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Tiger Tamer: The Development Of The M26 Pershing Tank In World War II

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TIGER TAMER: THE DEVELOPMENT OF THE M26 PERSHING TANK IN WORLD WAR II

A THESIS SUBMITTED TO THE DEPARTMENT OF HISTORY

BY

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HELENA, MONTANA

APRIL, 1998
This thesis for honors recognition has been approved for the department of History.

Dr. Robert Swartout, Director

Fr. William Greytak, Ph.D., Reader

Professor Alan Quist, Reader
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The pictures throughout this work have been used with permission granted from the designers of three web pages. Mario Paesani, James Perlowski, Jr., and George Parada were very gracious in granting permission for me to use photos, images, and information from their pages. George Parada’s page can be found at
www.yesic.com/lostark/intro.htm. Figures 1, 3, 5, 7, 8, and 14 were found on Mario Paesani’s page at www.ansaldo.it/~paesani/armorweb.htm. Figures 2, 4, and 6 were found on James Perlowski Jr.’s page at www.lightlink.com/tiger1/main.htm. Their interest in the subject helped me enormously in compiling background information. I am extremely grateful for their hard work and generosity. Figures 9-13, and 15-17 were obtained from the National Archives and other U.S. Government documents.

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<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>German panzer Mark III</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>German panzer Mark IV</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Russian T-34/76</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>German panzer Mark V Panther</td>
<td>8</td>
</tr>
<tr>
<td>5.</td>
<td>German panzer Mark VI Tiger I</td>
<td>9</td>
</tr>
<tr>
<td>6.</td>
<td>German panzer Mark VI Tiger II</td>
<td>10</td>
</tr>
<tr>
<td>7.</td>
<td>U.S. M3</td>
<td>11</td>
</tr>
<tr>
<td>8.</td>
<td>U.S. M4 Sherman</td>
<td>13</td>
</tr>
<tr>
<td>9.</td>
<td>U.S. T26E3 with the .50 caliber machine gun</td>
<td>21</td>
</tr>
<tr>
<td>10.</td>
<td>Rearview of the T26E3</td>
<td>24</td>
</tr>
<tr>
<td>11.</td>
<td>T26E3 on the testing course</td>
<td>24</td>
</tr>
<tr>
<td>12.</td>
<td>T26E3 frontal view</td>
<td>25</td>
</tr>
<tr>
<td>13.</td>
<td>Overhead view of the T26E3</td>
<td>26</td>
</tr>
<tr>
<td>14.</td>
<td>U.S. M26 Pershing Heavy Tank</td>
<td>27</td>
</tr>
<tr>
<td>15.</td>
<td>View from tunnel onto the Ludendorff Bridge</td>
<td>33</td>
</tr>
<tr>
<td>16.</td>
<td>M26 with M3 90mm main gun</td>
<td>37</td>
</tr>
<tr>
<td>17.</td>
<td>T26E4 with T15E2 90mm main gun</td>
<td>37</td>
</tr>
</tbody>
</table>
# TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Penetration Table of the Panther vs. the Sherman</td>
<td>14</td>
</tr>
<tr>
<td>2. Comparison between German and American Tank Production</td>
<td>15</td>
</tr>
</tbody>
</table>
INTRODUCTION

Technological advances made during the first half of the twentieth century vastly improved the weapons of war and these new killing machines met on the battlefields of World War II. Only three decades earlier, the Great War had degenerated into static trench warfare with armies sustaining astronomical losses to gain nothing more than mere miles. World War II differed in that the participating countries used the flexibility provided by new weapons to wage offensive warfare, attacking and counter-attacking with a speed that was never before seen. While most of the countries involved in the war in Europe agreed that the defensive stalemate experienced during World War I should not be repeated, one country in particular made radical steps to ensure this.

Ignoring the restrictive terms of the Treaty of Versailles, the Germans rebuilt their mighty military machine and, in 1939, began testing its prowess at the expense of their European neighbors. German U-boats ruled the seas, choking off supply routes used by the Allied countries. The powerful German Luftwaffe dominated the skies, extending its terror to London and beyond. On the ground, German panzer divisions employed the new offensive-minded concepts of Blitzkrieg with enormous success. To perfect this radically different form of warfare, the German Army concentrated on the development of a relatively young weapon, the tank. Tanks had proven their usefulness by the end of World War I, but many countries slowed their further development of this burgeoning weapon after 1918. Germany, however, secretly worked to perfect the use of tanks, stressing mobility and the massing of the vehicles into specialized panzer divisions. The use of these tanks early in the war resulted in a string of brilliant victories. Reacting to Germany’s superiority, the Allies scrambled to produce tanks capable of equaling the
weapons of their enemy.

Early in World War II, the Allies’ tank forces were drastically outmatched. American tanks were hastily designed, mass produced, and rushed to the European Theater to meet the German panzers. As the war progressed, the German panzers began to meet more formidable opponents. The Russian T-34 and American M4 Sherman proved to be superior to the early model panzers, causing a brief period of Allied tank superiority. Reacting to this turn of events, German engineers designed two new panzers: the Tiger and the Panther. These German monsters dominated their American counterparts, and an improved U.S. tank was needed.

The process to design an improved U.S. tank, which was initiated early in World War II, did not produce a viable alternative to the Sherman until 1945. This tank was the M26 Pershing. But why had it taken the United States, easily one of the most technologically and industrially advanced nations of the world, so long to equip its soldiers with a tank capable of effectively combating enemy weapons? Many factors combined to delay the Pershing’s development, including U.S. Army tank warfare doctrine, reliance on the superiority of numbers achieved by the Sherman, and a controversy between development branches within the U.S. Army. To begin to understand how these factors affected U.S. design and development procedures, an examination into the strategies and weapons of the other participants of World War II is needed.
Many factors played a part in the rapid development of tanks during World War II. Technological advances allowed designers to use lighter, yet stronger metals when constructing tanks. Improved engines could now power these large vehicles to speeds that were unimaginable only a few years earlier. Great strides had been made in the area of weaponry and the guns mounted in the tanks of the Second World War proved to be far more powerful and accurate than anything to date. Military theories first put forth by the British Army were adapted and used by the German Army with devastating effect. The epic tank battles of World War II immortalized names like Patton, Montgomery, and Rommel. Before an understanding can be reached concerning the U.S. Army’s use of tank warfare during the Second World War, an examination of the tanks, armor improvements, and tactics of the other participants in the war, specifically the Germans and Russians, is needed.

Between the wars, the German Army had been secretly experimenting with new weapons and techniques. After its defeat in World War I, Germany suffered harshly from the restrictions imposed by the Treaty of Versailles. This proclamation eliminated Germany’s airforce and navy and reduced the army to a force of 100,000 men. Restrictions were also placed on the development of new weapons. To get past these limitations, Germany and Russia arranged a secret agreement, the Rapallo Pact, whereby the Germans could experiment with new weapons and techniques in the USSR in exchange for instructing the Red Army. During this time, the Germans worked to perfect the concept of Blitzkrieg, or lightening war. The ideas behind Blitzkrieg were first put
forth by British military theorists including Captain B.H. Liddell Hart, Major-General J.F.C. Fuller, and Major-General G. le Q. Martel. In Germany, the young men who would become the leaders of the coming offensives, which would change the world forever, studied these concepts and adapted them to fit the German Army. Training secretly in Russia, the German Army perfected these new tactics which they would use to race across Europe a few short years later.¹

The key components of Blitzkrieg included using tanks “en masse” to break through enemy defensive positions and destroy the lines of communication. German airborne troops were dropped ahead of the tanks to seize key strongholds. Stuka divebombers protected the advancing armor’s flank and terrorized the enemy with their screaming descent and deadly accuracy. Specialized motorized infantry followed to mop up and secure the area that had been overrun.² The German generals coordinated all of these components to gain unprecedented victories while suffering very little loss.

