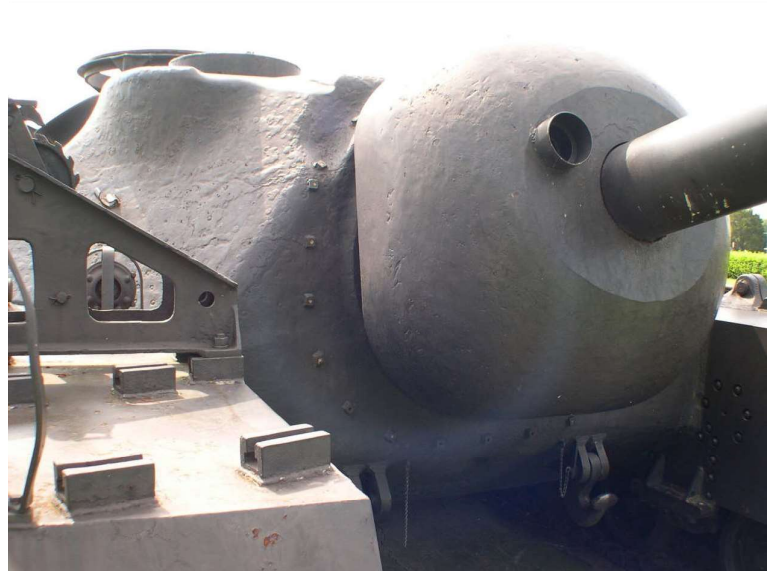
M4 (76mm) (Sherman) (UNITED STATES) - CONTINUED: Like the earlier M4s, the 76 mm gun-equipped M4s were thinner and undergunned compared to their German competition, but they were produced in staggering quantities and were reliable. For all their weaknesses, they were easily built, relatively easily transported by sea, and they captured more ground in Western Europe than the Germans ever had. While unequal to German tanks one on one, they undoubtedly caused the destruction/abandonment of more German vehicles than vice versa, and they protected many men who otherwise would have been unprotected out in the open. American models were typically M4A3(76)W HVSS, also called M4A3E8 or simply "Easy Eight."



M6 (UNITED STATES) - CONTINUED: Note the relative sizes of the M6, M4 Sherman and the French Renault R-35. At bottom are the M6's massive tracks, awaiting possible restoration.



M18 Hellcat (UNITED STATES): Mid-WWII Tank Destroyer. Crew: 5. Main Armament: 76 mm. Machineguns: 1. Armor: 7-12 mm. Horsepower: 400 hp. Weight: 20 tons. Max Speed: 50 mph. Range: 150 miles. Number Produced: 2,507. Pros: High speed, low silhouette, good gun. Cons: Very light armor, open roof turret. Notes: The Buick-designed and built M18 Hellcat tank destroyer had the same 76 mm gun as later Shermans and the M10 Wolverine tank destroyer. It proved a superb vehicle in many aspects. The Hellcat had very thin armor and a roofless turret, making its crew vulnerable to small arms and the weather. However, the resulting low weight and high power from its R975 Continental Radial Engine (350 hp for early Hellcats; 400 hp for later ones), made it World War II's fastest AFV.



T28 (UNITED STATES): Late WWII Tank Destroyer. Crew: 8. Main Armament: 105 mm. Machineguns: 1. Max. Armor: 25-300 mm. Horsepower: 410 hp. Weight: 95 tons. Max Speed: 8 mph. Range: 100 miles. Number Produced: 2. Pros: Tremendous main gun and armor. Cons: Incredible weight. No turret. Notes: The T28 mounted a very powerful 105 mm anti-tank gun in a fixed superstructure. But instead of just one pair of tracks, the T28 had two tracks per side to handle the vehicle's massive weight. The outer tracks could be removed to allow the T28 to pass more easily in places and for easier transport. The dismantled tracks could be paired to each other and then towed by the T28 or by another vehicle. Only two were ever built; neither made it to combat, and one burned up in a fire.