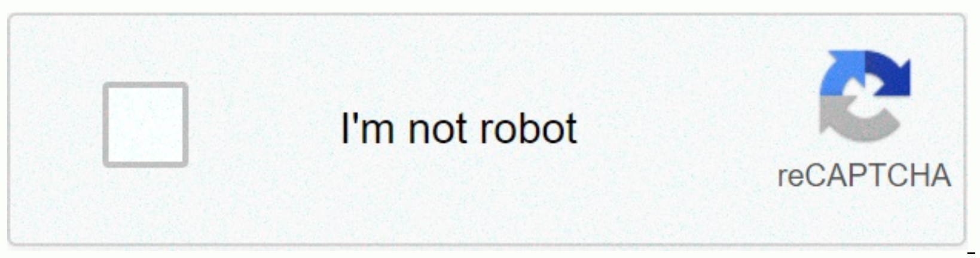

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How many british tanks were made in ww2

British tanks and armored cars 1939-1945 Infantry Tanks Cruiser Tanks A.27, Cruiser Mk.VIII, CromwellA.34, Cruiser Tank, CometA.9, Cruiser Mk.I Medium Tanks Vickers Medium Mk.DVickers Medium Mk.I & Mk.IIVickers Medium Mk.III Light Tanks Tank Destroyers A.22D, Churchill Gun CarrierSherman VC Firefly Tankettes Loyd CarrierUniversal Carrier Flamethrowers Armored Cars Funnies Other Vehicles Prototypes & Projects 40RBL78 MA Field GunA.11E1, Infantry Tank, Matilda PrototypeA.33, Assault Tank “Excelsior”A.34* (Star), Cruiser Tank, CometA.38, Infantry Tank, ValiantA.39, Heavy Assault Tank, TortoiseA.43, Infantry Tank, Black PrinceArthur Janser’s 500-ton Battleship and Grasshopper TanksBechhold TankBritish Testing of the Praga TNH-P 8-ton Tank in 1938Churchill Mk.III with ‘Ardeer Aggie’ MortarGerrey Machine Gun Motor VehicleHeavy/Assault Tank T14Johnson’s Light Tropical TankKahn’s Obstacle Ball / Rolling Fortress ‘Tank’Morris-Martel TankettesPraying MantisSmeaton Sochaczewski CarrierTOG 300GTOG AmphibianTOG CitadelVickers Amphibious Light Tank L1E3Vickers No.1 & No.2 Tanks Anti-Tank Weapons Fake Tanks Tanks from The Shape of Things to ComeWalmington-on-Sea APC (April Fools) Tactics Technology Introduction While the British Empire was depending foremost on its navy to defend its interests, it also had modern and efficient aircraft, and a small army, but very well equipped and trained. Its armored forces were not at all numerically equal to France or Nazi Germany, but qualitatively of good level. This was the case mostly thanks to a booming export production in the thirties (mostly Vickers) and many tests, exercises and authorship of the idea of mechanized warfare (in fact the basis on which the Blitzkrieg was founded), with revolutionary concepts such as the Carden-Loyd tankette, or the adoption of the Christie suspension for its cruiser tanks. The BEF (British Expeditionary Force) in May, 1940 In 1939, besides the colonial forces stationed around the world, mainly made up of infantry and artillery, the heavy mechanized forces were included in the British Expeditionary Force commanded by Lord Gort, formed in 1938, and landed in France soon after the declaration of war on September 3. Reduced in number (one tenth of the Allied forces, France, Belgium, Holland, Denmark included), but of very high combat value, the BEF included 158,000 men, arrived in five weeks, with 25,000 vehicles, artillery and support. Final deployment was completed in May 1940, in 10 divisions, assisted by 500 units (approximately 400,000 men). The majority of the forces were assigned to the French-Belgian border, but some units went and stood behind the Maginot Line. These forces were highly mechanized and consisted mainly of trucks and artillery tractors, armored cars and tanks, classified according to the custom of the time, in cavalry tanks (Cruisers), Scouts (Light) and Infantry. But because of the turn of events, most of this hardware was lost on the the way to the Dunkirk beaches. 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The latter gained fame in the North African campaign, but it was obsolete by 1943 and new models had arrived: The Cavalier, Centaur and, most famous, Cromwell (Mark VII), all equipped with the new 6 pdr (57 mm/2.24 in) antitank gun, improved engine and armor. When the African campaign started, the British armored force was left with second-rate tanks, most of nearly obsolete models, like the Light Tanks Mk.II/III, Mk.V and Mk.VI and tankettes, and the obsolete Vickers Medium Mark II. There were also a few Cruisers Mk.II/IIIs. By 1940, as the Italian threatened Egypt from their Eastern African colonies and Libya, some armored reinforcements were sent, and nearly all available tanks when, in September 1940, the Germans ceased their air offensive over Britain. At the same time, production was re-centered around a few models: The infantry tank Matilda II, the Cruiser tank Mk.IV, and the freshly arrived Valentine. 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This giant pincer movement was designed to deliver the coup de grace to the Afrika Korps and the remainder of the Italian forces, now retiring to Tunisia. The Tunisian campaign was nothing but a though and bloody affair. Tunisian muddy winter combined with a stiffened and well-ordered fighting retreat by hardened Axis troops was not what the Allies expected, and the arrival of general Kesselring with fresh reinforcements, including the brand-new Tiger tank, further increased the Allied disarray. As a response, British armor received new anti-tank guns, but to lead the assault, they also received the heavy Churchill tank, slow but extremely resilient and versatile. The last Crusaders had been phased out, and early versions of the Valentine had been converted with success into the Bishop SPG. Now obsolete Grants were sent to the Far East. They would go on to have a brilliant fighting career in Burma, until 1945. 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Soon after these landings, a new Italian government was formed, which decided to put Mussolini in arrest and quickly entered peace talks with the Allies. But, despite the defection of Italian troops, the offensive reached a standstill. General Kesserling was able to put a very sturdy resistance, helped by his hardened troops, some reinforcements and the Italian landscape.

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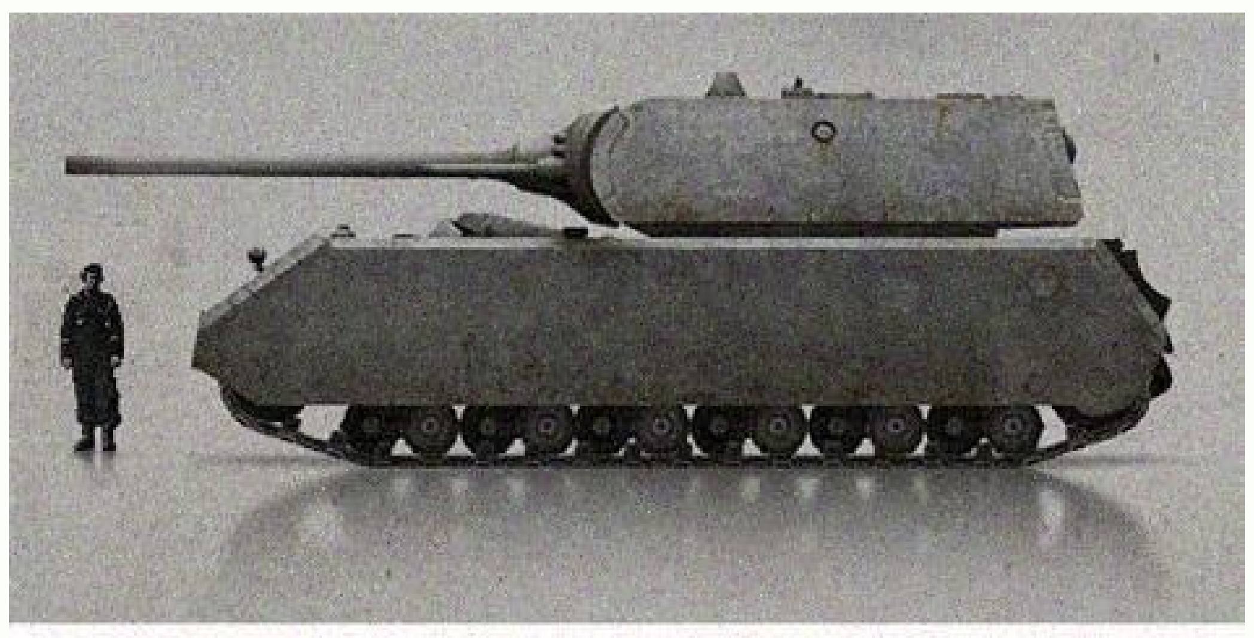