These new tactics created such fear throughout Europe that the German Army was believed to be practically invincible. It seemed that the Germans had an endless supply of tanks and planes as they overran Poland, the Low Countries, and, eventually, France. This seeming superiority of numbers was often not the case. Hitler’s victories in France, for example, were achieved with an inferior number of tanks compared to his enemies. The French and British fielded around 3,800 tanks, compared to Germany’s 2,600.³ The difference proved to be in the way the tanks were used. The British and French spread their tanks thinly, using them as infantry support or in static, defensive positions. The Germans, however, achieved victory by massing their panzers against enemy strongholds and using the full offensive potential of their outnumbered tanks.

The tanks which Germany had developed in Russia between the wars were used early on in World War II and gained the German Army unprecedented victories. These tanks—the Mark I, II, III, and IV—were extremely mobile for their time. This mobility helped the Germans to overcome the fact that, oftentimes, they were outnumbered.
Although helpful early on in World War II, further combat proved the Mark I and Mark II to be too lightly armored and undergunned to warrant their continued construction. Production then concentrated on the Mark III and Mark IV, which would constitute the main part of the panzer divisions until 1943. These Mark III and Mark IV tanks proved superior to most enemy tanks and continued to roll virtually unchecked through Europe. This would not always be the case.

![Fig. 1. The panzer Mark III shown on the left. Fig. 2. An early version of the Mark IV on the right.](image)

During June of 1941, Hitler initiated Operation Barbarossa, the German invasion of Russia. The German soldiers soon found their Mark III and Mark IV panzers inferior to the tanks of the Red Army. The Russian T-34 tank, considered by many to be the best tank of the war, defeated the obsolete German panzers time after time. The Russian T-34 had an enormous effect on tank development during World War II. After meeting the T-34 in battle, the Germans designed new panzers to challenge the superior weapons of their enemies to the east. These new German developments, in turn, proved superior to the American tanks of the day, causing the U.S. Army to push for an improved tank. Because the T-34 had such a far-reaching effect, examining this simple, yet effective Russian weapon is crucial to an understanding of the evolution of the tank during World War II.
Fig. 3. The T-34/76, the Russians' most effective and numerous tank of World War II.

The project designed to provide the Red Army with an effective tank began in 1934 and resulted in the production of the T-34 in June of 1940. Two versions of the tank were produced: the T-34/76 mounting a 76mm main gun, and the T-34/85 with a powerful 85mm cannon. The basic T-34, which was the mainstay of the Russian Army, effectively balanced mobility, firepower, and armor protection. It had an efficient diesel engine, reducing the risk of fire and increasing its operational range. The T-34 used wide tracks enabling it to travel over mud and snow more effectively than the German tanks. The Russian designers were among the first in the world to incorporate sloped, shot-deflecting armor which proved extremely successful. One of the main advantages of the T-34 was the ease with which it could be produced; a T-34 could be built in 40 hours. This simplicity made it reliable, easy to repair, and available in great numbers to meet the advancing German panzer. The Russians produced 105,251 tanks and self-propelled vehicles during the war; more than half of these vehicles were T-34s. The German soldiers who encountered the T-34 tanks realized that it was indeed a fine weapon. One
German tank crewman had this to say after a battle on the Eastern Front:

The Russians' tanks are so agile, at close ranges they will climb a slope or cross a piece of swamp faster than you can traverse the turret. . . . When they hit one of our panzers there is often a deep long explosion, a roar as the fuel burns, a roar too loud, thank God, to let us hear the cries of the crew.7

Because of the inferiority of the German Mark III and Mark IV tanks to the weapons of the Russians, something had to be done. Until this point, the Germans believed that their panzers were far superior to every other tank in the world. Instead of continuing to fight with outdated, inferior weapons, on November 25, 1941, Hitler ordered that new tanks be developed that were capable of defeating the Russian threats.8 These efforts resulted in the production of the Mark VI Tiger I in August of 1942 and the Mark V Panther in January of 1943.

Two companies, Daimler Benz and MAN (Maschinenfabrik-Augsburg-Nuremberg), were commissioned to develop an answer to the T-34. By May 14, 1942, both companies tested prototypes before the Fuehrer. The Daimler Benz model was rejected because of poor performance and Hitler decided to support MAN's design. This model was greatly influenced by the T-34, including such similarities as wider tracks, a high-velocity 75mm cannon, and sloped armor for added protection. This new German medium panzer was called the Mark V Panther.9

Hitler had wanted the Panther to be mounted with the 75mm KwK 42 L/100 main gun, but this weapon was still in the experimental stages and could not be mass produced. Instead, the Panther used the shorter 75mm KwK 42 L/70 cannon which could penetrate 140mm of armor from a distance of 1000 meters. This was an extremely effective, high-velocity gun and it far outclassed the short barreled 75mm mounted on the earlier German Mark IV.10

The Panther made its first appearance in July of 1943 at the battle of Kursk on the Russian front. Because of continuos mechanical problems, many Panthers broke down,
making it a disappointing debut. The German engineers worked to correct these technical problems, but unreliability would plague the Panther throughout the war. Despite frequent breakdowns, when the Panther was working, it proved to be one of the most effective and feared tanks of World War II. Against the T-34, after which it had been modeled, the Panther proved to be an effective answer. In one encounter during August of 1944, two Panthers destroyed eleven T-34/85 tanks and inflicted heavy loss of life on Russian infantry without suffering damage to themselves.11 The Panther medium tank is considered to be one of the most successful tanks of World War II, but another German tank, the Tiger, is more well known.

German designers began plans to build a heavy tank as early as 1937, but an adequate model was not ready until July of 1942. The process was accelerated when the German Mark III and Mark IV tanks encountered the superior T-34 during Operation Barbarossa. As with the Panther, Hitler ordered two companies, Porsche and Henschel, to submit prototypes for a heavy tank. The prototypes that the companies produced were

Fig. 4. The German Mark V Panther. Note the longer 75mm gun and the slanted armor.
tested for the Fuehrer on his birthday, April 20, 1942. The Porsche model was disappointing, but the Henschel prototype proved to be extremely impressive. The new tank, the Mark VI Tiger I, was put into production in July of 1942.12

Fig. 5. The German Mark VI Tiger I with the powerful 88mm main gun.

The Tiger I weighed 57 tons, had a very powerful engine, extremely thick armor frontal and side armor, and wide tracks. The most impressive aspect of the Tiger was its long barreled, high-velocity, 88mm KwK 36 L/56 main gun.13 This gun had been adapted from the 88mm Flak anti-aircraft weapon which was extremely successful throughout World War II. The 88mm was also used as an anti-tank gun and was easily the most feared and effective all-purpose weapon of the war. With its combination of size, armor, and firepower, the Tiger made great strides towards closing the tank gap created by the T-34. The Tiger I first saw action at Leningrad in late August of 1942, and performed well.

To attempt to ensure that they would never be outmatched again in the area of tank warfare, German engineers continued to adapt and improve on the Tiger I. Attempting to counter an expected Russian improvement in tank technology, the
Germans went to work on the Tiger II, or "Royal Tiger." This improved version weighed an enormous 68 tons, traveled at speeds of 22mph, and actually had a greater range than the smaller Tiger I. It mounted the 88mm KwK 36 L/71 gun and had thicker armor than any tank to date. Although this was a very formidable weapon, it had little influence on the war since a total of only 489 Tiger IIs were produced.

Fig. 6. The German Mark VI Tiger II.

As previously noted, the German Army in 1941 realized that their tanks were becoming inferior to the enemy’s models. Hitler immediately ordered that action be taken to correct the problem. New tanks were produced in a short period of time that helped Germany regain its armor supremacy. The United States Army encountered a similar problem but reacted very differently.

Because American tank development lapsed after World War I, the U.S. Army was extremely overmatched by the Germans when World War II began. Amazingly, between 1918 and 1933 the United States produced a mere 35 tanks, none of which were of the same model. During this time period, the government of the United States concentrated on its domestic problems brought on by the Great Depression. Americans, for the most part, were isolationists, wanting to focus on solving problems within their
own country and tried to avoid becoming entangled in European affairs. This attitude, along with a limited budget, resulted in little progress being made in tank technology.

