THE ART OF TANK WARFARE

A Guide to World War II Armored Combat for Players of **Panzer Elite**

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Contents

HOW TO USE THIS BOOK

This book is designed as both a historical reference for the armored warfare enthusiasts among us, and as a primer for the novice. The history and development of the tank, covered in the first chapter, is provided in order to give some background on the state of armored vehicle technology in World War II. The second chapter gives much more specific information on the "current" technologies and how they were used in combat. Chapter three covers the tactics associated with armored fighting vehicles in different roles and against different types of targets. Chapter four is a supplement to the overall historical guide, detailing the historical campaigns included with the game (for in-depth data on the specific scenarios, see the Gameplay Manual, chapter seven). Reference data for all of the units in Panzer Elite is provided in chapters five and six. Finally, a glossary of armored vehicle terminology and abbreviations is given in chapter seven. Before you begin play, we recommend that you should at least read chapters two and three.

1. THE HISTORY OF TANK WARFARE

Armored fighting vehicles are a relatively recent development of military capability. Superceding the horse cavalry shortly after the First World War, new theories on armored warfare slowly displaced the age-old concepts of infantry and cavalry driven offensive battle by the eve of the Second World War. The history of armored warfare, like any other technological advancements designed for the military, have suffered at the hands of politicians, languished on the books of economists and been compromised by the higher echelons of command. Fortunately, for the armor theorists, their ideas were eventually proven sound and the tank took its place as a major battlefield component, forging the way for maneuver warfare and the further development of combined arms theory.

WORLD WAR I

Although the tank first came into use during the First World War, the basic principles of armored warfare had been used for hundreds, even thousands, of years. The notion of a heavily armed and armored mobile force which could strike deep into enemy territory was first embodied by the heavy cavalry and chariot units of ancient times, as well as by the infantry tactic known as the "tortoise" which was used to assault fortified installations. However the need for a self-propelled armored vehicle was recognized much earlier in history. The Spanish used horse-towed sleds with small cannons mounted on them to provide close artillery support for their troops in the field. The famous inventor and artist Leonardo de Vinci recognized the need for a heavily armored and mobile engine of war and drew up plans accordingly. In World War I, the need became apparent for a vehicle that could resist the machinegun, a weapon that had completely dominated the flesh-and-blood battlefield of man and horse. At first, the use of simple armored cars was common, however, it was soon obvious that these vehicles, based on the limited suspensions of the current automobile and truck, were impractical on a battlefield which was covered with bomb craters, trenches, and barbed wire. A new solution was needed and, thanks to the invention of the caterpillar track, the tank was born.

The First Tanks. The British were the first to recognize the need for an armored vehicle capable of traversing the battlefield. Their first design, ordered by Winston Churchill (then First Lord of the Admiralty), called the No. 1 Lincoln machine, was built in 1915 and subsequently modified through the addition of superior tracks to become the 'Little Willie'. This vehicle could easily cross a five-foot (1.52 m) trench and climb up a four-and-a-half foot (1.37 m) obstacle. For performance and armament, it had a top speed of 3.5 MPH (5.6 km/h), light armor, and fittings for a 40mm gun in a small turret. This early design was superceded by Big Willie, a now-familiar design utilizing the rhomboidal-shaped chassis and tread system with guns mounted on the hull sides instead of in a turret. The frontal armor was only 10mm thick, with a crew of eight men, a top speed of 4 MPH (6.4 km/h), two 57mm guns in hull sponsons, and four pivoting machineguns. This basic vehicle was tested in early 1916 and ordered into production in two versions; the "male" version, mounting the twin 57mm guns, and the "female" version which replaced the two cannons with two more machineguns. Although used mainly for local testing, the British armies first major use of tanks in combat took place on November 20, 1917, at the Battle of Cambrai, where the British used 400 tanks to penetrate almost ten kilometers into German lines.

The German Army had their own tank in development, the A7V, which had a maximum of 30mm of armor, a 57mm gun in the hull front, six machineguns, and a crew of 18 men. The A7V was unwieldy, with generally poor performance, and a requirement for an enormous crew of 18 men. As a result, less than 35 were actually produced. The French, also seeing the need for such a vehicle early in the war, had produced several heavy tank designs and one exceptional light tank design, the Renault FT-17. This tank, along with the British Mk.VI, a late-war version of the Big Willie, was adopted by the US Expeditionary Forces, which did not come up with an indigenous design until after the war ended in 1918. The FT-17 was the first "modern-style" tank design, mounted with a 37mm gun in a small, one-man turret, with the hull suspended between low tracks, and the engine situated in a rear compartment. The crew consisted of a much-overworked commander/gunner/loader and a driver. Italy had also produced an improved version of this vehicle known as the Fiat Tipo 3000 Modello 1921, which did not enter service until after the war.

The First Tankers. Nearly every major nation had its own outspoken supporter of the tank during this critical period of armor development. Colonel Ernest Swinton was the most outspoken advocate of armored warfare in Great Britain, and was heavily supported by future Prime Minister Winston Churchill, as well as Major J. F. C. Fuller, who later invented and refined many of the early tactics and techniques of armored warfare. It was largely due to Swinton's efforts that the British tank design program was initiated in 1915. General Elles, the commander of the successful British armored attack at Cambrai, was also one of the early pioneers. Lieutenant Colonel George S. Patton, Jr., who was later to become famous as commander of the Third Armored Division in World War II, was also an early supporter, and one of the first American tank officers to fight in September, 1918. The first American armored warfare school, located in Pennsylvania, was established by another officer whose experiences would heavily influence the outcome of WWII: Captain Dwight D. Eisenhower. Among the French, it was Colonel Jean Baptiste Estienne who managed to convince his commander, General Joffre, of the need for armored fighting vehicles. It was he who envisioned the first successful light tank, the Renault FT-17, and obtained the authority to have them designed and built. It was not until after the war had ended and the effectiveness of the tank in action tested, that Germany and the Soviet Union, the two major proponents and innovators in armored warfare in World War II, took an interest.

BETWEEN THE WARS

The results of the First World War proved the initial usefulness of the concept of armored warfare, however, the war was over before the technical and tactical aspects of armored warfare could be completely worked out. In the years immediately following the war, the world fooled itself into believing that The Great War had also been The War to End all Wars, and like most immediate responses to peace after a prolonged conflict, most countries drastically cut all military recruiting, research and production. The horse cavalry once again moved to the fore, and the advancement of the airplane and antitank rifle, also used in combat for the first time during World War I, were seen as doom for the tank. Never the less, every army contained die-hard advocates of armored vehicles, and they continued preparing for the next war, even amid the taunts and ridicule of their compatriots in the more "traditional" military branches.

The Enlightenment. J. F. C. "Boney" Fuller was one of the first British armor theorists to advocate the concept of combined-arms warfare; a melding of tactics utilizing armored units, infantry, artillery, and aircraft (although he later modified his concepts to include only different types of tanks). Apparently, only the German and Soviet armies paid attention to the ideas of this British officer! While J. Walter Christie, an American engineer, had designed a more advanced suspension system for armored vehicles, he was unable to convince the US government of the usefulness of a more reliable armored vehicle. The Soviet Union, however, took his research to heart and went on to produce one of the best tanks of the Second World War; the T34. Adna R. Chaffee was the prime promoter of mechanization in the United States, and eventually went on to command the first American mechanized cavalry brigade. In France, Charles de Gaulle, later to become famous as the leader of the Free French in World War II, advocated the need for armored fighting vehicles in the French army. He was so successful in his advocacy, that when Germany did attack France early in the Second World War, France actually maintained an armored force, both more numerous and of higher quality, than that of Germanys. Unfortunately, these units were ineffectively utilized in the field, being commanded by "Old Heads", who had not thought much beyond the tactics of the man, the horse and the artillery tube. Heinz Guderian was the German visionary who successfully organized, with Hitler's support, the concepts of the German Panzer Division and Corps. His grasp of armor tactics, first espoused

by Fuller, but further expanded to combine all units of the Wehrmacht, including the Luftwaffe, was made clear long before the first Panzer crossed the border into Poland in 1939. Many of these units were secretly trained in the Soviet Union, where Misha Tukhachevski and Kliment Voroshilov had built up the Soviet armored force during the 1920s and '30s. The Soviets and Germans learned a great deal from each other during this period, with the Germans specializing in tactics and vehicle quality, while the Soviets concentrated on vehicle simplicity and mobility. These lessons, learned and applied by Guderian during the buildup and training of the German Panzer Corps, culminated in one of Hitler's most effective military tools, the Blitzkrieg, or 'Lightning War'. Guderian's book, Achtung! Panzer!, which was published in 1937, outlined this armored warfare concept, and should have been proof enough and a warning to the world that Germany's military might was sleeping restlessly.

Tank Designs. Due to the short-sighted expectations of a lasting peace by many nations' governments and people's desire for an end to the bloodshed, armored forces were generally not supported after the First World War. Advancements made during this time in armored vehicle development were made at a much slower "peacetime" pace, leading to some unusual (and mostly useless) vehicles that, luckily, didn't reach much further than the prototype stages of development. Britain, for example, fielded a large number of one and two-man tankettes. These small, open-topped vehicles were armed with light infantry weapons, usually only a machinegun. Thinly armored, but highly mobile, these vehicles were adopted as an economizing measure by many countries that could not afford real tanks. Vickers Arms also developed a light tank, and with the manufacturing license for the design being sold around the world, formed for many nations the foundation of their experimentation with domestic tank production. In the US, this design was the basis for the T1 tank, in Poland, for the 7TP, and in the Soviet Union for the T26. These tanks were usually armed only with machineguns or light (37mm-40mm) cannon, and had frontal armor ranging from 15mm to 40mm thick. The majority of these early armored forces were divided into light, fast vehicles used for reconnaissance and penetration, taking on the traditional role of the cavalry, and the slower tanks with heavier armor designed to closely support the infantry during their attacks. These vehicles often had 50mm-80mm of frontal armor, and were also armed with machineguns and a light cannon although these were occasionally replaced by a mortar or light howitzer for more mobile indirect support. The final tank concept that evolved between the wars, was that of the heavy "breakthrough" tank. Although this circuitous development cycle culminated in such sound designs as the German Tiger tank and the Soviet KV-1, the process of development also included the construction of what have become known as "land battleships" by several nations. These slow, heavy tanks were designed to engage massed enemy formations and fortifications, pushing forward against any resistance to allow the deployment of the infantry and light tanks in their wake. These vehicles were huge, often larger than some of the First World War behemoths, and mounted several machineguns and multiple cannon, often in several turrets or half-turrets surrounding an elevated central turret. The Soviets were especially fond of this type of vehicle, and produced several models (the T-28, T-35, T-100, and SMK), some of which were actually used in the Second World War until replaced by the superior and more operationally effective KV series.

WORLD WAR II

Armored warfare, as a professional branch of military service and a tool for battlefield dominance in modern times, culminated within the crucible of the Second World War. No conflict, before or since, has seen such extensive development and use of the tank in combat, either in numbers, time, or variants. This developmental explosion had such a profound influence on later concepts of armored vehicle design and their tactical application, that land combat would never be the same again. From the earliest Blitzkrieg into Poland until the final assault on Berlin, no other conflict has seen such a rapid evolution of what was and still is, considered by many to be the decisive arm of battle. An infantryman will usually go into great detail concerning their indispensable role in holding a piece of real estate, once it's been won. What they often forget to mention is that the armored vehicle is what got them there in the first place.

A short overview of the war in Europe is provided in the following synopsis.

Blitzkrieg. Prior to 1939 and the Invasion of Poland, the early German victories of WWII had been predominantly bloodless. This included the annexation of the Sudetenland, the occupation of Czechoslovakia and Austria, and the expulsion of occupation forces from the Ruhr. Although Britain and France had been wary of German expansion, they did not declare war on Germany until she invaded Poland on September 1, 1939. By offering half of Poland, as well as the Baltic states of Latvia, Lithuania, and Estonia to the Soviet Union, Germany managed to secure a measure of security to the east. This agreement, based on the Molotov-Ribbentrop Pact, was the culmination of many years of military co-operation between the two nations. This agreement included allowances for Guderian's training of German tank forces in the Soviet Union when it was still illegal for Germany, under the Versailles Treaty (which ended the First World War), to develop and field any armed forces other than a 100,000 man army. This ban also precluded the development of a standing German air force, which was developed in secret, paralleling the armor forces as a second major component of Guderian's Blitzkrieg. Of the 62 divisions making up the two German Army groups that took part in the invasion, six of the divisions were tank units and ten were mechanized infantry divisions. The entire Polish army, at that time, was composed of only 40 divisions, none of them armored units, and all of their equipment was inferior in both quality and quantity to that of the invading Germans. The battle was over in a few short weeks, to be followed by several months of inactivity from both sides (known as the "Phoney war" to the British and as "Sitzkrieg" in Germany).

Hitler then turned to Scandinavia, which he invaded on April 9th, 1940, taking both Denmark, which fell without a fight, and Norway, which resisted bitterly for just over a month. On May 10th, the Wehrmacht invaded France through Belgium and the Netherlands, which fell before a concentrated attack of armor, airpower, airborne engineers and infantrymen who demolished fortifications and secured bridges all along their attack routes. This northern thrust was flanked by a southern thrust through the Ardennes, terrain that had been considered impassable to tanks due to its thick woods and rough hills. Both of these offensives neatly bypassed the heavily fortified Maginot Line, upon which the French had come to rely for defense against German aggression. A combination of excellent planning and training by the veteran German forces and poor operational techniques and low morale among the green French and British forces allowed the Wehrmacht to capture France in only six weeks. In the fighting for France's defense, the French army counted their losses at nearly 90,000, while the British army was decimated, (even though much of its manpower was rescued at Dunkirk, it was forced to abandon or destroy much of its equipment on the docks). Throughout the entire operational move west through France, the German army only lost approximately 27,000 of its number. England stood alone.

Italy, meanwhile, as Germany's ally, had annexed Albania and subsequently invaded Greece, where Mussolini's forces were still stalled, as they were in North Africa. In order to save the Italian forces, and to secure the mineral-rich Balkans prior to the upcoming attack on the Soviet Union, the Wehrmacht invaded Yugoslavia from Bulgaria, Romania, Hungary, and Austria, all of whom were now members of the Tripartite Pact, commonly known as the Axis. From the outset of the battle on April 6, 1941, the 31 Yugoslavian divisions were outclassed. Hostilities against Greece were also opened on this date from Bulgaria. The entire Balkan campaign lasted less than three weeks, and eliminated the last ally of the British in the region. Finally, the Greek island of Crete was captured in a battle initiated by large airborne drops. Starting on May 20th, the operation lasted just over a week and inflicted horrendous losses on the attacking German paratroopers. The campaign ended just in time for the majority of the German troops involved to be transferred to the east, where they would participate in the invasion of the Soviet Union, commencing in June.

The Desert War. Once again coming to the aid of an ally, Germany sent the Afrika Korps to Libya in an attempt to support the failed advances of the Italian forces there against the British and Free French. General (later Fieldmarshall) Erwin Rommel, a hero of the First World War and winner of the Pour le Merite, or "Blue Max," arrived in Tripoli with two divisions on February 12, 1941. By the 11th of April, Rommel had recaptured all of the territory lost to the British offensive of four months prior, and Tobruk was under siege. After a series of abortive counterattacks in 1941, Rommel withdrew. He resumed the offensive on January 21, 1942 and chased the British back into Egypt. By October, he had exhausted most of his supplies, which had been arriving only occasionally since the domination of the Mediterranean by the British Navy. The British counterattack in October, combined with Anglo-American landings in French North Africa on November 8, 1942, forced Rommel back to Tunisia. The last German forces in Tunis surrendered on May 13, 1943.

The Eastern Front. Having conquered or intimidated nearly every major nation in Europe, Hitler decided to move east, into the open country of the Soviet Union. Although Stalin, General-Secretary of the Communist Party of the Soviet Union and its de facto leader, had known there would be a clash eventually, he had hoped it would come later, and with the Soviets on the offensive. Operation Barbarossa, as the invasion was codenamed, therefore came as a surprise to the Soviet forces. It involved the use of nearly the entire Wehrmacht: almost 4 million soldiers in 180 divisions, over 3,000 tanks, 7,000 artillery pieces, and 2,000 aircraft, plus more than 20 allied divisions. On June 22, 1941, the first day of the attack, over 1,200 aircraft of the Soviet air forces were destroyed on the ground and in the air. In the first two weeks, 89 Soviet divisions were eliminated, with 300,000 prisoners captured, and 2,500 tanks and 1,400 artillery pieces seized in just the central region. By July 20, another 310,000 prisoners, 3,200 tanks, and 3,100 artillery pieces had been captured in Smolensk alone. Although Soviet industry was producing 1,000 tanks and 1,800 planes every month, their losses were even higher. Three months into the engagement, German troops had taken the remains of Poland, conquered Lithuania, Latvia, and Estonia, the majority of the Ukraine, and had moved the front to a line with Leningrad at its northern tip and the Crimea at its southern end.

The German Heer, however, was unprepared for the Russian winter. Since they expected that the fighting would end before the frosts began, the German High Command had not thought to issue winter clothing and equipment to the Wehrmacht. By December 6, 1941, the German forces had penetrated as far towards Moscow as they would ever reach. Some German reconnaissance units had even scouted the suburbs of the city before the first Soviet counterattack of the war struck in the area around Moscow. Leningrad was under siege. German offensives were halted until the following summer.

In the summer of 1942, the Wehrmacht attacked into the Caucasus region, hoping to capture that oil and mineral-rich region and deny its resources to the Soviets. Although this thrust gave some impressive successes at the outset, it culminated in the loss of Feldmarshall von Paulus and his 6th Army at Stalingrad in the winter of 1942-43. After this battle, the Red Army of Workers and Peasants took the offensive, and the Wehrmacht was forced to retreat. On July 5th, 1943, the German army conducted its last major offensive in the area around Kursk. This operation, codenamed Citadel, was known to the Soviets through their intelligence network, and was prepared for. Their defenses included around 10,000 artillery pieces, including anti-tank guns and multiple-rocket launchers, and 60 divisions. An average of 3,000 mines were laid along each kilometer of the front. 300,000 civilians labored to create a defensive network of eight separate defensive lines, the farthest being almost 150 kilometers behind the front lines. The attackers brought about 2,700 tanks and 1,800 aircraft in 34 divisions into the battle. Such was their strength, that Stalin was forced to make early counterattacks on August 3rd. This was the most decisive battle on the Eastern Front, and after this the Wehrmacht would never again be allowed to take the strategic offensive. In the south, the Soviets advanced through the Ukraine, Romania, and Hungary in 1944. In the north, they recaptured the Baltic states, and moved into Poland and East Prussia. In early 1945, the Red Army invaded Germany and captured Berlin, which fell on May 2, 1945, just ahead of the combined US and British advances, pushing back the struggling Wehrmacht in its final defense of Germany.

The Western Front. The Second Front, which had been promised to Stalin by Churchill and Roosevelt in order to effectively split Germany's concentration of troops, did not materialize as promised in 1942. It did not even take place in 1943. As a concession for the delay, however, the Western Allies decided to invade the Third Reich's "soft underbelly" in Italy. On July 10, 1943, an Allied landing codenamed Operation Husky took place on the southern beaches of Sicily. This attack, unexpected by the Wehrmacht, also had the side effect of precipitating a rebellion among Mussolini's Italian generals, who had him arrested. They immediately began to negotiate their surrender to the Allies. By the end of August, Sicily had been secured. The "boot" of Italy was invaded beginning on September 3rd, the day Italy officially surrendered to the Allies. German occupation forces quickly disarmed the remaining Italian forces, and stubbornly resisted the Allied advances up both sides of the Italian peninsula. By the end of 1943, the Allied advance had only just reached the heavily defended Gustav Line, just south of Rome. Difficulties in overcoming the stiff German resistance, compounded by friction between the Allies, enabled the German forces to hold Rome until just two days before the Normandy invasion. They moved quickly northwards through the summer, but were stopped again at the Gothic Line, across the top of the Italian peninsula at Florence. This line held until the beginning of 1945, but by the end of hostilities in May, the entire country had been occupied by the Allied forces.

Operation Overlord, the famous landings on the beaches of Normandy in northern France, was the largest campaign of the Western Allies and the long-awaited opening of the Second Front in Europe. The invasion fleet numbered nearly 6,500 vessels, of which about 4,000 were actual landing craft. Of 12,000 aircraft flown into the battle by the Allies, over 5,000 were fighters. More than 10,000 tons of bombs were dropped on or near the landing beaches the night of June 5th, along with three airborne divisions, which were dropped on the flanks of the invasion beaches. Five American, British, and Canadian divisions were landed on the morning of the 6th of June. Although the landing was difficult, the subsequent breakout from the beachhead was more costly. The Cotentin peninsula with the valuable port of Cherbourg was captured quickly, however, nearly two months after the landings, the Allies were still being kept on the peninsula and mostly within 30 kilometers of the invasion beaches. This stalemate was broken when Patton's Third Army broke through the German left flank at Avranches, pouring two infantry and two armored divisions through a narrow corridor in less than 24 hours. This maneuver outflanked the defending German Fifth Panzer and Seventh Armies, and opened northern France up to continued Allied advances. With the exception of the short-lived German attempt to capture the port of Antwerp from the Ardennes shortly before Christmas, the Germans were being pushed back at every turn. This slow, but steady rate of advance held until the Western Allies joined-up with the Soviet forces at the Elbe river in May. The last holdouts of the Wehrmacht surrendered on May 11th, 1945 and the war in Europe, for the Allies, was won.

2. TANK ACADEMY

It is essential that a tank crewman understand how his tank is built, the reasoning behind the design and how these factors will influence the tactics used in the field. The commander of an armored unit, regardless of its size and force composition, must also become familiar with the all the tactics and techniques of tank warfare and how they are applied in practice.

TANK BASICS

Tanks are made up of three primary facets: Firepower, Protection, and Mobility, all of which are explained in detail below. In addition to these three basics, there are several other factors that can heavily influence the capabilities of individual tanks and their functions in relation to other military units. These include training, crew positions, visibility, optics, communications, ammunition stowage, vulnerabilities, and size.

FIREPOWER

The cannon on a tank is essentially a giant gun barrel. The longer the barrel, the more accurate and powerful the tank cannon is. The cannon barrel can have a smooth bore, like a shotgun, or rifling grooves engraved along its length which impart spin (and therefore greater accuracy) to the shell in its flight. However, most W.W.II cannon used some degree of spin-stabilization. An additional feature which affects the accuracy of the tank gun is the use of a muzzle brake, also called "muzzle whip", which reduces the movement of the barrel during firing, as well as reducing the recoil and its effects on the tanks structure and crew. The accuracy of the shell is also affected by several other factors, which together are called the "ballistics" of the weapon. These factors include the rate of spin, wind resistance and crosswind. Gravity, range, and the duration of the shell's flight will also affect the accuracy of the shell. The ammunition used in tank guns is generally of the "fixed" type, which means that the powder charge is fully enclosed and attached to the shell, like a rifle cartridge. Some of the larger cannon, especially howitzers and most large naval guns, may use separate-loading ammunition, which means that the shell is inserted into the breech, then individual bags of powder are forced in behind it.

Essential Qualities of an Armoured Commander
(British Royal Armoured Corps)

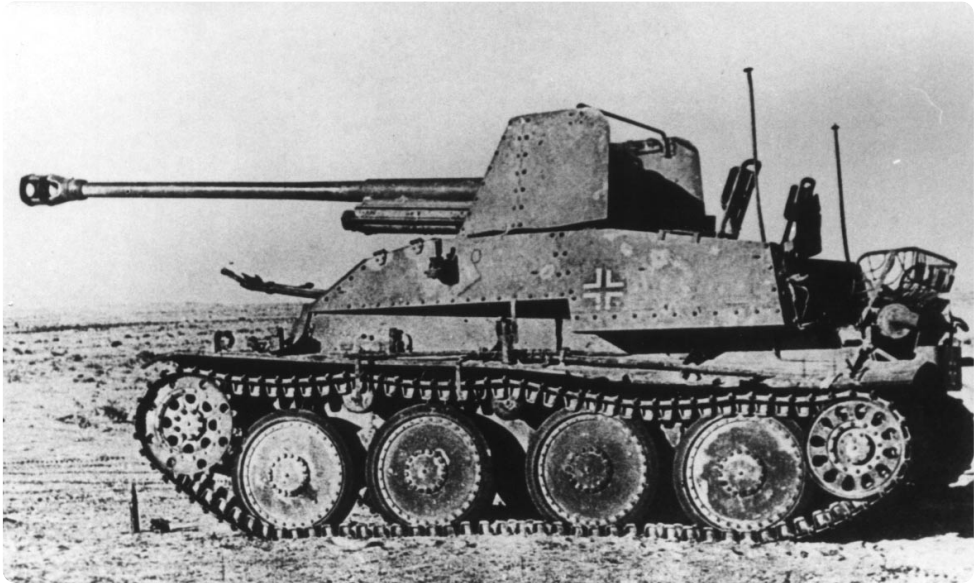
a. **Sense of Awareness.** The armoured commander must be tactically aware. He will look outwards at what the enemy and other friendly forces are doing. If he becomes obsessed with the detailed actions of his crew or sub-unit, he will miss opportunities for destroying enemy and fail in his task.

b. **Grip and Leadership.** Every leader has his own style, and this is right and proper. However, an armoured commander must lead from the front, must be clear and concise in his actions and orders, and must not accept second best from those under him.

c. **Speed of Reaction and Anticipation.** A commander without a flexible attitude of mind and a sense of urgency will get left behind in armoured warfare. Quick reaction, initiative and the ability to anticipate are vital.

d. **Knowledge.** A commander must know his enemy, his men and his equipment. Modern warfare is complex and he must also understand the procedures and capabilities of the other arms with whom he may be grouped if he is to cooperate effectively with them.

e. **Commonsense.** Commonsense tempers the more volatile qualities and prevents mistakes.



As the armor used on armored vehicles grew thicker and more advanced, it became obvious that smaller guns were incapable of penetrating it. At first, this meant that the production of smaller guns ceased and the production of larger guns increased. When the development of armor quickly outstripped the capabilities of even the largest of the currently produced guns, new ammunition was designed to increase the penetrating power of the guns already in use. Initially, the ordinary solid shot, or armor piercing (AP) round, was used against tanks, while an ordinary high explosive (HE) shell was used against infantry and other 'soft' targets. The problem with solid shot was that its penetrating power could only be increased through greater weight that created an increase in the caliber of the gun, higher muzzle velocities, or increase in the chamber pressure or barrel length. A ballistic cap (APCBC) could also be mounted in order to keep the shot from shattering against thick armor. This problem was solved first by the Germans. By utilising a shell with a heavy tungsten-carbide core, (APCR), surrounded with a softer metal and fired through a barrel which tapered as it reached the muzzle, the softer metal would be squeezed from around the shot and as the barrel pressure increased, so did the muzzle velocity of the round. An unfortunate side effect was a rapid drop-off in velocity, which reduced the long-range performance of the round. A simplified version of this, called discarding-sabot (APDS), used a lightweight collar that fitted around the tungsten carbide core, and dropped off when fired. This had the advantage that it could be fired out of ordinary barrels and did not require a tapering bore to maintain the higher barrel pressure.

For low velocity guns and rockets, another technological advance was required. This appeared in the form of the shaped charge (HEAT), in which the explosive filler was moulded so as to leave a cone-shaped space in the end facing the target. When the charge detonated, the concentration of explosive forces in that cone-shaped cavity created a solid jet of plasma (known as the Monroe Effect) capable of punching through armor. This generally required a large warhead (at least 75mm) for good effect, but since the round was not dependent on higher velocity for penetrating power, it could penetrate the same amount of armor at 1,000

meters that it could at 10 meters. A shaped charge round mounted on the end of a stick and muzzle-loaded into the 37mm antitank gun was even developed by the Germans! Other types of ammunition, such as smoke producing shells, was also produced, but was reserved mainly for signalling and for screening troops, not for fighting. As a final note, ammunition and barrel qualities, due mainly to materials quality and workmanship, were also a limiting factor in main gun accuracy and effectiveness. These arguments go a long way towards explaining why the significantly larger 122mm cannons of the Soviet Union were inferior to the German 88mm and the American 90mm guns at the end of the war.

PROTECTION

The primary feature of a tank is its use of thick armor specifically designed to protect the crew and the internal components from harm. Tanks were originally outfitted with just enough armor to protect them from rifles, machineguns, and artillery fragments. It soon became obvious that the armor needed to withstand attacks from antitank rifles and other tank guns. As these weapons were improved, the armor of the tank was required to follow or become obsolete and vulnerable. Some weaknesses could be found in every tank, including places where transmission or exhaust systems passed through the armor, the connecting ring of the turret to the hull, hatches and viewports, suspension and tracks, and anywhere else that the armor tended to be thin. These disadvantages were learned by every tanker in an effort to increase his life expectancy on the battlefield and shorten that of his opponent.

Metallurgical developments prior to World War II included the development of face-hardened armor. This involved taking a piece of ordinary "homogeneous" plate armor, and heating the front face to a higher hardness than that of plain steel (normally compounded with nickel) alone. Although it was possible to harden the entire thickness, it was soon discovered that this caused the armor to become brittle, and shattered when struck by a solid shot of the same diameter as the armor thickness. Face-hardening allowed for a harder, but more brittle, front face, which was backed up by a more pliable, easily worked softer plate. As the war progressed, tanks were outfitted with thicker and thicker plates of face-hardened armor. A sufficient thickness of face-hardened plate could also cause the solid shot of smaller guns to shatter on impact, leading to further experimentation in ammunition design.