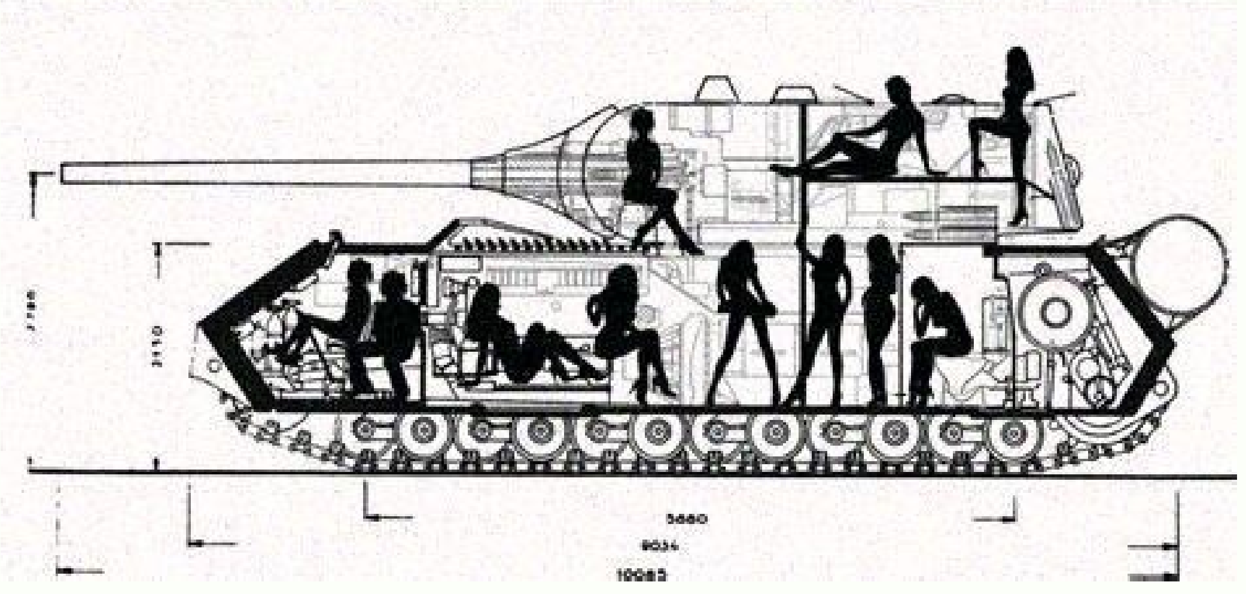

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D-Day and the European campaign (1944-45): Before D-Day, the only attempted landing in occupied France had occurred on 19 August 1942. This was a complete failure, with a heavy price which was mostly paid by Canadian troops. This was also one of the first actions of the new Churchill tank. Already developed in 1941, the Churchill looked obsolete, and it was plagued by teething problems. At Dieppe, none of these heavy tanks made it farther than the beach, easy prey for the German artillery at point-blank range. The problem was not in the tank, but in the very stuff that composed the beach, tiny chert which clogged into the drivetrain and tracks. The Churchills were doomed. But this tank would prove its value in a matter of weeks in North Africa and especially Tunisia,. When all its defaults were corrected, it ended up as a very fine armored vehicle. It was extremely sturdy, roomy, reliable, and highly adaptable, and it could climb slopes impossible for any other Allied model. It became the staple of the Royal engineers for every duty imaginable, from D-Day to V-Day. The bulk of the British tank force during D-Day was made of US-built Sherman tanks.

The British were not long to grasp the potential of this tank and quickly attempted a modification of their own, the Firefly. This was basically an up-gunned version, fitted with the long-barrel, high-velocity QF 17-pdr (76.2 mm/3 in), the British perfect "tank killer", capable of knocking out any German tank of the day.

It was used in conjunction with other models and proved really up to the task during the operations in the Normandy bocage and heavy fighting around Caen. The US devised their own upgunned version, the 76(w), which appeared not long after and became the next upgrade of all Sherman versions. The second most important British tank deployed was the Cromwell. Derived from the long line of "cruisers" and equipped with the same engine as the legendary Spitfire (the Rolls-Royce Meteor), the Cromwell was faster than the Sherman, but also lower, and equipped with the largely available and very efficient QF 6-Pdr (57 mm/2.24 in) gun.

However, it was cramped and the small hatches too often condemned the crews to burn alive inside the tank. The Cromwell was chiefly used for training, and only equipped the 7th Armored Division and other elite specialized units, like the reconnaissance units attached to the Guards Armored Division and 11th Armored Division. Other important AFVs deployed at D-Day were the self-propelled howitzers, M7 Priest and the Canadian Sexton. Indirect fire could be provided quickly thanks to these vehicles, which turned out to also be efficient troop transports. So much so, that many other turretless vehicles were called for the task, summarily called "Kangaroo". But these converted vehicles were all open-topped. The unique SPG designed to operate as a tank hunter was the 17-Pdr Archer, based on the Valentine chassis. Around 600 were produced in 1944, and they operated in France, Holland, Germany and Italy. These were characterized by a rearward-firing configuration.

The A.30 Challenger (Cruiser Mark VIII) made its debut in France in the summer of 1944. It was introduced with the new high-velocity 17 pdr (76.2 mm/3 in) QF AT gun, capable of dealing with German Panzer IVs and Panthers. However, its development took time, and the Firefly appeared cheaper to convert in numbers. So despite its advantages (it was faster and agiler), the costly and complex Challenger never saw action before July and August 1944, when the mulberries were operational, and only 200 were built, equipping British elite units, as well as Czech and Polish ones. Both concepts of tank hunter and cruiser tank were reunited in a single package, the Comet, first introduced by early 1945.

The Comet was basically a Cromwell re-equipped with a specially adapted version of the deadly QF-17 pdr. An impressive package of speed, armor and firepower, which represented the peak of British experience facing German tanks. But it was not the last "cruiser". As soon as 1943, the general Staff asked for a "Heavy Cruiser" (A.41), which could withstand a direct hit from a German 88, be agile like the Comet and Cromwell, still be armed with an improved version of the QF 17-pdr and stay within the 40-tons limit to allow transport by the lorries. A mock-up was built in May 1944, with prototypes in early 1945 after many revisions. It is said that three pre-series Mk.I Centurion prototypes were sent to Germany before V-day, but the armistice was signed before they could participate in any action. However, they had a great postwar career and pioneered the "main battle tank" we know today. Armoured cars Daimler Dingo With nearly 6,400 machines produced in several sub-versions until 1945, the Dingo was one of the best armored reconnaissance 4×4 vehicles produced in the world. About 400 served during the campaign of France in the 1st Armored Division and the Northumberland Fusiliers; and in many theaters after. Humber Light Reconnaissance Car About 300 of these armored armored car were produced by the Rootes Group (Humber) and served with the BEF. These vehicles had a Boys anti-tank rifle and a Bren gun. After the Fall of France, 3600 more would be produced. Older models -There were still ww1 vintage or 1920-24 pattern Rolls-Royce models in use in North Africa, especially in Libya and East Africa -The rare Vickers Crossley 4×4 (model 25) was produced for Japan, whereas 100 "Indian pattern" were used by the Raj of India and the 6×6 Mark I was still during the war for training (to come). About thirteen IGA-1s 6×6 were also used by the Estonian defence Forces in WW2 and the model 26 4×4 by Argentina. -Guy Armoured Car: Only 101 of the "pre-production" prototypes for the famous Humber were built by Sydney Guy at Wolverhampton in 1939. Only four went with the BEF, all captured, the rest were used at home for training. -Lanchester 6×4: A rather rare 6×6 model developed in 1928 (34 built) and used overseas during ww2 (Malaya) and at home for training. Relatively similar to the Vickers-Crossley.

New ww2 models -Humber armored car: One of the most successful ww2 armored cars. Developed from the Guy in 1940, 5400 were produced up to 1945. Armament was variable but in general a couple of a heavy Besa and light machine guns. Used as a standard for ground reconnaissance on all fronts. -AEC Armoured Car: A 4×4 monster built during the war and sturdy enough to sport the turret of the Valentine tank. It was one of the earliest example of a wheeled tank during ww2. -Coventry Armoured Car: A late (1943) ww2 attempt to design a standard wheeled armored car to replace previous models, only 220 built.

-Morris CS9: Morris was a prolific prewar car manufacturer, but only produced 99 of its own armored car in 1938-39, the CS9.