Combined with the lack of tanks was the U.S. Army’s outdated tactical use of armor. The U.S. Army’s tank doctrine was announced and summed up in one sentence: "The primary mission of the tank is to facilitate the uninterrupted advance of the riflemen in the attack."Comparatively, the German Army’s use of tanks in specialized panzer divisions had great success, overwhelming the enemy by massing tanks to achieve a breakthrough. The United States Army clung to the doctrine that tied armor to infantry units, lessening the ability of the tank as an offensive weapon. The U.S. Army’s doctrine of avoiding tank-to-tank combat also limited the effectiveness of such a powerful new weapon. U.S. military theorists ignored the fact that on the field of battle, American tanks would eventually have to take on German panzers. Because of this attitude, U.S. doctrine did not take into account tank versus tank combat when designing new weapons. As the war waged on, the U.S. Army did adapt its tank warfare policy to include the close integration of armor, artillery, and infantry, but the time it took to learn these lessons cost American lives. Much of the American tank doctrine stemmed from the almost total reliance on the M4 Sherman medium tank to win the war. The Sherman was developed using lessons learned from the M3, the first U.S. tank to see action in World War II.

Fig. 7. The U.S. M3. Note the limited range of movement of the 75mm main gun.
In August of 1940, the U.S. Army attempted to upgrade its outdated tank force by mounting a 75mm cannon in the earlier M2 light tank. This resulted in the U.S. M3 medium tank. U.S. Army engineers had not perfected the technology of mounting the 75mm in a large, 360 degree turret, so the M3 mounted its main gun in the right front of the superstructure and had a 37mm gun in its small turret. This greatly limited the effectiveness of the 75mm, but the M3 could be produced quickly. Producing and delivering material to the British was critical in this Lend-Lease phase of the war. The M3 was used effectively by the British Army early on in the Second World War, but an improved tank was needed. This tank was the M4 Sherman medium tank.21

The Sherman tank was mechanically very similar to the M3, but had a turret-mounted 75mm main gun. The M4, and its many variations, constituted the vast majority of tanks used by the U.S. Army in every theater of World War II. During the North African Campaign, the first U.S. action in the war, the Sherman performed very well. Pitted against the early German panzers (Mark III's and Mark IV's) that had raced through Europe only a few months earlier, the M4 proved totally superior.22 But this superiority was short lived. At the same time that the German panzers were being defeated by the Sherman, the Russian T-34 was also causing German designers to develop the aforementioned Panther and Tiger tanks.

The first battle between American Shermans and German Tigers in Tunisia foreshadowed the U.S. tank inferiority that would continue until the end of the war. The strides made by the massive Tiger tank more than made up for Germany's lull in tank superiority. The Tiger's 88mm cannon could easily penetrate the Sherman's frontal armor from long range, while the M4's short-barreled 75mm gun was practically useless against the Tiger's thick skin.23 In one battle, a single Tiger wiped out twenty-five British armored vehicles in succession without suffering significant damage to itself.24 In another instance, a lone Tiger held up an entire Allied task force for two hours, withstanding the
U.S. Shermans and artillery before retreating unharmed. Experiences like these and others gave the Tiger an air of invincibility and the American tankers proceeded with extreme caution when dealing with Tigers. The Panther, the Tiger’s smaller counterpart, was equally dangerous. Mounting a potent, high-velocity 75mm gun and protected by thick, slanted, shot-deflecting armor, the Panther far outclassed anything that the Allies could throw at it.

![Fig. 8. An early version of the U.S. M4 Sherman tank, the most numerous tank of the war](image)

Besides the M4’s shortcomings of a weak main gun and thin armor, the Sherman also caught fire easily. Because the Sherman’s engine used regular gasoline rather than diesel, the tank often burst into flames when struck by enemy fire. This became such a problem that many U.S. soldiers referred to the M4 as the “Ronson,” a popular cigarette lighter of the time.

Attempts were made to improve the M4 by welding on additional armor and mounting a longer, more powerful 76mm gun, but these adaptations also slowed the tank. The final version of the Sherman was the M4A3E8, or “Easy Eight.” This was an effective tank compared to earlier M4 models, but still could not compete with the
German Panther or Tiger. Table 1.1 gives an example of the matchup between the Panther and the later Shermans mounting the 76mm main gun.

Table 1: Penetration Table of the Panther vs. the Sherman

<table>
<thead>
<tr>
<th>Area of Tank</th>
<th>Panther 75mm gun penetrates M4 up to:</th>
<th>M4 76mm gun penetrates Panther up to:</th>
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</thead>
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<tr>
<td>Front Turret</td>
<td>2500m</td>
<td>700m</td>
</tr>
<tr>
<td>Mantlet</td>
<td>1000m</td>
<td>100m</td>
</tr>
<tr>
<td>Glacis</td>
<td>100m</td>
<td>0m</td>
</tr>
<tr>
<td>Nose</td>
<td>2800m</td>
<td>0m</td>
</tr>
<tr>
<td>Side Turret</td>
<td>+3500m</td>
<td>+3500m</td>
</tr>
<tr>
<td>Super</td>
<td>+3500m</td>
<td>2800m</td>
</tr>
<tr>
<td>Side Hull</td>
<td>+3500m</td>
<td>+3500m</td>
</tr>
<tr>
<td>Rear Turret</td>
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<td>+3500m</td>
</tr>
<tr>
<td>Rear Hull</td>
<td>+3500m</td>
<td>+3500m</td>
</tr>
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</table>

If World War II had been fought solely with medium tanks, the Sherman would have matched up very well, but compared to the Tiger and the Panther, the Sherman was inferior in almost every aspect. The few technical advantages that the M4 had over the new German panzers included climbing ability, engine life, ease of maintenance, and track life. The engine life of the Sherman was much longer than that of either the Tiger or the Panther, both of which suffered constant mechanical difficulties. Comparatively, the M4's track life of 2500 miles was five times that of the German tanks. What consolation could the advantages of engine reliability, track life, and climbing ability be
to the U.S. tank crews? Of course, the Sherman would get to the fight, but what good was that if it was terribly outmatched when it got there? The answer was that the U.S. soldiers could always count on superiority of numbers over the German panzers. The amazing advantage that the U.S. Army enjoyed with sheer quantity of equipment is a testament to the unequaled productivity of American industry during World War II. Because of the technical inferiority of the Sherman, American soldiers had to rely on defeating the Germans by overwhelming them with an avalanche of M4s.

Table 2: Comparison between German and American Tank Production (1940-1945)

<table>
<thead>
<tr>
<th>Date</th>
<th>German</th>
<th>American</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>1459</td>
<td>331</td>
</tr>
<tr>
<td>1941</td>
<td>3256</td>
<td>4052</td>
</tr>
<tr>
<td>1942</td>
<td>4098</td>
<td>24997</td>
</tr>
<tr>
<td>1943</td>
<td>6083</td>
<td>29497</td>
</tr>
<tr>
<td>1944</td>
<td>8466</td>
<td>17565</td>
</tr>
<tr>
<td>1945</td>
<td>933</td>
<td>11968</td>
</tr>
<tr>
<td>Total</td>
<td>24360</td>
<td>88410</td>
</tr>
</tbody>
</table>

The American public was not satisfied with just outproducing the Germans. Questions arose as to why the most technologically advanced nation in the world could not create a tank equal to the new German panzers. When the German tanks had been shown to be outmatched early on in World War II, German engineers rushed to correct the problem by adapting their design methods to produce two tanks that were capable of dominating almost every tank in the world. So why, after the Sherman was obviously outgunned and outarmored, didn’t the U.S. Army develop a replacement capable of meeting the Tiger and the Panther on equal ground? The American media asked the same question. Early in 1945, journalist Hanson W. Baldwin wrote in the New York
Why, at this late stage in the war, are American tanks inferior to the enemy's? That they are inferior the fighting in Normandy showed and the recent battles in the Ardennes have again emphatically demonstrated. This has been denied, explained away and hushed up, but the men who are fighting our tanks against much heavier, better armored and more powerfully gunned German monsters know the truth. It is high time that Congress got at the bottom of a situation that does no credit to the War Department. This doesn't mean our tanks are bad. They are not; they are good. They are the best in the world--next to the Germans.