Tank designers in some countries, most notably the Soviet Union, realized that by making the armor steeply angled or rounded it was possible to increase the apparent thickness. This had the additional effect of increasing the likelihood that a solid shot would ricochet off of the hull, and reduced the amount of metal required to obtain the same apparent thickness, thus decreasing overall weight and increasing mobility. Rounded armor, especially for turrets, was often made by casting, which was cheaper and faster than welding or bolting. Bolt-on armor was abandoned early in the war, when it was discovered that following an impact the bolts flew off and bounced around the inside of the tank killing the crew. Welded armor was often used when flat plates of angled armor were fastened together, particularly in vehicle hulls. The Germans also tended to use this method to build their distinctively angled turrets and hulls. When they discovered the inherent weakness of welded armor seams, they compensated for this by fitting the armor pieces together using interlocking pieces, like a jigsaw puzzle. The angling of armor was also related to the discovery of "shot traps." These were places where the armor could unintentionally cause an enemy shell to ricochet into another part of the vehicle, and were most often found around the turret. When this caused a ricochet into the thinner armor of the upper hull, it could allow a relatively weak gun to destroy a very well armored vehicle.

As new types of ammunition were developed, tank armor was forced to keep pace. Alternatives to extremely thick armor were developed. At first, it was simply a matter of making the frontal armor thicker and the rear armor thinner, since an attack from the rear was less likely. Later, supplemental armor plates were attached over weak spots. In the field, crews often supplemented their armor with sandbags and spare track links. Late in the war, wood and cement were used to disrupt the effects of the shaped-charge ammunition used by low-velocity guns and antitank rockets, and also to protect the hull from magnetic mines and grenades. The Germans were the first to attach stand-off armor, called Schuerzen, to their tanks. These thin steel plates were attached to the sides of the turret and the hull by brackets that left a gap between the armor and the hull. This dissipated the effects of shaped-charge ammunition and also interfered with the flight of ordinary solid shot, reducing its effectiveness.

MOBILITY

Most tanks are heavy, slow, and have tracks instead of wheels. Combined with the unusual controls and poor visibility for the driver, World War II tanks were difficult to drive well. Most tanks were steered by two levers, each one controlling the speed of one of the tracks. This enabled the driver to turn the tank by slowing the track in the direction of the turn and speeding up the track on the opposite side. One advantage of this method of steering was the "neutral steer," in which one track was moved forward and the other left in neutral or reverse. This enabled a stationary tank to swivel quickly and this was often combined with, or used in place of, turning the turret to bring the main gun on to a target as quickly as possible. A large diesel or gasoline engine provided power.

Tank mobility was dependent upon several interrelated functions, and had to be considered both by its tactical and strategic implications. These included the power of the engine, its fuel consumption, the weight of the vehicle, ground pressure, and the expected life of the tracks, roadwheels, suspension, transmission, and engine. The power of the engine compared to the weight of the vehicle determined the top speed of the tank. An underpowered vehicle was susceptible to breakdown due to excessive wear on the engine components. Too powerful an engine could cause excessive wear to the tracks and drivetrain, as well as using a large quantity of fuel. A large fuel requirement and excess weight, making it difficult to transport or cross smaller bridges could easily hamper tanks strategic mobility. The ground pressure of the vehicle was one of the most important tactical considerations, as a vehicle with a low ground pressure could still be mobile in wet or sandy terrain. The ground pressure could be found by dividing the kg weight of the vehicle by the number of square centimeters of track on the ground at any given moment, resulting in an expression of ground pressure as kg/cm2. The lower this number is the greater the area over which the tanks weight is distributed, preventing it from becoming easily stuck in mud or sand, sliding down hills, and bogging down in streams or swampy terrain.

Early in World War II, tanks were light, did not require as much power to maintain a good tactical speed, could be transported easily, and had a low ground pressure even with fairly narrow tracks. This included such tanks as the German PzKpfw I, II, III, and IV, the American Stuart, Lee and Grant, the British Crusader, Comet, and Churchill, and the Soviet BT7, T60, and T70. Later, as heavier armor and guns were introduced, it became necessary to increase the engine power and it was soon discovered that the greater stress brought on by these developments required wider and stronger tracks and suspension systems. Wide track pioneers included the German Tiger and Panther tanks and the Soviet T34 series. These tanks were more maneuverable than tanks of equivalent weight with thinner tracks, and even more maneuverable than many lighter tanks, including the American Sherman. In an attempt to improve the maneuverability of the Sherman, American engineers made a set of adapters that were clipped to the existing tracks to spread the weight out farther. Known as "duckbills" these were not very effective, and wider tracks were eventually made standard.

The two main types of suspension used were the supported or "roller" type and the unsupported or "Christie" type. Supported suspensions used smaller roadwheels and included small return rollers on the top of the track to guide it to the drive wheel. Examples of this type of suspension include the German PzKpfw I, early PzKpfw II, and PzKpfw II and IV tanks, and the American Stuart, Grant, Lee, and Sherman tanks. Unsupported suspensions used large roadwheels, with the track riding along the top of the wheel on its return movement. This type of suspension was pioneered by an American named J. Walter Christie, and had the advantage that the track could be removed and the tank run on the roadwheels alone in an emergency. Examples of this type of suspension include the German Panther and Tiger tanks, the British Crusader and Cromwell tanks, and the Soviet T34 series.

OTHER FACTORS

A tank could have a powerful gun, thick armor, and excellent maneuverability, and still be unable to beat inferior tanks in combat if several other factors were not addressed. The Afrika Korps was able to fight while heavily outnumbered, with older equipment, and hold out for long periods against fresh Allied units due to their attention to these other factors.

Training. Crew training and experience were probably the most decisive factors of tank warfare. Individual knowledge of friendly and enemy vehicles, how to use terrain effectively, and crew cohesion and morale were all results of excellent crew training programs. Because of the experience gained in the early invasions of Spain, Poland, France, Scandinavia, and the Balkans, backed by long periods of intense basic armor training, the Wehrmacht had the best trained and most experienced crews. Soviet tank crews did not survive long enough to gain any battle experience, and were often thrown into action with minimal training. This problem was compounded by the Soviet penchant for centralized command, a lack of initiative among junior officers and their adherence to outdated tactics and techniques. By mid-war, however, these problems had been addressed and the quality of Soviet tank crews increased dramatically. British tankers, having received some experience in the North African campaign, proved to be quick learners and fought well despite their often outmatched vehicles. American tank crews suffered heavily at the outset of the North African campaign, and the unexpected requirement for new replacement crews further diluted the experience levels of the veterans until well into the French and Italian campaigns. The problems with inexperienced crews became so troublesome that by the time the Germans began fielding the Panther tank, official policy recommended that one German tank should be dispatched by no less than five Shermans! By the time of the invasion of Normandy, German tank crews had often experienced three to five years of combat, while American crews rarely had more than a year in action, and the majority even less, or none at all.

Crew positions. The crew lived in their tank during combat, and cramped and uncomfortable positions were made more difficult by poor design. It was quickly discovered that small one or two-man turrets quickly overburdened the commander, who was often responsible not only for directing the crew and firing, but loading as well. Early light tanks such as the German PzKpfw I and II, American M3 Stuart, Soviet T-26, T-40A, T-60, and T-70, and the French D1B and S35 all suffered from this problem. Interim solutions, such as raising the commander's position or giving him a smaller turret of his own gave rise to problems in his vulnerability as well as increasing the visible height of the vehicle. Difficulties with hatches, especially with the turretless assault guns, often led to difficulties in mounting and dismounting the vehicle, leaving it vulnerable for precious seconds while the crew was feverishly trying to get in or out. The cramped positions also made it difficult to adopt another crewman's position in the case of casualties. Compared to the earlier PzKpfw III and IV and the Lee and Grant series tanks, the later Panther and Sherman tanks were spacious.

Visibility. The ability of the crew to see outside of their tank was a very limiting factor in armored combat. Most commanders and drivers left their hatches open for better vision, and some chose to remain exposed even during combat. This was due to the restricted view from each position. As the design of tanks became more important and information was received from crews using them in battle, vision ports and periscopes were introduced and improved. These usually consisted of glass prisms or blocks through which the crewmember could look while all of the hatches were "buttoned up". These changes also influenced improvements in hatch design. Some tanks, such as the Panther, had comparatively excellent visibility, while others, such as the Stuart, were at a severe disadvantage with the hatches closed.

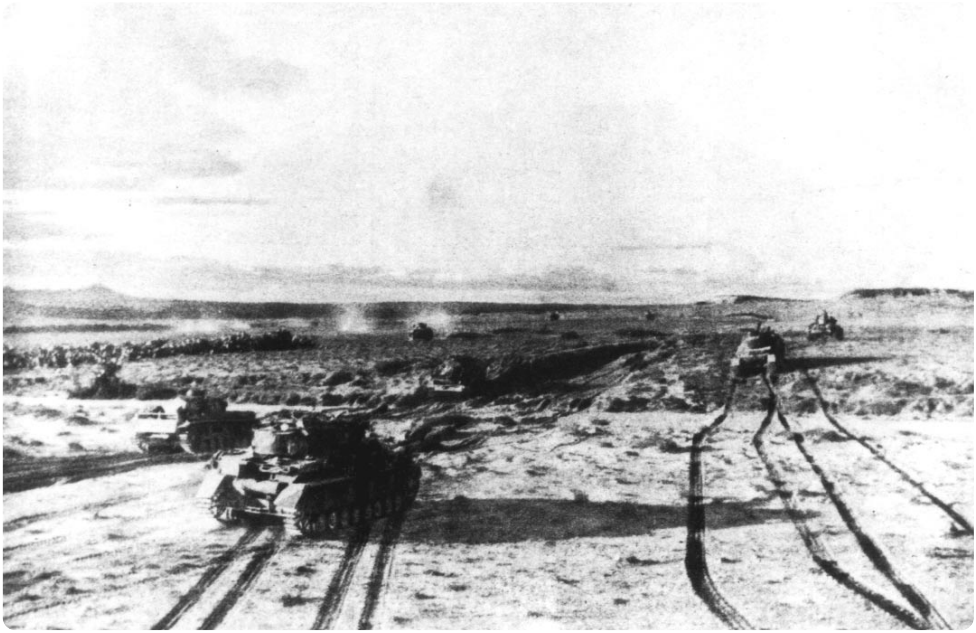
Optics. The quality of a tank's optics affected not only how well the crew could see out of the vehicle, but also the accuracy and usefulness of the rangefinder and optical targeting systems. Poor quality Soviet optics reduced the overall accuracy of their tanks. American and British optics were better than the Soviets but German glass quality, optical designs and workmanship were the best throughout the war, although they occasionally suffered from complexity. The utility of an optical system in viewing and determining range improved the speed and accuracy of the main gun, while its consistent alignment to the bore was critical to hitting any target. Different methods of gauging range were used. The most common, however, was to include a simple mil scale on the gunner's reticule, enabling him to quickly estimate range by the size of the target vehicle in the sight. As a general conversion, one mil is equal to one meter of width at 1,000 meters, thus a four meter wide tank covering only two mils on the scale is at 2,000 meters range.

Communications. By the end of the Second World War, nearly every tank had a two-way radio set. At the beginning of the war, only the German army had realized the need for two-way communications for all vehicles. The Soviets learned late, and often suffered horrendous casualties due to a lack of communications. Even the Sherman was initially equipped with a receiving set, in order to allow the platoon and company commanders to send orders down. This problem was taken care of quickly, however, unlike the Soviet radio problem, which lasted well into the war. All armies also produced special command, artillery, and communication vehicles with multiple radios and versions with greater power. These were used to communicate with higher command, call for and control artillery and airstrikes, and provide reconnaissance information from far behind enemy lines.

Ammunition stowage. All tanks face the problem of ammunition stowage. Larger supplies for the main gun means the tank needs to resupply less often, but also leads to a higher risk of crew death by explosion. The need for ammunition to be readily available to the loader is offset by the need to stow it safely and securely. Improper ammunition stowage often led to disaster. Sherman crews stored several loose rounds on the floor of the turret basket. This led to the vehicle receiving the nickname "Ronson" from the British, after a cigarette lighter which advertised that it always lit on the first try. It also led to the development of wet stowage, whereby the ammunition was stored in a solution of water, antifreeze, and a rust inhibitor, which reduced the likelihood of a fire reaching the ammunition before the crew could bail out.

Vulnerabilities. Every tank has its vulnerable points, and experienced tankers knew this and protected their own, while taking advantage of the enemy's. Shot traps, usually caused by an angled piece of armor deflecting shot into a weaker piece of armor (normally from the turret into the superstructure roof) could be taken advantage of at close range. Weak spots, such as where air exhaust or intakes passed through the armor or welded joints where face-hardening was weakest, were favorite targets, as were the thinner sides and rear areas of any tank, gun and vision ports, tracks and roadwheels, and the gap between the turret and the hull. Additional armor, such as the one-inch plates welded onto many American Shermans and the Schuerzen armor skirts on many later German tanks helped a great deal, especially against HEAT rounds. Field modifications and improvised armor, such as boards, sandbags, and spare track sections were often added as well. This measure of added protection sometimes caused additional problems due to the extra weight and bulk. Some of the add-on armor welded to the Sherman hull and turret sides was even used as a targeting aid by German tank crews who knew that the armor was weaker there, effectively negating its value.

Size. The larger the vehicle, the easier it is to spot and hit. This gave some advantage to the assault guns with their lower chassis (since they had no turret). A smaller vehicle also requires less armor to cover its smaller exposed area. Some vehicles, such as the German Tiger, could ignore their large size since their armor was sufficient to repel almost any attack. Other vehicles, such as the American Sherman, were simply too large for their weight, trading greater size off against adequate armour protection. The size of some vehicles was due, in part, to the size of the gun mounted in the turret. Larger guns require larger-diameter turret rings, which consequently require a wider hull. The larger-caliber ammunition also takes up more room in the hull, meaning that the vehicle storage capacity for ammunition must be increased, or the number of shells carried must be reduced. This design trend must continue further, as a larger powerplant and transmission will be required to move this heavier vehicle at a decent speed.



3. TANKS IN BATTLE

The armor tactics of World War II were developed between the wars, primarily in Germany. These tactics were innovative in concept, considering the armor branch a weapon of decision and breakthrough. The majority of other nations distributed slow and heavily armored tanks among and in support of the "poor bloody infantry." The Germans concentrated their light, fast tank forces together, in an effort to smash the enemy at one decisive point. Combined with superior training and excellent co-operation between the tanks and the supporting air and artillery forces, this technique of "Blitzkrieg" was soon proven to be sound. The German tactics were tested in Spain during their Civil War, and victory gave food for thought to the opposition there, which included both American and Soviet volunteers. As other nations recognized the advantages to these tactics and slowly began their modernization programs, the Germans swiftly invaded Poland, France, and the Low Countries, then turned around and swept through Yugoslavia and Greece, finally turning their sights on the Soviet Union. By this time, every other modern nation had begun a crash program to put these new tactics into practice, and to provide new tanks that could implement them.

This brings us to the five major roles of the tank in modern conflict: offensive, defensive, against tanks, against infantry, and in antitank warfare. Each of these roles is described below, with an examination of some of the tactics that have proven effective in that role. Keep in mind, always, that although aggression in combat is one of the keys to tank warfare success, as a commander you must be decisive and flexible, and understand not only how to fight, but also where and when to fight.

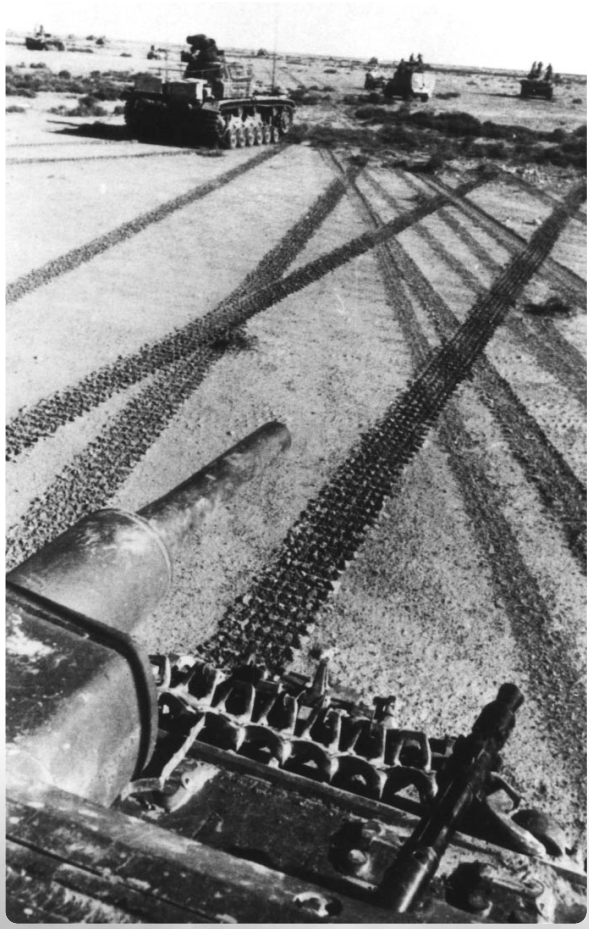
Tank Tips (Lt Col. Ernest D. Swinton, 1916)

Remember your orders.
Shoot quick.
Shoot low. A miss which throws dust in the enemy's eyes is better than one which whistles in his ear.
Shoot cunning.
Shoot the enemy while they are rubbing their eyes. Economise ammunition and don't kill a man three times.
Remember that trenches are curly and dugouts deep – look round corners.
Watch the progress of the fight and your neighbouring tanks.
Watch your infantry whom you are helping.
Remember the position of your own line.
Shell out the enemy's machineguns and other small guns and kill them first with your 6 pdrs.
You will not see them for they will be cunningly hidden.
You must ferret out where they are, judging by the following signs: Sound, Dust, Smoke.
A shadow in a parapet.
A hole in a wall, haystack, rubbish heap, woodstack, pile of bricks.
They will be usually placed to fire slantways across the front and to shoot along the wire.
One 6 pdr shell that hits the loophole of a MG emplacement will do it in.
Use the 6 pdr with care; shoot to hit not to make a noise.
Never have any gun, even when unloaded, pointing at your own infantry, or a 6 pdr gun pointed at another tank.
It is the unloaded gun that kills the fool's friends.
Never mind the heat.
Never mind the noise.
Never mind the dust.
Think of your pals in the infantry.
Thank God you are bulletproof and can help the infantry, who are not.
Have your mask always handy.

TANKS IN THE OFFENSIVE

The concept of armored warfare is inherently offensive. Tanks are designed to drive through enemy positions, destroying or bypassing any enemy forces they meet, and pushing deep into enemy rear areas, in order to wreak havoc on their command, control, communications, and supply systems. They excel in the capacity to take on all kinds of enemy forces and survive. Offensive armor tactics are founded on the concepts of speed, surprise, and breakthrough. Moving too quickly for the enemy to react, the armored unit hits the enemy where they least expect it, then moves through the breach it has created and towards the soft and complacent supporting units.

Individual tank movement. While tanks are capable of dealing with very rugged terrain, drivers must use certain landscape features to their own advantage.



Some basic assumptions that underlie tank driving.

The driver must be careful of obstacles of all kinds, as these may render the gun or drive train inoperable.

Water obstacles, including mud, are very difficult to judge, and should be avoided whenever possible.

Care should be taken when driving alongside rivers and streams.

Steep slopes are often impossible for a tank to climb. Traversing a hill can be dangerous as the tank may flip over on its back. It is not recommended in combat for other reasons, mainly because it presents a predictable target.

All of this must be kept in mind while using the terrain to its best tactical advantage. Roads should only be used for travel behind friendly lines, as they are likely spots for ambush. Thick woods and villages should also be avoided for the same reason. Driving across or along

the top of a hill or ridge is a good way to get spotted. To keep from being silhouetted against the sky, tanks should be driven below the crest of the hill, on the opposite side from the enemy. Obvious choke points, such as narrow roads through forests, bridges, fords, road intersections, and mountain passes should be avoided if at all possible.

Finally, the vehicle itself must be taken into consideration. Some vehicles are more prone to tipping than others, while the ground pressure of others means that they may be more or less affected by mud. Care should be taken to avoid too much driving in reverse or pivoting, as these maneuvers, especially on rough ground, tend to wear the tracks or cause them to come off of their rollers. The engine must be maintained as well. Naturally, there are times when the most possible power will be needed in combat. Redlining the engine, however, may result in a blown engine rather than a quick escape. To avoid redlining, try to keep the engine running at only about 70% of maximum on roads, and 50% of maximum when driving off-road (lower in extremely hot environments). This will reduce the likelihood of overheating the engine enough to blow it.

Movement as part of a Platoon. Formation control within an armored unit is as critical a component of armored combat as the vehicles' weapons or the ammo that feeds them. Each of the following formations provide both tactical advantages and disadvantages, usually governed by terrain, battlefield placement and unit positions. These formations, while not rigid in their spacing or positioning, allow increased tactical flexibility on the battlefield.

• **Column.** Column formations allow for the fastest movement of an armor unit along a route, especially if a unit is passing through restricted terrain. Firepower in the forward and rear arcs of the unit is limited to a single vehicle each, but is alternately good to the flanks of the unit, where each alternating vehicle in the column covers each side of the unit with large, overlapping fields of fire. This also allows for heightened response times to the unit's flanks by reducing the search area to be covered by each tank.

• **Line.** Units formed up along a Line or 'abreast' formation cover the largest horizontal area of any formation, while maximizing the unit's frontal firepower and overlapping fields of fire. The main drawback to this is severely reduced rear and flank fire coverage and protection. The use of this formation in an assault should be limited to areas where tactical overwatch can cover the restricted areas of the unit during its movement or as a defensive formation within prepared positions where other units are positioned to both flanks.

• **Echelon Left and Echelon Right.** The diagonal placement of vehicles in a Right or Left Echelon formation allows the unit to maximize its firing and search arcs from their axis of advance around to include overlapping cover for their flank. Optimum deployment of a unit in an echelon formation would be along the edge of a larger unit formation in an advance or defensive position. This allows for added protection or as a springboard for an encirclement maneuver. This placing, in a defensive action, allows increased flank protection to prevent an enemy from gaining access to an area to the rear of the main battle line.

• **Wedge.** The Wedge allows a unit both flanks enjoying good coverage and overlap of firepower as well as good forward firepower. This formation is best deployed in situations where the threat axis is mainly forward, but there are possibilities of attempted flanking maneuvers. The Wedge is also good for providing overwatch for other units and where a unit must cover many others or large areas of open ground. In an attack posture, the Wedge should only be employed when operating in open or rolling terrain, allowing for good visibility in all quarters or under the guns of an overwatch.

• **Reverse Wedge.** In a Reverse Wedge or 'Vee' formation, the tactical concerns of the commander are on control of the unit. It allows for good fields of fire to the flanks and rear, but severely restricts the forward fire arcs. This formation also allows a unit the ability to provide self-overwatch capabilities. (Not currently available to the TC in PE).

• **Diamond.** If a unit is alone, tactically, or is in a halted state where a threat might come from any direction and require a perimeter-type defense in 360 degrees, then a good option for the unit commander would be the Diamond or 'Coil' formation. If a unit requires a movement formation to maintain security and good fields of fire, then another formation would probably be best. (Not currently available to a TC in PE)

Movement as part of a Company. In general, the objectives you are given as a platoon reflect and support the greater objectives of the company as a whole. The other platoons will also be assigned similar objectives. While one platoon may be assigned to take a bridge, another may be guarding a convoy which needs to cross the bridge, while another may be holding a defensive position, and yet another attacking enemy positions as a feint, in order to draw off his forces. Each of these platoon objectives is essential to the success of the overall company mission, which, in this case, is to move a convoy safely over a bridge. Knowing where the rest of the company is supposed to be is of primary importance when engaging distant targets, so as to avoid accidentally firing on friendly troops. This is especially important when two or more of the platoons in a company have been given the same objective (usually approaching from different sides). Knowing the difference in appearance between friendly and enemy units is extremely important in this case.

Another concept of movement within a larger formation, is that of an 'overwatch'. When there is a requirement for a unit to safely advance into potentially hostile areas, there is also a need for mutual support from other units within the larger division. If two or more units have objectives in the same area, one unit will be able to cover the other as it advances and vice-versa. Each unit will move from one position of relative safety (such as a hull-down position from one hill to the crest of the next) along the line of the units advance while the second unit provides direct fire support. Once the first unit is able to traverse the area in question, it will set itself up in a viable position to cover the second units advance, and so on. A 'leapfrog' series of movements will develop with each unit moving safely under the guns of the other. This continuing sequence of movements will allow both units to cover more ground, with a higher safety factor, than if both had covered either alone or as one large force.

Movement as part of a Tank-Infantry team. Infantry units are slower and weaker than armored units. This means that extra care must be taken to maintain contact with assisting infantry, provide them the benefit of full (and close) armor support, and avoid becoming separated. In open terrain, this means advancing in front of the infantry and using searching fire (firing at likely places where the enemy could be hiding) as needed. In close terrain, especially towns and villages, the infantry should precede the tanks to flush out enemy antitank teams. Mechanized infantry operations give commanders more tactical flexibility and mobility in various situations. Infantry that can disembark also allows them to perform as separate unit in cases where enemy infantry is dug in and would be difficult for armor alone to dispatch them. This type of force combination presents the opportunity for the half-track or other APC to provide its own direct fire support for its dismounted troops.

Concentration of force. Whenever possible, the maximum amount of force should be used to secure an objective or engage enemy forces. This enables the platoon or company to engage quickly and with overwhelming force, in order to be immediately ready for an enemy counterattack. This will also help keep a force from being pinned in place (and becoming an artillery target), and allow it to sustain fewer losses than if the unit had been engaged piecemeal. In general, this means using a platoon to engage lone enemy units, and a company to engage enemy platoons. Artillery can also be used as a force multiplier, to distract, damage, and pin enemy troops. Although concentration of force is one of the primary ingredients of a successful engagement, it is not necessary, or desirable, for all of the friendly forces to be bunched together. As a rule of thumb, about half of the unit should engage the enemy unit directly, while the other half moves around one flank or the other to make contact from the enemy side or rear. Friendly forces should be spread out far enough to avoid suffering great casualties during an artillery attack or from an unexpected counterattack, yet still be close enough to see one another, provide mutual support, and still be able to target the enemy unit that is being engaged.

Breakthrough techniques. By using overwhelming force at a single location, preferably a spot where enemy forces are known or suspected to be weak, it is possible to break through enemy lines, giving a considerable advantage to the attacker. Artillery can be used to soften up the enemy positions and use smoke rounds to obscure friendly movements and prevent the enemy from being able to effectively reinforce the breach. Once the breakthrough is made, a small force (usually, a force which has sustained losses in the initial attack) is left behind to keep the breach open, while stronger forces, often made up of fresh reserves, moves deep into enemy territory. One of the advantages of a breakthrough is the capability to overrun enemy supply bases, headquarters, and artillery positions. This will disrupt his communications and supply systems, often causing great confusion among both front and rear echelon units. This, however, requires a very deep penetration and a force capable of throwing off local counterattacks. More common is the local breakthrough, which is used to provide a tactical, rather than strategic or operational, advantage. In this case, the breakthrough force is used to attack the enemy front lines in the flanks and rear, often creating confusion and causing troops to withdraw from their positions. Local penetrations can also be used to seize objectives such as bridges, road intersections, hills, and villages. These objectives can then be held against enemy counterattack, while fresh reserves are brought through the breach to reinforce and expand these positions behind enemy lines. By maintaining a fast operational tempo and high mobility, exploiting even a small breach in the enemy lines can serve to force the enemy forces to spread out and often to throw their reserves into the battle, thus weakening their front lines and possibly enabling further breakthroughs.

Reserves on the offensive. Reserves are an essential part of any offensive, even if they are small. On a platoon or company scale, half of the unit can be used to engage the enemy, while the other half serves as a maneuver element and is capable of reacting to unexpected events, such as enemy counterattacks or exploiting a sudden breach in enemy lines. When engaging using superior forces, reserves provide a layer of protection against this kind of event. Reserve units can also be used to relieve weaker units at the front, thus preventing a rout or by providing fresh troops for a breakthrough. A company should keep a full platoon in reserve whenever possible, while a platoon should hold back one or two tanks. These reserve forces should be kept close enough that they can easily be moved forward to engage the enemy, yet stay far enough back to avoid contact with forward enemy units and be free to move around to engage their flanks or protect the rear of forward friendly units. One technique often used by platoons is to engage an enemy with the main body, then send the reserve tanks to attack the enemy in the flank or rear. Once they have begun their attack, the main body then becomes the reserves, and moves up behind the rest of the platoon, with the platoon leader normally joining up with the new main body and continuing the offensive pressure to the maximum extent possible.

TANKS IN THE DEFENSIVE

Originally designed to seize and hold the initiative by taking the offensive, tanks can also be very useful on the defensive. Properly prepared, tanks can provide fire support from a position that is nearly invulnerable to enemy fire, and still be able to make a tactical withdrawal to previously established positions in the rear. They can be used as mobile support, to reinforce wherever the fighting is worst. Best of all, once the defensive operations have destroyed the enemy's will to fight, these same tanks can then be used to initiate counter offensive operations against those same battle-weary troops.