A sturdy 4×4 lightly armed and armored, it was quickly retired from the front line. -Morris Light Reconnaissance Car: Designed and mass-produced after Dunkirk (1940) at 2200 units, this light RC armored car was lightly armored and protected, but cheap to built and faster than the heavier CS9. However it suffered from reliability issues and had limited offroad capabilities. -Standard Beaverette: A desperate case of improvization, these were post-Dunkirk 1940. Called "Lord Beaverbrook's pets" (RAF) they were hastily-made armored conversions for home guards defence. They were made of Standard car vehicles, 2,800 converted in a shot time and several series. They only served at Home. Light tanks Vickers Light Mk.II-III Mk.I (10 built), Mk.II (66 built) and Mk.III (34 built), 110 built in all. From these light tanks derived many models, including the 6-ton light tank widely sold for export. They were classified as cavalry tanks, light, fast, with a turret armed with a single gun, and a crew of two. Relegated for training until 1942. Vickers Light Mk.IV 34 of these improved Mk.IIIs with a new hull and suspensions were delivered. Vickers Light Mk.V 22 of these three-men crew vehicles with a redesigned hull were built. Vickers Light Mk.VI 1682 built. By far the most common light tank of the BEF, the Mk.VI was produced until 1939, of which many were sent overseas. It used a heavy .50 cal (12.7 mm) machine gun, combined with a light machine gun (7.7 mm/0.3 in). Tetrarch (Tank, light, Mk.VII) 177 built. The A.17 was a specific wartime version designed to be airborne. The Tetrarch served in Normandy, but, being unsatisfactory, they were quickly withdrawn. Next, was the Harry Hopkins, a disastrous model.

Tank, light, Mark VIII "Harry Hopkins" The Tank, Light, Mk.VIII (A.25), better known as "Harry Hopkins", was a British light tank made in just 100 vehicles by Vickers-Armstrong specifically for airborne operations. It was also the very last of the long line of British light tanks and successor to the Mk.VII Tetrarch. Compared to the latter, it was larger and had a better armour. Submitted to the War Office in late 1941, the design was accepted and an order for 1,000 was approved by the Tank Board (War Office), later increased to 2,410 in November 1941. However production only started by June 1942 and early exercises underline a great number of problems, requiring a stray of modifications of the design as production was ongoing.

Complaints accumulated at the War Office from the Fighting Vehicle Proving Establishment.

The issues were such that only six Hopkins tanks had been delivered by mid-1943, and the serie went on until reaching 100 in February 1945 before being cancelled. By mid-1941 already, some in the War Office and British Army estimated that light tanks were no longer desirable, lacking armament and armour, and often foreshadow in their scout role by cheaper armoured cars. In general they performed poorly in many engagement. For the Mk.VIII this meant they were already undesirable and were in addition obsolete when the production ended. In fact none ever saw combat. Reconversion plans were made by the War Office like having reconnaissance units fielding these, attached wings tests, to be towed as gliders, but nothing really worked. By default of other ideas, they were handed over to the Royal Air Force, and used use in airfield defence. The Mk.VIII only variant was the short-lived Alecto self-propelled gun, using a howitzer for paratroopers close-support artillery in airborne operations, but only a few were produced, only tested, never fielded in active units. Medium tanks A.9, Cruiser Mk.I 125 built in 1938. Designed in 1937, a development of Major Giffard Le Quesne Martel's tankettes, these medium tanks were the forerunners of the famous Crusader. Cruiser Mk.II 175 built. Closely derived from the Mk.I, it was equipped with a 2-pounder (37 mm/1.47 in) high-velocity gun, a heavy Besa machine-gun and a coaxial Vickers machine gun. Cruiser Mk.III 65 built. Derived from the Mk.II, this new medium tank had a Christie suspension, giving it a much better grip on rough terrain. They were built in part for the BEF, but quickly supplanted by the Mk.IV. Cruiser Mk.IV 890 in all (225 Mk.IV and 665 Mk.IVA). Based on the Mk.III with improvements but with a far superior, sloped armor. It was widely used in North Africa . Cruiser Mk.V Covenanter 1771 built in 1940-42. A largely improved Cruiser, built by LMS/Nuffield, which suffered from many design flaws, despite being the blueprint of the Crusader. It saw little combat and was mostly used for drilling. Cruiser Mk.VI Crusader 5,300 in all. An all-around superior tank to the previous Cruisers, it made up the bulk of the British tank force during the African campaign. But, suffering from engine problems, relatively weak armor and armament, it was phased out in 1942. Cruiser Mk.VII Cavalier 500 built. Also known earlier as the Cromwell I or A.24 (Nuffield), it was basically an improved Crusader with a new turret, armor and 6 pdr. Cruiser Mk.VIII Centaur/Cromwell 4,016 built until 1945. Improved version of the Cavalier or A.27L (the Centaur was at first known as the Cromwell II) with a Liberty Engine (by Nuffield).

The Cromwell proper (A.27M) was propelled by a more powerful Rolls-Royce Meteor, an adaptation of the famous Merlin propelling the Spitfire. Cruiser Mk.VIII Challenger This 1942 project, headed by Roy Robotham, was meant to carry the long 17-pdr gun. On paper, this was quite a formidable anti-tank gun, but incompatible with the turrets of the Crusader and Cromwell series.

It was realized that the new tanks (Comet and later Centurion) would need at least two more years of development, so an interim solution was chosen with the modification of a Cromwell tailored to carry a larger turret ring for the 17-pdr. This resulted into the A.30 design, basically a stretched-out Cromwell with an extra pair of roadwheels and many other modifications, including the removal of the bow machine gun to free space for the bigger rounds. The new turret was taller and, due to the strain added, compromise led to it having thinner armor than actually found on the Cromwell. After production started in February 1943, with 200 Challengers built by Birmingham Railway Carriage and Wagon Company, the General Staff declined any further order and canceled the project in November of that year. The few Challengers built acted as tank hunters until the end of the war. They arrived in operations in August 1944 in Normandy, then northern France and the Low Countries. Many served with the 1st Czechoslovak Armoured Brigade and 22 were found in service in the Czechoslovak army until 1951 when provisions of Soviet-built tanks made it obsolete. Derivative: The A.30 Avenger tank hunter The Challenger's turret problems were later to be solved by a tank hunter, developed in 1944 by Leyland motors.

It reused most of the Challenger, swapping to the Comet's suspensions in late production (1945). This peculiar vehicle was the A.30 self-propelled gun, Avenger. just like the Achilles, a conversion with the 17-pdr of the American M10 GMC Wolverine, the Avenger had a lower, thicker open top turret, which just a small cover for the crew. It was not very successful and of the 230 ordered, it seems only about 60 were delivered as the order was cancelled in May 1945. None was used during the war, but they made two tank hunter battalions until 1952, discarded afterwards.

Comet 1,186 built in 1944-45. A product of Leyland motors, carrying the 77 mm (3 in) gun, better known as the legendary 17-pdr, the best piece of AT ordinance in the Allied arsenal by 1943. The Comet was also designed to correct the Cromwell's flaws (track shedding and broken suspension problems). Infantry Tank Mk.I Matilda I 140 built. This vehicle was slow and very well protected, with a simple caliber .303 (7.62 mm) heavy machine gun, it was a testbed for the next, better known Matilda II. Infantry Tank Mk.II Matilda II 2,987 built by 1939. Called A.12, Tank, Infantry, Mk.II, it was a major best-seller among the British models. By 1939, about 300 were produced. They were a little faster, had a powerful and economical diesel and a high-velocity 2-pounder gun (40 mm/1.57 in). It was twice as massive and overall better protected than the Matilda I. Heavy tank by the standards of 1939. Matilda Black Prince, click the picture for more. Infantry Tank Mk.III Valentine 8,300 built until 1943. Designed internally by Vickers without a specific request from the War Ministry, the Valentine infantry tank was more compact and lighter than previous tanks of the type. It was not a priority, but received the endorsement of the War Office after the Dunkirk evacuation, being produced in many versions, steadily improved until the Mk.XI of 1943. Infantry Tank Mk.IV Churchill 7,368 built. The Tank, Infantry, Mk.IV was one of the heaviest, but also most dependable Allied tanks during the war. Its sturdy chassis and well-protected hull served for many conversions and utility versions: bridge layer, minelayer/minesweeper, AVRE (Royal engineer corp), Petard (mortar), Oke and Crocodile (flamethrower), ARV (recovery), ARK (ramp). Others Bishop SPH support artillery 149 built in 1941. Converted Valentine with a protected QF 25-Pdr (87.6 mm/3.45 in) howitzer Archer SPG tank hunter 660 built. Tank hunter armed with the 17 Pdr gun on the Valentine chassis, 1944. Sherman Firefly 2,000 built. Tank hunter armed with the 17 Pdr (76.2 mm/3 in) gun on the Sherman chassis, 1944. WW2 British Tanks more in detail (And Tanks missing as posts for now). The Vickers-Carden-Loyd Mark.VI was the most exported and most produced tankette, from 1927 to 1935.

Born as a concept from army engineer Major Giffard LeQuesne Martel, it reduced the armored mobility concept to its very core. 450 were built, most exported, although many served with the British armored forces. They were discarded and phased out to training duties by 1939. The tankette fad lasted until 1939. Photo credits: Flickr, dave Highbury, Bovington Tank Museum (wikimedia commons) The Vickers 6 ton (Mark E) from 1929. With its twin turret and one turret versions, it was another one of the firm's outstanding export successes. 13 countries bought it. The first customer, the USSR, developed the T-26 and the Polish firm Ursus developed the 7TP.