Baldwin was not alone in his criticism of the American tanks. It was no secret that there was a serious problem facing American tank crews. An article in the January 15, 1945, issue of *Newsweek* reinforced the truth about the American tank situation:

Correspondents have time and again written that the big German tanks were better than the 30-ton American Shermans. The Washington reply has nearly always been that the American machines were "more maneuverable."...both the Royal Tiger and the smaller Panther can penetrate American armor at 2,500 yards, whereas the Shermans have to approach within 400 yards to cut through the thick hides of the Nazi monsters.

Articles such as these echoed the American sentiment that a new tank must be developed to level the playing field against the Tiger and the Panther. This tank must be larger, more thickly armored, and have a more powerful main gun than the Sherman if it was going to compete with the German panzers. The tank that the burden fell upon was the M26 Pershing.
CHAPTER 2
THE U.S. ARMY'S DEVELOPMENT OF AN IMPROVED TANK

As the Russians and Germans had discovered through experience, heavier tanks were needed to compete on the battlefields of the Second World War. Before the war, the U.S. Army had shown very little interest in the development of a heavy tank, choosing instead to concentrate on lighter versions following the doctrine of avoiding tank-to-tank combat. In the spring of 1940, a push was made to develop a heavy tank. The United States Ordnance Department was authorized to design a tank which was to weigh around fifty tons and mount a 3 inch cannon. This was enormous considering that most of the tanks of the time were well under twenty-five tons. The Baldwin Locomotive Company was contracted to build fifty of these new weapons. The first prototype made its debut at a public ceremony on the day after the Japanese attack on Pearl Harbor. Called the M6 heavy tank, it had armor between three and four inches thick, a 925 horsepower engine, and mounted a 3 inch main gun with a 37mm cannon also in the main turret. The M6 weighed over sixty tons and was the heaviest and most powerful tank in the world at the time, but this excessive weight also hindered the new vehicle. Problems with the suspension, transmission, brakes, and other parts plagued the early M6 models. Nonetheless, the President Roosevelt’s program called for the production of five hundred M6 heavy tanks in 1942 and five thousand in 1943. The contracts for the production of the M6 tanks were awarded to Baldwin and the Fisher Tank Arsenal, both of which were to build 250 per month.

Despite the planned mass production of the M6, further testing by the Armored Board in Fort Knox, Kentucky, proved that the tank’s excessive weight and unreliability limited its tactical usefulness. These reports caused the Ordnance Department to cancel
its contract with Fisher and a total of only forty M6 tanks were produced. None of these tanks ever reached the battlefield. The lessons learned in the development phase of the M6 proved helpful in designing other tanks, but, overall, the failure of the M6 made it extremely difficult to convince Army officials to invest in other heavy tank designs. Still, an improvement on the M4 Sherman was needed.

One factor that stood in the way of the development of an improved medium tank was a U.S. Army regulation. Army Regulation 850-15 stated that American tanks were not to exceed thirty tons in weight or 103 inches in width; some Army personnel jokingly observed that Hitler’s tanks violated this rule. This regulation was meant to ensure that American tanks were in agreement with the U.S. Army’s doctrine on tank warfare to support infantry and avoid tank-to-tank combat. These size requirements were also enacted to allow the tanks to cross the prefabricated Army bridges. The bridges were designed to support vehicles under about forty tons, but anything larger would damage them, thus causing a delay in waiting for repairs. These reasons seem rather trivial when the main request from the soldiers in the ETO was to produce a tank with improved armor protection and more firepower to allow it to take on enemy tanks. This was only one of many problem areas in the design phase.

Two other factors resulted in the lengthy delay in the development of a tank to replace the Sherman. The first was the U.S. Army’s obsession in producing vast quantities of tanks to offset German capabilities. This emphasis on quantity was, in part, caused by an overestimation of enemy tank strength. U.S. soldiers in the ETO often thought they faced far more Panthers and Tigers than they actually did. The inflated estimates caused the officials in charge of production to reject any policies that would decrease the number of Shermans rolling off the assembly line.

The second factor delaying the development of a new tank actually contributed to the overestimation of German numbers. This factor was tank doctrine. Because the German tanks were massed against American strongpoints with devastating effect, the
U.S. soldiers often assumed that they faced far more panzers than they actually did. The German Army had adapted the doctrine of using tanks “en masse” and had developed heavier tanks to carry out these tactics. The development of an improved, heavier U.S. tank was hindered by the Army’s adherence to the outdated tank doctrine of using tanks in infantry support roles only and avoiding tank-to-tank combat. The main contributor to the continued reliance on this doctrine was the U.S. Army Ground Forces or AGF. This branch was opposed in almost every aspect of tank development by the Ordnance Department.

The controversy between the AGF and the Ordnance Department raged throughout World War II, making the development of new tanks a long and complicated process. Despite the seemingly obvious fact that a heavier armed and armored tank was needed to combat the Panther and the Tiger, AGF continued to demand that maneuverability be stressed over armor and firepower. Ordnance called for thicker armor and more powerful guns, but would fight an uphill battle against the AGF.

Another reason for the heated debate between the two sides was the development of weapons for which no formal requests had been made. The AGF opposed developing weapons that were not deemed absolutely essential, but Ordnance felt that, to stay ahead of the enemy, new weapons should be developed and perfected before it was too late.

A final major disagreement was on the subject of testing the readiness of a weapon before committing it to battle. The AGF stood fast to the procedure that new weapons must be tested in the United States before being sent to combat units. Any flaws or problems discovered during these tests would then be corrected and the weapon would be tested again. The Ordnance Department, however, believed that once a weapon had been produced and major flaws worked out, it should be sent to combat and used immediately. Any problems uncovered during this baptism by fire would be communicated back to the designers in the United States and corrections could be made. Both views had their strong and weak points, and a good example of the Ordnance
position can be seen in the German development process. Faced with their older tanks' inferiority in the face of the Russian T-34, the German designers rushed the Panther and the Tiger into production, and these new weapons were sent rapidly into battle. Problems did plague both models, but the strengths of the new panzers far outweighed their weaknesses. If the Germans would have waited until both new weapons were completely mistake free, they never would have regained the edge in the area of tanks.6

Two men on opposite sides of this controversy would both argue vigorously to implement what they believed to be the best policies for the development of an improved medium tank. The Army Ground Forces commanding officer was Lieutenant General Lesley J. McNair, while Major General Gladeon M. Barnes served as the chief of the Ordnance Research and Development Division. These two generals would play integral parts in the process to build a competent replacement for the Sherman tank. This complex process began in April of 1942 as the T20 series to build a medium tank, and ended in January 1945, with the standardization of the T26E3 as the M26 Pershing heavy tank. (The “T” designates a tank as experimental, when a vehicle is standardized, an “M” is then used.)

After continued pressure from the Ordnance Department, the Army Service Forces, another branch of the U.S. Army’s design phase, approved the building of test vehicles referred to as the T20 medium tank series.7 These new tanks were to experiment using various types of guns, transmissions, suspension systems, and lessons learned through earlier tank combat. All of this was to be accomplished with the new tank being approximately the same weight as the Sherman. A wooden mock-up of the proposed tank was completed in May of 1942, and this model was met with great enthusiasm from U.S. Army officials. Permission was given to begin construction of two pilot tanks.

These new tanks were to incorporate lessons learned in combat and technological advances that had occurred since the invention of the Sherman. The T20 series had a crew of five. The tank commander, gunner, and loader were seated in the turret, while
the front hull housed the driver and assistant driver. A new concept known as Space Engineering used a box-shaped hull which maximized armor protection while minimizing weight. Any items that were not absolutely essential were stripped out of the interior of the tank and attached in boxes over the tracks. The series was to use a new Ford GAN 500 horsepower V8 engine which gave the tank a much lower silhouette than the Sherman.