Fighting positions. Tanks, like infantry, can and should take advantage of cover. By siting a tank properly in a "hull-down" position, it is possible to protect the tank hull from enemy fire and provide a smaller target to the enemy. This can be done by driving up to the crest of a hill, even a small one, and stopping just short of the top, but high enough so that the main gun can be depressed to fire over it. This allows the commander to see and the gunner to shoot at enemy vehicles without exposing the entire tank. This works best when there are trees or buildings to the rear, so that the silhouette of the tank turret is not so obvious. A platoon of tanks on a hill in hull-down positions is a very difficult target and a very effective antitank position, and one from which it is relatively easy to withdraw. Trees also make good cover. Whenever possible, move the tanks deeper into the woods and destroy the trees to the front of the vehicle, creating a lane of fire down which the tank can see to attack enemy troops as they expose themselves through the gap. This method is also easy to retreat from, and gives the enemy great difficulty as your tank is completely hidden in the woods. The only problems with this method are that it takes time to prepare, including ensuring that there is a way out of the woods, and that enemy infantry may infiltrate the forest and conduct close assaults on the tanks, unless friendly infantry can provide flank security. Finally, buildings make good cover for tanks on the defensive. Tanks parked inside buildings are very difficult to see, and may observe and fire from windows and over broken sections of wall. The building itself also provides some protection, and

retreat is easy, as buildings are inevitably connected to other buildings by roads. If you want to have the tanks fall back to other buildings after they are engaged (to avoid artillery and infantry attacks), do not forget to have infantry units protecting their flanks from close assaults, especially in urban areas where the movements of enemy infantry may be difficult to detect.

Defensive formations. Unlike the offensive formations, which are based on a moving platoon (and are often used on the defensive when conducting a mobile defense or counterattack), the positions of tanks in a defending tank platoon are often dictated by the availability of good positions. Most often, the platoon is brought on line, allowing the entire section to bring its guns to bear on any target that comes in range. This is especially useful when the platoon is in a hull-down position firing over the crest of a hill or ridge, or concealed in the treeline. When using terrain features such as buildings and craters for cover, each tank should be positioned so as to make the best use of its individual cover. Additionally, each tank should be placed so that it can provide covering fire to at least one other vehicle in the platoon. This will enable it to assist in the event that the other tank is forced to move to the rear, thereby preventing enemy tanks from moving in for a flank or rear shot.

Defense in depth. When the enemy is strong and he is very likely to penetrate friendly lines, a defense in depth can be constructed to withstand this attack. This can only be done successfully if there are enough troops on hand to fill these defenses. The use of restrictive or difficult terrain and the careful siting of friendly forces may make this task easier. A thin line of infantry mixed with light antitank guns will slow the enemy down, yet allow him to penetrate the first defensive line. The second line should be right behind the first, and made up of more infantry and heavier antitank guns, which should stop him and make him vulnerable to attacks from front and rear. Finally, the third line should be immediately behind the second line and made up of infantry and tanks in a supporting role, which can be used to stop the enemy if the second line is penetrated or counterattack if his attack stalls. If the enemy attack penetrates to the third defensive line, the first and second lines should then be pulled out of action and used to establish new defensive lines to the rear of the third line, but farther back to allow the third wave time to break off the attack if necessary. When the first and second lines have been moved and new lines successfully set up, artillery can be called onto their old positions to prevent the further advance of enemy forces, and smoke can be used to allow the third echelon to break contact and re-establish their third line behind the new first and second lines of defense. This process can be maintained until the enemy is destroyed or there are insufficient friendly units to hold the lines.

Mobile defense. When the enemy is strong and defending forces are weak, static troops (such as antitank guns) should be placed into positions wherever they can do as much damage as possible to the enemy. Infantry units should be placed so as to screen the antitank guns and occupy the most difficult terrain, making them harder to dislodge. Tanks and other armored fighting vehicles should be spread out in positions from which they can maneuver freely across the rear of the friendly defensive line, as dictated by terrain and the enemy forces. Although the screening forces are weak, they will be most effective if they can hold in place for as long as possible. Local breakthroughs can then be stemmed by local counterattacks as necessary from the mobile forces held in reserve. Once the breakthroughs have been eliminated, some of these reserves will have to close the gap in the lines, leaving fewer and fewer reserves as more and more breakthroughs take place. Wait until the last of the reserves have been committed before retreating, and use them as a covering force for the remaining units. Hopefully, the enemy attack will have been blunted and he will be too tired and disorganized to press the attack. Artillery and smoke can be used to cover this movement and also to further confuse the enemy units.

Counterattack. When the enemy forces are insufficient to penetrate friendly lines or friendly infantry and antitank forces are weak but tank forces are strong, a counterattack can often be staged to inflict the maximum amount of damage on the enemy. This can be done by creating a thin defensive line, as with the mobile defense. The mobile forces are then consolidated on one flank, immediately behind friendly lines. The area where this formation can be most effective will be dictated by the enemy positions and the terrain available. Once the enemy has initiated the attack and become bogged down among the friendly defenses, but before he has successfully broken through the lines, this mobile force should advance around the enemy flank, striking as deep as possible into his lines. By engaging the enemy lines at an angle to the attacking forces, this will cause them to be drawn off the front lines to stem the counterattack and will make his lines of supply and communication vulnerable. If done properly and with enough force, this can cause him to go on the defensive and recall his attacking forces, or use up his reserves, thus enabling the defenders to push forward and rout him. Vital objectives behind his lines can be seized and held by this method, forcing the enemy to fight on two local fronts and dividing his forces. Once he has been contained in the "cauldron," artillery and smoke can be used to further damage and demoralize his forces.

Reserves in the defensive. Each of the methods of defense presented include the use of a mobile reserve force. It is essential to have such a force, particularly on the defensive, to provide some elasticity to the defense and to maintain the defender's advantage of being able to rapidly move from one firefight to another. These reinforcements should never be distributed in small amounts, but used in large formations, so as to enable them to destroy the enemy quickly and be ready to immediately go to another fight. On the other hand, all of the reserves should not be committed at once. This would allow the enemy to flank friendly forces or penetrate unopposed in the location of his choice. If necessary, artillery can be used to temporarily halt an enemy breakthrough until reserves can be freed up. If reinforcements become available during the battle, they can be used as a fresh reserve force, allowing the current reserves to make local counterattacks and reinforce weak positions. When attacking, be wary of the enemy's defensive reserves and try to engage them so that they lose their ability to react elsewhere, then attack in force on the opposite flank or through a weakly held section of the line.

TANK AGAINST TANK

Unlike the tanks of the last war, modern tanks were designed from the start to fight other tanks. Light tanks move quickly behind enemy tanks to get at their vulnerable rear armor. Heavy tanks move directly towards enemy tank forces, counting on their superior armor to protect them. When fighting superior tanks, armored forces know to advance quickly, taking advantage of all available cover and concealment, in order to get that close-range shot which is sure to penetrate even heavy armor. When fighting inferior forces, armored units rapidly engage and destroy enemy tanks, paving the way for the following infantry and supporting forces to seize objectives. Above all, every tanker must know the weaknesses and strengths of enemy vehicles, so that he can make a rapid and accurate assessment of the tactical situation as it develops and then utilize it to his best advantage.

Know your enemy. One of the most important concepts in the art of armored warfare is to know and understand your enemy - his mindset, motivations, tactics and equipment. Being able to recognize friendly units is important for the obvious reason that this will prevent 'friendly fire' episodes. For the individual tank commander, knowing the strengths and weaknesses of other friendly units can best allow him to estimate where and when the enemy is likely to attack, and what he is likely to attack with, thus allowing him to better prepare, mentally and tactically, for that eventuality. Knowing the appearance and technical specifications of enemy vehicles will allow the commander to recognize when he is outgunned, and take appropriate measures, such as calling for artillery fire or moving around for a flanking shot. It will also enable him to know when he has an advantage over enemy vehicles, so he can press that advantage home. Finally, an understanding of enemy tactics and motivations will help the commander to understand what the enemy is doing or planning to do, enabling him to find potential weaknesses in enemy plans and positions, and to lead the enemy into ambushes or difficult terrain.

Closing techniques. When attacking a weak enemy tank unit it is often advisable to simply stop and engage with whatever long-range weaponry, either direct or indirect fire support, that the friendly force has at its disposal. This prevents friendly force vehicles from coming within the effective range of enemy guns, and keeps the friendly units from running into hidden ambush or antitank positions. Once the enemy unit has been eliminated, the attacking force should move to another position to avoid possible artillery fire and counterattack by enemy troops. Units utilizing this form of attack, even while they are stopped to either fire directly or co-ordinate indirect fire should always maintain a forward momentum once the enemy positions are cleared. Remember that movement is simply another weapon for a commander to use. When engaged by smoke or artillery, the unit should move immediately to avoid being outflanked and to keep the attack from bogging down.

When facing the prospect of a stronger enemy or one that is too distant from friendly tanks for effective engagement, it is necessary to close on the enemy forces and engage them from a direction that they least expect. By 'prepping' an enemy position with smoke and artillery volleys to distract and suppress the enemy vehicles and to keep them from spotting the advancing units, the friendly tanks can then maneuver around into the enemy's flank. While watching carefully for additional enemy troops trying to enter the fray, this will allow the friendly units to strike the enemy tanks from a closer range where the friendly guns will be more effective against the weaker side and rear armor of the enemy vehicles. In this way the enemy will be most vulnerable shortly after the barrage of supporting fire.

Using supporting units against tanks. Although the infantry is not at its best when fighting directly against enemy armor, it is possible for friendly infantry to destroy enemy units when they attack friendly positions in restricted terrain, such as woods and urban areas where the armored units cannot easily maneuver. Infantry units, armed with light antitank weapons, can be used to ambush enemy tanks once they have penetrated into the forest or town. Care must be taken by a unit commander not to initiate an attack too early or at too great a range, as this will allow them time to maneuver away from the kill zone, and escape. It is also best to move additional antitank troops in behind the enemy unit after they have moved into the area, thus preventing it from retreating successfully. Smoke can also be used to further confuse the vehicles once they have come under attack, and to help screen the movements of the assaulting infantry. Artillery and air support units can also be used effectively to engage lightly armored units and tank destroyers when they are in the open or to force an enemy commander into an area where a kill zone for other supporting units has been prepared.

TANK AGAINST INFANTRY

Although modern tanks were designed mainly with the goal of eliminating enemy armored forces, they are often used to provide direct support to advancing infantry, especially when they are forced to cross open ground or fight against fortified enemy positions. This is one of the gravest situations an armored unit can face, as it is likely to expose the slow-moving tank to the many types of antitank defences. Most importantly, tankers must not let themselves get separated from their supporting infantry, become bogged down in small fights against local infantry units, or be pushed or lured into an antitank ambush. Particularly in areas with limited visibility, such as in heavy woods or built-up areas, tanks must keep a sharp lookout for traps.

Overruns and close assaults. Although these two events are similar in nature, they often come about due to two completely different events. An overrun occurs when a tank is used to assault enemy infantry. This is a very dangerous tactic, and should only be attempted in the gravest emergencies when infantry support is not available. The tank must remain buttoned up, move quickly among the enemy infantry, fire the machineguns without stopping, and quickly move out of the area before the infantry can recover their wits and conduct a close assault. The close assault may result from a botched overrun, or it may take place when an infantry unit attacks from a concealed position in close terrain (such as woods or buildings). In this case, it is the infantry who are assaulting the tank with grenades, mines, and light antitank weapons. Since the tank is very vulnerable to a close assault, it is imperative that it break from the engagement and reposition immediately if possible. This may take the form of charging forward. This may, however, result in the vehicle running into another antitank position and becoming trapped. It is often better to retreat to a nearby open area and either wait for the infantry to advance to your position, or bypass the difficult terrain and engage the enemy infantry with direct fire or artillery or air support, while at range. Smoke and artillery can also be used to distract and destroy the infantry, as well as providing cover while the exposed tank retreats.

Using supporting units against infantry. When fighting enemy infantry in difficult terrain, it is best to let friendly infantry attack. In order to make this as easy as possible for the advancing friendly units, it is a good idea to soften up the target with artillery fire if it is available and there is sufficient time available to wait for the artillery strike. If friendly forces are already engaged, the use of artillery may be too dangerous to friendly troops. In this case, tanks may provide supporting fires by firing high explosive shells into the area where the enemy infantry is taking cover. This may cause the enemy infantry to flee, leaving them exposed to further attacks. It may also deny them their cover and keep them from firing, allowing friendly forces to approach unmolested until they can effectively assault the enemy positions. Smoke screens, placed between the advancing troops and the waiting enemy forces, can also be used to protect units forced to move across open terrain.

ANTITANK WARFARE

Everyone, it seems, wants to destroy tanks. The infantry have their rocket launchers, flamethrowers, antitank rifles, antitank grenades, mines, and even Molotov cocktails, which they employ against tanks whenever they get a chance. The artillery has developed large and small-bore cannon for use against tanks, and sometimes even presses field guns, howitzers, and antiaircraft guns into that role. Finally, even tankers themselves have come up with specially built self-propelled antitank guns called tank destroyers. All of these forces combine to make the battlefield a deadly place for even the most heavily armed and well-protected tank.

Infantry antitank teams. Effective antitank weapons, particularly the 'HEAT' warhead, were developed due to the need for a capable antitank weapon that could be carried by individual infantrymen. This warhead, unlike traditional armor-piercing rounds, was not dependent on kinetic energy for its penetrating effects. Relying on chemical means, it could be fired from low-velocity guns or used for rockets. Germany developed the first practical antitank rocket, called the Panzerfaust, which was used throughout the war, with successive models being improvements of the basic launcher and warhead. Although its range was short, it had an excellent warhead capable of penetrating up to 200mm of armor (on the later models) and was lightweight, reliable, and disposable. The American rocket launcher, known unofficially as the ''Bazooka' (due to its resemblance to a musical instrument used by comedian Bob Burns), and officially as the Launcher, Rocket, AT, M1, was developed as a tube for launching stabilized rifle grenades. Its penetrating power was not as good as the Panzerfaust, but it did have a longer range and could be reloaded. Captured Bazookas were copied by the Germans to form the basis for the Panzerschreck rocket launcher.

Some other weapons used in an antitank role included; hand and rifle grenades, antitank rifles, flamethrowers, mines, satchel charges, and improvised antitank weapons such as the Molotov cocktail and the 'Gammon' bomb (a brick of raw explosives with a detonator inserted). These close quarters weapons make it wise to employ friendly infantry units, when available, against enemy infantry, or to defeat them from a distance with artillery or long-range HE bombardment.

Antitank guns and tank destroyers. Antitank guns are basically field artillery pieces capable of firing at and destroying tanks. The development of these weapons often parallels the development of tank guns, however, antitank guns have their own pros and cons. Antitank gun emplacements are often well camouflaged and dug-in, making them difficult to strike at, and their low-cost makes it easy to deploy many antitank guns where they are most effective. However antitank guns and their crews are vulnerable to artillery and infantry attacks, since the only crew protection usually consisted of armor plating mounted in place just aft of the gun barrel and in front of the breech on the carriage.

Tank destroyers are an interesting compromise of the tank and an antitank gun. Mounting a fixed, forward firing antitank gun, housed in an open-topped and lightly armored cupola or superstructure, the tank destroyers were usually based on old, obsolete tank chassis and hull. This concept allowed for a lower-cost, mobile weapon that allowed large amounts of firepower to be brought to bear on the enemy. American tank destroyers preferred to mount their guns in an open-topped hull, such as in the case of the M10 series, while Germans guns and crew were completely enclosed, allowing for more protection, but slightly reduced mobility and visibility. The outstanding StuG and JagdPanther designs were fine examples of this potent component of the German armored Corps.

Artillery. Indirect fire artillery differs from direct-fire artillery (which includes tank guns, antitank guns, and antiaircraft artillery) in that the units which fire are so far from the battle that their fire may take two or three minutes to organize, direct, and arrive on the battlefield. Because of this, the tank commander must be careful not to drive into a targeted area until after the artillery has struck and the barrage is completed. Various types of artillery may be available to the commander, depending on the assets of the unit to which he is attached. This may include mortars, field guns, and howitzers. Mortars are lightweight, simple artillery pieces that fire in a very high ballistic arc and are usually found immediately behind the attacking or defending tanks and infantry forces. Although they are not as powerful as larger caliber guns, their ubiquity means that they are more likely to be available, and their proximity to the front means that they are likely to respond swiftly. It's important to note, however, that several very large caliber mortars were created and

utilized by both sides in the Second World War. Most of these were restricted to use as siege weapons and were not often seen, or luckily, felt, on the open battlefield in support of troops, due to their cumbersome size and nature. The 'Karl' series of heavy mortar is an excellent example. Field and infantry guns are the medium to large-caliber (usually 75mm - 150mm) and medium to long-range artillery normally assigned to support companies and battalions, with infantry guns being especially light and mobile. While not as powerful as howitzers, they are more likely to be made available to the lower-echelon commander. Howitzers are large-caliber (100mm – 200mm), long-range guns generally used to support the regiment or brigade in the attack or defense. While their power makes them desirable, their distance from the front means fire missions take longer to prepare and execute.

Other types of indirect fire support may include naval artillery, rocket artillery and close air support. Naval artillery is essentially the same as regular artillery, except guns are mounted on a fighting ship and strikes may be called only near a port or amphibious landing zone. Naval artillery also tends to be more powerful, often ranging from 125mm to 800mm in caliber. Rocket artillery is also different from regular artillery, although it is used much the same way. Instead of cannons, rockets are launched from tube or railed launchers, usually firing from five to ten rockets per salvo in one massive strike. Although highly destructive, these attacks tend to be less accurate than regular "tube" artillery, and take a long time to ready for the next salvo. Close air support by fighter-bomber air force or naval units can significantly increase the amount of firepower placed on call for higher command level use, usually at the company level and above. Payloads can include multiple weights of free-fall HE bombs, rockets, both HE and AP and small caliber cannon and machinegun bullets for the strafing of lightly armored targets and infantry, all possibly aiding or disrupting a coordinated armored operation. During the Blitzkrieg and under the direction of Heinz Guderian, the German army pioneered the effective tactical application of close air support in combined arms operations.

4. THE CAMPAIGNS

These three campaigns represent the majority of conflict between American and German armored forces in World War II. Each involves different units, equipment, and terrain. From the deserts of Africa, to the mountains of Italy and the bocage country of France; all of the major battlefields upon which these forces met are represented. The historical background and major units and commanders involved in these campaigns are covered in more detail below.

NORTH AFRICA

Operation Torch, the Anglo-American invasion of Morocco and Algeria, allowed American and German troops to meet in combat for the first time in a major action. Fresh American soldiers with new equipment met up with the battle-weary veterans of Rommel's Afrika Korps shortly after the landings on November 8, 1942. In order to counter the strength of the US First Army under General Eisenhower, Hitler sent reinforcements, which began to arrive on November 16th. They included the veteran 10th Panzer division, Hermann Göring Panzer Parachute division, and the 334th Infantry division, as well as the Fifth Panzer Army, which were all posted to the German western flank in order to counter the Americans. By the time they reached their positions, US forces had occupied all of the coastal areas of Morocco and Algeria, and were moving into Tunisia. Similarly, the recently reinforced British Eighth Army had pushed Rommel and his "original" Afrika Corps, weakened by a crucial lack of supplies, as far west as southern Tunisia.

While the British and Commonwealth forces advanced steadily from the east, the US Army maintained their offensive pressure on the Germans from the west. Although the German forces were almost always outnumbered, they were rarely outfought. These force dispositions led to some very difficult battles for the key passes through the Western Dorsal Mountains as well as coastal airfields and villages in December. Due to the position of the German forces and their hasty reinforcement, as well as the uncertainty and inexperience of the American troops and commanders, these actions were mostly local in nature. It was not until Rommel was pushed into northern Tunisia and given command over all German and Italian forces in the region (the late-arrived reinforcements were commanded by General von Arnim of the Fifth Panzer Army) that a co-ordinated offensive was mounted. The Afrika Korps attack threw the American forces, including the 1st Armored division and most of the US II Corps, back from their positions at Faid and Gafsa to the Kasserine Pass. There the US forces managed to put up a stiff resistance until reinforcements arrived in the form of the US 9th Infantry division. After a short pause for reinforcement and reorganization, the Allies closed in from both east and west, forcing the surrender of some 125,000 German and 115,000 Italian troops by May 13th, 1943.

ITALY

On July 10, 1943, an Allied landing, codenamed Operation Husky, took place on the southern beaches of Sicily. As the British Eighth Army landed on the southeast coast, the US Seventh Army, under General George S. Patton, landed on the southwest coast. The American force included the 1st, 9th and 45th Infantry divisions, the 82nd Airborne division, 2nd Armored division, and several mixed infantry and armored brigades and regiments, including two battalions of Rangers. This force was relatively lightly

opposed, and easily overpowered the weak German and Italian forces deployed along the west coast. After seizing Gela and Licata, the US forces moved up the coast through Agrigento, Ribera, and Castelvetrano during the remainder of July. Meanwhile, the Axis forces were reinforced by General Hube's Fourteenth Panzer Corps and the Hermann Göring Panzer division from Italy into northeastern Sicily. With the nearly bloodless capture of Palermo in the north, the western half of the island had been captured. Patton's Seventh Army then moved east to relieve pressure on the British forces, which were being held up at Mount Etna by Hube's Panzers, by occupying Falcone in early August. This force continued its advance, crossing the Termini River to attack Messina the following week. By the end of August, Messina had fallen, and Sicily had been secured, although about 100,000 German and Italian troops had escaped over the Strait of Messina to Italy.

The surviving Axis troops were quickly reorganized and reinforced, then placed in position to defend against the expected attack on mainland Italy. This attack, mounted on September 3rd, coincided with the day Italy officially surrendered to the Allies. German occupation forces quickly disarmed the remaining Italian forces, while the Luftwaffe damaged the Italian fleet and while both forces stubbornly resisted the parallel Allied advances up the sides of the Italian peninsula. On September 9th, General Mark Clark led the US Fifth Army, including the 36th and 45th Infantry divisions and the British X Corps, ashore at Salerno. Salerno was defended by the German LXXVI Panzer Corps, which included the 16th and Hermann Göring Panzer divisions, as well as the 3rd, 15th and 29th Panzer Grenadier divisions. This amphibious attack caused German forces in the "boot" to withdraw northwards, allowing the Allies to make rapid progress until they reached the Germans' "Viktor Line," north of Naples, on October 3rd. Here, German reinforcements, which were arriving from northern Italy, southern France, Austria, and Sardinia, held back the Allied advance long enough for the "Gustav Line" to be prepared farther north, along the Sangro and Garigliano Rivers.

It took the Allies all of October and most of November to advance to the Gustav Line. This was mainly due to poor weather and rugged terrain combined with some of the most experienced defenders in the Wehrmacht. These steadfast and dogged units included: I Fallschirmjäger Corps, 26th, 16th, and Hermann Göring Panzer divisions, and 334th, 305th, 94th, 65th, 44th, and 5th (Mountain) Infantry divisions. Matched to counter this force was the US 3rd, 34th, 36th, and 45th Infantry divisions, as well as seven British and Commonwealth Infantry divisions and one British Armored division. Weaknesses within the German force, exploited by the US commanders, allowed the US troops of the 1st Armored division and the 3rd, 34th, and 45th Infantry divisions to advance into Anzio. This position put the US forces well behind the Gustav Line, near Rome, by January 22nd 1944. The 34th and 45th Infantry Divisions were pulled out of the line south of Cassino to compound on the US advances. The German forces defending Anzio and along their retreating route to Rome included the Lehr, 3rd, 4th, 26th, 29th, 114th, 362nd, and 715th Infantry divisions, the 16th SS division, and the I Fallschirmjäger Corps, which was pulled back to defend Rome along with the 65th Infantry division.

The area around Monte Cassino was finally taken in the Spring after intense fighting between the US 36th Infantry division, and three New Zealand, two Polish, and two Indian Infantry Divisions, against the German 44th and 71st Infantry divisions, 1st Fallschirmjäger division, and 90th Panzer Grenadier division. The penetration of the Gustav Line at Cassino and elsewhere allowed the southern Allied forces, now reinforced by the bulk of the Free French and Free Polish armies, to advance northward to relieve the battered defenders of Anzio in May. This combined force managed to take Rome on June 4th, after heavy fighting, and continued to slowly push the remains of the German forces in Italy northwards until the end of the war.

NORMANDY

Having established a successful beachhead in Normandy on June 6, 1944, the Allies continued to press inland. German reinforcements, including several of their best armored divisions, were rushed to prevent the Allied armies from moving south. Operations Epsom and Goodwood, launched by the British and Commonwealth forces, were repulsed by these fresh units on the eastern side of the beachhead during their attempt to seize Caen. Meanwhile, American forces were advancing slowly, their primary goal the occupation of the Cotentin Peninsula with its important port of Cherbourg, which was held by the German 9th, 77th, 79th, 243rd, and 709th Infantry divisions. The US units included the 1st, 2nd, 4th, 9th, 29th, and 90th Infantry divisions, the 2nd Armored division, and the 101st and 82nd Airborne divisions. After Cherbourg fell on 26 June, the US built up its reserves and secured the peninsula by taking St. Lo, Marigny, and La Haye-du-Puits, which prevented further German reinforcements from moving into the area. This area was occupied by the German 265th, 275th, and 352nd Infantry divisions, the 3rd Fallschirmjäger division, and 17th SS division.

On July 25th, US forces staged a breakout, codenamed Operation Cobra. It began on the farthest eastern part of the beachhead, with General Patton's Third Army. The spearhead of the attack consisted of 3rd, 4th, and 6th Armored divisions and 1st Infantry division. Using XIX and V Corps at St. Lo as a lynchpin, the VII and VIII Corps under Patton's army broke through at Lessay, moving south along the coast to Avranches and Mortain. The German defenders included the II Fallschirmjäger Corps, XLVII Panzer Corps, 363rd Infantry division, and 2nd and 116th Panzer divisions. Thanks to Allied planning, as well as superiority in quantities of tanks, planes, and personnel, the German forces were surrounded except for a small escape route through Argentan.

While local attacks kept the German forces pinned, the Allies squeezed the area, known as the Falais Pocket, tighter. British and Canadian forces applied pressure along the northern flank, while the US Third Army was responsible for the south. By August 12th, the German forces were in a general state of retreat throughout France, as American forces swept south and then east, crossing the Loire River on August 11th, and threatening Paris. The besieged Germans, including Fifth Panzer Army under Obergruppenführer Sepp Dietrich and Seventh Army under General Hausser, attempted to fight an orderly retreat as they moved their units through the shrinking gap at Argentan. Their forces included I and II SS Panzer Corps, LXXIV and LXXXIV Corps, LVIII and XLVII Panzer Corps, and II Fallschirmjäger Corps, however, they were all short of supplies, especially fuel, and many of their vehicles were destroyed or abandoned. Still, through bitter fighting, they managed to hold the area around Argentan for over a week, long enough for the majority of German troops to escape eastward, where they would be reorganized and resupplied for the Ardennes offensive in the Winter. On the 20th of August, American and Canadian forces linked up, closing the Falaise Pocket, and the German forces left behind capitulated.

5. THE WEHRMACHT

At the beginning of World War II, the Wehrmacht (the ground forces of the Heer, the air forces of the Luftwaffe and the naval forces of the Kriegsmarine as well) seemed to be an unstoppable juggernaut. Its forces were far superior in quality, and only rarely in quantity, to those of its opponents. When American troops first encountered German troops, they were engaging a force that had been fighting for three years, and were equipped with some of the most advanced tanks and weapons in the world. Learning painful lessons, the Americans improved quickly, while the German economy could not hope to match the output of American industry. Due to constant interruption by allied air and ground interdiction, supply lines back to Germany faltered. Finally, recruit quality began to fall after 1943, and coupled with mounting veteran losses effectively ended the German advantage in training, experience, and leadership.

German tanks were technically and technologically superior to most Allied tanks throughout the war although they were often over-engineered. This led to difficulties in armored vehicle production and repair. The German armaments industry was incapable of meeting the demand for these new vehicles in useful quantities, and certainly not in the quantities in which American and Russian tanks were being produced (German production levels equalled the Soviets only late in the war). During the entire war, only 80,000 armored vehicles of all types were produced in Germany, while the United States alone produced over 50,000 Sherman tanks! This was partly made up for by the high quality of German tank crews coupled with thick, high-quality armor, powerful guns, and greater manoeuvrability provided by wider track designs. The official American estimate of the cost of each Panther tank was five Sherman tanks!

The following tables of organization and equipment represent the bulk of German ground forces during the Second World War. As a side note, difficulties in production, supply and reinforcement meant that nearly every unit had its own differences from the standard force levels, particularly among elite units and those not strictly belonging to the army (such as the Luftwaffe field divisions).

• The German Panzer Battalion of 1942-1943 was made up of three tank companies (usually two PzKpfw III and one PzKpfw IV), organized into three platoons of five tanks each (a number only reached by elite units, with ordinary units making do with four tanks per platoon), a platoon of four or five light tanks, and a headquarters section of two tanks. This was supported by a headquarters platoon with three command tanks, and a support company with an engineer platoon (with trucks), signals platoon (with trucks), reconnaissance platoon (four or five light tanks), and an antiaircraft platoon (eight 20mm on four halftracks).

• The German Panzer Battalion of 1944-1945 was made up of three tank companies, organized into three or four platoons of four or five tanks each, with a headquarters section of two tanks. This was supported by a headquarters platoon with three command tanks and a support company with an engineer platoon (with halftracks), signals platoon (with trucks), reconnaissance platoon (with four or five PzKpfw IV), and an antiaircraft platoon (3 vehicles).

• The German Heavy Panzer Battalion of 1942-1943 was made up of two companies, organized into two platoons of four heavy tanks (Tigers) and two platoons of four or five medium tanks, with one command tank for the company headquarters. This was supported by a headquarters section with two tanks and a support company with an engineer platoon (with trucks), a reconnaissance platoon (with three or four tanks), and an antiaircraft platoon (three halftracks with four 20mmeach).

• The German Heavy Panzer Battalion of 1944-1945 was made up of three companies, organized into three platoons of four heavy tanks (Tigers) and two command tanks for the company headquarters. This was supported by a headquarters section with three command tanks and a support company with an engineer platoon (with trucks), an antiaircraft platoon (four or five Wirbelwind), and a recovery vehicle platoon (with five Bergepanther).