Here is a Portuguese Vickers Mark E Type B (37 mm/1.46 in) The Vickers Medium tank Mk.I was another famous interwar British tank. It belonged to the early twenties generation, fitted with a full traverse three-man turret (for the first time in the world), a new suspension system, and a quick-firing 3 pdr (47 mm/1.85 in) gun. 200 were built and phased out for training in 1938. The next Medium Mk.II was mostly similar. Production stopped in 1934.

Many were reactivated and served in secondary duties during the early phases of WW2. They were slow, badly protected and their suspension too weakly built to sustain any damage. Probably the most successful of all tankette derivatives, the famous "Universal Carrier" was mass-produced to such an extent that it became the prime scout and armored mover of all Commonwealth forces, being largely supplied to the Soviets (like in this picture), Free Polish, Free French and other allies during World War Two. It was very fast, reliable, but lightly armed and protected only against small arms fire. It was also produced and used in large numbers by the Canadian army. The Matilda I was a new generation specialized infantry tank. But this cost-saving model was quickly replaced by the much more efficient Matilda II, which became famous during the early phase of the war (1940-42) in Africa. Although very slow, its armor could stand against everything except the deadly German 88. Conceived as the Tank, Infantry, Mk.III, the Valentine was a compromise between the speed of the Cruiser IV and the sturdiness of the Matilda II. It was declined into eleven versions throughout the war, with a total production of 8275, the biggest British wartime tank production ever.

The Churchill was the last infantry tank. This good all-around heavy tank was at the forefront of the British armored force from 1943 to 1945. It started with teething problems in 1941, and failed miserably at Dieppe.

However, in Tunisia, this model proved its superb climbing abilities and out of the ordinary sturdiness. It was used for any kind of support and genie missions imaginable. The Cruiser I was the first of a long line of early cruiser tanks, a new breed of cavalry tanks designed to exploit a breakthrough. Unfortunately, their top speed was unsatisfactory since they had a classically sprung suspension. The up-armored Cruiser Mk.II, was too slow to operate effectively as a cruiser, but the Mk.III and Mk.IV, featuring a Christie-style suspension, were a real improvement and regained the edge. The Cruiser Mk.IV was very similar to the Cruiser III, apart from the turret design. Very fast, it appeared ideally suited for desert warfare. The Cruiser V Covenanter (named after the Scottish Presbyterian movement) was a much-improved evolution of the Mk.IV. Production was first ordered in April 1939, featuring innovations like an opposed-piston engine, the front placement of cooling radiators, and the wide use of welding for the hull construction. However, it was kept chiefly for training, and inspired the more famous Cruiser VI. The Cruiser VI, better known as Crusader, was the most famous cruiser tank using the revolutionary Christie suspension. Its top speed largely compensated for its light armament and average protection. It was, however, the war horse of many operations throughout the North African campaign, and one of its most distinctive symbols. Although similar, the Cruiser VIII Centaur and Cavalier differed by the choice of their engine. They had a new QF 6-Pdr (57 mm/2.24 in) gun and good protection, while retaining a low profile and excellent speed of previous cruisers. The Cruiser VIII Cromwell was the one fitted with the Rolls Royce Meteor engine, and most successful of the three. It was introduced in 1943, declined into many variants.

It soldiered until the end of the war. The Cruiser VIII Challenger was based on the previous Centaur/Cromwell, but fitted with a devastating 17-Pdr (76.2 mm/3 in) gun. Although promising and liked by its crews, it was dropped in favor of the Sherman Firefly. Developed after a long line of Crusader successors, the Comet was the last of this "cruiser" generation, and the best overall. It arrived in late 1944, ready for post D-Day operations in Europe, and opening the way for the postwar generation of British tanks led by the legendary Centurion. The 17 pdr (76.2 mm/3 in) Archer, built over surplus Valentine chassis, was a British SPG tank destroyer. It was designed to make use of the 17-Pdr in its original form, but had it mounted facing the rear of the tank. British tank squadron markings. The color changes depending on the regiment, but they normally used the same shapes.

British Tanks of WW2 Poster (Support Tank Encyclopedia) Illustrations The turret of this Canadian 12th Manitoba Dragoons Staghound Armored Car was fitted with four 60 lb RP-3 (Rocket Projectile 3-inch) air to ground aircraft rocket launcher rails in November 1944. A.10 Cruiser Mk.II in early configuration, with three .303 (7.62 mm) Vickers liquid-cooled machine-guns. It was part of the 21 delivered which were later sent with the British Expeditionary Force (BEF) to fight in France. Cruiser Mk.IIA CS (Close Support) with the BEF, 1st Armoured Division, France, May 1940. A Cruiser II defending Tobruk, during the aftermath of the Italian invasion in December 1940. A Cruiser Mk.IIA (Besa machine-guns) during Operation Compass, the British counter-offensive against Italian forces in Libya, January 1941. The last surviving Mark IIAs were phased out by late 1941. A.10 Cruiser Mk.IIA in Greece, 3rd RTR, April 1941. 60 were shipped from North Africa to Southern Greece to support the Greek defenders against much superior German Forces. Cruiser Mk.III during the French campaign, B Squadron, 3rd Battalion, Royal Tank Regiment, 3rd Armoured Division, May 1940. Cruiser Mk.III of the 7th Royal Tank Regiment, 7th Armoured Brigade, Operation Crusader, Libya, December 1940 Cruiser Mk.III CS (Close Support) Cruiser Mk.IV from the 10th Hussars, 2nd Armoured Brigade, 1st Armoured Division, BEF, 1940 Cruiser Mk.IVA, B squadron, 7th Queens Own Hussars, Libya, 1941 Cruiser Mk.IVA, 7th Armoured Division, Egypt, 1941. Cruiser Mk.IVa, Greece, 1941. Cruiser Mk.IV, 7th Infantry Brigade decoy force, Cyprus, 1942. Covenanter Mark I, early production version, summer 1940. Covenanter Mk.I CS Covenanter with a brown livery, 18th Hussars, 9th Armoured Division, 1941-42. Covenanter Mk.II Covenanter Mk.III in North Africa, King's force, fall 1942. Covenanter Mark III, late production version, 9th Armoured Division, 1943. An early production Crusader Mk.I, Libya, Operation Crusader, November 1941. A Crusader Mk.I CS (Close Support). These converted versions were equipped with a 3.7 in (94 mm) L15 howitzer firing smoke rounds. Gazala, December 1941. Late Crusader Mk.I. These models incorporated modifications gained from early desert war experience, like a slightly better ventilation system, to try to prevent the engine of overheating, and better, full side, fixed protective panels. A Crusader II of the 9th Queen Lancers, attached to the 1st Division, Libya, December 1941. Besides the new protective panels and some minor alterations, the Mark II were pretty close to the previous Mark I. They even retained the auxiliary forward turret, usually removed soon after arrival on the front. A Cruiser VI Crusader Mark II of the 22nd Armoured Brigade in Libya, December 1941. This three-tone pattern was rare. Late production Crusader Mk.II. Unknown unit, Gazala, May 1942. By the beginning of the second battle of El Alamein, almost all Mark I and IIs had been removed from the frontline, replaced by more recent Mark IIIs. Crusader Mark III from the 6th Armoured Division, February 1943, showing a green pattern with dark green, blended stripes. Crusaders were often painted "on the spot" with available colors and depending on the season and landscape, as there were few regulations on this matter. A Crusader Mark III, one of the only 100 which fought in October 1942 during the second battle of El Alamein. Cruiser VI Crusader III of the 17th/21st Lancers, 6th Armored Division, Tunisia, November 1943. Over 1373 Crusaders were converted for special purposes, of which around 400 were Crusader AA Mark Is. They were armed with a Bofors 40 mm (1.57 in) gun, bringing its highly recognizable "pom-pom" sound on the battlefield, which gave it its popular surname among soldiers and Royal Navy sailors as well. This was the first conversion of existing Mk.III hulls. At first, the gun was just mounted on an open platform with its regular front flat shield. But it soon became obvious that better protection was needed and a four-side, open-top shield was wrapped around for the next batch of late production models.

A Crusader AA Mark III, with its distinctive twin 20 mm (0.79 in) Oerlikon mount. It had a devastating combination of speed and firepower, especially deadly for low-flying aircraft. They were coupled with a targeting .303 (7.7 mm) Vickers machine gun. These guns were balanced by a large metal cylinder mounted on a threaded rod, for adjustment. They could fire almost vertically. The Mark II and III only differed by the radio position, moved from the turret into the hull, for added free space. They were put in use in the later stages of the African campaign, in Tunisia, and fought in Sicily, Italy and Normandy.

There, Allied air dominance was such that they were relegated to secondary duties. Production records are scarce but, in June 1944, 268 of these Mk.II/IIIs were enlisted for D-Day. First tests began in June 1943, and conversions started in October.

Normal provision was 600 rounds.