The T20 series also incorporated new, more powerful main guns. Originally, an improved, light weight 76mm gun was tested in one model, the T20E3. Since this cannon was still in the experimental stages, other options were needed. The T20E1 used a 75mm gun with an automatic loader that, eventually, proved to be unsuccessful. Both tanks had coaxial .30 caliber machine guns along with bow-mounted machine guns. A .50 caliber machine gun was located on top of the turret for use by the tank commander.

![Fig. 9. Note the .50 caliber machine gun on top of the turret.](image)

Various different transmissions and suspension systems were used in these early test models. Innovations such as torsion-bar suspension and a new torqmatic transmission were used for the first time. These experimental designs suffered many defects and slowed the development process of the T20 series, but, in the end, made the final products faster, more reliable, and able to carry more weight. As the development process continued, designers experimented with different combinations of transmission
and suspension systems. These combinations resulted in the production of two types of test vehicles. The medium tank T22 was to be built by the Chrysler Corporation and equipped with a rearranged version of the M4 Sherman’s gear box transmission. The T23 version was to use the new electric drive which had been developed by the General Electric Company for use in the T1E1 heavy tank, which never saw combat."

The electric drive was new to tanks and allowed the tracks to turn in opposite directions at the same time, pivoting the tank much more efficiently than anything to date. Several problems worked against this new technology. The electric drive added two tons to the overall weight of the tank and caused severe weight distribution problems. Also, this transmission would not allow the tank to operate at speeds less than 10 miles per hour for long periods of time. This impeded the tank’s ability to work along side infantry, causing serious tactical problems. It was decided by the AGF that the T23 should not be produced because of these problems and the fact that it did not prove to be superior to the Sherman."

Three different main guns were used in the early T20 series medium tanks. the T20, T22, and T23 would mount the 76mm cannon. The 75mm gun with the automatic loader was to arm the T20E1, T22E1, and the T23E1. Finally, the 3 inch gun, which had been mounted on the earlier M6 heavy tank, was scheduled to be mounted on the T20E2, T22E2, and the T23E2. The 76mm gun proved to be more successful and much lighter than the 3 inch. Because of this, none of the T20E2, T22E2, or T23E2 tanks were produced." The automatic loader on the 75mm gun proved to be unreliable and only one tank, the T22E1, was produced before this model was discontinued." This left only the 76mm gun, which many thought to be too weak to defeat the German tanks.

General Barnes of the Ordnance Department still maintained that the new tanks needed much more powerful guns and thicker armor. His ideas came from soldiers in the field of battle. Barnes requested, early in 1943, that the prototypes experiment with 90mm, 105mm, and 155mm guns. The two larger guns were not tested until after the
war, but the 90mm performed well." This cannon was to be an answer to the thick armor of the German Panther and Tiger tanks."

After the far-reaching success of the German 88mm gun as a field artillery piece, as an anti-aircraft gun, and as an anti-tank weapon, General Barnes pushed for an American gun that would be equal to it. This “triple-threat” gun was to be the 90mm, but the compromises made to accomplish this task weakened the gun in all three areas. Nonetheless, the 90mm was far more effective than the earlier 75mm or 76mm U.S. tank guns." Proponents of the 90mm argued that, even though it went against American tank doctrine, U.S. tanks inevitably had to engage German tanks on the field of battle. Because the new German tanks were too often unscathed by American 75mm and 76mm guns, the 90mm represented the only U.S. gun capable of defeating the enemy tanks. Despite these seemingly obvious facts, the AGF and General McNair opposed the 90mm gun believing that an improved 76mm would be sufficient." This stalemate remained until after D-day when the 75mm and 76mm guns on the M4s proved incapable of defeating the Panther and the Tiger in head-to-head combat. In July 1944, General Dwight D. Eisenhower took action. He sent Brigadier General Joseph A. Holly, the chief of his Armored Fighting Vehicles and Weapons Section, to the United States in order to implore the designers to hurry along the introduction of the best armor-piercing gun possible and a heavy tank capable of defeating the German panzers." Ironically, General Holly had been instrumental in getting the 90mm gun and heavy tank project canceled only months earlier." Eisenhower’s orders worked to the advantage of the Ordnance Department and the T20 series now concentrated on heavier, better armed tanks.

The T20 series had, by this time, progressed to the T25 and T26 medium tank models. Originally, the T25 was to weigh about 72,000 pounds, but this was increased to over 81,000 with further development. Similarly, the original weight estimate for the T26 of 80,000 pounds increased to around 90,000 when the test vehicles were completed. Two T25 prototypes with the 90mm cannon were completed by April 1944, and tested at
the Aberdeen Proving Grounds and Fort Knox. By the time that the T25s underwent testing, the designers had decided to concentrate their efforts on the heavier T26 series and it was recommended that the T25 receive no further consideration. By the spring of 1944, forty T25E1s had been completed.21

The T26 was to be the first in the models of the heavier tank. The T26 tank mounted the 90mm gun and was equipped with the electric drive transmission. The first T26 was produced by the Detroit Tank Arsenal and arrived at the Armored Board testing facilities on November 14, 1944. Testing began on November 30, and the T26 showed many deficiencies. The electric drive, although it made the tank faster and more maneuverable, caused most of the problems for the tank. The added weight of the electric drive, almost 4,000 pounds, overloaded the suspension system, requiring many man hours of maintenance work just to keep the tank running during testing. During this testing, it was also concluded that, "the electric drive was too complicated for the average mechanic to understand and repair." The Armored Board went on to state that "No further consideration be given the Heavy Tank, T26, with its present electric power train." These problems lead to the emphasis being placed on the T26E1 model, which was identical to the T26 except that it had a torqmatic transmission instead of an electric drive, as in the T26.22

Fig. 10. A rearview of the T26E3. Fig. 11. A T26E3 on the testing course.
The Ordnance Department authorized the production of ten T26E1 tanks to be built by the General Motors Fisher Tank Arsenal. The first of these tanks was delivered to the Aberdeen Proving Grounds early in February 1944. Five more T26E1s were sent to the Armored Board in Fort Knox to undergo testing. The tests of these first ten T26E1s showed that certain changes were needed, most importantly in the areas of ammunition stowage and the muzzle blast from the 90mm gun.

The stowage capacity for the 90mm ammunition was only 42 rounds. Comparatively, the German Panther carried 70 rounds of 75mm ammunition and the Tiger I carried 90 rounds of 88mm. Clearly, this would cause a problem in combat. The ammunition stowage problem was solved by, first, enlarging the floor ammunition compartments. Next, racks were placed on either side of the interior of the turret and a ready rack installed next to the loader’s seat. These improvements raised the capacity from 42 to 70 rounds of 90mm ammunition.

The firing tests at Fort Knox also uncovered a problem with the 90mm gun. The muzzle blast from the 90mm kicked up so much dust that it caused a long delay to wait for the dust to clear before it could be fired again. This problem reduced the 90mm gun to a “one shot” weapon. The Armored Board insisted that this problem be solved by adding a muzzle brake to deflect the force of the blast sideways. This greatly reduced the dust that was kicked up, allowing the tank to fire more rapidly.

Fig. 12. Note the muzzle brake added to the end of the barrel.
After the tests, the Armored Force requested immediate mass production of the T26E1 and the Ordnance Department agreed, requesting 1500 tanks. Both contingents did this in an attempt to accelerate the process to get an improved tank to the U.S. forces in the ETO, but the AGF was wary of giving such high priority to a tank that was not yet perfected. The AGF did not consider the T26E1, as it was at the time of the tests, to be a battleworthy weapon. The Army Ground Forces would not approve any T26 version until the necessary improvements were made and the vehicle was tested at either the Aberdeen Proving Grounds or the Armored Board. After these adaptations were made, the resulting tank was reclassified as the heavy tank T26E3 (after the end of World War II the tank would again be reclassified as a medium tank).

Fig. 13. An overhead view of the T26E3.