• The German Panzer Grenadier Battalion was made up of three companies, organized into three platoons of three halftracks (sometimes trucks were substituted, especially early in the war) and one command halftrack, a headquarters platoon of three halftracks, and a combat support platoon of a machinegun section (with three halftracks), an antiaircraft section (two halftracks with 20mm), and a mortar section (two halftracks with 81mm mortars). This would normally be supported by a headquarters section with three or four halftracks and a support company with a machinegun section (with three or four halftracks), a heavy mortar platoon (with five halftracks and four 120mm mortars), and a mortar platoon (with seven halftracks and six 81mm mortars). To allow for greater anti-armor protection/offensive capability, a platoon of StuG or tank destroyers was often attached.

• The German Infantry Battalion of 1939-1942 was made up of three companies, organized into three platoons of three ten-man squads and a headquarters section each, a company headquarters platoon, and a combat support platoon with a section of three 50mm mortars and a section of three MG34 or MG42 on tripods. This was supported by a headquarters platoon and a combat support company with a headquarters platoon, a machinegun platoon (with six machineguns), and a mortar platoon (with six 81mm mortars).

• The German Infantry Battalion of 1943-1945 was made up of three companies, organized into three platoons of three eight-man squads and a headquarters section each, a company headquarters section, and a combat support platoon with a section of two 81mm mortars and a section of three MG34 or MG42 on tripods. This was supported by a headquarters platoon and a combat support company with a headquarters section, a machinegun platoon (with six machineguns), and a mortar platoon (with four 120mm mortars).

German Attack Order and Fire Plan

[Used by the commander to organize his offensive plan]

1. Estimate of the situation (disposition of friendly and enemy troops).
2. Mission.
3. Assembly areas for the forward companies; objectives; sector boundaries; orders for the continuation of combat reconnaissance.
4. Instructions for the preparation of the heavy-weapons fire support, especially for massed fire.
5. Orders to the artillery for fire preparation and coordination.
6. Assembly areas for the reserves.
7. Time of attack.
8. Instructions for rear services (medical services and supply).
9. Location of command posts.
10. Miscellaneous.

[The Fire Plan is used to pre-plot artillery and heavy weapons]

1. Assignment of combat missions.
2. Distribution of observation sectors and fields of fire for the infantry and the artillery.
3. An estimate of capabilities of the artillery for effective execution of the combat mission.
4. Orders for the commencement of fire and fire schedules.
5. Orders for the preparation of massed fires.
6. Instructions for ammunition supply.

GERMAN TACTICS

German military tradition has always emphasised the need for aggression and surprise in all operations. Defensive operations were felt to be akin to retreat! The use of armor in large formations combined with bold leadership and initiative at all levels characterised the German Wehrmacht as a flexible fighting machine. Although air and artillery support of the advancing troops had been advocated and used efficiently early in the war, the supremacy of Allied airpower later in the war negated this advantage and forced German ground forces to rely more heavily on locally available artillery assets. In preparation for each operation, detailed and systematic reconnaissance of the area under attack was made, which maintained a high state of situational awareness for the unit commanders. As the attack preparations were completed, the bulk of forces available were massed at the Schwerpunkt, the main point of the attack, and all efforts were made to support the primary attack. Once the commander has selected his tactics, whether to envelop, penetrate, encircle, or attack on the flanks or front of the enemy, he issues an Attack Order and a Fire Plan. Individual platoons then meet in the assembly areas, adopt one of the basic formations, and then begin to attack in waves. Panzer Grenadiers, the armored infantry of the Wehrmacht, follow the tanks into action. Tanks often advanced rapidly and waited for the infantry to catch up, rather than moving at the speed of the infantry. Special battlegroups were formed of tanks and infantry teams, often supported by assault guns, to mop up defensive pockets or eliminate fortifications. Once enemy lines were penetrated, units were assigned tasks to complete the objective.

When German units meet enemy units by accident, they are always told to attack immediately, and to pursue and annihilate the retreating enemy forces. On the defensive, aggressive and violent counterattacks are called for whenever possible. Static defensive postures were adopted only when sufficient reserves were not available to allow for a swift, decisive counterattack. Advance outposts were established to provide intelligence and to call for and observe artillery fire. Strongpoints were created in difficult terrain and established to take the maximum advantage of cover and concealment. Finally, retreat is always the last choice, but it is carefully conducted so that the smallest unit possible is sacrificed in order to cover the retreat of the main force.

GERMAN ARTILLERY

The German war machine used many different types of artillery, several of which are available to the German player as "on-call" indirect fire, using high explosive and smoke ammunition. The following types of artillery barrages may be available, depending on the scenario:

81mm Mortar: This was the most commonly available artillery for the company-level commander. It was often used to drive infantry from cover, harass enemy armored vehicles, or provide a smoke screen. Because it was attached at a lower echelon, the 81mm mortar was also quicker to respond than the conventional artillery, which was only attached at battalion and higher level. The heavy weapons company of each infantry battalion had two sections made up of three schwere Grenatwerfer sGW 34 each. This weapon could fire its 3.5 kg high explosive shell up to 2,400 meters.

75mm Infantry Gun: This common short-barrelled weapon was made in several variations, including the leichtes Infanteriegeschütz leIG 18 and the Infanteriegeschütz IG 37 and IG 42. Each of these guns weighed less than half a ton and was ordinarily towed by a horse and cart. They were used primarily to provide smoke and HE support, although HEAT rounds were sometimes provided for self-defence against armor attacks. These guns had a maximum range of between 4,000 and 5,000 meters with a 6 kg shell. They were organised into batteries of various sizes, depending on what unit they were assigned to, with a typical battery consisting of two sections of four guns each, or one section of six guns. According to pre-war structure, a third section was to have been added during wartime from the reserves (Ersatzheer), however, these sections were generally used to bring new units up to strength instead (this actually applies to all of the regular artillery batteries).

105mm Howitzer/Field Gun: This heading represents several 105mm guns, including the leichte Feldhaubitze leFH 18, leFH 18/39, leFH 18/40, the schwere Kanone sK 18, and the Kanone K 17. These were medium towed artillery, usually organised into two or three batteries of three to four guns each or two batteries of six guns each. Self-propelled models were organised into sections of six vehicles each. The howitzers had a maximum range of 10,000 to 12,000 meters with a 14 kg shell, while the field guns were capable of ranges of 16,000 to 19,000 meters with a 15 to 18 kg shell.

150mm Infantry Gun/Howitzer: These weapons were the mainstays of the heavy artillery arm of the German forces. This heading includes several similar variants, such as the schweres Infanteriegeschütz sIG 33 infantry gun and the schwere Feldhaubitze sFH 18, sFH 36, and sFH 18/40. All of these were towed heavy artillery, organised into three batteries of three or four guns each, which utilised separate-loading ammunition. Self-propelled versions were organised into sections of six vehicles each. The range of the infantry gun was about 5,000 meters with a 38 kg shell, while that of the howitzers varied from 13,000 to 15,000 meters with a 43.5 kg shell.

170mm Field Gun: This is the excellent Kanone K 18 Matterhorn mounted on a heavy mortar carriage. Because the weapon was so heavy, it was split into two loads for transport. It was capable of firing its 68 kg high explosive shell out to a 28 km range, or a lighter 63 kg shell out to 30 km. It was organised into batteries of two sections of two guns each.

15cm Nebelwerfer: The Nebelwerfer ("Smoke thrower") series of rocket launchers were both light in weight and heavy in firepower. The 15cm version fired six rockets simultaneously, and each battery normally consisted of six launchers, thus placing 36 rockets onto the target at once. Mobile versions were also manufactured, and mounted in racks of ten on Opel Maultier halftracks, which were assigned three to five vehicles per battery (for a 30 to 50 rocket salvo). Unfortunately, the weapon was not very accurate, however, its power and range (over 6,000 meters), combined with the effectiveness of such a large salvo, was felt to make up the difference.

21cm Nebelwerfer: Identical to the 15cm Nebelwerfer but featuring a larger rocket and a reduced number of tubes on each launcher (five) due to a requirement to be able to use the same mount as the smaller rocket launcher. The range of this weapon was also reduced to around 4,000 meters. Mobile versions of this weapon were not produced.

28cm Nebelwerfer: The 28cm version of the Nebelwerfer was mounted on the ubiquitous SdKfz 251/1 and called the Wurfrahmen 40. This weapon fired six of these enormous rockets to a range of two kilometers. Incendiary rockets with a 32cm diameter could also be fired, but were not often carried. A battery of three to five of these vehicles could fire their barrage of 18 to 30 rockets in less than ten seconds.

GERMAN UNIT OPTIONS

The following options may be available to some German armored units:

- **Additional mantlet armor:** An additional 20mm layer of face-hardened steel armor plate was mounted on the front of the mantlet on some models of PzKpfw III, giving extra protection to the gun and crew.

- **Additional superstructure armor:** An additional 20mm layer of face-hardened steel armor plate was mounted on the front of the superstructure on some models of PzKpfw III, giving extra protection to the crew.

- **Heavy Schuerzen armor skirts:** Similar to regular Schuerzen, this was a thicker model designed for heavier tanks and used primarily on the Panther series. It was capable of stopping explosive rounds and occasionally deflecting smaller armor-piercing rounds that struck at a steep angle.

- **Saukopfblende mantlet:** This type of mantlet was optional on some tanks and self-propelled guns. It was much thicker and more rounded than the ordinary mantlet, giving far superior protection.

- **Schuerzen armor skirts:** These were thin metal skirts attached to the sides of the superstructure and turret in such a way as to protect the vulnerable suspension and the turret. Although too thin to stop any round, explosive rounds, including HEAT rounds (e.g., from the Bazooka), would often be detonated a harmless distance from the main armor of the tank.

- **Zimmerit antimagnetic mine coating:** This device was actually several hundred pounds of cement pasted onto the hull and turret of the tank, and was thick enough so that magnetic mines placed by enemy soldiers would not stick. Unfortunately, it was a wasted effort as the German army was the only major user of such mines.

GERMAN ARMAMENTS

The following charts give the nomenclature for the German ammunition penetration, in millimeters, of non-face-hardened armor plate at the ranges shown for the weapons mounted on German vehicles and those provided as antitank weapons. The lack of penetration data for the APCR round at 2,000 meters represents the fact that it was not common practice for German gunners to fire this type of ammunition at this range as the AP/APCBC round was often equal or superior to this round at long range, and stocks of tungsten were so low that few of these rounds were issued. In addition to these types of ammunition, high explosive and smoke ammunition was also provided for many weapons. Hand-held antitank weapon capabilities are given for comparison.

German Ammunition Designations

Name	Abbreviation	Type of Ammunition
Granate 38 H1/A	G 38 H1/A	High Explosive Antitank (HEAT) [For 75mm L/24]
Granate 38 H1/B	G 38 H1/B	High Explosive Antitank (HEAT) [For 75mm L/24]
Granate 38 H1/C	G 38 H1/C	High Explosive Antitank (HEAT) [For 75mm L/24]
Granate 39 H1/A	G 39 H1/A	High Explosive Antitank (HEAT) [For 105mm L/28 and 150mm L/12]
Granate 39 H1/B	G 39 H1/B	High Explosive Antitank (HEAT) [For 105mm L/28]
Granate 39 H1/C	G 39 H1/C	High Explosive Antitank (HEAT) [For 105mm L/28]
Granate 39 H1	G 39 H1	High Explosive Antitank (HEAT) [For 88mm L/56]
Patrone sMK	Patr sMK	Machinegun ammunition [For MG34 or MG42 machinegun]
Panzergranate	Pzgr	Armor Piercing (AP)
Panzergranate 39	Pzgr 39	Armor Piercing Capped, Ballistic Cap (APCBC)
Panzergranate 39/42	Pzgr 39/42	Armor Piercing Capped, Ballistic Cap (APCBC) [For 75mm L/70]
Panzergranate 39-1	Pzgr 39-1	Armor Piercing Capped, Ballistic Cap (APCBC) [For 88mm L/71]
Panzergranate 40	Pzgr 40	Armor Piercing Composite Rigid (APCR)
Panzergranate 40/42	Pzgr 40/42	Armor Piercing Composite Rigid (APCR) [For 75mm L/70]
Panzergranate 40/43	Pzgr 40/43	Armor Piercing Composite Rigid (APCR) [For 88mm L/71]
Nebelgranate	Nbgr	Smoke
Sprenggranate	Spgr	High Explosive (HE)
Stielgranate 41	Stgr 41	High Explosive Antitank (HEAT) [For 37mm L/45 AT guns only]
Stielgranate 42	Stgr 42	High Explosive Antitank (HEAT) [For 50mm L/60 AT guns only]

Armor Penetration of German Weapons

Weapon	Shell Weight	Muzzle Velocity	Thickness of armor penetrated at 30° angle at 100m	500m	1000m	1500m	2000m
7.92mm MG	0.0115 kg (MG)	785 m/s	8	3	-	-	-
20mm L/55, L/112	0.148 kg (AP)	780 m/s	20	14	9	-	-
	0.1 kg (APCR)	1,050 m/s	49	20	-	-	-
37mm L/45	0.685 kg (AP)	762 m/s	50	36	22	19	-
	0.368 kg (APCR)	1,030 m/s	68	40	-	-	-
	8.63 kg (HEAT)	110 m/s	180	180	-	-	-
37mm L/60	0.685 kg (AP)	770 m/s	35	28	21	17	-
50mm L/42	2.25 kg (APCBC)	685 m/s	54	46	36	28	22
	0.85 kg (APCR)	1,060 m/s	96	58	-	-	-
50mm L/60	2.25 kg (APCBC)	823 m/s	67	61	50	34	26
	0.85 kg (APCR)	1,198 m/s	130	86	55	-	-
	8.2 kg (HEAT)	110 m/s	180	180	-	-	-
75mm L/24	6.8 kg (APCBC)	385 m/s	41	39	35	33	30
	4.65 kg (HEAT)	450 m/s	100	100	100	100	-
75mm L/43	6.8 kg (APCBC)	740 m/s	98	91	82	72	63
	3.18 kg (APCR)	920 m/s	126	108	87	69	-
	4.65 kg (HEAT)	450 m/s	100	100	100	100	-
75mm L/46, L/48	6.8 kg (APCBC)	792 m/s	120	104	89	76	64
	3.18 kg (APCR)	990 m/s	135	115	96	80	-
	4.65 kg (HEAT)	450 m/s	100	100	100	100	-
75mm L/70	6.8 kg (APCBC)	925 m/s	138	124	111	99	89
	4.75 kg (APCR)	1,120 m/s	194	174	149	127	106
88mm L/56	10.2 kg (APCBC)	773 m/s	120	110	100	91	84
	7.3 kg (APCR)	930 m/s	171	156	138	123	110
	7.2 kg (HEAT)	820 m/s	165	165	165	165	-
88mm L/71	10.4 kg (APCBC)	1,000 m/s	203	182	167	153	139
	7.3 kg (APCR)	1,130 m/s	237	226	192	162	136
105mm L/28	15.7 kg (APCBC)	390 m/s	63	56	52	49	46
	12.3 kg (HEAT)	495 m/s	70	70	70	70	-
150mm L/12	25.0 kg (HEAT)	280 m/s	160	160	160	160	-
Panzerfaust 100	2.9 kg (HEAT)	(Rocket launcher)	200	-	-	-	-
Panzerschreck	3.25 kg (HEAT)	(Rocket launcher)	160	-	-	-	-
Tellermine-42	9.4 kg (HE)	(Mine)	100 (At 0 meters)			-	-
AT Hand Grenade	3.0 kg (HEAT)	(Grenade)	150 (At 0 meters)			-	-
AT Rifle Grenade	1.0 kg (HEAT)	(Grenade)	80 (AT rifle grenade)			-	-

PzKpfw II F

Type:	Tank	**Top Speed:**	40 KPH (11 off-road)
Availability:	Jan 40 – Dec 43	**Redline:**	3000 RPM (2600 average)
Playability:	AI only	**Armor:**	
Main Armament:	KwK 38 20mm L/55	**Hull Front:**	35mm
Depression/Elevation:	-10°/+20°	**Hull Sides:**	20mm
Secondary Armament:	Coax MG	**Hull Rear:**	14.5mm
Ammunition:	40 (20mm), 600 (MG)	**Hull Top:**	14.5mm
Smoke:	None	**Superstructure Front:**	35mm
Turret Traverse:	25 seconds	**Superstructure Sides:**	20mm
Radio:	Yes	**Superstructure Rear:**	14.5mm
Target Size:	Small	**Superstructure Top:**	14.5mm
Height:	2.15 meters	**Mantlet:**	10mm
Weight:	9.5 tons	**Turret Front:**	35mm
Ground Pressure:	1.0 kg/cm2	**Turret Sides:**	20mm
Maximum Slope:	30°	**Turret Rear:**	20mm
Maximum Vertical:	0.6 meters	**Turret Top:**	14.5mm

The PanzerKampfwagen IIF was the last of the PzKpfw I and PzKpfw II series of tanks to be produced in quantity and used on the Western Front. By 1942, this vehicle was already obsolete, and was therefore used only in a reconnaissance role. In the invasions of Poland, France, Norway, Yugoslavia, and Greece, the PzKpfw II series had distinguished itself as the mainstay of German armored forces, however, it was realized even in those early battles that its armament was too weak and its armor too thin to engage enemy medium tanks. Only 524 PzKpfw IIF were produced (compared to 1,256 of all prior PzKpfw II variants), with manufacture ending in late 1942. The chassis of the PzKpfw II was used for the Marder II tank destroyer, and many of the chassis from older PzKpfw II were converted to this use.

Options: None.

PzKpfw III H

Type:	Tank	**Top Speed:**	38 KPH (11 off-road)
Availability:	Jan 41 – Dec 42	**Redline:**	3000 RPM (2600 average)
Playability:	Wingman only	**Armor:**	
Main Armament:	KwK 38 50mm L/42	**Hull Front:**	30mm
Depression/Elevation:	-10°/+20°	**Hull Sides:**	30mm
Secondary Armament:	Hull MG, Coax MG	**Hull Rear:**	30mm
Ammunition:	99 (50mm), 3750 (MG)	**Hull Top:**	10mm
Smoke:	None	**Superstructure Front:**	30mm
Turret Traverse:	35 seconds	**Superstructure Sides:**	30mm
Radio:	Yes	**Superstructure Rear:**	30mm
Target Size:	Medium	**Superstructure Top:**	10mm
Height:	2.5 meters	**Mantlet:**	10mm
Weight:	21.6 tons	**Turret Front:**	30mm
Ground Pressure:	0.93 kg/cm2	**Turret Sides:**	30mm
Maximum Slope:	30°	**Turret Rear:**	30mm
Maximum Vertical:	0.6 meters	**Turret Top:**	20mm

The PanzerKampfwagen IIIH (which includes the upgunned models of the PzKpfw IIIG with 50mm L/42 gun) was the first German production tank with a 50mm gun. Although it was originally intended to mount the 50mm L/60, the 50mm L/42 was used in the interim. This gun was far superior to the original 37mm L/46.5. In 1941, when this version was first introduced, it had comparatively good armor as well as a good gun. Although later versions increased its lethality, it proved to be too light to be a good medium tank, and it was quickly outclassed by Soviet tanks on the Eastern Front. 908 of the PzKpfw III G and H series were built by April 1941, when production ceased, compared to 601 vehicles of all previous PzKpfw III models put together.

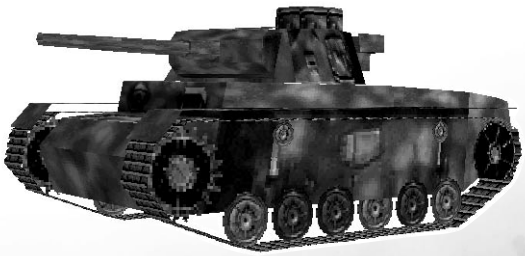
Options: None.

PzKpfw III J

Type:	Tank	**Top Speed:**	38 KPH (11 off-road)
Availability:	Mar 42 – Dec 43	**Redline:**	3000 RPM (2600 average)
Playability:	Wingman only	**Armor:**	
Main Armament:	KwK 39 50mm L/60	**Hull Front:**	50mm
Depression/Elevation:	-10°/+20°	**Hull Sides:**	30mm
Secondary Armament:	Hll MG, Coax MG	**Hull Rear:**	50mm
Ammunition:	84 (50mm), 3750 (MG)	**Hull Top:**	10mm
Smoke:	No	**Superstructure Front:**	50mm
Turret Traverse:	35 seconds	**Superstructure Sides:**	30mm
Radio:	Yes	**Superstructure Rear:**	50mm
Target Size:	Medium	**Superstructure Top:**	10mm
Height:	2.5 meters	**Mantlet:**	10mm
Weight:	21.5 tons	**Turret Front:**	30mm
Ground Pressure:	0.94 kg/cm2	**Turret Sides:**	30mm
Maximum Slope:	30°	**Turret Rear:**	30mm
Maximum Vertical:	0.6 meters	**Turret Top:**	20mm

The Panzerkampfwagen IIIJ improved on the interim upgrade of the armor as provided on the PzKpfw III H, and also incorporated several minor modifications to the hull and superstructure. Additional plates of armor were also available to increase this armor as it later became outclassed by enemy guns. 1,549 of the PzKpfw IIIJ model were produced with the 50mm L/42 gun, and a further 1,067 with the 50mm L/60 gun, with earlier models being upgraded as quickly as possible. Production of this model was halted in mid-1942 in favor of the N-model with its short-barrelled 75mm gun.

Options: Additional mantlet armor, Additional superstructure armor.

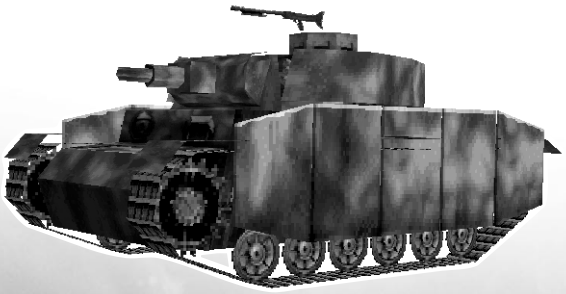


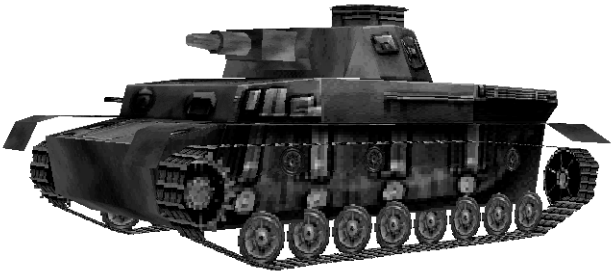
PzKpfw III N

Type:	Tank	**Top Speed:**	38 KPH (11 off-road)
Availability:	Sep 42 – Dec 44	**Redline:**	3000 RPM (2600 average)
Playability:	Wingman only	**Armor:**	
Main Armament:	KwK 37 75mm L/24	**Hull Front:**	50mm
Depression/Elevation:	-10°/+20°	**Hull Sides:**	30mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear:**	50mm
Ammunition:	64 (75mm), 3450 (MG)	**Hull Top:**	10mm
Smoke:	No	**Superstructure Front:**	50mm
Turret Traverse:	35 seconds	**Superstructure Sides:**	30mm
Radio:	Yes	**Superstructure Rear:**	50mm
Target Size:	Medium	**Superstructure Top:**	10mm
Height:	2.5 meters	**Mantlet**:	10mm
Weight:	23.0 tons	**Turret Front:**	50mm
Ground Pressure:	1.03 kg/cm2	**Turret Sides:**	30mm
Maximum Slope:	30°	**Turret Rear:**	30mm
Maximum Vertical:	0.6 meters	**Turret Top**:	20mm

The PanzerKampfwagen IIIN was the final vehicle of the PzKpfw III series, and was mechanically almost identical to the PzKpfw IIIJ. The 50mm L/60 gun, which had become ineffective against more modern medium tanks, was replaced by the 75mm L/24 gun, which was capable of firing both high-explosive shells, in the infantry support role, and high-explosive antitank shells (HEAT) with greater armor penetrating capability than the 50mm gun. Due to increased weight of the 75mm gun, additional mantlet armor was not available, however, this was made up for in part by the addition of Schuerzen armor skirts. Only 663 of this variant of the PzKpfw III were produced, and 37 converted from older models, before production ceased in mid-1943.

Options: Additional superstructure armor, Schuerzen armor skirts.





PzKpfw IV E

Type:	Tank	**Top Speed:**	38 KPH (11 off-road)
Availability:	Jan 41 – Dec 43	**Redline:**	3000 RPM (2600 average)
Playability:	Player	**Armor:**	
Main Armament:	KwK 37 75mm L/24	**Hull Front:**	30mm
Depression/Elevation:	-10°/+20°	**Hull Sides:**	20mm
Secondary Armament:	Hull MG, Coax MG	**Hull Rear:**	20mm
Ammunition:	80 (75mm), 3150 (MG)	**Hull Top:**	10mm
Smoke:	None	**Superstructure Front:**	30mm
Turret Traverse:	35 seconds	**Superstructure Sides:**	20mm
Radio:	Yes	**Superstructure Rear:**	20mm
Target Size:	Large	**Superstructure Top:**	10mm
Height:	2.68 meters	**Mantlet:**	37mm
Weight:	21 tons	**Turret Front:**	30mm
Ground Pressure:	0.79 kg/cm2	**Turret Sides:**	20mm
Maximum Slope:	30°	**Turret Rear:**	20mm
Maximum Vertical:	0.6 meters	**Turret Top:**	20mm

The PanzerKampfwagen IVE was typical of the early models in this series, with 223 E-type and 640 of all earlier types being manufactured before production was stopped in favor of the later variants of this series. It shared a weakness of armor in common with its smaller brother, the PzKpfw III, and was outfitted from the start with a short-barrelled 75mm L/24 gun. This gun was intended to be used against enemy infantry, not tanks, and did not gain any real tank-fighting capability until the introduction of the high-explosive antitank round. By this time, the PzKpfw IV series had been fitted with larger guns with the ability to fire armor-piercing rounds. Although the PzKpfw IVE was manufactured until early 1941, it was out of the inventory by early 1944.

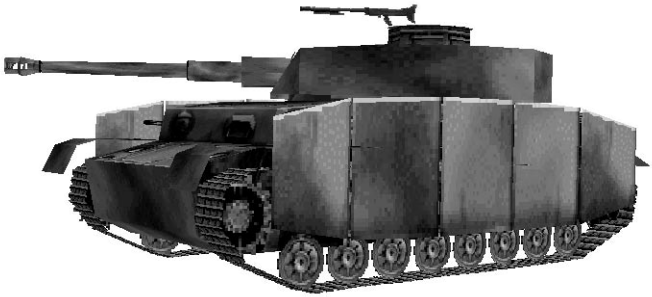
Options: None.

PzKpfw IV F2

Type:	Tank	**Top Speed**:	38 KPH (11 off-road)
Availability:	Jun 42 – Dec 43	**Redline**:	3000 RPM (2600 average)
Playability:	Player	**Armor**:	
Main Armament:	KwK 40 75mm L/43	**Hull Front**:	50mm
Depression/Elevation:	-10°/+20°	**Hull Sides**:	20mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	20mm
Ammunition:	87 (75mm), 3192 (MG)	**Hull Top**:	10mm
Smoke:	None	**Superstructure Front**:	50mm
Turret Traverse:	35 seconds	**Superstructure Sides**:	20mm
Radio:	Yes	**Superstructure Rear**:	20mm
Target Size:	Large	**Superstructure Top**:	10mm
Height:	2.68 meters	**Mantlet**:	37mm
Weight:	23.6 tons	**Turret Front**:	50mm
Ground Pressure:	0.84 kg/cm^2	**Turret Sides**:	30mm
Maximum Slope:	30°	**Turret Rear**:	30mm
Maximum Vertical:	0.6 meters	**Turret Top**:	20mm

The PanzerKampfwagen IVE was replaced by the PzKpfw IVF series, of which the F1 was simply an E-type with the addition of thicker armor and wider tracks. The PzKpfw IVF2 had not only these improvements, but also a 75mm L/43 gun, enabling it to fight the better-armored Soviet and British tanks on equal, if not superior, terms. 175 PzKpfw IVF2 were built, and 25 more converted from F1-types, before production was halted in July, 1942, in favor of the PzKpfw IV G and H series vehicles.

Options: Schuerzen armor skirts, PzGr40 ammunition.

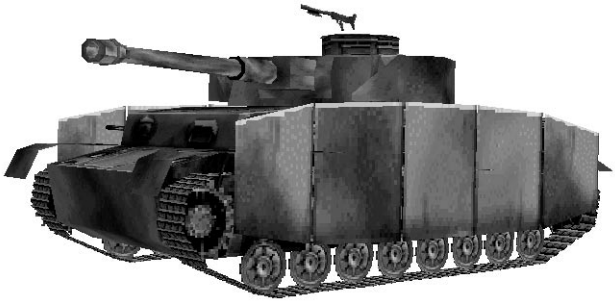


PzKpfw IV H

Type:	Tank	**Top Speed**:	38 KPH (11 off-road)
Availability:	Aug 42 – May 45	**Redline**:	3000 RPM (2600 average)
Playability:	Player	**Armor**:	
Main Armament:	KwK 40 75mm L/48	**Hull Front**:	80mm
Depression/Elevation:	-10°/+20°	**Hull Sides**:	30mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	20mm
Ammunition:	87 (75mm), 3150 (MG)	**Hull Top**:	15mm
Smoke:	None	**Superstructure Front**:	80mm
Turret Traverse:	35 seconds	**Superstructure Sides**:	30mm
Radio:	Yes	**Superstructure Rear**:	20mm
Target Size:	Large	**Superstructure Top**:	15mm
Height:	2.68 meters	**Mantlet**:	50mm
Weight:	26.0 tons	**Turret Front**:	80mm
Ground Pressure:	0.89 kg/cm^2	**Turret Sides**:	30mm
Maximum Slope:	30°	**Turret Rear**:	30mm
Maximum Vertical:	0.6 meters	**Turret Top**:	20mm

The PanzerKampfwagen IVH differed from the PzKpfw IVG only in minor features, and late model PzKpfw IVG tanks are nearly identical with early H-type models. 1,687 PzKpfw IVG and 3,774 PzKpfw IVH were produced between Spring, 1942, and Summer, 1944. These tanks were superior in both armor protection and firepower to the earlier models of this series as a result of an increased thickness of interlocked armor and the installation of a more powerful 75mm L/48 gun. The PzKpfw IVH was replaced in service by the PzKpfw IVJ, which was the culmination of the series.