Standard Cavalier used for training in Great Britain, fall 1942. The Cavalier was basically an up-armored and redesigned Crusader. The engine and transmission as most of the technical parts were identical. The easiest points to distinguish the Cavalier from the Centaur and Crowmell are the redesigned rear (due to the transmission), positioning of the rear extra fuel tanks, and absence of the exhaust vent on the engine deck behind the turret. A.24 Cavalier with mudguards, from a training unit in Great Britain, 1943. There is a mislabeled "Cavalier" at the Saumur Museum, with a beige-dark brown camouflage pattern and active units symbols, which in reality could be a Centaur or Cromwell CS. Since a few "Cavaliers" were donated to the French forces in 1945, this is probably the origin of the error. Cavalier OP (Observation post), Great Britain, 1944. Cavalier ARV (Armored Recovery Vehicle) in Holland, 1945.

Centaur Mark I, Great Britain, December 1942. Centaur Mark III, training unit in Great Britain, mid-1943.

Polish Centaur III of the 14th Jalzowiecki Lancers Regiment, 16th Independent Armored Brigade, in a training unit in Great Britain, May 1944. Centaur IV CS (Close Support), Normandy, summer 1944.

Camouflaged Centaur IV CS, as preserved at the Saumur tank museum. Centaur Mark I AA, Normandy, July 1944. Centaur ARV Dozer of the Royal Engineers, summer 1944.

Infantry tank, Mk.I (A.11). The first Infantry Tank was completely overshadowed by the Mark II, a completely different model, better known as the Matilda. This designation is often incorectely used as a nickname for the awkward, duck-tail look of the first infantry tank.

Infantry Tank Mk.I, 1st Army Tank Brigade, defense of Arras, 15 May 1940. This unit fought against Panzer IIIs and IVs of general Rommel\'s 7th Panzer Division. Many surviving Matildas were left in France, most sabotaged, before and during the evacuation of Dunkirk. The A.11E1, the pilot model for the Infantry Tank Mk.I, here on trials. Tank Encylopedia's own rendition of the AE1 Independent. Light Tank Mk.IIA, unknown unit, probably Australian, East Africa, August 1940. Light Tank Mk.IIB Indian Pattern, here with a recognizable square cupola, better engine, better hull cooling and a more powerful Meadows EPT 85 hp engine.

Light Tank Mk.II, 6th Australian Cavalry Division – Egypt, 1941. Light Tank Mk.III, the last of this lineage derived from the Mk.VI tankette. A.4E19 prototype. Regular Light Tank Mk.IV, Great Britain, 1939. Early Light Mark V derived from the L3E1 prototype in 1934. The Horstmann suspension system was virtually unchanged. Light Mark V, fully equipped, possibly used by the BEF for training in France, prior to May 1940. Light Tank Mk.VI, first batch vehicle, early 1937. Only a handful of these were produced, perhaps 30 or 40, and they were likely used, after 1939, as training machines, like the Mk.Vs. Light Mk.VIa of the British Expeditionary Force (BEF), western Belgium, May 1940. Vickers Mk.VIa Light Tank, B Squadron, 4/7th Royal Dragoon Guards, BEF, northern France, February 1940 Light Mk.VIb of a C.A.F.V.T (Canadian Armoured Fighting Vehicle Training) unit, late 1940. Light Mk.VIb of the 11th troop, C squadron, 2nd Royal Tank Regiment, France, May 1940. Light Mk.VIb, A Sqdn, 1st Battalion Royal Tank Regiment, 7th Armoured Division, Egypt, fall 1940. Light Mk.VIc, Malta, June 1942. This late version, produced until mid-1940, was reequipped with a high-velocity 15 mm (0.59 in) Besa machine-gun. The Besa heavy machine-gun had a better punch and accuracy than the Vickers cal.50 (12.7 mm). However, it also had poorer performances compared to the German 20 mm (0.79 in) that equipped the Panzer II. Its unusual method of cocking was tricky and needed careful maintenance. The first Vickers Mark Es were model As, the twin turret model, armed with two liquid-cooled Vickers machine guns. This one was part of the only four machines retained by the British army for testing and training purposes. Many Type A vehicles were sold abroad, but they were by far eclipsed by the Type B. An early production Vickers E Type B, with the low-velocity 47 mm (1.85 in) gun. This one served with the Siamese army, which bought thirty Type Bs in 1933-34. They saw action in 1941 against French colonial forces, and duelled with the few French light tanks they encountered. Bulgarian Vickers Mark F. Bulgaria bought twenty Mk.Fs, a modified version of the Mark E, mostly for training purpose. They were still in service at the beginning of WW2. Finnish Vickers Mark F, modified with a Bofors 37 mm (1.46 in) gun. They only took part in one battle until the very end of the war with Russia in 1939. Archer Self Propelled 17 pdr, Valentine, Mk.I, Archer in Italy, winter 1944-45. Archer in the Netherlands, winter 1944. British Archer, east bank of the Rhine, 1944-45. An AEC Mk.I Gun Carrier Deacon with an early green camouflaged livery, December 1942. Standard AEC Mk.I Gun Carrier Deacon in desert livery, 1943. Early Mark VI model. It was an open model, completely unprotected from above.

After a complete redesign, the model ended as the famous "Universal carrier" The main production model, also the most exported and built under license. It was, this time, completely protected from above, with two hexagonal domes for the crew members. The late production model, only retained by the British army, and built by the Royal Ordnance Factory. A Carden-Loyd Mk.VI of the Royal Thai army, January 16, 1941, Burapha Siamese army, battle of Phum Preav. 30 tankettes of the 1930 type and perhaps 30 others were purchased in 1935. Belgian SA FRC 47mm, tank hunter, self-propelled gun. The Belgian Commission permanente de Motorisation purchased six tankettes of the Mark VI type in 1929, but they converted them into SPGs, equipped with the standard-issue S.A. 47 mm (1.85 in) built at Fonderie Royale des Canons (FRC), Liege. It was found more practical and effective to carry than to tow these guns. They were part of the Chasseurs Ardennais until 1938, then spread into two Régiments Cyclistes-Frontière, which ambushed a German column on May 10, 1940, alongside the Meuse river. Captured Dingo Mk.I, designated Leichter PzKpfw Mk.I 202(e), DAK, Libya, 1941. Dingo Mk.IA, British Expeditionary Force, 3rd RTR, 1st Armoured Division, Holland, summer 1940.

Dingo Mk.IA from the HQ squadron of the 1st Northamptonshire Yeomanry, 20th Armoured Brigade, 6th Armoured Division, training in Great Britain, 1941. Dingo Mk.IA, Libya, fall 1940. Daimler Dingo Mk.IB, Great Britain, fall 1941.

Dingo Mk.II, unknown reconnaissance unit, Western Europe, 1944. Dingo Mk.II, 4th Field Squadron RE, 7th Armoured Division, Libya, 1942. Dingo Mk.II attached to the reconnaissance battalion of the 7th RTR, VIIIth Army, Libya, fall 1942. Dingo II, 2nd NZ Division HQ, El Alamein, November 1942.

Dingo Mk.II with a Boys AT rifle, 23rd Armoured Battalion, 5th RTR, Tunisia, March 1943. (HD illustration) Dingo Mk.II, NZAC training center near the Red Sea, 1945. Dingo Mk.II, 11th Hussards, 7th RTR, Holland, winter 1944-45. Dingo Mk.III, 11th Armoured Division, Holland, winter 1944-45. AEC Mark I, El Alamein, November 1942. AEC Mark II, 10th Indian Infantry Division, Italy, 1943. AEC Mark II, Italy, winter 1944 (now preserved at Bovington). AEC Mark II used by the Yugoslav Army in 1945. AEC Mark III, D Squadron, 2nd Household Regiment, VII corps, Normandy, 1944. AEC Mk.III, 2nd British Army, North-West Europe, spring 1945. Coventry Armoured Car, early production version on trials, summer 1944. Coventry in French service, 2nd Tunisian Spahi, 5th Cuirassiers, Indochina, 1947-52.

Daimler AC Mark I, green livery Daimler AC Mark I in 1942 Daimler Armoured Car Mark 1, desert livery Daimler Mark II, RA 11th Hussars, 7th Armoured Division, Berlin, 1945 Daimler AC Mk.II of the "Desert Rats", North Africa 1942 Daimmler Armoured car of the AR 7th Armoured Division, Egypt, 1942 Postwar Daimler Mk.I training at Lulworth Ranges Daimler Mk.II of the Qatari Army today. A Guy Armoured Car in 1939. It was the predecessor of the Humber Mark I. Humber Mark I, North Africa, 1941. Humber Mark IA, Great Britain, 1942 Humber Mark II, Italy, early 1944. Canadian Humber Mark II in France, mid-1944. Notice the .50 cal's short barrel. British Humber Mark III in Tunisia, early 1943. Humber Mark III attached to the recce battalion of the 1st Polish Armoured Division, Normandy, June 1944. Humber Mark IV "Laughing Boy III", from a British unit, The Netherlands, fall 1944. British Humber Mark IV in the Rhineland, winter 1944-45. Lanchester armored car from the RNAS (Royal Naval Air Service), Dunkirk, 1915. A camouflaged Lanchester, Flanders, 1916. RNAS operating in Persia, 1916. Russian Lanchester, Caucasus 1916. Notice the 37 mm (1.46 in) Hotchkiss, the small cupola above the turret, the absence of stowage boxes at the rear and the tires wrapped in mud chains in autumn.