The T26E3 heavy tank was the final product of the long process to build an improved American tank, but the controversy was not over. The Ordnance Department wanted the tank to be standardized and delivered to the ETO immediately, but the Army Ground Forces did not agree. The AGF demanded that the new heavy tank go through the normal testing process before being delivered to the troops. If this delay occurred, the war would most likely be finished by the time the AGF was ready to authorize production of the tank. Without the determination of General Barnes, the T26E3 would not have been developed, and he was not about to quit when the tank was so close to seeing battle. His actions in getting past the AGF testing demands would be vital in the new tank’s
delivery to the ETO before the end of the war."

Eventually, the T26E3 was tested and deemed battleworthy on January 20, 1945. The new tank was standardized as the M26 and called the Pershing in honor of General John J. (Black Jack) Pershing, a U.S. general during World War I. Production of the M26 Pershing took place at the Grand Blanc Tank Arsenal (operated by Fisher Body Division of General Motors) and at the Detroit Tank Arsenal (Chrysler). By the end of the war in Europe, General Motors had built 1,190 Pershings and Chrysler had turned out 992.

Fig. 14. The U.S. M26 Pershing Heavy Tank.

Three years had elapsed from the beginning of the T20 series until the production of the M26 Pershing. Comparatively, when the German Army found their tanks to be outclassed they needed just over one year to develop two new tanks that were superior to any others on the battlefield. Why then, since the U.S. Army and American soldiers both knew that the M4 Sherman was outmatched, did it take three years to solve the problem? A variety of factors were responsible for this delay, including the U.S. Army’s reliance on the superiority of numbers created by the M4, the Ordnance-AGF controversy, and a fear of changing U.S. Army tank doctrine by accepting heavier tanks. All of these combined to slow the process of development, thus causing American soldiers to have to face superior German tanks for three years with outdated M4 Shermans” Not until
January 1945, did U.S. soldiers finally have, at least in limited numbers, a new, larger, more powerful tank to face the German monsters. It was no longer David vs. Goliath when American tanks met their German counterparts. But would the M26 Pershing arrive in Europe in sufficient numbers to aid the American soldiers? And, was the Pershing powerful enough to take on the Panther and Tiger, the tanks that it had been designed to defeat? These questions still remained to be answered, and the fate of the Pershing again hinged on the Ordnance-AGF confrontation.
As production of the T26E3 began at the Grand Blanc Tank Arsenal in the fall of 1944, General Barnes made a decision that, while controversial, resulted in the tank reaching the ETO in time to be tested in combat. Barnes requested that twenty of the first forty Pershings off the assembly line be sent directly to Europe, while the remaining twenty would be sent to the Armored Board for testing. Barnes thought that the need for the new tank in the ETO was so urgent that time could not be wasted in testing. The AGF, however, believed it was necessary to run the Pershing through its paces before sending the tank into combat. This difference of opinion threatened to delay the introduction of the Pershing into the ETO. General Barnes would not allow the AGF to stand in his way and appealed to higher authority. Secretary of War Henry Stimson and General Russell L. Maxwell, Assistant Chief of Staff, agreed with Barnes and twenty of the experimental tanks were shipped to Antwerp, Belgium, in January 1945. A team of civilian and military experts led by General Barnes would meet the tanks in Europe to begin the mission which had been code named Zebra. The group reached Paris on February 9, 1945, where, at a meeting with General Eisenhower, it was decided to deploy the tanks as soon as possible. The twenty Pershings were to be sent to the 12th Army Group where General Omar Bradley would direct them to the First U.S. Army to be divided equally between the 3rd and 9th Armored Divisions.

Simply getting the Pershings to Europe was not the last step in the arduous process designed to deliver an improved tank to the U.S. troops. Upon arrival in Antwerp, the officer in charge of keeping the tanks in one group had been outranked.
The twenty Pershings were loaded onto fifteen different freight cars which were consequently separated, causing much confusion for the Zebra Mission. Two weeks were needed to track down the tanks and, eventually, the Pershings were ready to be shipped to their units. Further time was wasted obtaining travel permits to pass through British controlled sectors and bypassing Military Police who delayed the convoy. Finally, the Pershings reached the 3rd and 9th Armored Divisions and, after crash courses on operating the new vehicle, the units were ready for battle. American soldiers had waited long enough for an improved tank, and they expected the Pershing to give them the edge over the German panzers. The soldiers' excitement was illustrated by the fact that they called the new Pershing the “Tiger Tamer” and it would not take long to test the tank's prowess.

In the first match between the vaunted Tiger and the untested Pershing, the decision went to the Germans. A Pershing, nicknamed “Fireball” by its crew, was guarding a roadblock at night, but nearby fires exposed its position to a lurking Tiger. The Tiger fired three rounds, knocking the Pershing out and killing most of its crew. The German goliath attempted to pull back to the safety of the darkness, but became entangled in a pile of debris, forcing the crew to abandon it. The following day, the 3rd Armored Division would get revenge. Outside the nearby town of Elsdorf, a single Pershing knocked out two German Mark IVs and one Mark VI Tiger in rapid succession at a range of over a thousand yards.

The first encounter between a Pershing and a Mark V Panther occurred on March 6, 1945, during the fighting for Cologne. The Panther, which had been almost immune to shots from the Sherman, was knocked out with three shots from the 90mm gun, while the Pershing was unharmed. During the same battle, a German Mark IV and a Mark VI Tiger were destroyed by other Pershings from the same regiment.

The experts sent over from the United States and the crews that had been trained to work on the Pershings did an excellent job of keeping the tanks operational. One main
difference between German and American tank policy during the Second World War was the repair of damaged vehicles. For the most part, the Germans abandoned tanks which had been knocked out during battle. In contrast, the Americans put forth every efforts to recover and repair damaged tanks, and did this with great success. Without question, this emphasis on returning vehicles to battle aided the Americans and helped result in their enormous superiority of numbers. An excellent example of this was the Zebra Mission. “Fireball” was back in action seven days after being knocked out. Three Pershings encountered engine problems, but were promptly returned to working order by the diligent men on the maintenance crews. The training that these crews had received from the experts in the Zebra Mission meant that the tanks would be in prime condition to take on the Germans and aid the American soldiers.

Of the twenty Pershings involved in the Zebra Mission, seven engaged German tanks in battle during their first two weeks of combat. They accounted for six “dead” panzers: one Mark V Panther, two Mark VI Tigers, and three Mark IVs. Only one of the original twenty Pershings did not finish the war on active duty; this tank had been knocked out by a German 88mm anti-tank gun at a range of 300 yards and was taken to the rear to be used for spare parts.

The Zebra Mission was a success and the American soldiers of the ETO finally had a tank that leveled the playing field. The T26E3, with its 90mm cannon and thick slanting armor, had proved that it could take on and defeat the best the Germans had to offer. The Pershing’s victories over the Tiger and the Panther pleased the leaders of the Zebra Mission and the commanders of the ETO. General Barnes reported back to the United States: “All Commanders of Armored Divisions thought that the heavy tank T26E3, represented the ideal type of tank . . . .” Next, the Pershing was to be involved in a mission of enormous strategic importance, the Allied push to the Rhine River and into the heart of Germany.

The Rhine River, Germany’s natural border to the West, had been an obstacle for
invading armies throughout time and, in the early months of 1945, this stretch of water was the only thing standing between Allied armies and the last bastion of German resistance. As the British and American armies pushed relentlessly on, the Germans attempted to evacuate thousands of troops across the Rhine where they could regroup, be resupplied, and prepare to counterattack. The U.S. First Army’s 9th Armored Division was to push to Sinzig, a village along the Rhine. As scouts from the advancing American divisions crested the high ground overlooking the small town of Remagen, on the west bank of the Rhine, they could not believe the sight below. The U.S. Army had expected all bridges over the Rhine to be destroyed by the retreating Germans, but the 1,300 foot Ludendorff railway bridge was unscathed. Because of this totally unexpected good fortune, the Allies altered their plans and an all-out effort was initiated to capture the bridge intact. The Allies rushed forces toward Remagen to take advantage of this new development, but the Germans still held the bridge.