Options: Schuerzen armor skirts, PzGr 40 ammunition.



PzKpfw IV J

Type:	Tank	**Top Speed**:	38 KPH (11 off-road)
Availability:	Jan 44 – May 45	**Redline**:	3000 RPM (2600 average)
Playability:	Player	**Armor**:	
Main Armament:	KwK 40 75mm L/48	**Hull Front**:	80mm
Depression/Elevation:	-10°/+20°	**Hull Sides**:	30mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	20mm
Ammunition:	87 (75mm), 3150 (MG)	**Hull Top**:	15mm
Smoke:	None	**Superstructure Front**:	80mm
Turret Traverse:	35 seconds	**Superstructure Sides**:	30mm
Radio:	Yes	**Superstructure Rear**:	20mm
Target Size:	Large	**Superstructure Top**:	15mm
Height:	2.68 meters	**Mantlet**:	50mm
Weight:	25.0 tons	**Turret Front**:	80mm
Ground Pressure:	0.89 kg/cm^2	**Turret Sides**:	30mm
Maximum Slope:	30°	**Turret Rear**:	30mm
Maximum Vertical:	0.6 meters	**Turret Top**:	20mm

The PanzerKampfwagen IVJ was manufactured right up until the end of the war and was the final version of the PzKpfw IV series to be built. Most of the changes on this vehicle were intended to speed production, however, armor thickness and close-range defenses were improved as well as the exhaust and fuel systems. 1,758 PzKpfw IVJ were built, bringing the total number of PzKpfw IV series tanks to 8,744, not including command vehicles and other vehicles which used the PzKpfw IV chassis.

Options: Schuerzen armor skirts, PzGr 40 ammunition.

PzKpfw V D Panther

Type:	Tank	**Top Speed**:	55 KPH (30 off-road)
Availability:	Jul 43	**Redline**:	3000 RPM (2500 average)
Playability:	Player	**Armor**:	
Main Armament:	KwK 42 75mm L/70	**Hull Front**:	80mm
Depression/Elevation:	-8°/+20°	**Hull Sides**:	40mm
Secondary Armament:	Hull MG, Coax MG	**Hull Rear**:	40mm
Ammunition:	79 (75mm), 4200 (MG)	**Hull Top**:	15mm
Smoke:	None	**Superstructure Front**:	80mm
Turret Traverse:	35 seconds	**Superstructure Sides**:	40mm
Radio:	Yes	**Superstructure Rear**:	40mm
Target Size:	Very Large	**Superstructure Top**:	16mm
Height:	2.99 meters	**Mantlet**:	100mm
Weight:	44.8 tons	**Turret Front**:	80mm
Ground Pressure:	0.88 kg/cm^2	**Turret Sides**:	45mm
Maximum Slope:	30°	**Turret Rear**:	45mm
Maximum Vertical:	0.9 meters	**Turret Top**:	16mm

Although designated the PanzerKampfwagen VD, this was the first model of the famous Panther tank to be manufactured (possibly taking its Ausführung designator from Daimler-Benz, its manufacturer). The Panther was loosely based on the Soviet T-34 tank, with the addition of some newer German technologies and along more traditional German lines. Mechanical performance was poor on this first model, but combat performance was excellent, even against the newest Allied tanks. The effective 75mm L/70 gun and thick, steeply-sloped armor combined with the wide tracks and powerful engine came to epitomize German tank production during World War II. 850 of this type were produced between January and September 1943, when production was stopped in favor of the PzKpfw VA.

Options: Heavy Schuerzen armor skirts

PzKpfw V A Panther

Type:	Tank	**Top Speed**:	55 KPH (30 off-road)
Availability:	Jul 43 – Apr 44	**Redline**:	3000 RPM (2500 average)
Playability:	Player	**Armor**:	
Main Armament:	KwK 42 75mm L/70	**Hull Front**:	80mm
Depression/Elevation:	-8°/+20°	**Hull Sides**:	40mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	40mm
Ammunition:	79 (75mm), 4200 (MG)	**Hull Top**:	15mm
Smoke:	None	**Superstructure Front**:	80mm
Turret Traverse:	35 seconds	**Superstructure Sides**:	40mm
Radio:	Yes	**Superstructure Rear**:	40mm
Target Size:	Very Large	**Superstructure Top**:	16mm
Height:	2.99 meters	**Mantlet**:	100mm
Weight:	44.8 tons	**Turret Front**:	110mm
Ground Pressure:	0.88 kg/cm^2	**Turret Sides**:	45mm
Maximum Slope:	30°	**Turret Rear**:	45mm
Maximum Vertical:	0.9 meters	**Turret Top**:	16mm

The PanzerKampfwagen VA was simply a performance-improved model of the PzKpfw VD, with modifications to the engine, transmission, and exhaust systems. A new machinegun mount for the hull MG and a new cupola for the vehicle commander were also added. When production ceased in May, 1944, 2,000 PzKpfw VA had been built. The vehicle was subsequently replaced by the PzKpfw VG.

Options: Heavy Schuerzen armor skirts.

PzKpfw V G Panther

Type:	Tank	**Top Speed**:	55 KPH (30 off-road)
Availability:	Oct 43 – May 45	**Redline**:	3000 RPM (2500 average)
Playability:	Player	**Armor**:	
Main Armament:	KwK 42 75mm L/70	**Hull Front**:	80mm
Depression/Elevation:	-8°/+20°	**Hull Sides**:	50mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	40mm
Ammunition:	79 (75mm), 4200 (MG)	**Hull Top**:	30mm
Smoke:	None	**Superstructure Front**:	80mm
Turret Traverse:	35 seconds	**Superstructure Sides**:	40mm
Radio:	Yes	**Superstructure Rear**:	40mm
Target Size:	Very Large	**Superstructure Top**:	30mm
Height:	2.99 meters	**Mantlet**:	100mm
Weight:	44.8 tons	**Turret Front**:	110mm
Ground Pressure:	0.88 kg/cm^2	**Turret Sides**:	45mm
Maximum Slope:	30°	**Turret Rear**:	45mm
Maximum Vertical:	0.9 meters	**Turret Top**:	16mm

The PanzerKampfwagen VG Panther was the peak of the Panther series and was produced right up until the end of the war, with 3,126 being built altogether. Armor thickness was improved, shot traps eliminated, and even a heater for the crew compartment was installed. The Panther was the peak of German armored vehicle design, and influenced tank design around the world for several years.

Options: Heavy Schuerzen armor skirts.

PzKpfw VI E Tiger

Type:	Tank	**Top Speed**:	45 KPH (17 off-road)
Availability:	Dec 42 – Dec 44	**Redline**:	3000 RPM (2500 average)
Playability:	Player	**Armor**:	
Main Armament:	KwK 36 88mm L/56	**Hull Front**:	100mm
Depression/Elevation:	-9°/10°	**Hull Sides**:	60mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	80mm
Ammunition:	92 (88mm), 4800 (MG)	**Hull Top**:	25mm
Smoke:	None	**Superstructure Front**:	100mm
Turret Traverse:	40 seconds	**Superstructure Sides**:	80mm
Radio:	Yes	**Superstructure Rear**:	80mm
Target Size:	Very Large	**Superstructure Top**:	25mm
Height:	2.93 meters	**Mantlet**:	110mm
Weight:	57.0 tons	**Turret Front**:	100mm
Ground Pressure:	1.04 kg/cm^2	**Turret Sides**:	80mm
Maximum Slope:	35°	**Turret Rear**:	80mm
Maximum Vertical:	0.8 meters	**Turret Top**:	25mm

The PanzerKampfwagen VIE was originally designed as a heavy breakthrough tank, for making a hole in enemy lines for the lighter tanks and reserves to move through into the enemy rear areas. For nearly the entire war, it was one of the most powerful tanks on the battlefield. Although slow, it had wide tracks for greater maneuverability. Although its armor was not sloped, it had some of the thickest armor of any tank, with at least 100mm on all frontal surfaces. Its gun, the famous 88mm L/56 was capable of knocking out any enemy tank right up until the end of the war. Issued to special heavy tank battalions, this vehicle was so feared that most Allied soldiers on the Western Front misidentified almost any German tank as a Tiger! A total of 1,354 Tiger tanks of both the early and late production model were built between the Summers of 1942 and 1944.

Options: None.

PzKpfw VI E Tiger (late version)

Type:	Tank	**Top Speed**:	42 KPH (15 off-road)
Availability:	Jan 44 – May 45	**Redline**:	3000 RPM (2500 average)
Playability:	Player	**Armor**:	
Main Armament:	KwK 36 88mm L/56	**Hull Front**:	100mm
Depression/Elevation:	-9°/10°	**Hull Sides**:	60mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	80mm
Ammunition:	92 (88mm), 4800 (MG)	**Hull Top**:	25mm
Smoke:	None	**Superstructure Front**:	100mm
Turret Traverse:	40 seconds	**Superstructure Sides**:	80mm
Radio:	Yes	**Superstructure Rear**:	80mm
Target Size:	Very large	**Superstructure Top**:	25mm
Height:	2.93 meters	**Mantlet**:	110mm
Weight:	57.9 tons	**Turret Front**:	100mm
Ground Pressure:	1.05 kg/cm^2	**Turret Sides**:	80mm
Maximum Slope:	35°	**Turret Rear**:	80mm
Maximum Vertical:	0.8 meters	**Turret Top**:	40mm

The late model of the PanzerKampfwagen VIE Tiger tank was distinguishable from the earlier models only by improvements in the viewports and hatches, with performance being enhanced by the installation of a new engine and a suspension system with steel wheels, and combat capabilities improved by the installation of the Nahverteidigungswaffe close-defense system.

Options: Zimmerit antimagnetic mine coating.

PzKpfw VI B King Tiger

Type:	Tank	**Top Speed**:	42 KPH (18 off-road)
Availability:	Jun 44 – May 45	**Redline**:	3000 RPM (2600 average)
Playability:	AI only	**Armor**:	
Main Armament:	KwK 43 88mm L/71	**Hull Front**:	150mm
Depression/Elevation:	-8°/15°	**Hull Sides**:	80mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	80mm
Ammunition:	84 (88mm), 5850 (MG)	**Hull Top**:	40mm
Smoke:	None	**Superstructure Front**:	150mm
Turret Traverse:	50 seconds	**Superstructure Sides**:	80mm
Radio:	Yes	**Superstructure Rear**:	80mm
Target Size:	Huge	**Superstructure Top**:	40mm
Height:	3.08 meters	**Mantlet**:	80mm
Weight:	69.8 tons	**Turret Front**:	180mm
Ground Pressure:	1.02 kg/cm^2	**Turret Sides**:	80mm
Maximum Slope:	35°	**Turret Rear**:	80mm
Maximum Vertical:	0.85 meters	**Turret Top**:	40mm

The PanzerKampfwagen VIB was the ultimate expression of the heavy tank to appear in the Second World War. Although the Americans had a gun which was as powerful as its 88mm L/71, and the Soviets had tanks with thicker armor, the quality and design of this vehicle left it with capabilities which outclassed any Allied tank of its time. With a gun that could penetrate over 9" of armor at point-blank range, and over 7" of frontal turret armor, its low speed was an insignificant problem for an army fighting mostly defensive battles. In all, 489 PzKpfw VIB were produced from early 1944 until the end of the war.

Options: None.

StuG IIIG

Type:	Assault gun	**Maximum Vertical**:	0.6 meters
Availability:	Jun 42 – May 45	**Top Speed**:	40 KPH (11 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	KwK 40 75mm L/48	**Armor**:	
Depression/Elevation:	-10°/+20°	**Hull Front**:	80mm
Secondary Armament:	AA MG	**Hull Sides**:	30mm
Ammunition:	54 (75mm), 600 (MG)	**Hull Rear**:	30mm
Smoke:	Yes	**Hull Top**:	20mm
Radio:	Yes	**Superstructure Front**:	80mm
Target Size:	Small	**Superstructure Sides**:	30mm
Height:	2.16 meters	**Superstructure Rear**:	30mm
Weight:	23.9 tons	**Superstructure Top**:	20mm
Ground Pressure:	1.04 kg/cm^2	**Mantlet**:	15mm
Maximum Slope:	30°		

The Sturmgeshütze IIIG was the successor to a long line of assault guns based on the PzKpfw III chassis. The first vehicles of the series were armed with the 75mm L/24 gun, and later versions armed with the 75mm L/43 or L/48 gun. 1,365 StuG III of earlier vehicles were produced, plus 7,720 of the StuG IIIG. The low silhouette of the vehicle combined with its good ballistic shape and thick armor (80mm in front) gave it excellent protection, while its powerful 75mm L/48 gun could deal with nearly any Allied tanks. It was cheaper and easier to produce than regular tanks, its only drawback being the lack of a turret, which limited its usefulness to open terrain and improved fighting positions.

Options: Zimmerit antimagnetic mine coating, Schuerzen armor skirts, Saukopfblende mantlet.

StuH 42

Type:	Assault gun	**Maximum Vertical**:	0.6 meters
Availability:	Nov 42 – May 45	**Top Speed**:	40 KPH (11 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	StuH 42 105mm L/28	**Armor**:	
Depression/Elevation:	-10°/+20°	**Hull Front**:	80mm
Secondary Armament:	AA MG	**Hull Sides**:	30mm
Ammunition:	36 (105mm), 600 (MG)	**Hull Rear**:	30mm
Smoke:	Yes	**Hull Top**:	20mm
Radio:	Yes	**Superstructure Front**:	80mm
Target Size:	Small	**Superstructure Sides**:	30mm
Height:	2.16 meters	**Superstructure Rear**:	30mm
Weight:	23.9 tons	**Superstructure Top**:	20mm
Ground Pressure:	1.04 kg/cm^2	**Mantlet**:	15mm
Maximum Slope:	30°		

The Sturmhaubitze 42 was designed to give the StuG units some integral artillery support. It had the same chassis, size, and shape as the StuG III series vehicles, but was armed with a lower-velocity 105mm L/28 howitzer for use against infantry, light vehicles, and emplacements. Between late 1942 and early 1945, 1,211 StuH 42 were built.

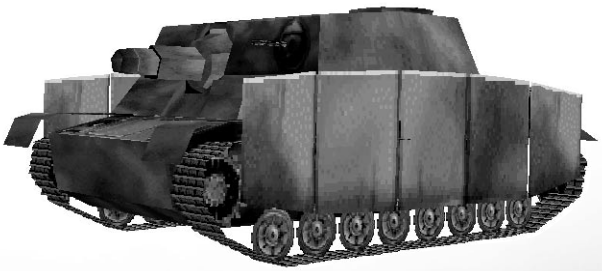
Options: Zimmerit antimagnetic mine coating, Schuerzen armor skirts, Saukopfblende mantlet.

StuPz IV Brummbar

Type:	Assault gun	**Maximum Vertical**:	0.6 meters
Availability:	Jul 42 – May 45	**Top Speed**:	40 KPH (11 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	StuH 43 150mm L/12	**Armor**:	
Depression/Elevation:	-10°/+20°	**Hull Front**:	100mm
Secondary Armament:	Hull MG, AA MG	**Hull Sides**:	40mm
Ammunition:	38 (150mm), 600 (MG)	**Hull Rear**:	20mm
Smoke:	None	**Hull Top**:	20mm
Radio:	Yes	**Superstructure Front**:	100mm
Target Size:	Small	**Superstructure Sides**:	50mm
Height:	2.16 meters	**Superstructure Rear**:	30mm
Weight:	28.2 tons	**Superstructure Top**:	20mm
Ground Pressure:	0.98 kg/cm^2	**Mantlet**:	15mm
Maximum Slope:	30°		

The Sturmpanzer IV was built on the chassis of the PzKpfw IV tank. It was designed as a heavily armored assault gun to supplement the armored forces in the artillery role, although its 150mm L/12 gun could demolish a tank if it was lucky enough to hit it! Between the Springs of 1943 and 1945, 298 StuPz IV were manufactured.

Options: Zimmerit antimagnetic mine coating, Schuerzen armor skirts.



PzJäg 38(t) Marder III

Type:	Tank destroyer	**Maximum Vertical**:	0.8 meters
Availability:	May 42 – May 45	**Top Speed**:	47 KPH (15 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	PaK 40 75mm L/46	**Armor**:	
Depression/Elevation:	-9°/+9°	**Hull Front**:	25mm
Secondary Armament:	Hull MG	**Hull Sides**:	15mm
Ammunition:	38 (75mm), 1200 (MG)	**Hull Rear**:	15mm
Smoke:	None	**Hull Top**:	15mm
Radio:	Yes	**Superstructure Front**:	14.5mm
Target Size:	Medium	**Superstructure Sides**:	10mm
Height:	2.47 meters	**Superstructure Rear**:	Open
Weight:	23.9 tons	**Superstructure Top**:	Open
Ground Pressure:	0.67 kg/cm^2	**Mantlet**:	None
Maximum Slope:	30°		

The PanzerJäger 38(t) Marder III was designed as an improvement on the earlier Marder II series vehicles, which used the PzKpfw II chassis and a 75mm L/40 gun. The original Marder III vehicles mounted captured Soviet 76.2mm L/51.5 guns, however, these were soon replaced with the newer German antitank guns. The chassis for this vehicle was that of the Czech PanzerKampfwagen 38(t) tank, which had been adopted by the German army in great numbers during the occupation of the Sudetenland in 1938, but was phased out of service early in the invasion of the Soviet Union in 1941. 975 Marder III were manufactured or converted between Spring 1943 and Spring 1944, when the vehicle was replaced in service by the Hetzer. 1,431 of earlier versions, including Marder II and versions armed with captured guns, were built or converted during the war as well.

Options: None.

JgdPz III (IV) Hornisse (Nashorn)

Type:	Tank destroyer	**Maximum Vertical**:	0.6 meters
Availability:	Jul 43 – May 45	**Top Speed**:	40 KPH (11 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	PaK 43 88mm L/71	**Armor**:	
Depression/Elevation:	-8°/+40°	**Hull Front**:	30mm
Secondary Armament:	AA MG	**Hull Sides**:	20mm
Ammunition:	40 (88mm), 600 (MG)	**Hull Rear**:	20mm
Smoke:	None	**Hull Top**:	20mm
Radio:	Yes	**Superstructure Front**:	10mm
Target Size:	Very large	**Superstructure Sides**:	10mm
Height:	2.94 meters	**Superstructure Rear**:	10mm
Weight:	24.0 tons	**Superstructure Top**:	Open
Ground Pressure:	0.85 kg/cm^2	**Mantlet**:	None
Maximum Slope:	30°		

The JagdPanzer III and IV were identical vehicles, their sole difference lying in the chassis upon which their superstructure was built (PzKpfw III for the Hornisse, PzKpfw IV for the Nashorn). The lightly armored superstructure housed one of the most powerful antitank guns of the entire war, the 88mm L/71 (the same gun used on the King Tiger heavy tank). Although highly effective against enemy tanks, it was necessary to conceal these vehicles carefully and screen them with infantry due to their large size and thin armor. 494 of both types were manufactured between early 1943 and early 1945.

Options: None.

JgdPz 38(t) Hetzer

Type:	Assault gun	**Maximum Vertical**:	0.65 meters
Availability:	Aug 44 – May 45	**Top Speed**:	40 KPH (25 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	PaK 39 75mm L/48	**Armor**:	
Depression/Elevation:	-6°/+12°	**Hull Front**:	60mm
Secondary Armament:	AA MG	**Hull Sides**:	20mm
Ammunition:	40 (75mm), 600 (MG)	**Hull Rear**:	20mm
Smoke:	None	**Hull Top**:	8mm
Radio:	Yes	**Superstructure Front**:	60mm
Target Size:	Small	**Superstructure Sides**:	20mm
Height:	2.1 meters	**Superstructure Rear**:	20mm
Weight:	16.0 tons	**Superstructure Top**:	8mm
Ground Pressure:	0.78 kg/cm^2	**Mantlet**:	70mm
Maximum Slope:	30°		

The Jagdpanzer 38(t) Hetzer was another vehicle built on the chassis of the outdated Czech PanzerKampfwagen 38(t), however, unlike the Marder III, this vehicle was small and low, with thicker armor, and a more powerful gun. Its design was new, although based on that of an experimental Romanian tank destroyer, and so effective that 2,584 were built in the last year of the war.

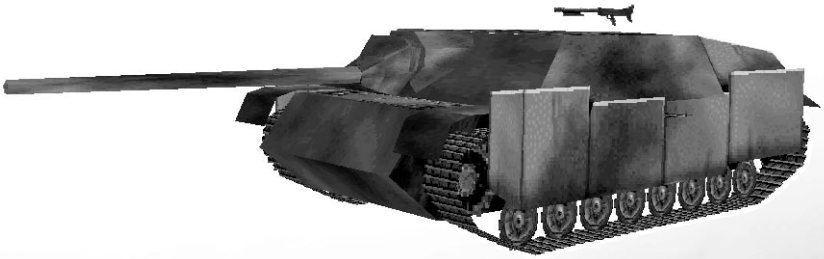
Options: Schuerzen armor skirts.

JagdPz IV/70

Type:	Assault gun	**Maximum Vertical**:	0.6 meters
Availability:	Mar 44 – May 45	**Top Speed**:	40 KPH (11 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	StuK 42 75mm L/70	**Armor**:	
Depression/Elevation:	-8°/+12°	**Hull Front**:	60mm
Secondary Armament:	AA MG	**Hull Sides**:	30mm
Ammunition:	79 (75mm), 1200 (MG)	**Hull Rear**:	20mm
Smoke:	None	**Hull Top**:	20mm
Radio:	Yes	**Superstructure Front**:	60mm
Target Size:	Small	**Superstructure Sides**:	30mm
Height:	1.85 meters	**Superstructure Rear**:	30mm
Weight:	23.0 tons	**Superstructure Top**:	20mm
Ground Pressure:	0.83 kg/cm^2	**Mantlet**:	70mm
Maximum Slope:	30°		

The JagdPanzer IV was built to replace the StuG III, StuG IV, and JgdPz IV series vehicles, although production of all of these vehicles continued nearly to the end of the war. The JgdPz IV was typical of the later German assault gun/tank destroyers in that it used a proven chassis and drive train (in this case that of the PzKpfw IV tank) and had thick, well-sloped armor surrounding a powerful antitank gun. The 75mm L/70 gun was similar to that used on the Panther series tanks, and was probably the best gun in its class of the war. 930 were produced between August 1944 and March 1945, supplementing the 1,139 StuG IV and 769 JgdPz IV it was supposed to replace.

Options: Zimmerit antimagnetic mine coating, Schuerzen armor skirts.

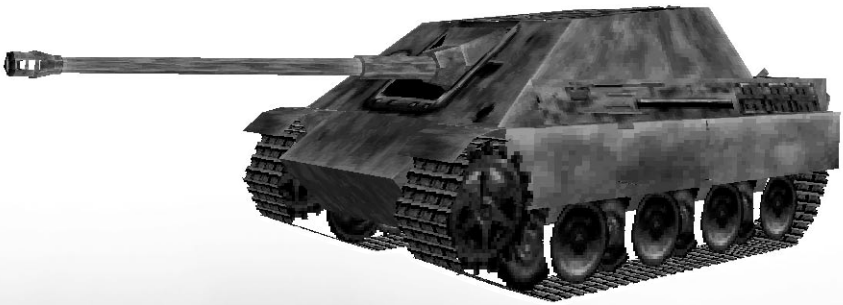


JagdPz V JagdPanther

Type:	Assault gun	**Maximum Vertical**:	0.9 meters
Availability:	Jun 44 – May 45	**Top Speed**:	55 KPH (16 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	PaK 43 88mm L/71	**Armor**:	
Depression/Elevation:	-8°/+14°	**Hull Front**:	80mm
Secondary Armament:	Hull MG	**Hull Sides**:	40mm
Ammunition:	57 (88mm), 600 (MG)	**Hull Rear**:	40mm
Smoke:	None	**Hull Top**:	25mm
Radio:	Yes	**Superstructure Front**:	80mm
Target Size:	Medium	**Superstructure Sides**:	50mm
Height:	2.71 meters	**Superstructure Rear**:	40mm
Weight:	45.5 tons	**Superstructure Top**:	25mm
Ground Pressure:	0.87 kg/cm^2	**Mantlet**:	80mm
Maximum Slope:	30°		

The JagdPanther was a large and extremely potent tank hunter, based on earlier designs which used PzKpw III and IV series chassis, but using the heavier Panther chassis and mounting an 88mm L/71 gun (similar to that used in the King Tiger heavy tank). The armor was reasonably thick, and steeply sloped, and an advanced Nahverteidigungswaffe close-defense weapon was built-in. 392 JagdPanther were produced between early 1944 and the end of the war.

Options: Schuerzen armor skirts.



Elefant

Type:	Assault gun	**Maximum Vertical**:	0.6 meters
Availability:	Nov 42 – May 45	**Top Speed**:	40 KPH (11 off-road)
Playability:	AI only	**Redline**:	3000 RPM
Main Armament:	PaK 43 88mm L/71	**Armor**:	
Depression/Elevation:	-10°/+20°	**Hull Front**:	80mm
Secondary Armament:	Hull MG	**Hull Sides**:	30mm
Ammunition:	50 (88mm), 600 (MG)	**Hull Rear**:	30mm
Smoke:	Yes	**Hull Top**:	20mm
Radio:	Yes	**Superstructure Front**:	80mm
Target Size:	Large	**Superstructure Sides**:	30mm
Height:	2.16 meters	**Superstructure Rear**:	30mm
Weight:	23.9 tons	**Superstructure Top**:	20mm
Ground Pressure:	1.04 kg/cm^2	**Mantlet**:	15mm
Maximum Slope:	30°		

The Elefant (originally called the Ferdinand) was a heavy antitank gun mounted in a very heavily armored cupola mounted on a Tiger chassis (with two Maybach engines). Only 90 vehicles were built in the Spring of 1943, however, these were so powerful that they lasted through use on both the Eastern Front and in Italy. Just over half of these vehicles actually mounted the hull machinegun, with the rest (the original Ferdinands) remaining defenseless against infantry attacks.

Options: None.

SPW 250/1

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Sep 41 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	3000 RPM
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	14.5mm
Secondary Armament:	Hull MG	**Hull Sides**:	8mm
Ammunition:	3000 (MG)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	Yes	**Superstructure Front**:	14.5mm
Target Size:	Small	**Superstructure Sides**:	8mm
Height:	1.66 meters	**Superstructure Rear**:	8mm
Weight:	5.8 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

The Schutzenpanzerwagen SdKfz 250/1 was a later model of the SdKfz 50 halftrack, and the foundation of all of the specialized SdKfz 250-series vehicles. Its main purpose was to carry a half-squad into combat, although the many variants also had additional capabilities. 4,250 were produced from mid-1941 to late 1943, with an additional 2,378 of a simplified version produced until the end of the war (this included all of the SPW 250 variants). Although the SPW 250/1 mounted a forward-firing MG34, the half-squad's MG34 (if it had one) could be placed in an AA mount on the rear of the vehicle. Unarmed versions of this vehicle were also used as munitions carriers, command posts, and observation vehicles.

Options: None.

SPW 250/1 sMG

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Sep 41 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	3000 RPM
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	14.5mm
Secondary Armament:	Hull MG, Rear MG	**Hull Sides**:	8mm
Ammunition:	3000 (MG)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	Yes	**Superstructure Front**:	14.5mm
Target Size:	Small	**Superstructure Sides**:	8mm
Height:	1.66 meters	**Superstructure Rear**:	8mm
Weight:	5.8 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

This version of the Schutzenpanzerwagen SdKfz 250/1 had an MG34 mounted on the front and rear and was used to support the advancing infantry.

Options: None.

SPW 250/8

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Jul 43 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	3000 RPM
Main Armament:	KwK 37 75mm L/24	**Armor**:	
Depression/Elevation:	-8°/+20°	**Hull Front**:	14.5mm
Secondary Armament:	None	**Hull Sides**:	8mm
Ammunition:	20 (75mm)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	Yes	**Superstructure Front**:	14.5mm
Target Size:	Small	**Superstructure Sides**:	8mm
Height:	1.66 meters	**Superstructure Rear**:	8mm
Weight:	6.3 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

This model of the Schutzenpanzerwagen SdKfz 250/1 had the 75mm L/24 gun, which was mounted on the early PzKpfw IV and late PzKpfw III series tanks. This gun was mounted to fire over the front of the vehicle, and was used primarily to provide direct-fire artillery support to advancing infantry. Because of the size of the gun and the requirement for ammunition storage, no infantry could be carried.

Options: None.