A Lanchster Mark I of the 12th Lancers. This was a heavily armed vehicle for the time, armed with a heavy MG and two Vickers medium MGs. The first could destroy light tanks when equipped with AP bullets. A vehicle of the 12th Lancers, B squadron in Malaya, 1941. This particular vehicle (now on display in a museum) was reequipped with a Light Tank Mark III turret and had only two Vickers 0.3 in machine guns. The Lanchester 6×4 had good off-road capabilities and was rugged and reliable. However, it was too heavy and slow for effective operations in reconnaissance units. Morris CS9 of the 12th Lancers, British Expeditionary Force (BEF), Franco-Belgian frontier, May 1940. Morris CS9 of the 11th Hussars, Libya, 1942. Morris Mk.I, early production version, Great Britain, 1941. Morris Mk.I in North Africa, now preserved at Bovington. Morris LRC Mk.II in Normandy, summer 1944. Morris LRC Mk.II in Tunisia, RAF patrol guard, now preserved at Duxford.

Beaverette Mark I. Notice the rib going along the side of the vehicle and the vertical radiator grills. Beaverette Mark II, with the standard camouflage. Notice the lack of the rib from the Mark I and the horizontal radiator grills. Beaverette Mark III, early type armed with a Boys 0.5 in (12.7 in) AT rifle.

Beaverette Mark III with Bren gun and "Mickey Mouse" camouflage. Beaverette Mark III with a Boulton-Paul quad 0.3 in (7.62 mm) turret Beaverette Mark IV with a twin Vickers LMGs mount. Notice the redesigned armor. Ordnance QF 25 pdr on Carrier Valentine 25-pdr Mk.I "Bishop" of the VIIIth Army, El Alamein, fall 1942.

Bishop of the VIIIth Army in Southern Italy, February 1944. The standard 1939 2-pounder was the main infantry antitank weapon in service with the BEF in may-june 1940. A 2 Pounder Anti-tank Gun Carrier (Universal Carrier) used by Australian forces in North Africa, 1941. Chevrolet 30 CWT (WA/WB) 2pdr portee, the same type used by the LRDG in North Africa. This was a widespread solution, also declined on the Morris 15 cwt truck, CMP Ford F30 or Chevrolet C30, until the US-supplied lend-lease M10 tank hunter made them obsolete. Tank Encyclopedia's own rendition of the TOG-1 in 1940. Basic AEC 4×4 ACV in UK, may-june 1941. AEC 4×4 in North Africa, 7th armoured division, December 1941 Captured Rommel's "Max" command car. Both vehicles were called "Max" and "moritz" after popular XIX Boyish Pranks by author Wilhelm Busch published in 1865. Dorchester in North Africa, Tunisia, 1943 with a wavy "spiked" dark brown/sand yellow pattern. AEC 4×4 ACV in Normandy, summer 1944, notice a two-tone dark green and olive camouflage variant in use until the end of WW2. When stationary, they were also often heavily camouflaged with foliage, using the stretched canvas extensions to create a large open space. A Pakistani Dorchester during the 1965 Indo-Pakistani war. British Churchill Tank – Tank Encyclopedia Support Shirt Sally forth in with confidence in this Churchill tee. A portion of the proceeds from this purchase will support Tank Encyclopedia, a military history research project. Buy this T-Shirt on Gunji Graphics! Forgotten Tanks and Guns of the 1920s, 1930s and 1940s By David Lister History forgets. Files are lost and mislaid. But this book seeks to shine a light, offering a collection of cutting edge pieces of historical research detailing some of the most fascinating arms and armament projects from the 1920s to the end of the 1940's, nearly all of which had previously been lost to history.Included here are records from the UK's MI10 (the forerunner of GCHQ) which tell the story of the mighty Japanese heavy tanks and their service during the Second World War. Buy this book on Amazon! TOG-2R Heavy Tank Service Manual By Andrew Hills Service Manual for the British Super-Heavy tank TOG-2R. Pieced together from surviving records this manual was written in sections during the long development of the tank and was stopped when the project was terminated. As such the manual is incomplete but has been recreated as close as possible to what the original manual would have looked like had the tank entered production.FWD Publishing Buy this book on Amazon! TOG-2* Heavy Tank Service Manual By Andrew Hills Service Manual for the British Super-Heavy tank TOG-2*.

Pieced together from surviving records, this manual was written in sections during the long development of the tank and was stopped when the project was terminated. As such the manual is incomplete but has been recreated as close as possible to what the original manual would have looked like had the tank entered production. FWD Publishing Buy this book on Amazon! The Tanks of TOG The work, designs, and tanks of the Special Vehicle Development Committee in World War II By Andrew Hills The previously untold story of the Special Vehicle Development Committee, better known as 'The Old Gang' or by the abbreviation 'TOG'. The SVDC managed in very short time to design more than one vehicle to accomplish this seemingly impossible task and built tanks bearing their acronym as TOG-1 and TOG-2. FWD Publishing Buy this book on Amazon! In May 1945, as the war in Europe drew to a close, six prototypes of a brand new British tank were hurried to the front in the hope that they could be tested in action.

The tank was the Centurion, which went on to become one of the most successful of all post-war British designs.

After years of struggle, Britain had finally produced a well-armed and well protected battle tank. Sadly for many British tank soldiers of the Second World War, it was far too late. Germany was defeated, but its tanks and anti-tank guns had proved lethally superior to the very end. For much of the Second World War, the British Army was saddled with a succession of tanks that ranged from the bad to the barely adequate. Some were rushed into service too quickly and proved notoriously unreliable. Others spent too long in development, or only achieved a degree of usefulness after numerous modifications. Most lacked the armour to resist enemy anti-tank weapons, and nearly all were under-gunned. From 1943, British armoured divisions were equipped en masse with the American Sherman. This tank, though itself nearly always outclassed by the opposition, was at least reliable, adaptable and available in large numbers. It was a testament to both American industrial might and British procurement failure. Britain's belated equivalent, the Cromwell, was outmoded by the time it entered service. Its more powerful successor, the Comet, was certainly the best British tank of the war, but only saw action in the last weeks of hostilities. The Centurion would have been a game changer, but belongs to the post-war world. So why had it taken Britain so long to produce a truly effective tank? Pre-war developments The seeds of failure had been planted pre-war, when disarmament, economic retrenchment and the Army's deeply rooted conservatism inhibited the development of armoured forces. There was some experimentation with the deployment of mechanised formations, but no real impetus to properly incorporate tanks into the Army's structure, nor firm decisions made about doctrine or what sort of tanks were required. As a new war loomed and Britain re-armed, the cavalry finally relinquished their horses, but the Army lagged behind the other services in funding. The government's strategic priority was home defence, which meant the lion's share of resources went to the Royal Air Force, the Navy and anti-aircraft defences. There was little money available to equip a mechanised expeditionary force. These factors all had a huge impact on the development of Britain's tank force and its performance during the Second World War. The British had previously been pioneers in tank warfare.

Tanks evolved from a need to end the deadlock on the Western Front during the First World War and proved reasonably effective even if their mobility and reliability were poor. The lumbering machines were designed to support the infantry in frontal attacks across no man's land, but there were glimpses of their future potential in August 1918 when faster Whippet tanks broke through and caused mayhem behind German lines. After the war the Army was greatly reduced in size. The Tank Corps survived, but shrank from 25 battalions to just four. It became the Royal Tank Corps in 1923. Despite the cavalry's insistence that the horse still had a role to play, the War Office was keen to see the army mechanised. A new Directorate of Mechanisation was established to work on tank design alongside the manufacturers, which at this time consisted only of Vickers Ltd and the Royal Ordnance Factory at Woolwich. To their advocates, tanks were weapons of rapid exploitation, not to be mired in the mud and wire of the trenches.

Tank specialists such as Colonel J F C Fuller and Basil Liddell Hart rejected the old First World War concept of the tank and called for lighter, faster designs suited to mobile warfare. Some saw fleets of tanks operating independently, while others thought they should form the core of mobile, combined-arms formations. In 1927 the Experimental Mechanical Force was set up to test their theories.