At first, the Germans had been caught off guard, too busy evacuating people across the bridge to even notice the advancing Americans. But as the enemy entered Remagen on the way to the bridge, sporadic fighting broke out. Attempting to destroy the bridge and the Allied hope of a quick crossing, the Germans detonated explosive charges. After the dust cleared, the bridge was only slightly damaged and the U.S. soldiers continued their assault. As the Americans neared the bridge, the fighting intensified. German machine gunners positioned on the towers of the bridge raked the advancing infantry with withering fire, slowing the attack to a crawl. The new Pershings were brought forward and, with the powerful 90mm gun, quickly silenced the enemy machine gun nests. As the infantry gathered to cross the bridge, Germans on the other side set off their emergency explosives on the bridge in a desperate attempt to repel the invaders, but this also failed to bring the structure down. The U.S. soldiers realized that time was running out; if they were to capture the bridge, they had to move quickly before the German demolition crews were successful.
The American infantrymen began to make their way across the bridge, knowing that it could explode at any moment, killing them all. Because of the gaping holes caused by the explosions, the Pershings could not provide protection for the infantry by crossing over to the other side. The tanks covered the eastern side of the bridge with machine gun fire to disrupt the German demolition attempts and make the going easier for the American troops. German soldiers hidden on a partially submerged barge in the river began to open fire on the U.S. troops. A Sherman tank found the range and destroyed the barge with its 75mm cannon. As the Pershings waited on the west bank, a German train carrying troops to the front lumbered unsuspectingly toward the bridge on the east side of the river. The Pershings opened fire from across the river, destroying the train and sending the passengers scrambling for cover.17

American troops began to creep across the bridge while the German soldiers, protected by the train tunnel on the east side of the bridge, resisted fiercely. Engineers followed closely behind the first wave of infantry, disconnecting explosive charges in an attempt to save the badly damaged bridge. After fierce fighting, the American soldiers secured a small toehold on the eastern bank. The stunned Germans were not prepared for this occasion and lost precious time before they could mount a counterattack.18

Fig. 15. A view of the Ludendorff Bridge from the tunnel on the west bank of the Rhine River.

The time lost by the Germans allowed the Americans to expand the bridgehead
and materials were hastily brought forward. During the night, the U.S. engineers worked
diligently at filling the holes in the bridge to allow tanks to cross over. Two platoons of
Shermans and several tank destroyers had made the crossing by morning. The Pershings,
because of their wide tracks and heavy weight, were not allowed to use the damaged
bridge. They would not cross the Rhine until five days later when the tanks would be
loaded on barges and floated across the river into enemy territory.

The Germans were not about to give up the bridge without a fight. In the days
following the American capture of the structure, the Germans put every available weapon
to the task of destroying the Ludendorff Bridge. The German generals plotted ground
counterattacks to recapture the area, while heavy artillery and divebombers tried to
destroy the bridge. The Americans, desperate to hold the bridge, brought forward
enormous amounts of weaponry, including the heaviest concentration of anti-aircraft
weapons in the war. Hitler’s troops bombarded the bridge with huge 155mm and 210mm
cannons and the Fuehrer ordered his V-2 rockets to be used also. The V-2 rocket was
highly inaccurate and the order to use them with German civilians so close by shows how
important destroying the bridgehead was to the German leader. After ten days of Allied
attempts to repair it and German attempts to destroy it, the Ludendorff railway bridge
collapsed. By that time, however, the Americans had constructed pontoon bridges, and
men and materials continued to pour into the German homeland.

The capture of the bridge at Remagen on March 7, 1945, was instrumental in the
Allied victory over Germany and shortened the war, saving countless lives. This
American penetration into Germany over the Rhine River was the first made by an
invading army since Napoleon. The new Pershing tank, while not able to actually cross
the Ludendorff Bridge, had helped to make this feat possible. During the battle for the
Bridge, the 14th Tank Battalion was the first to concentrate the Pershings into one
platoon. The Pershing’s involvement in one of the most important battles of World War
II was the culmination of the arduous process to deliver an improved tank to the
American soldiers who had been outgunned for far too long.

The experimental T26E3 was standardized as the M26 heavy tank in March 1945 (after the war it would be reclassified as a medium tank). In late March, 157 additional Pershings were on their way to Europe and 53 more were being prepared to embark. The Ninth U.S. Army was moving so rapidly through Germany that time could not be lost sending crews back for training. Eventually, the tanks were brought forward to Ninth Army’s 2nd Armored Division and, after a very brief training session, the Pershings were sent out in search of Germans. Ninety M26s had been allocated to Patton’s Third U.S. Army and by April, forty of these were delivered to the 11th Armored Division. The remaining fifty tanks were held in the main army combat vehicle pool. Experts from the Zebra Mission trained the 11th Armored Division’s tank crews and maintenance men rapidly, but more thoroughly than they had trained the Ninth Army units weeks before. After this introduction, the Pershings were sent forward on April 21. By this time, the tanks were too late to meet much German resistance. As of V-E Day (May 8, 1945) a total of 310 Pershings had reached Europe, 200 of which had been issued to American troops.

A demand for a replacement of the outdated Sherman tank also came from the U.S. forces in the Pacific Theater. American forces had landed on Okinawa on April 1, 1945, and by mid May, tank losses were mounting. The Japanese 47mm anti-tank gun was the main weapon responsible for the many knocked out Shermans. Although the 47mm was not as large as the anti-tank guns that Americans had faced elsewhere, its size made it easy to conceal and it fired a high velocity armor piercing shell that could effectively penetrate the M4’s armor. During one battle at Kakazu on April 19, 1945, four Shermans were knocked out by one 47mm gun. U.S. maintenance crews resorted to welding track sections and armor from wrecked tanks to the Shermans to give them more protection from the 47mm. This did not solve the problem and the American soldiers in the Pacific demanded an improved tank with greater firepower and thicker
Twelve Pershings were to be shipped immediately to help alleviate the problem in the Pacific. Several officers who had been involved in the Zebra Mission were put in charge of accompanying the tanks and training the crews and maintenance workers. These officers had learned, from the problems encountered in Europe, to take nothing for granted when shipping the tanks. A careful check of the tanks showed that many spare parts and replacement units were missing and on back order. Knowing that these essential parts would not arrive in time, the officers searched for other Pershings to utilize. Two M26s were found at the Richmond Tank Depot and permission was given to extract the essential components. These parts were rushed to the ship, which departed on May 31 for Okinawa. Several unexpected delays slowed the delivery of the M26s and the ship did not reach Okinawa until July 21. Unloading the tanks proved to be a problem and the weather also caused further delays. Finally, by August 4, all of the Pershings had been unloaded onto Okinawa and training could begin. By this time, the action in the Pacific was all but over. V-J Day, on August 15, 1945, ended the hostilities in the Pacific and the Pershings were returned to the United States.31

One interesting variation on the new tank resulted from an attempt to make the Pershing’s gun even more powerful. American developers had improved the existing M3 90mm gun by making it longer with a much larger chamber. These changes resulted in the T15E1 90mm cannon which was comparable to the most effective 88mm gun possessed by the Germans at the time. In fact, the T15E1 could penetrate the frontal armor of a Panther at 2,600 yards, whereas the M3 90mm gun was effective at only 1,100 yards. These types of performance statistics caused American engineers to mount the new gun into a T26E1 to test its performance. The longer gun upset the balance of the tank, so springs were added to the outside of the turret to counteract this additional load. A counterweight was also welded to the back of the turret to further offset the longer gun. Some of the ammunition used in the T15E1 was as long as 50 inches and caused
problems inside the turret, where space was limited. To alleviate this problem, the gun
was changed to use different ammunition. This ammunition was stored and loaded in
two separate pieces, the projectile and the cartridge case. The 90mm gun, which now
took two-piece ammunition, was redesignated the T15E2. Tanks with these new 90mm
guns were designated as the T26E4."

Fig. 16. This M26 Pershing mounts the M3 90mm main gun.

Fig. 17. This is the T26E4 with the T15E2 90mm cannon. Note the greater
length of the gun compared with the M3 90mm cannon.