SPW 250/9

Type:	Halftrack	**Top Speed**:	65 KPH (53 off-road)
Availability:	Jul 43 – May 45	**Redline**:	3000 RPM
Playability:	AI only	**Armor**:	
Main Armament:	KwK 38 20mm L/55	**Hull Front**:	14.5mm
Depression/Elevation:	-4°/+70°	**Hull Sides**:	8mm
Secondary Armament:	Coax MG	**Hull Rear**:	8mm
Ammunition:	100 (20mm), 1050 (MG)	**Hull Top**:	8mm
Smoke:	None	**Superstructure Front**:	14.5mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	8mm
Radio:	Yes	**Superstructure Rear**:	8mm
Target Size:	Small	**Superstructure Top**:	8mm
Height:	1.66 meters	**Mantlet**:	10mm
Weight:	5.9 tons	**Turret Front**:	14.5mm
Ground Pressure:	1.0 kg/cm^2	**Turret Sides**:	8mm
Maximum Slope:	24°	**Turret Rear**:	8mm
Maximum Vertical:	0.3 meters	**Turret Top**:	Open

This variant of the Schutzenpanzerwagen SdKfz 250/1 had the turret of the SdKfz 222 (with a 20mm L/55 gun) mounted on an armor plate over the passenger compartment. Needless to say, this variant did not carry any infantrymen. It was primarily used for reconnaissance by the Panzergrenadier units to whom it was issued.

Options: None.

SPW 250/10

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Sep 41 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	PaK 35/56 37mm L/45	**Armor**:	
Depression/Elevation:	-8°/+25°	**Hull Front**:	14.5mm
Secondary Armament:	Hull MG	**Hull Sides**:	8mm
Ammunition:	216 (37mm), 1100 (MG)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	Yes	**Superstructure Front**:	14.5mm
Target Size:	Small	**Superstructure Sides**:	8mm
Height:	1.66 meters	**Superstructure Rear**:	8mm
Weight:	5.67 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

This variant of the Schutzenpanzerwagen SdKfz 250/1 did not carry an infantry half-squad. Instead, it mounted a 37mm L/45 antitank gun in a fixed position firing over the front of the vehicle. This vehicle was normally issued to platoon leaders as an integral light antitank section for the platoon.

Options: None.

SPW 251/1

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Sep 39 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	14.5mm
Secondary Armament:	Hull MG, Rear MG	**Hull Sides**:	8mm
Ammunition:	3000 (MG)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	None	**Superstructure Front**:	14.5mm
Target Size:	Small	**Superstructure Sides**:	8mm
Height:	1.75 meters	**Superstructure Rear**:	8mm
Weight:	9.0 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

The Schutzenpanzerwagen SdKfz 251/1 was the basis for all of the specialized SdKfz 251-series vehicles, as well as the first armored halftrack to be issued to special-purpose infantry units. Its main purpose was to carry an infantry squad into combat, although there were many variants with additional capabilities. 15,252 of all Ausfuhrung (A, B, C, and D) were produced from mid-1939 to early 1945, including all of the SPW 251 variants. Other versions of this vehicle which were also used included munitions carriers, searchlight vehicles, command posts, night-fighting vehicles, rocket launchers, and observation vehicles.

Options: None.

SPW 251/1 sMG

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Jun 40 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	14.5mm
Secondary Armament:	Hull MG, AA MG, Rear MG	**Hull Sides**:	8mm
Ammunition:	3000 (MG)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	None	**Superstructure Front**:	14.5mm
Target Size:	Small	**Superstructure Sides**:	8mm
Height:	1.75 meters	**Superstructure Rear**:	8mm
Weight:	9.0 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	10mm
Maximum Slope:	24°		

The Schutzenpanzerwagen 251/1 sMG usually carries a machinegun squad into combat and mounts an extra MG34 or MG42 machinegun as well.

Options: None.

SPW 251/9 Stummel

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Jul 43 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	KwK 37 75mm L/24	**Armor**:	
Depression/Elevation:	-8°/+20°	**Hull Front**:	14.5mm
Secondary Armament:	Rear MG, AA MG	**Hull Sides**:	8mm
Ammunition:	52 (75mm), 2010 (MG)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	Yes	**Superstructure Front**:	14.5mm
Target Size:	Small	**Superstructure Sides**:	8mm
Height:	1.75 meters	**Superstructure Rear**:	8mm
Weight:	8.5 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

The Schutzenpanzerwagen 251/9 Stummel is similar to the SPW 250/8 in that it carries a 75mm L/24 gun mounted in a fixed position to fire over the front of the vehicle. Although it could not carry an infantry squad, it provided much needed direct-fire artillery support to the Panzergrenadier units.

Options: None.

SPW 251/10

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Jan 40 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	PaK 35/36 37mm L/45	**Armor**:	
Depression/Elevation:	-8°/+20°	**Hull Front**:	14.5mm
Secondary Armament:	AA MG	**Hull Sides**:	8mm
Ammunition:	168 (37mm), 1100 (MG)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	Yes	**Superstructure Front**:	14.5mm
Target Size:	Small	**Superstructure Sides**:	8mm
Height:	1.75 meters	**Superstructure Rear**:	8mm
Weight:	9.0 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

The Schutzenpanzerwagen 251/10 was similar to the SPW 250/10 in that it carried the 37mm L/45 gun in a fixed mounting designed to fire over the front of the vehicle. It was normally used by the platoon leader as his command vehicle, and could also carry a half-squad of infantry.

Options: None.

PSW 222

Type:	Armored car	**Top Speed**:	80 KPH (20 off-road)
Availability:	Sep 39 – May 45	**Redline**:	
Playability:	AI only	**Armor**:	
Main Armament:	KwK 38 20mm L/55	**Hull Front**:	14.5mm
Depression/Elevation:	-7°/+80°	**Hull Sides**:	8mm
Secondary Armament:	Coax MG	**Hull Rear**:	8mm
Ammunition:	180 (20mm), 1050 (MG)	**Hull Top**:	8mm
Smoke:	None	**Superstructure Front**:	14.5mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	8mm
Radio:	Yes	**Superstructure Rear**:	8mm
Target Size:	Small	**Superstructure Top**:	8mm
Height:	2.0 meters	**Mantlet**:	10mm
Weight:	4.8 tons	**Turret Front**:	14.5mm
Ground Pressure:	1.0 kg/cm^2	**Turret Sides**:	8mm
Maximum Slope:	20°	**Turret Rear**:	8mm
Maximum Vertical:	0.25 meters	**Turret Top**:	Open

The Panzerspähwagen 222 was designed in the 1930s as the fast reconnaissance vehicle of the Wehrmacht armored forces. 989 were manufactured between 1936 and 1943, when production was halted in favor of the larger and more heavily armed and armored eight-wheeled armored cars. One of the features of this vehicle (which also, unfortunately, required the turret top to be left open) was the ability of the 20mm gun to engage aircraft. Metal screens were mounted on the turret roof, which split when the gun raised, to keep out thrown grenades.

Options: None.

PSW 232

Type:	Armored car	**Top Speed**:	90 KPH (22 off-road)
Availability:	Sep 39 – May 45	**Redline**:	
Playability:	AI only	**Armor**:	
Main Armament:	KwK 38 20mm L/55	**Hull Front**:	14.5mm
Depression/Elevation:	-7°/+80°	**Hull Sides**:	8mm
Secondary Armament:	Coax MG	**Hull Rear**:	8mm
Ammunition:	180 (20mm), 1050 (MG)	**Hull Top**:	8mm
Smoke:	None	**Superstructure Front**:	14.5mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	8mm
Radio:	Yes	**Superstructure Rear**:	8mm
Target Size:	Medium	**Superstructure Top**:	8mm
Height:	2.35 meters	**Mantlet**:	10mm
Weight:	8.5 tons	**Turret Front**:	14.5mm
Ground Pressure:	1.0 kg/cm^2	**Turret Sides**:	8mm
Maximum Slope:	30°	**Turret Rear**:	8mm
Maximum Vertical:	0.5 meters	**Turret Top**:	8mm

The Panzerspähwagen 232 eight-wheeled armored car was manufactured from 1936 to 1943, with 607 being produced. It was replaced, like all of the armored cars built up to that point, by the PSW 234 series of eight-wheeled armored cars. Although it had the same armament as the PSW 222, this was mounted in a fully-armored turret rather than an open-topped cupola, and suffered a corresponding loss in ability to fire at aircraft. One of the interesting features of this vehicle was the inclusion of a complete set of controls in the rear, enabling it to be driven backwards. Later models also had additional armor plates added to increase the frontal armor to 30mm on the superstructure, hull, and turret.

Options: None.

PSW 233

Type:	Armored car	**Maximum Vertical**:	0.5 meters
Availability:	Jan 43 – May 45	**Top Speed**:	85 KPH (21 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	KwK 37 75mm L/24	**Armor**:	
Depression/Elevation:	-0°/+20°	**Hull Front**:	14.5mm
Secondary Armament:	Hull MG	**Hull Sides**:	8mm
Ammunition:	32 (75mm), 1500 (MG)	**Hull Rear**:	8mm
Smoke:	None	**Hull Top**:	8mm
Radio:	Yes	**Superstructure Front**:	14.5mm
Target Size:	Medium	**Superstructure Sides**:	8mm
Height:	2.25 meters	**Superstructure Rear**:	8mm
Weight:	8.6 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	30°		

The Panzerspähwagen 233 eight-wheeled armored car was a modified version of the PSW 232 with the turret removed and a 75mm L/24 gun mounted in a fixed position which enabled it to fire over the front of the vehicle. 109 of these vehicles were built and 10 more converted from PSW 232 between late 1942 and late 1943. This vehicle provided some direct-fire artillery support to the reconnaissance units of the Wehrmacht, being issued to the reconnaissance battalions in platoons of six vehicles each.

Options: None.

PSW 234/1

Type:	Armored car	**Top Speed**:	90 KPH (22 off-road)
Availability:	Jul 44 – May 45	**Redline**:	
Playability:	AI only	**Armor**:	
Main Armament:	KwK 38 20mm L/55	**Hull Front**:	30mm
Depression/Elevation:	-4°/+70°	**Hull Sides**:	8mm
Secondary Armament:	Coax MG	**Hull Rear**:	10mm
Ammunition:	480 (20mm), 1500 (MG)	**Hull Top**:	8mm
Smoke:	None	**Superstructure Front**:	30mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	8mm
Radio:	Yes	**Superstructure Rear**:	10mm
Target Size:	Medium	**Superstructure Top**:	8mm
Height:	2.1 meters	**Mantlet**:	10mm
Weight:	11.5 tons	**Turret Front**:	30mm
Ground Pressure:	1.0 kg/cm^2	**Turret Sides**:	14.5mm
Maximum Slope:	30°	**Turret Rear**:	14.5mm
Maximum Vertical:	0.5 meters	**Turret Top**:	Open

The Panzerspähwagen 234/1 eight-wheeled armored car replaced the previous PSW 222 and PSW 232 in service as the Wehrmacht's primary reconnaissance vehicle. 200 were built between mid-1944 and early 1945, and these were issued to reconnaisance battalions. This vehicle mounted a turret similar to that of the PSW 222 and SPW 250/9. Like the PSW 232, this vehicle could be driven in reverse (6 gears).

Options: None.

PSW 234/2 Puma

Type:	Armored car	**Top Speed**:	90 KPH (22 off-road)
Availability:	Oct 43 – May 45	**Redline**:	
Playability:	AI only	**Armor**:	
Main Armament:	KwK 39 50mm L/60	**Hull Front**:	30mm
Depression/Elevation:	-8°/+20°	**Hull Sides**:	8mm
Secondary Armament:	Coax MG	**Hull Rear**:	10mm
Ammunition:	55 (50mm), 2850 (MG)	**Hull Top**:	8mm
Smoke:	None	**Superstructure Front**:	30mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	8mm
Radio:	Yes	**Superstructure Rear**:	10mm
Target Size:	Medium	**Superstructure Top**:	8mm
Height:	2.38 meters	**Mantlet**:	100mm
Weight:	11.7 tons	**Turret Front**:	30mm
Ground Pressure:	1.0 kg/cm^2	**Turret Sides**:	14.5mm
Maximum Slope:	30°	**Turret Rear**:	14.5mm
Maximum Vertical:	0.5 meters	**Turret Top**:	8mm

The Panzerspähwagen 234/2 Puma eight-wheeled armored car used the same hull and chassis as the PSW 234/1, however, it carried a full turret with the 50mm L/60 gun made famous on the mid-production PzKpfw III series tanks and slightly heavier armor than most other armored cars, including a Saukopfblende mantlet. 101 Puma were produced between Fall 1943 and Fall 1944. Due to the outclassing of the 50mm gun by enemy armor, the Puma was replaced by the PSW 234/4. Companies of 25 Puma were attached to four Panzer divisions as heavy reconnaissance units.

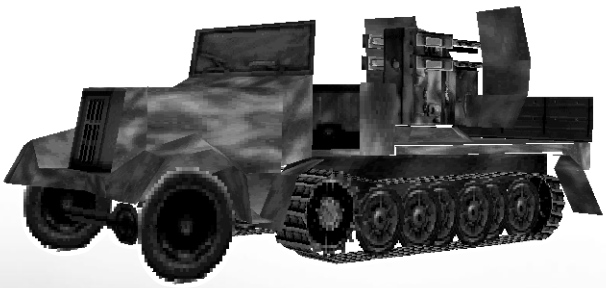
Options: None.

SdKfz 7/1

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Jul 43 – May 45	**Top Speed**:	50 KPH (32 off-road)
Playability:	AI only	**Redline**:	2600 RPM
Main Armament:	Four FlaK 38 20mm L/112.6	**Armor**:	
Depression/Elevation:	-10°/+100°	**Hull Front**:	None
Secondary Armament:	None	**Hull Sides**:	None
Ammunition:	(20mm)	**Hull Rear**:	None
Smoke:	None	**Hull Top**:	Open
Radio:	None	**Cab Front**:	8mm
Target Size:	Large	**Cab Sides**:	8mm
Height:	2.62 meters	**Cab Rear**:	8mm
Weight:	11.55 tons	**Cab Top**:	8mm
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

The Sonderkraftfahrzeug 7/1 was a self-propelled antiaircraft gun mounted on the heavy SdKfz 7 8-ton halftrack. This vehicle carried four 20mm L/112.6 guns on an open, rotating platform. Although capable of depressing enough to hit ground targets, the lack of any decent armor on the vehicle made this a dangerous proposition. 319 were built between 1943 and 1944.

Options: None.



Opel Blitz

Type:	Truck	**Weight**:	2.1 tons
Availability:	Sep 39 – May 45	**Ground Pressure**:	1.0 kg/cm^2
Playability:	AI only	**Maximum Slope**:	15°
Smoke:	None	**Maximum Vertical**:	0.1 meters
Radio:	None	**Top Speed**:	80 KPH (10 off-road)
Target Size:	Large	**Redline**:	RPM
Height:	2.175 meters		

The Opel Blitz was one of many similar light trucks used by the Wehrmacht to transport personnel and supplies (up to 3 tons) in all theaters of the war. Unfortunately, it was hampered by poor traction and low power, and often failed entirely off-road, especially in muddy weather. During the war, 429,000 light trucks of all types were manufactured for the Wehrmacht, including about 95,000 Opel Blitz in both two- and four-wheel drive models.

Options: None.

SdKfz 7

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Sep 39 – May 45	**Top Speed**:	50 KPH (32 off-road)
Playability:	AI only	**Redline**:	2600 RPM
Smoke:	None	**Armor**:	
Radio:	None	**Cab Front**:	8mm
Target Size:	Large	**Cab Sides**:	8mm
Height:	2.62 meters	**Cab Rear**:	8mm
Weight:	tons	**Cab Top**:	8mm
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	24°		

The Sonderkraftfahrzeug 7 was a heavy halftrack capable of carrying eight tons. It was used as the prime mover for several artillery weapons, most notably the 88mm FlaK 18. It was also used as the basis for the SdKfz 7/1 self-propelled antiaircraft gun. It was somewhat slow and lacked any armor until 1943, when the cab was given 8mm of armor. A total of 10,257 8-ton SdKfz 7 were built during and before the Second World War.

Options: None.

Infantry (Early)

Type:	Infantry HS	**Weaponry:**	Kar 98k
Availability:	Sep 39 – May 45	**Secondary Weaponry**:	Hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle)
Target Size:	Very small	**Smoke**:	Yes

The early Heer infantry squad consisted of two half-squads, normally a regular infantry half-squad and a machinegun team. The soldiers were armed primarily with the Mauser Kar98k bolt-action rifle, a 7.92mm rifle with a 5-round internal magazine fed through the top by stripper clips. The squad leader usually carried an MP-40 9mm submachinegun and spare 32-round magazines. All of the soldiers carried the Stielhandgranate 24, the infamous "potato masher" hand grenade.

Options: None.

Infantry (Late)

Type:	Infantry HS	**Weaponry:**	Gew 43
Availability:	Dec 42 – May 45	**Secondary Weaponry**:	Hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle)
Target Size:	Very small	**Smoke**:	Yes

The late Heer infantry squad consisted of two half-squads, normally a regular infantry half-squad and a machinegun team or antitank team (either Panzerfaust or Panzerschreck). The soldiers were armed primarily with the Mauser Kar43 semiautomatic rifle, a 7.92mm rifle with a 10-round detachable magazine. The squad leader usually carried an MP-40 9mm submachinegun and spare 32-round magazines. All of the soldiers carried the Stielhandgranate 24 stick-type or Eihandgranate egg-type hand grenades.

Options: None.

Infantry (Fallschirmjäger)

Type:	Infantry HS	**Weaponry:**	FG 42
Availability:	Sep 43 – May 45	**Secondary Weaponry**:	Hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle)
Target Size:	Very small	**Smoke**:	Yes

The Fallschirmjäger infantry squad consisted of two half-squads, normally a regular infantry half-squad and a machinegun team or antitank team (either Panzerfaust or Panzerschreck). The soldiers were armed primarily with the Rheinmetall FG 42 automatic rifle, a 7.92mm rifle with a 20-round detachable magazine, and a built-in bayonet and bipod. The squad leader usually carried an MP-40 9mm submachinegun and spare 32-round magazines or an FG 42 of his own. All of the soldiers carried the Eihandgranate egg-type hand grenade as well.

Options: None.

Infantry (Assault)

Type:	Infantry HS	**Weaponry:**	StG 44
Availability:	Dec 43 – May 45	**Secondary Weaponry**:	Hand grenades
Playability:	AI only	**Ammunition**:	900 (Rifle)
Target Size:	Very small	**Smoke**:	Yes

The assault infantry squad consisted of two half-squads, normally a regular infantry half-squad and a machinegun team or antitank team (either Panzerfaust or Panzerschreck). The soldiers were armed primarily with the Sturmgewehr 44 assault rifle, a 7.92mm rifle with a 30-round detachable magazine. The squad leader usually carried an MP-40 9mm submachinegun and spare 32-round magazines or a StG 44 of his own. All of the soldiers carried the Stielhandgranate 24 stick-type or Eihandgranate egg-type hand grenades.

Options: None.

Machinegun Team

Type:	Infantry HS	**Weaponry:**	MP40
Availability:	Sep 39 – May 45	**Secondary Weaponry**:	MG34, Hand grenades
Playability:	AI only	**Ammunition**:	1200 (SMG), 2000 (MG)
Target Size:	Very small	**Smoke**:	Yes

The Heer machinegun team consisted of a half-squad, normally attached to a regular infantry half-squad or to another machinegun team or antitank team (either Panzerfaust or Panzerschreck). The soldiers were armed primarily with the Mauser Kar98k bolt-action rifle, a 7.92mm rifle with a 5-round internal magazine. One team member carried the squad's MG 34 or MG 42 general-purpose machinegun. This 7.92mm automatic weapon was belt-fed and capable of firing 900-1200 rounds per minute. Either weapon could be carried ready with a 50- or 75-round drum, used immediately in the belt-fed role from the bipod, or quickly setup onto a tripod mount, which was carried by the machinegunner's assistant. In addition to their small arms, the soldiers carried the Stielhandgranate 24 stick-type or Eihandgranate egg-type hand grenades.

Options: None.

Panzerfaust Team

Type:	Infantry HS	**Weaponry:**	Panzerfaust
Availability:	Oct 44 – May 45	**Secondary Weaponry**:	Kar98k, Hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle), 10 (PzF)
Target Size:	Very small	**Smoke**:	Yes

The Heer Panzerfaust team consisted of a half-squad, normally supplementing a regular infantry, antitank, or machinegun half-squad to form a full squad. The soldiers were armed primarily with the Mauser Kar98k bolt-action rifle, a 7.92mm rifle with a 5-round internal magazine. All of the soldiers carried the Sprengbüchse 24 seven-head stick-type antitank hand grenade or the Gewehrpanzergranate 46 antitank rifle grenade, as well as the Panzerfaust 100 disposable antitank rocket launcher. This weapon was capable of destroying any enemy tank (its 150mm shaped-charge warhead could penetrate up to 200mm of armor) and had a range of almost 100 meters. Earlier versions had less range and lower penetration. A special fragmenting sleeve was also available for the warhead which increased its lethality against troops.

Options: None.

Panzerschreck Team

Type:	Infantry HS	**Weaponry:**	Panzerschreck
Availability:	Oct 43 – May 45	**Secondary Weaponry**:	Kar98k, Hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle), 10 (PzS)
Target Size:	Very small	**Smoke**:	Yes

The Heer Panzerschreck team consisted of a half-squad, normally supplementing a regular infantry, antitank, or machinegun half-squad to form a full squad. The soldiers were armed primarily with the Mauser Kar98k bolt-action rifle, a 7.92mm rifle with a 5-round internal magazine. All of the soldiers carried Sprengbüchse 24 seven-head stick-type antitank hand grenade or the Gewehrpanzergranate 46 antitank rifle grenade, and one carried the 88mm Panzerschreck (Raketenpanzerbüchse 54) antitank rocket launcher. This weapon was capable of destroying most enemy tanks (its shaped-charge warhead could penetrate up to 160mm of armor) and had a range of about 150 meters. Unlike the Panzerfaust, the Panzerschreck was reloadable. It was also more accurate, and very much an improvement over the 2.36" (60mm) Bazooka from which it was developed.

Options: None.

Sniper Team

Type:	Infantry HS	**Weaponry:**	Kar98k
Availability:	Sep 39 – May 45	**Secondary Weaponry**:	Hand grenades
Playability:	AI only	**Ammunition**:	900 (Rifle)
Target Size:	Very small	**Smoke**:	Yes

The sniper team was an infantry half-squad armed with specially configured Mauser Kar98k bolt-action rifles (later in the war, Mauser Kar43 semiautomatic rifles were used, and the Fallschirmjäger used modified FG 42 rifles). The sniper's rifle was modified by the inclusion of a telescopic sight, and his rifle was handpicked at the factory for exceptional accuracy. This enabled him to select individual targets (such as exposed armored vehicle commanders) at ranges up to 600 meters. The sniper's assistants usually carried an MP-40 9mm submachinegun and spare 32-round magazines for security. All of the soldiers carried the Stielhandgranate 24 stick-type or Eihandgranate egg-type hand grenades.

Options: None.

PaK 35/36

Type:	Antitank gun	**Weaponry:**	PaK 35/36 37mm L/45
Availability:	Jan 39 – May 44	**Turning time**:	16 seconds
Playability:	AI only	**Ammunition**:	180 (37mm)
Target Size:	Small	**Height**:	1.0 meters

The Panzerabwehrkanone 35/36 37mm L/45 was developed in the early 1930's by Rheinmetall and was first field tested in the Spanish Civil War in 1936. It normally had a crew of two or three men. It was bought or copied by many nations, including the United States. By the time Germany invaded the Soviet Union in mid-1941, this gun had been outclassed by developments in armor, and earned the nickname "Hitler's Doorknocker." The special ammunition developed for this gun and the 50mm PaK 38, called the Stielgranate 41, consisted of a large shaped-charge warhead attached to a rod with fins on external bars. This was slipped over the barrel of the PaK 35/36 and fired by a powder cartridge. Although it was capable of excellent penetration, its short range and poor accuracy limited its usefulness.

Options: StGr 41 (HEAT).

PaK 38

Type:	Antitank gun	**Weaponry:**	PaK 38 50mm L/60
Availability:	Jan 41 – May 45	**Turning time**:	16 seconds
Playability:	AI only	**Ammunition**:	79 (50mm)
Target Size:	Small	**Height**:	1.2 meters

The Panzerabwehrkanone 38 50mm L/60 was designed to replace the 37mm PaK 35/36. It had a crew of four or five men, and was capable of fighting enemy tanks when first introduced, but was quickly outclassed. It had a muzzle brake (which necessitated a redesign of the Stielgranate 41 round) and a semi-automatic breech. Like the PaK 35/36, this weapon could be towed by a horsecart or light truck, and manhandled in action by the crew.

Options: StGr 41 (HEAT).

PaK 40

Type:	Antitank gun	**Weaponry:**	PaK 40 75mm L/46
Availability:	Jan 42 – May 45	**Turning time**:	16 seconds
Playability:	AI only	**Ammunition**:	67 (75mm)
Target Size:	Small	**Height**:	1.4 meters

The Panzerabwehrkanone 40 75mm L/46 was designed in anticipation of the next generation of tanks which German designers thought would appear on the battlefield. This model was essentially an enlarged PaK 38, and became the standard German antitank gun for the rest of the war. Because of its weight, a truck or tractor was required for towing, and a crew of five or six soldiers was needed for effective operations. This weapon, like most German antitank weapons, was provided with both AP and APCR ammunition, as well as a high explosive round for defense against infantry. A shaped charge round, the G 39 H1, was also issued, gaining importance once supplies of the tungsten needed for the APCR round were lost.

Options: None.

PaK 43

Type:	Antitank gun	**Weaponry:**	PaK 43 88mm L/71
Availability:	Jan 43 – May 45	**Turning time**:	16 seconds
Playability:	AI only	**Ammunition**:	50 (88mm)
Target Size:	Medium	**Height**:	2 meters

The Panzerabwehrkanone 43 88mm L/71 grew out of a need for a heavy antitank gun and the impressive reputation of the 88mm L/56 guns. Like the FlaK 18, this gun was mounted on a wheeled carriage and towed into combat by a heavy truck or halftrack, and used a four-legged mount to enable rapid turning and stability. The crew was generally less than half the size of that of the FlaK 18, and the extra cargo capacity was often taken up by spare ammunition. The breech was semiautomatic in design, and the barrel was longer to increase the accuracy and velocity of the shell. Although large and heavy, it was not as cumbersome as the FlaK 18, and so much more deadly to tanks that it was chosen for mounting in the Jagdpanther and the King Tiger.

Options: None.

6. THE U.S. ARMY

American units, especially early in the war, could not match German units in troop and equipment quality or tactics. These differences became balanced as American forces gained more experience, and German forces were forced to use more new recruits while deploying their best troops on the Eastern Front. By the end of the war, American troops had a better level of experience in general, and a great deal more equipment. American infantry equipment and light vehicles were generally superior to their German equivalents, with some notable exceptions among machineguns and small arms, and American equipment was also more readily available. American tanks and other armored fighting vehicles lagged qualitatively behind their German counterparts until nearly the end of the war, with the American vehicles suffering not only with less powerful guns and thinner armor, but inferior manoeuvrability as well. The late introduction of more powerful vehicles, combined with the tremendous numerical output of US military vehicle production, redressed these deficiencies by the end of the war, albeit at a great cost in crews.

At the beginning of the Second World War, the American army was the smallest of any of the major powers on both sides. It expanded over 4500% over the course of the war, finally becoming the second-largest force at the end of World War II. American tactical doctrine was still influenced initially by the lessons of the First World War, however, the late introduction of US forces into the war allowed for some time to introduce both new training techniques, tactics, and equipment. At the lower levels, leadership training was generally neglected throughout the war, leading to a weakness in junior officers, which lasted far beyond the end of World War II. The rapid rate of promotions due to the expansion of the force led to poor leadership and doctrine at all levels until mid-war.

The following tables of organization and equipment are fairly accurate for U.S. forces throughout the later part of the Second World War. Due to an excellent logistical system of replacements, parts and reinforcements, the industrial might of US industry provided materials in a timely manner and helped keep the deployed units at operational strength.

- The American Tank Battalion was made up of one company of light tanks, organized into three five-tank platoons and a headquarters section of two tanks, and three companies of medium tanks, each organized into three five-tank platoons with a headquarters section of two tanks. The battalion headquarters company included two medium and three support tanks, as well as numerous jeeps, trucks, and halftracks, and could be supplemented by a reconnaissance platoon of six armored cars.

- The American Tank Destroyer Battalion was made up of one reconnaissance company, organized into three platoons of two armored cars (one of which may be replaced by a platoon of light tanks) and several jeeps and a headquarters section of two halftracks and two jeeps. There were three tank destroyer companies, each organized into three platoons of four tank destroyers and two armored cars, with a headquarters section of two halftracks and two jeeps. The battalion headquarters platoon included two halftracks or armored cars and one jeep.

- The American Mechanized Infantry Battalion was made up of three mechanized infantry companies, organized into three platoons of four halftracks (each carrying a squad of twelve men), a weapons platoon with four halftracks mounting 60mm mortars and machineguns, a headquarters section with two halftracks, two jeeps and several bazooka teams. This was supported by an antitank battery with one jeep and three halftracks towing three antitank guns, a headquarters platoon, and a combat support company with a heavy machinegun platoon, an 81mm mortar platoon, a reconnaissance platoon with four armored cars and a battery of three self-propelled howitzers.

- The American Infantry Battalion was made up of three infantry companies, organized into three platoons of three squads of twelve men and a platoon headquarters jeep each, a headquarters section with two jeeps, and a weapons platoon with a machinegun section, a mortar section, and a platoon headquarters jeep. These units were further supported by an antitank battery made up of three or four towed antitank guns, trucks or halftracks, a combat support company with an 81mm mortar battery, a machinegun platoon, a heavy machinegun section, a bazooka section, and a headquarters platoon with two jeeps, and a headquarters platoon (for the battalion) with three or four jeeps and several bazooka teams.