In 1931 a permanent tank brigade was established and by 1937 two armoured divisions had been formed. The mechanisation of the Army's cavalry regiments took place on the eve of war. But even at this late stage there was still no clear policy on how armoured forces should be used. The standard British tanks in service for much of this period were the Vickers Mediums – ponderous, box-like vehicles armed with 3-pdr guns. Various attempts to produce replacements fell by the wayside for technical or financial reasons. Much effort was wasted on a new heavy tank, the A1 Independent, which spent ten years in development before being abandoned in 1933. By 1936 the Army had decided that it wanted three main types of tank to suit differing tactical requirements: light tanks for reconnaissance, heavily armoured 'infantry tanks' to support frontal attacks and fast 'cruisers' to exploit breakthroughs and take on enemy tanks. It was a decision that would bedevil British tank design and development.

The Vickers Light Tank Mark VI entered production in 1936, and was the most numerous tank available in the run-up to war. It was small and cheap to produce, but armed only with machine guns. Light tanks were seen to have an important reconnaissance task, and were useful in the colonial policing role, but were not suitable for the main armoured force. Tank versus tank actions required something more deadly than a machine gun and armour thick enough to resist more than a rifle bullet. The traditionalists within the Army's ranks favoured the infantry tank, in essence a throwback to the First World War. The threat of a new European conflict meant a possible return to trench warfare, which required tanks able to cross broken ground and resist the heaviest shot and shell. The highest-ranking proponent was Major General Sir Hugh Elles, Master General of the Ordnance and the man responsible for tank procurement. Elles had led the Tank Corps during the First World War and might have been expected to promote the more radical concepts of the tank theorists. Instead he favoured the A11 Matilda – a small, heavily armoured two-man tank intended to be used en masse to support infantry attacks. It may have been cheap to produce, but its machine gun armament was seen as a major limitation and the hull was too small to fit a bigger turret. A much larger tank, the A12 Matilda was ordered in its place and entered service in 1938. This 'Matilda Senior' had the thickest armour of any tank at the time and sported a 2-pdr gun – then one of the most effective anti-tank guns in existence. It was built by the Vulcan Foundry of Warrington, the first new firm to be brought into tank production, but output was slow because it was assembled from large complex castings which demanded specialist skills.

The cruiser tank concept was much more in keeping with the doctrinal ideas of the tank specialists. The first two were the A9 and A10, both armed with the 2-pdr gun. The A10 was an up-armoured version designed to work with the infantry, and classified as a 'heavy cruiser'. Only small numbers of each were produced and both would see limited use at the beginning of the war.

The most significant pre-war cruiser design originated from an official visit in 1936 to watch Soviet Army tank manoeuvres. The British delegation was impressed by the cross-country performance of the Soviet BT series tanks, which were based on a design by an American named J Walter Christie. The superb suspension system and V12 Liberty aero-engine of Christie's tank were incorporated into future British cruisers, the first of which was the A13, built by Nuffield Mechanisations & Aero. Small numbers were available in 1939. Britain began a period of major rearmament in 1937, but it was seriously weighted towards the RAF and Royal Navy. The Army placed urgent orders for the new tank designs, but there was not enough time or industrial capacity to turn them into reality. Work had to be given to a wider group of commercial companies with no prior experience of tank building, resulting in slow production and quality control issues. The vast majority of tanks delivered were the virtually useless Light Tank Mk VI. The newly established Royal Armoured Corps had only 143 infantry tanks and cruisers available in September 1939. They lacked spares and equipment, and very few crews had been trained to fight with them. The campaign in France in 1940 quickly revealed how ill-equipped Britain's tank force was. The cruisers and light tanks lacked the armour to withstand German anti-tank guns. The tougher Matildas were more effective, and caused brief alarm to the Germans during the Anglo-French counterattack at Arras. But such actions only delayed the inevitable and all British tanks in France were either destroyed or abandoned in the retreat. Brigadier Vyvyan Pope, tank adviser to the commander of the British Expeditionary Force Lord Gort, reported back on the consequences of poor tactics and equipment. Piecemeal attacks against concentrated German forces were bound to fail. Reliability was a major concern, with many tanks breaking down on long road marches. Most vital of all was the need for better protection and hitting power: 'We must have thicker armour on our fighting tanks and every tank must carry a cannon. The 2-pdr is good enough now, but only just. We must mount something better and put it behind 40 to 80mm of armour'. A fundamental problem was that the width of British tanks had to keep within the limits of the standard railway gauge for transportation. And unlike those of Germany and other nations, British designs kept the fighting compartment slung between the tracks and suspension to give the tank a lower overall profile. This constrained the diameter of the turret ring, which in turn affected the size of the turret and gun that could be fitted. Weight was an issue too, and tanks had to be light enough to be shipped overseas and use standard military bridges. All of this meant that there was no way of easily upgrading existing tanks, or improving those still on the drawing board. Another wider factor was the complex and bureaucratic organisation behind tank design and production. The old Tank Design Department of the War Office, set up in 1931, had never had much say over the designs offered by Vickers. Its task had been to issue specifications and suggest improvements to the final products, a situation which continued as Britain re-armed and other firms were brought into tank production. In August 1939 the new Ministry of Supply took over responsibility for the supply of weapons to the army. Its key objective was to galvanise production, especially the supply of tanks, but it meant even less collaboration between producers and end users. A new Directorate of Tank Design was established, but once again, it was to act as consultant and had only limited influence over the what the manufacturers came up with. In an attempt to co-ordinate tank development and production, a new committee – the 'Tank Board' – was set up in 1940.

On it were representatives from the Ministry of Supply, the War Office and the manufacturers. At first it served only to advise and report, and there were frequent changes of chairmen, members and terms of reference.

Only slowly was it given more executive powers over design and procurement. Not until the end of 1942 was tank policy properly synchronised between the War Office, Ministry of Supply and the manufacturers. Quantity over quality Tank supply continued to be affected by the artificial division between infantry tanks and cruisers, and the imposition of changing War Office requirements. In December 1939, in anticipation of re-fighting the First World War, the General Staff had demanded that two-thirds of production be given over to infantry tanks. A year later, after experiences in France, priority was given to the development of cruiser tanks. Light tank production had been quickly terminated and the divisional reconnaissance role taken over by armoured cars. Cruisers would equip the armoured divisions or independent armoured brigades for mobile operations, while infantry tanks were grouped in separate tank brigades for infantry support. This basic division remained in place for the rest of the war. Whatever the Army's operational requirements, production took precedence over design in the early years of the war. A massive increase in production was needed to make good the losses suffered in France and to provide for Britain's defence. Winston Churchill himself ordered maximum production of existing designs, whether good or bad. 1,379 tanks were built in 1940, out-stripping the Germans. One unfortunate consequence was that development of a more powerful tank gun was also delayed. Design of the new 6-pdr was already complete, but production of the 2-pdr could not be interrupted.

The 6-pdr would not be fitted into a British tank until May 1942. This focus on quantity over quality was the main reason the next two cruiser tanks, which entered service in 1941, were built in such large numbers despite very obvious flaws. Both were in the design stage at the outbreak of war and were built around the now obsolete 2-pdr. The A13 Covenanter was a low-profile, 'heavy cruiser' derivative of the original A13. Ordered off the drawing board in April 1939, it was nothing less than a spectacular failure. The tank was plagued by engine cooling problems that were never resolved and it had to be relegated to training duties. The A15 Crusader was another development of the A13. Rushed into production without adequate development trials or quality control, it quickly gained a reputation for unreliability. It was the principal British tank in the Western Desert campaign, where the sand and heat exacerbated its mechanical problems. The war in North Africa was a major testing ground where all the flaws in British tank design, organisation and tactics were brutally exposed. Initial success against the Italians was encouraging. Once again the Matilda Mk II's tough hide proved resistant to enemy weapons, but the reign of the so-called 'Queen of the Desert' was soon ended by the larger calibre anti-tank guns of the German Afrika Korps, especially the lethal 88mm. The cruisers did well at first too, racing across the desert in pursuit of fleeing Italians.