The first T26E4 was tested at the Aberdeen Proving Ground in early January
1945. After tests, this vehicle was shipped to the ETO. This tank was an earlier T26E1
model upon which engineers mounted the T15E1 single piece ammunition gun. The
second experimental T26E4 was a modified T26E3 with the T15E2 90mm gun. After the
initial testing success of the T26E4, it was ordered that 1,000 be produced. Factors,
including the problems with the ammunition and the approaching end of the war
combined, to reduce this order and only 25 T26E4s were produced, all by the Fisher Tank
These new tanks were dubbed “Super Pershings” and American designers were convinced that this model was equal to even the most powerful of the German panzers, the Tiger II “King Tiger.” American soldiers were eager to prove this. When the T26E4 reached the ETO, the U.S. tank crews welded armor plating taken off of a knocked-out Panther to the front of the “Super Pershing.” Then, the crew went hunting for a King Tiger with which to do battle. The war ended before this showdown took place, and further production of the T26E4s was canceled.34

Another variation on the M26 was modeled after one version of the Sherman. The M4A3E2 Sherman was a heavily armored assault tank that had proven the usefulness of additional armor in battle. The T26E5 was to be an assault tank based on the M26 Pershing. In January of 1945, the Ordnance Department requested ten T26E5s. Thicker armor was added to every surface of the tank, increasing the weight of the vehicle from about 92,335 pounds to over 102,300 pounds. Changes were also incorporated in track width and other areas. Following the production of test vehicles by Chrysler, testing showed that the new tank performed well. Despite the promising beginning, the production of the T26E5 was canceled due to the end of the war. A total of 27 of the experimental tanks were produced, none of which ever reached combat.35

The final opportunity for the M26 Pershing to be used in battle occurred in Korea. By the time of the conflict in Korea, the Pershing had been reclassified as a medium tank. The Pershing performed well in certain situations, but the terrain limited its usefulness. Because of the steep hills often encountered while fighting in Korea, the Sherman tank was often used because of the M4’s superior climbing ability compared to the M26. When combat occurred in this type of terrain, the Pershing was often relegated to the role of an artillery weapon. Dug in and static, the Pershings would lob their 90mm shells onto enemy positions from afar, while the Shermans maneuvered closer to the enemy. When tank versus tank combat did occur, the North Koreans used the tank which had been the
savior of the Soviet Union during World War II: the T34. Against these T34s armed with the 85mm cannon, the M26's performance was impressive. Only a few years earlier, these two tanks had been allies fighting against a common enemy, but in Korea, the M26 proved to be the better of the two tanks.36

Although the M26 Pershing's combat experience was shortlived, it did prove that the tank was an effective weapon. During World War II, the Zebra Mission and the battle for the bridge at Remagen provided the only opportunities for the Pershing to perform in battle. During these isolated instances, the Pershing performed well. Korea also provided the U.S. Army with a chance to use the Pershing in combat. But after 1953, the Pershing's role would be taken over by newer, more advanced tanks.
CHAPTER 4
CONCLUSION

During the first half of the twentieth century, technological breakthroughs were responsible for vast improvements in weaponry. Because of these advances, radical differences occurred between the way that World War I and World War II were fought. World War I had been a static, defensive struggle, dominated by trench warfare and endless, suicidal dashes across what became known as “no-man’s-land.” The lumbering, awkward tanks of World War I did little to change the outcome of that conflict, but were important precursors to their World War II cousins.

The tanks used during World War II revolutionized warfare by providing protection, firepower, and mobility to the soldiers. The American lapse in tank development between the wars resulted in the inadequacy of U.S. armor compared to its enemies, especially the Germans. German innovations in weaponry and tactics accounted for impressive victories early in World War II and set the standard for tank warfare. After encountering these dominant panzers, Allied countries initiated programs to develop tanks capable of matching the early German weapons. These tanks, most notably the U.S. M4 Sherman and the Russian T-34, provided the Allies with a brief period of superiority over the early model German panzers. To correct this problem, German designers developed the Tiger and the Panther, two tanks that came to symbolize Germany’s domination in the area of tank warfare. These two new weapons clearly outclassed American tanks, creating a need for an improved U.S. model. While it had taken the Germans just over a year to react to the improvements of their enemies by producing two tanks that made up for their lapse of superiority, the Americans did not find a suitable replacement for the outmatched Sherman until only a few months before
the end of the war.

The T20 series project to design an improved American tank was initiated early in World War II, but several factors combined to delay its final product. U.S. Army tank warfare doctrine, dependence on the flood of Shermans to win, and the Ordnance-AGF controversy all contributed to hinder the timely development an improved tank. Finally, the M26 Pershing was produced and rushed to the ETO to assist the frustrated American tank crews. In the limited action experienced by the Pershing, it performed well, proving that it was indeed equal to the best tanks that the Germans could produce. Helping in such strategically important missions as the crossing of the Rhine River, the Pershing and the Sherman fought side by side into the heart of Germany's once virtually impenetrable heartland. Pershings also found their way to the Pacific Theater, but delays in shipping prevented the tanks from being used in combat. The M26 Pershing finished its career with service in the Korean conflict, where it performed admirably, once again, alongside the Sherman.

If the M26 project had been undertaken with more urgency, it may have been possible to deliver the tank to the ETO in the late summer of 1944. This would have given the American soldiers an improved tank to use in the fierce fighting to gain a foothold in Europe and, possibly, could have shortened the war, saving many lives. Instead, U.S. Army doctrine, reliance on the Sherman, and the Ordnance-AGF controversy resulted in the introduction of the tank into Europe in early 1945, only a few months before the end of the war. This belated entrance gave the Pershing little opportunity to affect the outcome of World War II, but at last, the American soldiers had a weapon equal to that of their enemy.
Appendix 1: Comparison of Heavy Tanks used in World War II:

<table>
<thead>
<tr>
<th>Name</th>
<th>M26 Pershing</th>
<th>Mark VI Tiger I</th>
<th>Mark VI Tiger II</th>
<th>KV-I</th>
<th>JS 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (tons)</td>
<td>46</td>
<td>57</td>
<td>68</td>
<td>43</td>
<td>46</td>
</tr>
<tr>
<td>Speed (mph)</td>
<td>22</td>
<td>24</td>
<td>22</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>Range (miles)</td>
<td>93</td>
<td>90</td>
<td>106</td>
<td>210</td>
<td>150</td>
</tr>
<tr>
<td>Main Gun (mm)</td>
<td>90</td>
<td>88</td>
<td>88</td>
<td>76.2</td>
<td>122</td>
</tr>
<tr>
<td>Crew</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Max Armor (mm)</td>
<td>102</td>
<td>110</td>
<td>180</td>
<td>130</td>
<td>160</td>
</tr>
</tbody>
</table>


## Appendix 2: Comparison of Medium Tanks used in World War II:

<table>
<thead>
<tr>
<th>Name</th>
<th>M3</th>
<th>M4 Sherman</th>
<th>Mark III</th>
<th>Mark IV</th>
<th>Mark V Panther</th>
<th>T-34/76</th>
<th>T-34/85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (tons)</td>
<td>27</td>
<td>30</td>
<td>22.3</td>
<td>25</td>
<td>46.5</td>
<td>30</td>
<td>31.7</td>
</tr>
<tr>
<td>Speed (mph)</td>
<td>24</td>
<td>29</td>
<td>25</td>
<td>24</td>
<td>29</td>
<td>33</td>
<td>31</td>
</tr>
<tr>
<td>Range (miles)</td>
<td>121</td>
<td>100</td>
<td>66</td>
<td>126</td>
<td>125</td>
<td>250</td>
<td>190</td>
</tr>
<tr>
<td>Main Gun (mm)</td>
<td>75</td>
<td>75 or 76</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>76</td>
<td>85</td>
</tr>
<tr>
<td>Crew</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Max Armor (mm)</td>
<td>57</td>
<td>75</td>
<td>80</td>
<td>80</td>
<td>120</td>
<td>75</td>
<td>75</td>
</tr>
</tbody>
</table>


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