AMERICAN TACTICS

American infantry tactics were of two major types. The first was that of divided sections of each squad providing covering fire for each other as they moved from one piece of cover to another. By always posting the BAR gunner with the supporting squad, it was hoped that his firepower, combined with the semiautomatic rifles (either M1 Garands or M1 carbines) of the rest of the squad would enable the manoeuvring squad to move forward to a better position. Although this technique was taught in training, it was often replaced in combat by a technique known as "marching fire," in which all personnel advanced and fired on the move, usually in the form of a skirmish line rather than by squads. This proved to be a superior tactic in open terrain or when advancing down a slope. It required the close support of heavy weapons to be a success.

Combined arms tactics were emphasised, including the close co-ordination of artillery, infantry, and armor. Artillery was to be used to neutralise enemy artillery, including antitank guns, as well as their forward observers and observation posts. The infantry were to lead when an attack was going up against antitank guns, crossing rivers, or in thick terrain and towns. Tanks led in open terrain, and the need to fire into every piece of cover that could be used to hide enemy vehicles or antitank guns when in hostile terrain was noted. Machineguns could often be used to drive hidden enemy infantry or gun crews from their positions. Smoke shells were often used to blind enemy tanks so that American forces could manoeuvre around to get a better shot, while avoiding the more powerful German guns. Finally, the need for aggression by armored forces was often accentuated by planners, who often told tankers not to stop except to shoot, and to move around stalled friendly units in order to attack the flanks and rear of the enemy who was holding them back.

Fighting Principles
(General George S. Patton, Jr., 1944)

COMMAND

Leadership.

(1) *Full Duty.* Each, in his appropriate sphere, will lead in person. Any commander who fails to obtain his objective, and who is not dead or severely wounded, has not done his full duty.
(2) *Visits to the front.* The Commanding General or his Chief of Staff (never both at once) and one member of the general staff sections, the signal, medical, ordnance, engineer and quartermaster sections should visit the front daily. . . . The function of these staff officers is to observe, not to meddle . . . your primary mission as a leader is to see with your own eyes and to be seen by the troops.

Execution. In carrying out a mission, the promulgation of the order represents not over 10% of your responsibility. The remaining 90% consists of assuring, by means of personal supervision on the ground, by yourself and your staff, proper and vigorous execution.
Rest Periods. Staff personnel, commissioned and enlisted, who do not rest, do not last. . . . When the need arises, everyone must work all the time, but these emergencies are not frequent*; unfatigued men last longer and work better under high pressure.*
Location of command posts. The farther forward the CPs are located the less time is wasted in driving to and from the front. . . .

COMBAT PROCEDURE.

Maps. We are too prone to believe that we acquire merit solely through the study of maps in the safe seclusion of a Command Post. . . .
Plans. Plans must be simple and flexible. . . They should be made by the people who are going to execute them. . . .
Reconnaissance. You can never have too much reconnaissance. Use every means available before, during and after battle. Reports must be facts, not opinions; negative as well as positive. . . . information is like eggs: the fresher the better.

AMERICAN ARTILLERY

The US Army used many different types of artillery, several of which are available to the American player as "on-call" indirect fire, using high explosive or smoke ammunition. The following types of artillery barrages may be available, depending on the scenario:

81mm Mortar: The US M1 81mm mortar was essentially a copy of the German mortar of the same caliber. It was also used much the same way, being allocated to support companies and battalions. This weapon could fire its 3.1 kg shell out to about 3,000 meters. The battalion mortar battery normally included three sections with two mortars each.

107mm Mortar: This mortar was originally designed to fire smoke and chemical rounds, but was quickly adapted to fire high explosive ammunition as well. It could launch its 12.3 kg shell out to 5,500 meters. The heavy mortar battery usually consisted of four 107mm mortars.

75mm Field Gun/Howitzer: This heading includes several weapons, such as the M1916, M1917, and M2A2 field guns and the M1 and M1A1 howitzers, the majority of which also served in World War I. The field guns fired a 6.1 to 6.8 kg high explosive round out to 12,000 to 14,000 meters. The howitzers projected their 6.8 kg shell out to 9,000 meters. The howitzers were the very lightest models, designed for transportation by horse and cart and use in the mountains, where their crews often manhandled guns into position. All of these guns were organised into batteries of three sections of three guns each.

105mm Howitzer: The 105mm howitzers used by the American forces in World War II were generally designed shortly before the war and put into production only in 1939, and were therefore more modern than their smaller 75mm cousins. This includes the M2A1 howitzer as well as the M3 howitzer, which was designed as a lightweight gun for airborne units but was also adopted by the regular infantry in North Africa due to a shortage of guns. Both of these weapons fired a 15 kg shell, the M2A1 projecting it out to over 11,000 meters, while the M3 fired it out to 7,500 meters. These guns were normally organised into batteries of three sections of three or four guns each, or one section of six guns (for self-propelled guns and regimental artillery).

155mm Howitzer/Field Gun: The mainstay of the US heavy artillery was the 155mm howitzer M1 and the Gun M1. The howitzer M1 fired a 43.1 kg high explosive shell out to 15,000 meters. This weapon had a reputation for excellent accuracy, due in part to the innovative fire control techniques pioneered by American forces during the Second World War. The Gun M1 fired the same 43.1 kg shell out to a maximum range of 23,200 meters. Both utilised separate-loading ammunition. These guns were generally organised into batteries of three sections of two guns each.

207mm Howitzer/Field Gun: This heading represents both the 8-inch howitzer M1 and the less common 8-inch Gun M1. Both were designed shortly after World War I, and both were pressed into service during World War II, although the Gun M1 did not see action until nearly the end of the war. The howitzer M1 fired a 90.7 kg high explosive shell out to 17,000 meters. The Gun M1 projected its 108.8 kg shell out to 32,500 meters. They were usually organised into batteries of three sections of two guns each.

5" Naval Gun: The 5" naval gun was normally mounted as primary armament on destroyers and as secondary armament on larger ships such as cruisers. They were usually mounted singly in turrets, although occasionally two were mounted together. A destroyer might have four or five, while a capital ship generally had up to twenty such turrets, with the larger vessels also mounting larger guns as well.

12" Naval Gun: The 12" naval gun was normally mounted as primary armament on heavy cruisers and pocket battleships. Depending on the model, it could fire a 442.5 to 485 kg high explosive shell out to 12,000 to 17,000 yards. These guns were ordinarily mounted two to three per turret, with three to four turrets on one ship.

16" Naval Gun: These were the heaviest naval guns and were only mounted on the heaviest battleships used by the American forces during the Second World War. Depending on the model of gun mounted, this weapon could fire a 1,016 to 1,089 kg shell out to a maximum range of 25,000 to 45,000 meters. The 16" gun was mounted in a turret that held three guns. Normally, three such turrets were carried, in addition to any secondary armament. Barrages from these guns during the Normandy campaign literally flipped over Tiger VIE tanks or buried them in so many tons of dirt that they had to be dug out.

American Field Order

[The field order is used by the commander to organize his mission planning and is accompanied by maps as needed]

FIELD ORDER

1. **Information**: Include appropriate information covering:
   a. *Enemy*: Composition, disposition, location, movements,strength, identification, capabilities. Refer to intelligence summary of report when issued.
   b. *Friendly forces*: Missions or operations, and location of next higher and adjacent units, same for covering forces or elements of the command in contact, support to be provided by other forces.

2. **Decision or Mission**: Decision or mission, details of the plan applicable to the command as a whole and necessary for coordination.

TROOPS

3. **Tactical Missions for Subordinate Units**: Specific tasks assigned to each element of the command charged with execution of tactical duties, which are not matters of routine or covered by standard operating procedure. A separate lettered subparagraph for each element to which instructions are given. Instructions applicable to two or more units or elements or to the entire command, which are necessary for coordination but do not properly belong in another subparagraph.

4. **Administrative Matters**: Instruction to tactical units concerning supply, evacuation, and traffic details which are required for the operation (unless covered by standard operating or administrative orders; in the latter case, reference will be made to the administrative order).

5. **Signal Communication**
   a. *Orders for employment* of means of signal communication not covered in standard operating procedure. Refer to signal annex or signal operation instructions, if issued.
   b. *Command posts and axes of signal communication*: Initial locations for units and next subordinate units, time of opening, tentative and subsequent locations when appropriate. Other places to which messages may be sent.

AMERICAN UNIT OPTIONS

The following options may be available to some American armor units:

- **Additional superstructure armor**: This was a 30mm plate welded to the sides of the superstructure to cover weak spots. This plate was often used as a target by German tank and antitank gunners due to its position.

- **Additional turret armor**: This was a 30mm plate welded to the outside of the turret to cover weak spots. This plate was often used as a target by German tank and antitank gunners due to its position.

- **Hedgehog plow**: This plow was attached to the underside of the hull on the front of the tank, enabling it to plow through thick brush and hedgerows without exposing its belly to enemy fire.

- **Antiaircraft machinegun**: A Browning .30 caliber machinegun on a central pintle mount is optional.

- **Radio**: Some early vehicles did not include a two-way radio (although they did have a receiver set). This option allows the vehicle to have a two-way radio.

- **Turret umbrella**: This "field improvised" modification consisted of mounting a large cafe-style umbrella over the open turret, which provided some protection from the elements as well as allowing hand grenades to roll off, however, it was very large and consequently difficult to hide.

- **Wet ammo stowage**: This was designed in response to complaints that Sherman tanks would often catch on fire when struck, and was simply a storage system for main gun ammunition which was filled with a mixture of water, antifreeze, and a rust inhibitor.

AMERICAN ARMAMENTS

The following charts give the nomenclature for the American ammunition, penetration, in millimeters, of non-face-hardened (homogeneous) armor plate at the ranges shown for the weapons mounted on American vehicles and those provided as antitank weapons. In addition to these types of ammunition, high explosive and smoke ammunition was also provided for many weapons. Hand-held antitank weapon capabilities are given for comparison.

American Ammunition Designations

Name	Abbreviation	Type of Ammunition
.30-06 Ball	.30 MG	Machinegun ammunition [For Browning M1919 machinegun]
.50 M2	.50 HMG	Heavy machinegun ammunition [For Browning M2HB machinegun]
AP	AP	Armor Piercing (AP)
APCBC	APCBC	Armor Piercing Capped, Ballistic Cap (APCBC)
APCR	APCR	Armor Piercing Composite Rigid (APCR)
HE	HE	High Explosive (HE)
HEAT	HEAT	High Explosive Antitank (HEAT)
M1 HE	M1 HE	High Explosive (HE) [For the 105mm L/22 gun]
M42A1 HE	M42A1 HE	High Explosive (HE) [For the 76mm guns]
M48 HE	M48 HE	High Explosive (HE) [For the 75mm L/28 and L/37 guns]
M51 AP	M51 AP	Armor Piercing Capped, Ballistic Cap (APCBC) [For the 37mm guns]
M61 AP	M61 AP	Armor Piercing Capped, Ballistic Cap (APCBC) [For the 75mm L/37 gun]
M62 AP	M62 AP	Armor Piercing Capped, Ballistic Cap (APCBC) [For the 76mm guns]
M63 AP	M63 AP	Armor Piercing (AP) [For the 37mm guns]
M67 HEAT	M67 HEAT	High Explosive Antitank (HEAT) [For the 105mm L/22 gun]
M72 AP	M72 AP	Armor Piercing (AP) [For the 75mm L/28 and L/37 guns]
M74 HE	M74 HE	High Explosive (HE) [For the 37mm guns]
M79 AP	M79 AP	Armor Piercing (AP) [For the 76mm guns]
M89 WP	M89 WP	Smoke [For the 75mm L/37 gun]
M93 HVAP	M93 HVAP	Armor Piercing Composite Rigid (APCR) [For the 76mm guns]
Smoke	Smoke	Smoke

Armor Penetration of American Weapons

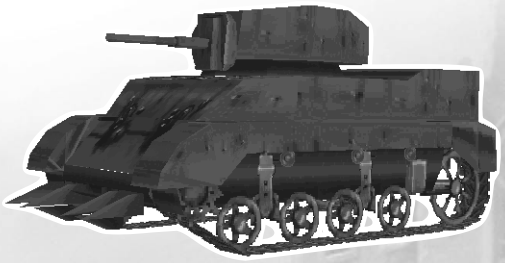
Weapon	Shell Weight	Muzzle Velocity	Thickness of armor penetrated at 30° angle at 100m	500m	1000m	1500m	2000m
.30 MG	0.01 kg (MG)	780 m/s	7	1	-	-	-
.50 MG	0.04 kg (HMG)	884 m/s	13	7	3	-	-
37mm L/45	0.685 kg (AP)	762 m/s	50	36	22	19	-
37mm L/53	0.87 kg (AP)	885 m/s	60	53	41	30	-
	0.87 kg (APCBC)	885 m/s	58	52	45	38	33
57mm L/50	2.9 kg (AP)	820 m/s	117	90	74	52	40
	2.83 kg (APCBC)	853 m/s	89	80	72	60	52
75mm L/28	6.77 kg (AP)	567 m/s	66	60	52	44	35
	6.31 kg (APCBC)	589 m/s	64	60	54	50	44
75mm L/37	6.77 kg (AP)	701 m/s	71	65	60	54	48
	6.5 kg (APCBC)	588 m/s	86	75	61	49	40
	3.8 kg (APCR)	869 m/s	133	115	93	75	57
76mm L/52	6.77 kg (AP)	793 m/s	122	107	89	73	60
	7 kg (APCBC)	793 m/s	97	93	87	80	72
	4.26 kg (APCR)	1,036 m/s	174	155	131	111	91
76mm L/55	6.77 kg (AP)	800 m/s	125	110	91	75	61
	7 kg (APCBC)	800 m/s	100	94	89	81	76
	4.26 kg (APCR)	1,045 m/s	181	160	135	114	93
105mm L/22	13.3 kg (HEAT)	381 m/s	102	102	102	102	-
Bazooka M1	1.5 kg (HEAT)	(Rocket launcher)	100	-	-	-	
M9A1 ATRG	0.6 kg (HEAT)	(Grenade)	80 (AT rifle grenade)			-	-

M3A1 Stuart

Type:	Tank	**Top Speed**:	58 KPH (26 off-road)
Availability:	Nov 42 – May 45	**Redline**:	2400 RPM (1800 average)
Playability:	AI only	**Armor**:	
Main Armament:	M6 37mm L/53	**Hull Front**:	51mm
Depression/Elevation:	-9°/+20°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	10mm
Ammunition:	103 (37mm), 8,270 (MG)	**Hull Top**:	10mm
Smoke:	None	**Superstructure Front**:	51mm
Turret Traverse:	20 seconds	**Superstructure Sides**:	38mm
Radio:	Yes	**Superstructure Rear**:	10mm
Target Size:	Small	**Superstructure Top**:	10mm
Height:	2.3 meters	**Mantlet**:	20mm
Weight:	12.9 tons	**Turret Front**:	51mm
Ground Pressure:	1.2 kg/cm^2	**Turret Sides**:	38mm
Maximum Slope:	25°	**Turret Rear**:	20mm
Maximum Vertical:	0.61 meters	**Turret Top**:	10mm

The M3A1 light tank (called the "Stuart" by the British, whose habit of naming American tanks after American generals was eventually adopted by the US Army as official policy) was an improvement on the earlier M2 series, and was officially adopted in 1941. By 1942, this vehicle was already obsolete, 5,811 M3A1 having been manufactured before production was halted in the Summer of 1942 in favor of the M3A3 model. Although the commander also acted as the loader in this tank, due to the two-man turret configuration, the light weight of the 37mm shells made this a relatively easy chore. Early models of this vehicle mounted five machineguns, the additional two being mounted in the front corners and controlled by the driver. This tank was widely used in the deserts of North Africa, and could also be found in some numbers in every theater of the war. Despite its relatively weak gun and thin armor, the total production of all variants of the M3 series totaled 13,859 tanks, although the vehicle was often consigned to reconnaissance and rear-echelon units after the introduction of the M5 light tank.

Options: None.



M5A1 Stuart

Type:	Tank	**Top Speed**:	64 KPH (28 off-road)
Availability:	Nov 42 – May 45	**Redline**:	3400 RPM (2800 average)
Playability:	Wingman only	**Armor**:	
Main Armament:	M6 37mm L/53	**Hull Front**:	67mm
Depression/Elevation:	-9°/+20°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	12mm
Ammunition:	123 (37mm), 6,250 (MG)	**Hull Top**:	12mm
Smoke:	None	**Superstructure Front**:	67mm
Turret Traverse:	20 seconds	**Superstructure Sides**:	38mm
Radio:	Yes	**Superstructure Rear**:	12mm
Target Size:	Small	**Superstructure Top**:	12mm
Height:	2.51 meters	**Mantlet**:	20mm
Weight:	14.6 tons	**Turret Front**:	67mm
Ground Pressure:	1.2 kg/cm^2	**Turret Sides**:	38mm
Maximum Slope:	27°	**Turret Rear**:	20mm
Maximum Vertical:	0.61 meters	**Turret Top**:	12mm

The M5A1 light tank was designed as the successor to the M3 series of light tanks in 1942, and actually mounted the same turret as the M3A3 version. The armor thickness was increased on this vehicle, and the hull and engine were modified to boost performance as well. Fuel capacity was increased, and the frontal armor angle was increased to provide better protection. 8,884 M5 series tanks were manufactured, including 6,810 M5A1, before manufacture ceased in October, 1944. This vehicle was used until the end of the war, although it was superceded by the M24 Chaffee light tank in late 1944. The chassis of the M5 also provided the basis for the M8 GMC.

Options: Hedgehog plow.

M3 Lee

Type:	Tank	**Top Speed**:	40 KPH (30 off-road)
Availability:	Nov 42 – May 45	**Redline**:	2400 RPM (1800 average)
Playability:	AI only	**Armor**:	
Main Armament:	M2 75mm L/28, M6 37mm L/53	**Hull Front**:	51mm
Depression/Elevation:	-9°/+20°,	**Hull Sides**:	38mm
Secondary Armament:	2 Hull MG, Coax MG, AA MG	**Hull Rear**:	38mm
Ammunition:	46/178 (75mm/37mm), 9,200 (MG)	**Hull Top**:	12mm
Smoke:	None	**Superstructure Front**:	51mm
Turret Traverse:	20 seconds	**Superstructure Sides**:	38mm
Radio:	Yes	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	12mm
Height:	3.12 meters	**Mantlet**:	25mm
Weight:	28.9 tons	**Turret Front**:	51mm
Ground Pressure:	1.2 kg/cm^2	**Turret Sides**:	51mm
Maximum Slope:	27°	**Turret Rear**:	51mm
Maximum Vertical:	0.61 meters	**Turret Top**:	22mm

Late in 1941 the US tank designers, realizing that the current M2 and M2A1 medium tanks were outclassed by recently developed German tanks, decided to devise a new series of medium tanks for the American forces. It was to have a 75mm gun housed in a central turret, and the concept led to the production of the M4 Sherman series. In the interim, they decided to make the M3 medium tank. This was an upgrade of the M2 with thicker armor and a 75mm M2 gun mounted in the right side of the hull in a sponson. It retained the 37mm gun of the M2 in a turret atop the main superstructure, along with a secondary turret for the commander above the primary (with a .30 MG). The two bow MGs were mounted and linked together and fixed to fire forward, under the control of the driver. 6,258 M3 were built, along with 1,334 M3A1 to M3A5. The remaining vehicles were declared obsolete in March, 1944, and were quickly removed from service, to be replaced by the M4 Sherman.

Options: None.

M4 Sherman

Type:	Tank	**Top Speed**:	40 KPH (22 off-road)
Availability:	Jul 42 – May 45	**Redline**:	2400 RPM (1800 average)
Playability:	Player	**Armor**:	
Main Armament:	M3 75mm L/37	**Hull Front**:	51mm
Depression/Elevation:	-10°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	38mm
Ammunition:	97 [+12] (75mm), 7,750 (MG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	51mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	None	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.97 meters	**Mantlet**:	89mm
Weight:	30.3 tons	**Turret Front**:	76mm
Ground Pressure:	1.1 kg/cm^2	**Turret Sides**:	51mm
Maximum Slope:	27°	**Turret Rear**:	51mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This was the first version of the famous Sherman tank to enter production, and all other models of the Sherman were variations on its basic design. Oddly though, it was not the first model to reach the troops (the M4A1 holds that distinction). The Sherman was America's answer to the German PzKpfw III and PzKpfw IV series tanks, and it matched the earlier models of these tanks in performance and protection, while exceeding them in firepower. Unfortunately, by the time the Sherman began to be used in large numbers, the later models of these tanks, as well as the newer PzKpfw V Panther and several versions of assault guns, were in German service, which were superior to the Sherman in every respect. This led to several upgraded versions of the Sherman, some with improvised armor plates welded to the hull, and finally a more powerful 76mm gun. This version of the Sherman could be identified easily by the hull nose, which was a three-piece bolted assembly. It had a Continental R975-EC2 engine (originally designed by Wright), and a total of 674 were built before production ceased in favor of later models. The first tanks had only a receiving radio (that is, they could not send any messages) and mounted twin fixed .30 machineguns in the hull under the driver's control, however, few tanks in this configuration actually saw combat. Because of weak spots in the armor, a common field modification consisted of welded steel plates over these thinner areas, in particular over ammunition storage areas. In total, 49,234 Sherman tanks of all types and models were built during the Second World War, making it the most common tank among the Western Allies.

Options: Radio, Hedgehog plow, Additional turret armor, Additional superstructure armor.

M4A1 Sherman

Type:	Tank	**Top Speed**:	40 KPH (22 off-road)
Availability:	Feb 42 – May 45	**Redline**:	2400 RPM (1800 average)
Playability:	Player	**Armor**:	
Main Armament:	M3 75mm L/37	**Hull Front**:	51mm
Depression/Elevation:	-12°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA MG	**Hull Rear**:	38mm
Ammunition:	89 [+12] (75mm), 7,750 (MG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	51mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	None	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.74 meters	**Mantlet**:	76mm
Weight:	30.2 tons	**Turret Front**:	76mm
Ground Pressure:	1.1 kg/cm^2	**Turret Sides**:	51mm
Maximum Slope:	27°	**Turret Rear**:	51mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

The M4A1 was the first Sherman model to actually be issued, and varied from the basic Sherman in several minor features. The hull and superstructure on this variant were cast, rather than welded, and the suspension and track system was identical to the M3 Lee tank, rather than being of the Sherman type. Early production versions of this tank also mounted the twin .30 machineguns for the driver, had no radio, and carried the M2 75mm gun instead of the later (and better) M3 model. Few of these models saw action, and most were upgraded to the M4A1 standard before they were sent to combat units. Altogether, 6,281 of the Sherman M4A1 model were built.

Options: Radio, Hedgehog plow, Additional turret armor, Additional superstructure armor.

M4A2 Sherman

Type:	Tank	**Top Speed**:	40 KPH (26 off-road)
Availability:	Apr 42 – May 45	**Redline**:	2100 RPM (1900 average)
Playability:	Player	**Armor**:	
Main Armament:	M3 75mm L/37	**Hull Front**:	79mm
Depression/Elevation:	-10°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	97 (75mm) 6250/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	64mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	Yes	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.74 meters	**Mantlet**:	89mm
Weight:	31.8 tons	**Turret Front**:	64mm
Ground Pressure:	1.2 kg/cm^2	**Turret Sides**:	64mm
Maximum Slope:	27°	**Turret Rear**:	64mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This model of the Sherman was identical to the later models of the M4 Sherman standard model with the welded hull and superstructure (that is, with two-way radio and no driver machineguns), except that the engine was replaced by two GM 6-71 diesel engines. 8,053 of this model were built before production was stopped in favor of later models.

Options: Hedgehog plow.

M4A3 Sherman

Type:	Tank	**Top Speed**:	40 KPH (24 off-road)
Availability:	July 43 – May 45	**Redline**:	2600 RPM (2200 average)
Playability:	Player	**Armor**:	
Main Armament:	M3 75mm L/37	**Hull Front**:	50mm
Depression/Elevation:	-10°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	97 (75mm) 5050/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	51mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	Yes	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.74 meters	**Mantlet**:	89mm
Weight:	30.2 tons	**Turret Front**:	76mm
Ground Pressure:	1.1 kg/cm^2	**Turret Sides**:	51mm
Maximum Slope:	27°	**Turret Rear**:	51mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

Options: Hedgehog plow.

M4A3E2 Sherman Jumbo

Type:	Tank	**Top Speed**:	35 KPH (22 off-road)
Availability:	Sep 44 – May 45	**Redline**:	2600 RPM (2200 average)
Playability:	Player	**Armor**:	
Main Armament:	M3 75mm L/37	**Hull Front**:	127mm
Depression/Elevation:	-10°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	104 (75mm) 6250/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	102mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	76mm
Radio:	None	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.95 meters	**Mantlet**:	178mm
Weight:	38.0 tons	**Turret Front**:	152mm
Ground Pressure:	1.1 kg/cm^2	**Turret Sides**:	152mm
Maximum Slope:	27°	**Turret Rear**:	152mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This variant of the basic M4A3 Sherman was designed as an assault tank, and was issued as an intermediate design while production began on the M26 Pershing heavy tank. It mounted the standard 75mm M3 gun in a specially-designed heavy turret and had additional armor welded to the hull. Permanent grousers, known as "duckbills," were attached to the ends of the track links to improve cross-country performance. Only 254 of these tanks were built in the Summer of 1944, however, they proved to be very effective in battle. Armored sideskirts were developed for this vehicle to provide additional protection to the tracks and suspension but were never issued due to similarities to the German Schuerzen armored skirts.

Options: Hedgehog plow, Wet ammo stowage.

M4A3(75)W Sherman

Type:	Tank	**Top Speed**:	40 KPH (26 off-road)
Availability:	Feb 44 – May 45	**Redline**:	2600 RPM (2200 average)
Playability:	Player	**Armor**:	
Main Armament:	M3 75mm L/37	**Hull Front**:	79mm
Depression/Elevation:	-10°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	104 (75mm) 6250/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	64mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	None	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.94 meters	**Mantlet**:	89mm
Weight:	31.5 tons	**Turret Front**:	76mm
Ground Pressure:	1.2 kg/cm^2	**Turret Sides**:	51mm
Maximum Slope:	27°	**Turret Rear**:	51mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This model of the M4A3 was the first to introduce wet ammo stowage, and it proved so successful that it was standardized on the Shermans which mounted the 76mm gun M1. 100 rounds of ammunition were carried in the floor of the tank (instead of the vulnerable side compartments used previously) in special containers which held the ammo in a solution of Ammudamp rust preventive compound, ethylene glycol antifreeze, and water. Four rounds were carried in the turret "ready rack." This also necessitated the removal of part of the turret basket to allow access to the flooring. Later models removed the turret basket entirely. 3,071 M4A3(75)W were manufactured.

Options: Hedgehog plow, Wet ammo stowage.

M4A1(76) Sherman

Type:	Tank	**Top Speed**:	40 KPH (26 off-road)
Availability:	Jan 44 – May 45	**Redline**:	2400 RPM (1800 average)
Playability:	Player	**Armor**:	
Main Armament:	M1 76mm L/52	**Hull Front**:	79mm (+25mm)
Depression/Elevation:	-10°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	71 (75mm) 6250/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	64mm (+25mm)
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	Yes	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.97 meters	**Mantlet**:	89mm
Weight:	32.0 tons	**Turret Front**:	64mm
Ground Pressure:	1.2 kg/cm^2	**Turret Sides**:	64mm
Maximum Slope:	27°	**Turret Rear**:	64mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This was the first model of the Sherman series to mount the M1 76mm L/52 gun. Although it required some turret modification, (most notably the extension of the turret bustle), it was so far superior to the M3 75mm gun that it was designated to replace it on all further Sherman tanks (excepting only the 105mm howitzer armed support models). Once wet ammo stowage was introduced, this vehicle was modified to accept that option as well. 3,426 of this variant of the Sherman were built.

Options: Hedgehog plow, Wet ammo stowage.

M4A2(76)W Sherman

Type:	Tank	**Top Speed**:	40 KPH (26 off-road)
Availability:	May 44 – May 45	**Redline**:	2100 RPM (1900 average)
Playability:	Player	**Armor**:	
Main Armament:	M1 76mm L/52	**Hull Front**:	79mm
Depression/Elevation:	-10°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	71 (76mm) 6250/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	64mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	Yes	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.97 meters	**Mantlet**:	89mm
Weight:	33.3 tons	**Turret Front**:	64mm
Ground Pressure:	1.2 kg/cm^2	**Turret Sides**:	64mm
Maximum Slope:	27°	**Turret Rear**:	64mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This vehicle was identical to the regular M4A2 Sherman in its hull, suspension, and engine, however, it mounted the turret of the M4A1(76) Sherman, modified to allow wet ammo stowage. 2,915 of this model of the Sherman tank were built.

Options: Hedgehog plow, Wet ammo stowage.

M4A3(76)W Sherman

Type:	Tank	**Top Speed**:	40 KPH (26 off-road)
Availability:	Mar 44 – May 45	**Redline**:	2600 RPM (2200 average)
Playability:	Player	**Armor**:	
Main Armament:	M1 76mm L/52	**Hull Front**:	79mm
Depression/Elevation:	-10°/+25°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	71 (76mm) 6250/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	64mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	Yes	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.97 meters	**Mantlet**:	89mm
Weight:	33.6 tons	**Turret Front**:	64mm
Ground Pressure:	0.77 kg/cm^2	**Turret Sides**:	64mm
Maximum Slope:	27°	**Turret Rear**:	64mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This tank was identical to the regular M4A3 Sherman in its hull, suspension, and engine, however, it mounted the turret of the M4A1(76) Sherman, modified to allow wet ammo stowage as introduced on the M4A3(75)W. 4,542 of this model of the Sherman were manufactured.

Options: Hedgehog plow, Wet ammo stowage.