But in later battles against the Germans they were decimated while making suicidal attacks against anti-tank gun screens without infantry support. The British tanks were unable to respond to this threat effectively because the 2-pdr couldn't fire a powerful enough high-explosive (HE) round. Trying to fire accurately on the move, in accordance with British doctrine, also proved impossible. German tanks wisely preferred to fire while stationary. The standard German tanks of the time were not significantly better, but had more effective optics and crew layouts. They could also be more easily up-gunned to keep them effective. Thus by 1942 the PzKpfw III sported a high-velocity 50mm gun, and some PzKpfw IVs were fitted with an even more effective 'long' 75mm gun. In 1942 the Crusader was also finally up-gunned with the 6pdr, but this required reducing the turret crew to two and its lack of durability remained a major problem. The Crusader's failure in particular led to Britain requesting supplies of American tanks, of which the M3 Grant and later the M4 Sherman were the most effective. Both were equipped with a dual purpose 75mm gun, which significantly increased hitting power against German tanks, and also gave British crews the chance to knock out dug-in anti-tank guns and other 'soft' targets. Despite the General Staff's preference for cruisers, production of infantry tanks continued in the early years of the war, and two major new designs came into service. The Valentine was a private venture by Vickers and ordered into production as war loomed. Once again, its small turret was a major drawback, but could at a pinch take the 6-pdr – provided again that one of the crew was left out. The Valentine was used both as an infantry tank and cruiser, and unusually for a British tank, was very reliable. It was built in greater numbers than any other British design, with many of these being shipped to the Soviet Union. The most famous infantry tank of the war was the A22 Churchill, which stemmed from a 1939 specification for a large First World War-type tank suitable for another bout of trench warfare. In 1940 the design was refined by Vauxhall Motors and ordered into production as urgently as possible. But the Churchill suffered reliability problems at first and needed a major programme of modifications before it was ready for action. By the later stages of the North African campaign the infantry tank concept had fallen from favour. Mobility was now prioritised over protection. However, the need to keep production running at full tilt meant that Matildas, Valentines and Churchills were churned out in large numbers, at the cost of other more promising tanks then in development. 8,700 of the 13,459 tanks produced in 1941 and 1942 were infantry tanks. The Churchill – due for retirement in 1943 – gained a reprieve after proving its ability to cope with the hilly terrain of Tunisia. Its thick armour also gave it an advantage and it soldiered on for the rest of the war. From cruiser to 'universal tank' Meanwhile, the search for a more effective cruiser tank continued.

After the Battle of France, the War Office had issued a specification for a new tank with thicker armour and a turret big enough to take the 6-pdr gun. It was to be in production by the spring of 1942. A design by Nuffield Mechanisation & Aero was chosen, known as the A24 Cavalier, using the Liberty engine and many of the components from the old Crusader. Unsurprisingly, given its parentage, the Cavalier was a disaster. It was afflicted by the same lubrication and cooling problems that blighted the earlier tank, and development was eventually abandoned. More promisingly, Birmingham Railway Carriage & Wagon Company had been proceeding with its own version, later designated the A27M Cromwell. It was powered by a new engine, the 600hp Meteor, which was derived from the famous Merlin aircraft engine. The Meteor promised much greater power and reliability, but the Ministry of Aircraft Production refused to make them available before its own demands had been met. It was not until late 1942 that supplies were assured. The shortage of Meteor engines meant that Leyland Motors was tasked to provide a third variant of the new tank, the A27L Centaur, fitted with an upgraded Liberty engine. The Centaur's development ran parallel to that of the Cromwell, but reliability issues meant it continually struggled in service trials. Like the Cavalier, it was never accepted as a front-line tank.

In total, 503 Cavaliers and 1,821 Centaurs were built, which represented a colossal waste of time and resources at a crucial time for British tank development. The army also tried and failed to get Valentine and Crusader production reduced to speed up the Cromwell programme. The need to avoid disrupting tank supply with abrupt factory changeovers meant that 1,650 Crusaders and 1,798 Valentines were built in 1943 alone, compared to 532 Cromwells. Only in 1944 was the new cruiser finally given priority, and other firms brought in to accelerate production. The Cromwell, effectively two years late, was only just ready in time for D-Day. The Cromwell's complex protracted development meant that by the time it entered service it was already obsolete. Its armour compared badly to that of its German counterparts, especially the new Tiger and Panther.

Ironically it was never fitted with the 6-pdr, the weapon for which it had been designed. The need for a good dual purpose gun meant it received instead the British Ordnance QF 75mm gun – effectively a 6-pdr bored out to take the US 75mm round. So despite the Cromwell's speed and reliability, which were a definite boon during the pursuit operations in the last year of the war, it was always under-gunned and unable to withstand the heaviest German weapons. This was all the more frustrating because a gun was now available that promised to reverse British inferiority at a stroke. Artillery development had always been well ahead of tank design in Britain and work had begun on a replacement for the 6-pdr in 1941. This new weapon, the 3-inch 17-pdr, became one of the best anti-tank guns of the war, able to penetrate the thickest armour at normal battle ranges. The first versions on modified field gun carriages were rushed out to Tunisia in May 1943 to combat the new German Tiger tank. But such was its size that it could not be fitted into any existing British tank. The 17-pdr's effectiveness inspired the War Office to call for a new tank to be built around it. The first proposal was the A30 Challenger – basically a stretched Cromwell with a bulky new turret. The new tank was badly designed. Its armour had to be reduced to allow for the weight of the gun, which meant it was less protected than a standard Cromwell. Other problems dogged development and it was not ready in time for D-Day. Fortunately another option had presented itself. It had been discovered that with a little ingenuity the 17-pdr could be made to fit – just – into a Sherman. The result was the Sherman Firefly, the most significant British tank adaptation of the war. The Firefly provided a desperately needed extra punch for the armoured regiments in the North-West Europe campaign, but there were never enough of them. Being based on a standard Sherman they remained very vulnerable to enemy fire, but they finally gave British tank crews the chance to outpace and out-shoot the German Panthers and Tigers that dominated the European battlefield. The successor to the Cromwell, and the ultimate British cruiser, was the A34 Comet. Specified in 1943 it was to have a new 75mm high-velocity (HV) gun built by Vickers. The calibre was later changed to 76.2mm and became known as the 77mm HV. This gun was more compact than the 17-pdr but just as effective, and gave the tank hitting power equal to the Panther. Inevitably, development was slow. It was the best British tank to see service, but only in the last months of the war. By 1944, British tank development and production had matured considerably.

The Department of Tank Design's influence and expertise had significantly grown and was now at last living up to its name. The requirement to produce outdated designs to keep numbers up had finally been dropped. Production was now mostly standardised on Cromwells, Comets and Churchills, and the number of firms involved reduced from 27 to 11. This was only possible because of the continuing reliance on the Sherman, 8,000 of which were imported in 1944 and 1945. Industrial techniques had improved and manufacturing processes simplified. Britain finally caught up with other nations and started to use welding instead of riveting, which made for lighter, stronger hulls and turrets. The British reputation for shoddy construction and unreliability was overturned, and the Cromwell and Comet were a world away from the Covenanter and Crusader in this regard. There were other projects, including wasteful plans to develop a class of heavily armoured assault tanks. The A33 Excelsior, designed to replace the Churchill, was tested in 1943 and abandoned in 1944. The A38 Valiant was an up-armoured and up-gunned Valentine that never got beyond testing in 1944. The monstrous A39 Tortoise weighed 78 tons and was an attempt to produce a tank resistant to the heaviest German guns, but the pilot models were only delivered after the war ended. The final significant development in Britain's wartime tank story was the A41 Centurion. It began as an idea in 1942 for a tank that combined several battlefield roles. The desert war had shown that pure 'cavalry-style' tank versus tank combat predicted by the pre-war visionaries rarely occurred. Similarly, the infantry tank concept – believed in 1939 to be the most important – was too restrictive on a modern battlefield. Experience had taught instead that the main function of the tank was to act as mobile fire support in both attack and defence. With this in mind the War Office and the Department of Tank Design looked towards a 'universal tank' that could fulfil all these functions.

By 1943, the old width and weight restrictions had been abandoned, and so designers had a free rein. The new tank was to have good cross country performance, mount a 17-pdr gun and be protected by thick, sloped armour able to resist the German 88mm gun. AEC was authorised to begin work in July 1943, but the war ended before it was finished.

Too little too late? Apart from the moderate success of the Churchill and the later cruisers, the story of British wartime tank development is a sorry one. It had got off to a bad start as a result of insufficient pre-war funding, and a lack of political and military drive to develop the armoured forces. Uncertainty over the role of tanks led to the conflicting developmental paths of infantry tanks and cruisers. Defeat in 1940 prompted the panic building of inadequate designs, which impeded the development of more promising tanks. Rushed production and design flaws led to reliability issues. External constraints meant tanks had limited capacity for future armament upgrades.

From late 1942, US tanks were required in increasing numbers to make up for the deficiencies of home-grown products. Only in 1944 was British industry able to deliver a tank reasonably fit for a fast-moving battlefield, and even then it was scarcely a match for its opponents. It can be argued that the Cromwell – and indeed the more numerous Sherman – gave Allied commanders greater operational flexibility than the Germans. The famous Tigers and Panthers may have been judged superior on the battlefield, but they were over-engineered, mechanically fragile and too few in number. Mobility and reliability were more important to the advancing Allied armies. But tanks like the Cromwell and the Comet should have been available much earlier. The Soviet Union showed it could be done. The T-34, produced in 1940, was arguably the best tank of the war. From the very start, the T-34 achieved that crucial balance between armour, firepower and mobility that eluded British tank designers for so long. It spurred the Germans to revitalise their own barely adequate tank force and embark on a technological arms race in which Britain quickly fell behind. British tank crews at the sharp end knew it only too well, and had every reason to bemoan the lack of protection and firepower which was a feature of their war.