M4(105) Sherman

Type:	Tank	**Top Speed**:	40 KPH (22 off-road)
Availability:	Feb 44 – May 45	**Redline**:	2400 RPM (1800 average)
Playability:	AI only	**Armor**:	
Main Armament:	M4 105mm L/22	**Hull Front**:	79mm
Depression/Elevation:	-10°/+35°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	66 (105mm) 6250/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	64mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	None	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.94 meters	**Mantlet**:	91mm
Weight:	31.5 tons	**Turret Front**:	76mm
Ground Pressure:	1.2 kg/cm^2	**Turret Sides**:	51mm
Maximum Slope:	27°	**Turret Rear**:	51mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This tank was identical to the original M4 series tank, except that it mounted an M4 105mm L/22 howitzer in an M52 mount (as opposed to the original M34 mount) in a slightly modified turret. One of the original specifications of the M4 tank series was that it must be able to mount a 75mm gun, 105mm gun, two 37mm guns, or three .50 M2HB machineguns on an antiaircraft mount. Although the last two variants were never produced, 1,641 of the 105mm armed version were made. A HEAT round was made for this weapon for self-defense against enemy tanks, however, it was intended as a close-support tank for the infantry, and was not intended to engage enemy armor unless absolutely necessary.

Options: Hedgehog plow.

M4A3(105) Sherman

Type:	Tank	**Top Speed**:	40 KPH (26 off-road)
Availability:	May 44 – May 45	**Redline**:	2600 RPM (2200 average)
Playability:	AI only	**Armor**:	
Main Armament:	M4 105mm L/22	**Hull Front**:	79mm
Depression/Elevation:	-10°/+35°	**Hull Sides**:	38mm
Secondary Armament:	Hull MG, Coax MG, AA HMG	**Hull Rear**:	38mm
Ammunition:	66 (105mm) 6250/600 (MG/HMG)	**Hull Top**:	19mm
Smoke:	None	**Superstructure Front**:	64mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	38mm
Radio:	None	**Superstructure Rear**:	38mm
Target Size:	Large	**Superstructure Top**:	19mm
Height:	2.94 meters	**Mantlet**:	91mm
Weight:	33.0 tons	**Turret Front**:	76mm
Ground Pressure:	0.86 kg/cm^2	**Turret Sides**:	51mm
Maximum Slope:	27°	**Turret Rear**:	51mm
Maximum Vertical:	0.61 meters	**Turret Top**:	25mm

This tank was a later model of the 105mm howitzer-armed close-support tank based on the superior M4A3 hull and drive train. 3,039 of this very successful tank were built.

Options: Hedgehog plow.

M10GMC Wolverine

Type:	Tank destroyer	**Top Speed**:	42 KPH (22 off-road)
Availability:	Mar 43 – May 45	**Redline**:	
Playability:	Wingman	**Armor**:	
Main Armament:	M7 76mm L/55	**Hull Front**:	51mm
Depression/Elevation:	-10°/+30°	**Hull Sides**:	25mm
Secondary Armament:	Coax MG, AA HMG	**Hull Rear**:	25mm
Ammunition:	54 (76mm) 600 (HMG) 2250 (MG)	**Hull Top**:	19mm
Smoke:	Yes	**Superstructure Front**:	38mm
Turret Traverse:	15 seconds	**Superstructure Sides**:	19mm
Radio:	Yes	**Superstructure Rear**:	19mm
Target Size:	Medium	**Superstructure Top**:	19mm
Height:	2.48 meters	**Mantlet**:	57mm
Weight:	29.5 tons	**Turret Front**:	25mm
Ground Pressure:	1.0 kg/cm^2	**Turret Sides**:	25mm
Maximum Slope:	27°	**Turret Rear**:	25mm
Maximum Vertical:	0.61 meters	**Turret Top**:	Open

The M10 GMC Wolverine was designed specifically to fill the needs of an American antitank concept known as the tank destroyer. Although the Germans already had similar vehicles, they were normally either self-propelled antitank guns (used in the role of regular antitank guns) or fully-armored assault guns fitted with antitank guns. The American idea was to take the chassis of a proven tank, in this case the M4 Sherman, and fit a lightly armored rotating cupola mounting a high-velocity antitank gun (the 76mm M7, essentially a shortened M5) in place of the turret. The idea was to use speed and range to counter the weaknesses in the vehicle's protection, and for the vehicles to be employed in large quantities. Although the theory was eventually proven wrong, it was not until after 4,993 had been manufactured, with production halted in December of 1942 in favor of the M18 Hellcat. The remainder of the tank destroyers were thereafter used as close artillery support and assault guns.

Options: Hedgehog plow, Turret umbrella.

M7HMC Priest

Type:	Self-propelled artillery	**Maximum Vertical**:	0.61 meters
Availability:	Nov 42 – May 45	**Top Speed**:	39 KPH (16 off-road)
Playability:	AI only	**Redline**:	2400 RPM (1800 average)
Main Armament:	M2 105mm L/22	**Armor**:	
Depression/Elevation:	-5°/+35°	**Hull Front**:	79mm
Secondary Armament:	AA HMG	**Hull Sides**:	38mm
Ammunition:	69 (105mm), 400 (HMG)	**Hull Rear**:	13mm
Smoke:	None	**Hull Top**:	19mm
Radio:	None	**Superstructure Front**:	13mm
Target Size:	Medium	**Superstructure Sides**:	13mm
Height:	2.54 meters	**Superstructure Rear**:	13mm
Weight:	22.9 tons	**Superstructure Top**:	Open
Ground Pressure:	0.83 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

The M7 HMC, better known as the Priest, due to the pulpit-like appearance of the machinegun cupola, is a self-propelled howitzer using the chassis of the M3 Lee/Grant series tank, and later the chassis of the M4 Sherman tank. The howitzer was the standard M2 used for long-range artillery support. It was not provided with any type of armor-piercing shells, as its purpose was solely to support the forward combat units. Even the armor was relatively thin, and this was complemented by an open-topped superstructure, which made it easy to load ammunition, while leaving the crew vulnerable to infantry, artillery, and air attack. The only means of self-defense available to the crew was one .50 M2HB machinegun and their personal small arms.

Options: Radio.

M3 Halftrack

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Nov 42 – May 45	**Top Speed**:	65 KPH (53 off-road)
Playability:	AI only	**Redline**:	2000 RPM (1600 average)
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	12mm
Secondary Armament:	AA HMG, AA MG	**Hull Sides**:	7mm
Ammunition:	800 (HMG), 2250 (MG)	**Hull Rear**:	7mm
Smoke:	None	**Hull Top**:	7mm
Radio:	Yes	**Superstructure Front**:	12mm
Target Size:	Small	**Superstructure Sides**:	7mm
Height:	2.26 meters	**Superstructure Rear**:	7mm
Weight:	8.0 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

The M3 series halftrack replaced the M2 version, which was produced throughout 1941 and had similar characteristics to the M3 version. 41,170 halftracks of all types were built, including the artillery and machinegun variants covered here. This vehicle was originally designed to carry a full infantry squad of ten to thirteen men and all of their equipment. Some variants mounted extra machineguns, mortars, antitank guns, antiaircraft guns, and even artillery. Several of these models are described below.

Options: None.

M3A1 Halftrack

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Jan 44 – May 45	**Top Speed**:	72 KPH (45 off-road)
Playability:	AI only	**Redline**:	2000 RPM (1600 average)
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	12mm
Secondary Armament:	AA HMG, AA MG	**Hull Sides**:	7mm
Ammunition:	800 (HMG), 2250 (MG)	**Hull Rear**:	7mm
Smoke:	None	**Hull Top**:	7mm
Radio:	Yes	**Superstructure Front**:	12mm
Target Size:	Small	**Superstructure Sides**:	7mm
Height:	2.26 meters	**Superstructure Rear**:	7mm
Weight:	8.3 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

The M3A1 was a product-improved version of the M3 halftrack, and filled the same roles as the earlier vehicle. It had a somewhat more reliable and powerful engine than its predecessor, and was also manufactured in great numbers.

Options: None.

M3A1 MMG Halftrack

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Nov 42 – May 45	**Top Speed**:	72 KPH (45 off-road)
Playability:	AI only	**Redline**:	2000 RPM (1600 average)
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	12mm
Secondary Armament:	AA HMG, AA MG, Rear MG	**Hull Sides**:	7mm
Ammunition:	1200 (HMG), 6750 (MG)	**Hull Rear**:	7mm
Smoke:	None	**Hull Top**:	7mm
Radio:	Yes	**Superstructure Front**:	12mm
Target Size:	Small	**Superstructure Sides**:	7mm
Height:	2.26 meters	**Superstructure Rear**:	7mm
Weight:	8.5 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

This version of the M3A1 halftrack was designed to carry the weapons and ammunition of the machinegun section, and was provided with an extra mount for one of the section's Browning .30 M1919 machineguns.

Options: None.

M3A1 HMG Halftrack

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Nov 42 – May 45	**Top Speed**:	72 KPH (45 off-road)
Playability:	AI only	**Redline**:	2000 RPM (1600 average)
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	12mm
Secondary Armament:	AA HMG, AA MG, Rear HMG	**Hull Sides**:	7mm
Ammunition:	3600 (HMG), 2250 (MG)	**Hull Rear**:	7mm
Smoke:	None	**Hull Top**:	7mm
Radio:	Yes	**Superstructure Front**:	12mm
Target Size:	Small	**Superstructure Sides**:	7mm
Height:	2.26 meters	**Superstructure Rear**:	7mm
Weight:	8.3 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

This version of the M3A1 halftrack was designed to carry the weapons and ammunition of the heavy machinegun section, and was provided with an extra mount for one of the section's Browning .50 M2HB machineguns.

Options: None.

M3A1 GMC Halftrack

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Nov 42 – May 45	**Top Speed**:	72 KPH (45 off-road)
Playability:	AI only	**Redline**:	
Main Armament:	M2 75mm L/28	**Armor**:	
Depression/Elevation:	-9°/+49°	**Hull Front**:	12mm
Secondary Armament:	Hull HMG, AA MG	**Hull Sides**:	7mm
Ammunition:	50 (75mm), 2250 (MG)	**Hull Rear**:	7mm
Smoke:	None	**Hull Top**:	7mm
Radio:	Yes	**Superstructure Front**:	12mm
Target Size:	Small	**Superstructure Sides**:	7mm
Height:	2.7 meters	**Superstructure Rear**:	7mm
Weight:	9.8 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

This model of the M3A1 halftrack carried the M2 75mm L/28 gun, its crew, and ammunition in place of a regular infantry squad. It was designed to provide the mechanized infantry with some integral artillery support that would be just as mobile as the infantrymen themselves. Although lightly armored, it was a success due to its low cost and high mobility.

Options: None.

M16 MGMC

Type:	Halftrack	**Maximum Vertical**:	0.3 meters
Availability:	Jan 44 – May 45	**Top Speed**:	72 KPH (45 off-road)
Playability:	AI only	**Redline**:	2800 RPM (2300 average)
Main Armament:	Four HMG	**Armor**:	
Depression/Elevation:	-5°/+85°	**Hull Front**:	12mm
Secondary Armament:	None	**Hull Sides**:	7mm
Ammunition:	8000 (HMG)	**Hull Rear**:	7mm
Smoke:	None	**Hull Top**:	7mm
Radio:	Yes	**Superstructure Front**:	12mm
Target Size:	Small	**Superstructure Sides**:	7mm
Height:	2.35 meters	**Superstructure Rear**:	7mm
Weight:	9.8 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

The M16 MGMC carried a specially designed mount, called the Mxson Mount, which held four .50 M2HB machineguns, instead of an infantry squad. Many versions were made to be mounted on trucks or trailers, however, the most popular model was the one which used the M3A1 halftrack as its basis. The entire mount could traverse in six seconds, and the guns could elevate 60° in one second. Due to its mobility, this vehicle could provide short-ranged antiaircraft defense to convoys as well as advancing motorized troops.

Options: None.

M3 Scout Car

Type:	Armored car	**Maximum Vertical**:	0.3 meters
Availability:	Jan 42 – May 45	**Top Speed**:	80 KPH (20 off-road)
Playability:	AI only	**Redline**:	2400 RPM (1800 average)
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	12mm
Secondary Armament:	AA MG, AA HMG	**Hull Sides**:	7mm
Ammunition:	800 (HMG), 2250 (MG)	**Hull Rear**:	7mm
Smoke:	None	**Hull Top**:	7mm
Radio:	Yes	**Superstructure Front**:	12mm
Target Size:	Small	**Superstructure Sides**:	7mm
Height:	2.0 meters	**Superstructure Rear**:	7mm
Weight:	5.6 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

Options: None.

M20 Armored Car Scout

Type:	Armored car	**Maximum Vertical**:	0.3 meters
Availability:	Jan 44 – May 45	**Top Speed**:	90 KPH (12 off-road)
Playability:	AI only	**Redline**:	3000 RPM (2400 average)
Main Armament:	None	**Armor**:	
Depression/Elevation:	-	**Hull Front**:	12mm
Secondary Armament:	AA HMG	**Hull Sides**:	7mm
Ammunition:	1000 (HMG)	**Hull Rear**:	7mm
Smoke:	None	**Hull Top**:	7mm
Radio:	Yes	**Superstructure Front**:	12mm
Target Size:	Small	**Superstructure Sides**:	7mm
Height:	1.9 meters	**Superstructure Rear**:	7mm
Weight:	6.6 tons	**Superstructure Top**:	Open
Ground Pressure:	1.0 kg/cm^2	**Mantlet**:	None
Maximum Slope:	27°		

This vehicle was simply an M8 Greyhound with the turret removed and the fighting compartment opened to allow the vehicle to be used to carry troops or supplies. Although not as popular as the M8, it was well-liked, even considering its inadequate armament, which consisted of a single M2HB .50 machinegun on a ring mount.

Options: None.

Truck, 2½ Ton 6x6 GMC

Type:	Truck	**Weight**:	2.5 tons
Availability:	Jan 42 – May 45	**Ground Pressure**:	1.0 kg/cm^2
Playability:	AI only	**Maximum Slope**:	15°
Smoke:	None	**Maximum Vertical**:	0.1 meters
Radio:	None	**Top Speed**:	80 KPH (10 off-road)
Target Size:	Large	**Redline**:	RPM
Height:	2.21 meters		

This truck, commonly called the "deuce-and-a-half" due to its payload, was a staple of US forces in every theater. Although unarmed and unarmored, it was the workhorse of the motorized forces, and over 200,000 were manufactured, although many of these were supplied to the Soviet Union.

Options: Antiaircraft machinegun.

M38 Jeep

Type:	Car	**Weight**:	0.25 tons
Availability:	Jan 42 – May 45	**Ground Pressure**:	1.0 kg/cm^2
Playability:	AI only	**Maximum Slope**:	15°
Smoke:	None	**Maximum Vertical**:	0.1 meters
Radio:	None	**Top Speed**:	KPH (off-road)
Target Size:	Large	**Redline**:	RPM
Height:	meters		

The M38 1/4 ton truck, General Purpose, was commonly called the Jeep, due to its initials G.P. It was designed shortly before the war began, and served well past its conclusion. The Jeep was known for its ruggedness and reliability. Its cross-country handling was also good, due to its use of four-wheel drive, although it was prone to tipping over on sharp corners at high speeds.

Options: Antiaircraft machinegun.

Infantry

Type:	Infantry HS	**Weaponry:**	M1 rifle
Availability:	Jan 42 – May 45	**Secondary Weaponry**:	Hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle)
Target Size:	Very small	**Smoke**:	Yes

The US Army infantry squad consisted of two half-squads, normally a regular infantry half-squad and a BAR team. The soldiers were armed primarily with the M1 Garand semiautomatic rifle, a .30 caliber rifle with an 8-round internal magazine fed through the top by stripper clips. The squad leader usually carried a Browning M3 .45 caliber submachinegun and spare 30-round magazines. All of the soldiers carried the Mark II "pineapple" hand grenades, and one soldier in each squad usually carried a rifle grenade adapter and several rifle grenades.

Options: None.

Airborne Infantry

Type:	Infantry HS	**Weaponry:**	M1 carbine
Availability:	Jun 44 – May 45	**Secondary Weaponry**:	Hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle)
Target Size:	Very small	**Smoke**:	Yes

The US airborne infantry squad consisted of two half-squads, normally a regular infantry half-squad and a BAR team. The soldiers were armed primarily with the M1 semiautomatic carbine, a .30 caliber rifle (with a shorter cartridge than the M1 Garand) with a 15 or 30-round detachable box magazine. The squad leader usually carried a Thompson M1A1 .45 caliber submachinegun and spare 20-round magazines. All of the soldiers carried the Mark II "pineapple" hand grenades.

Options: None.

Machinegun Team

Type:	Infantry HS	**Weaponry:**	M2HB
Availability:	Jan 42 – May 45	**Secondary Weaponry**:	M1 rifle, hand grenades
Playability:	AI only	**Ammunition**:	600 (SMG) 600 (HMG)
Target Size:	Very small	**Smoke**:	None

The US Army machinegun team consisted of a half-squad. These were normally combined into a section of two or three teams. The team was responsible for manning a single Browning M2HB .50 heavy machinegun. This weapon was very powerful for a machinegun, and was capable of knocking out light vehicles at over 1,000 meters. The soldiers were also armed with the M1 Garand semiautomatic rifle, a .30 caliber rifle with an 8-round internal magazine fed through the top by stripper clips. All of the soldiers carried the Mark II "pineapple" hand grenades.

Options: None.

Bazooka Team

Type:	Infantry HS	**Weaponry:**	Bazooka M1
Availability:	Jan 42 – May 45	**Secondary Weaponry**:	M1 rifle, hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle) 10 (Bazooka)
Target Size:	Very small	**Smoke**:	None

The US Army Bazooka team consisted of a half-squad. These were normally combined into a section of two teams. The team was responsible for manning a single M1 2.36" Bazooka rocket launcher. This weapon was capable of knocking out some enemy tanks at about 100 meters using a HEAT round derived from the M9A1 antitank rifle grenade. The soldiers were also armed with the M1 Garand semiautomatic rifle, a .30 caliber rifle with an 8-round internal magazine fed through the top by stripper clips. All of the soldiers carried the Mark II "pineapple" hand grenades.

Options: None.

BAR Team

Type:	Infantry HS	**Weaponry:**	M1 Garand
Availability:	Jan 42 – May 45	**Secondary Weaponry**:	BAR, Hand grenades
Playability:	AI only	**Ammunition**:	600 (Rifle) 600 (LMG)
Target Size:	Very small	**Smoke**:	Yes

The US Army infantry squad consisted of two half-squads, normally a regular infantry half-squad and a BAR team. The soldiers were armed primarily with the M1 Garand semiautomatic rifle, a .30 caliber rifle with an 8-round internal magazine fed through the top by stripper clips. The BAR gunner carried the .30 Browning Automatic Rifle, a heavy rifle which used 20-round detachable box magazines and included a built-in bipod (although this was often removed in the field). All of the soldiers carried the Mark II "pineapple" hand grenades, as well as extra ammunition for the BAR.

Options: None.

M3A1 Antitank Gun

Type:	Antitank gun	**Weaponry:**	37mm L/45
Availability:	Jan 42 – May 45	**Turning time**:	16 seconds
Playability:	AI only	**Ammunition**:	50 (37mm)
Target Size:	Small	**Height**:	0.97 meters

The M3A1 37mm L/45 was a copy of the famous German PaK 35/36 series antitank gun, fitted with a muzzle brake to reduce recoil (since the recoil was so low anyway, the muzzle brake was usually removed before the gun left the factory!). This weapon was already obsolete by the time it was adopted, although variants were made for use on light tanks and the gun itself was used in the campaign in North Africa. It was quickly declared unsatisfactory, and most of them were sent to the Pacific theater, where they were effective against the lightly-armored Japanese tanks at close range. In the European theater, it was replaced by the 57mm and 76mm antitank guns M1 and M5.

Options: None.

M1 Antitank Gun

Type:	Antitank gun	**Weaponry:**	57mm L/50
Availability:	Jun 44 – May 45	**Turning time**:	16 seconds
Playability:	AI only	**Ammunition**:	50 (57mm)
Target Size:	Small	**Height**:	1.27 meters

The M1 57mm L/50 antitank gun was a copy of the British 6-pounder antitank gun.

Options: None.

M5 Antitank Gun

Type:	Antitank gun	**Weaponry:**	76mm L/55
Availability:	Jan 42 – May 45	**Turning time**:	16 seconds
Playability:	AI only	**Ammunition**:	50 (76mm)
Target Size:	Medium	**Height**:	1.32 meters

The M5 76mm L/55 antitank gun was based on the 3" M3 antiaircraft gun, modified to accept the breech and carriage assembly of the M2 105mm howitzer. It was heavy for its type, requiring a 6x6 truck to tow it, however, it was still a very popular weapon due to its long range and good penetration characteristics. It was mounted, in a slightly modified form, on the M10 Wolverine tank destroyer. Although manufacture had begun before the North African campaign, it was not available in quantity to front-line units until the invasion of Italy in 1943. 2,500 M5 antitank guns were built, and another 6,824 were made for the M10 and other tank destroyers.

Options: None.

7. GLOSSARY AND ABBREVIATIONS

AA (Antiaircraft). A weapon which is designed to fire at aircraft. A machinegun in an antiaircraft mount can normally be elevated to fire at aircraft or depressed to fire at ground targets and is capable of firing in any direction, although a crewmember must ordinarily expose himself to do so.
Abt. (Abteilung). German designation for battalion or detachment.
Antitank. Any weapon or artillery piece designed to attack tanks. This will usually be by means of a high-velocity solid-shot shell (AP) or a low-velocity shaped-charge (HEAT) round.
AP (Armor Piercing). A type of ammunition designed to penetrate armor. It is usually made of hardened steel, and is not explosive.
APCBC (Armor-Piercing, Capped, Ballistic-Cap). An armor-piercing round which has been given two caps, one to improve penetration, and the other to improve flight characteristics.
APCR (Armor-Piercing Composite Rigid). A type of armor-piercing ammunition which uses a tungsten carbide core surrounded by a skirt of softer metal.
APDS (Armor-Piercing Discarding-Sabot). A type of armor-piercing shot which used a tungsten carbide penetrator carried by a lightweight sabot (pronounced say-bo), which separate as the round is fired.
Armored car. A lightly-armored fighting vehicle, mainly used for reconnaissance, which has four, six, or eight wheels and may be armed.
Army. A unit made up of 2-3 corps. May be prefaced by "infantry" or "tank" to show what types of corps are commanded. The numerical designation of the Army will be spelled out, e.g. Fifth Army, Seventh Army, etc.
Assault Gun. A fully-tracked and armored fighting vehicle mounting a cannon in a fixed forward-firing mount.
AT (Antitank). A weapon or device designed to penetrate the armor of tanks and inflict internal damage.
Ausf. (Ausfuhrung). German for model or variant.
BAR (Browning Automatic Rifle). An American magazine-fed light machinegun.
BDE (Brigade). A unit made up of 2 regiments or 3-4 battalions. Numbering for brigades is as for divisions.
BN (Battalion). A unit made up of 3-5 companies. The battalions in a regiment are normally numbered in order, e.g. 1st BN, 2nd BN, etc.
CO (Company). A unit made up of 3-5 platoons. Also used as American slang to refer to the company commander. The designation of the company is generally given alphabetically, as A CO, B CO, C CO, etc.
Coax (Coaxial). A weapon which is mounted next to the main gun in the turret of a tank, and may only be fired at targets to the front of the turret of the vehicle. Machineguns which are mounted next to the main gun of a self-propelled gun are considered to be hull-mounted machineguns.

Corps. A unit made up of 2-5 divisions. Usually prefaced by "infantry" or "tank" to show what types of divisions are commanded. The numerical designation of the corps will be spelled out in Roman numerals, e.g. LXXVI Corps, V Corps, II Corps, etc. Where more than one corps is being mentioned, the nationality is mentioned so as to avoid confusion.

DIV (Division). A unit made up of 2-4 regiments or 2-3 brigades (same in German and English). The numerical designation and type are given as usual, e.g. 9th Infantry division, 16th Panzer Division, etc.

Engineers. Troops which fight alongside the infantry and are specialists in destroying fortifications, bridges and emplacements, as well as constructing and maintaining them.

FJ (Fallschirmjäger). German designation for airborne infantry.

Fl. (Flammen or Flammpanzer). German designation for a flamethrower or flame-tank.

FlaK (Flugerabwehrkanone). German designation for antiaircraft cannon.

Fu. (Funk or Funkpanzerwagen). German designation for a radio or radio vehicle.

Gr. (Granate). German designation for a grenade or shell.

Grognard. A French term which came into use during the Napoleonic wars which describes a long-service veteran, and is currently used to refer to experienced modern historical wargamers.

GrW (Granatewerfer). German designation for a mortar.

Halftrack. A lightly-armored vehicle, similar to a truck, designed to carry personnel and equipment into battle, which is propelled by a small set of tracks in place of the rear wheels, and steered by means of the front (conventional) wheels.

HE (High-Explosive). A type of shell which explodes on impact. It is most often used against soft targets such as infantry and artillery positions.

HEAT (High-Explosive Antitank). A type of explosive shell designed to penetrate armor. Because its penetration capability is not based on velocity, it can be used to provide low-velocity guns and rockets with a capable warhead.

Heer. The German army, which is part of the Wehrmacht.

HMG (Heavy Machinegun). A machinegun issued at company level or mounted on vehicles which is belt-fed and fires very large caliber ammunition.

Hull. The main body of a tank or other armored fighting vehicle. A hull-mounted machinegun is only capable of firing out of the front of the vehicle.

ILLUM (Illumination). A type of round used to illuminate an area of the battlefield.

JgdPz (Jagdpanzer). German designation for a tank destroyer.

Kfz (Kraftfahrzeug). German designation for any light unarmored vehicle, or any vehicle in general.

Kompanie. German for "company."

KwK (Kampfwagen Kanone). German designation for a tank gun.

L (Kaliberlange). German designation for the length of a gun barrel in calibers (multiples of the shell diameter).

le (Leichte). German designation for "light."

Lkw (Lastkraftwagen). German designation for a truck or load-carrying vehicle.

LMG (Light machinegun). A machinegun issued at squad level which may be magazine-fed.
Luftwaffe. The German air force, which is part of the Wehrmacht.
MG (Machinegun or Maschinengewehr). A fully-automatic weapon firing rifle-caliber or larger ammunition from cloth or metal belts or a detachable magazine, generally used by and in support of the infantry.
MMG (Medium Machinegun). A machinegun issued at the platoon or company level or mounted on vehicles which is belt-fed and may be air or water-cooled.
MRL (Multiple Rocket Launcher). A type of artillery which uses rockets fired from a multi-barreled launcher. This includes the German Nebelwerfer and the American Calliope.
MV (Muzzle Velocity). The velocity at which a round leaves the barrel of a gun, usually expressed in meters per second.
NbW (Nebelwerfer). German designation for a rocket launcher, originally intended to lay smoke screens.
OKH (Oberkommando des Heeres). Army High Command.
OKW (Oberkommando der Wehrmacht). Wehr
PaK (Panzerabwehrkanone). German designation for an antitank gun.
Pi (Pionier). German designation for engineers.
PzG (Panzergrenadier). German designation for armored or mechanized infantry.
PLT (Platoon). A unit made up of 3-5 squads.
PSW (Panzerspähwagen). German designation for a wheeled armored car.
PzB (Panzerbüsche). German designation for an antitank rifle.
PzGr (Panzergranate). German designation for an AP shell for a tank or antitank gun.
PzKpfw (Panzerkampfwagen). German designation for a tank, usually shortened to "Panzer."
Rear. A machinegun mounted on the rear of a vehicle may be used to fire at ground targets which are located behind the vehicle only.
Redline. The maximum number of revolutions per minute that the engine is designed to withstand. It is possible to blow the engine up by overheating it (running constantly at or over redline).
RGT (Regiment). A unit made up of 2-4 battalions, often replacing the brigade entirely in division structure (the same in German and English). Numbering for regiments is as for divisions.
RR (Recoilless Rifle). A type of cannon which has no recoil, but a very large backblast. This allows it to be mounted on a tripod or light vehicle for use.
s (Schwere). German designation for "heavy."
SdKfz (Sonderkraftfahrzeug). German for special purpose vehicle. Nearly all vehicles in German service had an SdKfz number.
Slope. The maximum angle of terrain that a vehicle is capable of ascending. This angle may be reduced by mud or frozen ground.
SMG (Submachinegun). A fully-automatic weapon firing pistol-caliber ammunition from a detachable box magazine.

SP Artillery (Self-propelled Artillery). A fully-tracked lightly-armored vehicle mounting an indirect-fire support gun in a fixed, open-topped superstructure.
Sprgr (Sprenggranate). German designation for a HE shell.
SPW (Schützenpanzerwagen). German designation for a halftrack or armored personnel carrier.
SQD (Squad). A unit made up of two half-squads or fire teams, usually 10-12 men.
Stab. German for headquarters.
StuG (Sturmgeschütz). German designation for an assault gun, or turretless tank, which is often used as a tank destroyer.
StuH (Sturmhaubitze). German designation for an assault howitzer, which mounts a howitzer in place of a cannon for infantry support.
StuPz (Sturmpanzer). German designation for a turretless tank armed with an infantry gun instead of an antitank cannon.
Tank. A fully-tracked heavily-armed and thickly-armored vehicle with a cannon mounted in a fully-rotating armored turret.
Tank Destroyer. A fully-tracked lightly-armored vehicle with an antitank gun mounted in a fixed, open superstructure or an open-topped turret.
Theater. Allied designation for an area of conflict, such as the European Theater, which corresponds to the German Western Front.
Traverse. The time, in seconds, for the turret to make one full revolution.
Vertical. The maximum height, in meters, of an obstacle that can be driven over by the vehicle.
Wehrmacht. German designation for all of the armed forces.
WP (White Phosphorous). A type of shell used to provide a large smoke screen on the battlefield, which also has a secondary incendiary effect.
Zug. German designation for a platoon or troop.

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