

LIBERTY UNIVERSITY

Master's Thesis

---

**The M26 Pershing: America's Forgotten Tank - Developmental and Combat History**

---

*Author:*  
Robert P. Hanger

*Reader:*  
Dr. Christopher J. Smith

*Supervisor:*  
Dr. David L. Snead

A thesis submitted in fulfillment of the  
requirements for the degree of Master's of Arts

In the  
Liberty University Department of History

May 11, 2018

## **Abstract**

The M26 tank, nicknamed the “General Pershing,” was the final result of the Ordnance Department’s revolutionary T20 series. It was the only American heavy tank to be fielded during the Second World War. Less is known about this tank, mainly because it entered the war too late and in too few numbers to impact events. However, it proved a sufficient design – capable of going toe-to-toe with vaunted German armor. After the war, American tank development slowed and was reduced mostly to modernization of the M26 and component development. The Korean War created a sudden need for armor and provided the impetus for further development. M26s were rushed to the conflict and demonstrated to be decisive against North Korean armor. Nonetheless, the principle role the tank fulfilled was infantry support. In 1951, the M26 was replaced by its improved derivative, the M46. Its final legacy was that of being the foundation of America’s Cold War tank fleet.

## Contents

Introduction.....	1
<b>Chapter 1. Development of the T26.....</b>	<b>10</b>
<b>Chapter 2. The M26 in Action in World War II.....</b>	<b>40</b>
<b>Chapter 3. The Interwar Period.....</b>	<b>63</b>
<b>Chapter 4. The M26 in Korea.....</b>	<b>76</b>
The Invasion.....	77
Intervention.....	81
The M26 Enters the War.....	85
The M26 in the Anti-Tank Role.....	87
<b>Chapter 5. The M26 in the Infantry Support Role.....</b>	<b>99</b>
Conclusion.....	114
Bibliography.....	119

## Introduction

The study of armor during the Second World War tends to be either overemphasized or underappreciated. When it comes to the M26 Pershing, the United States' first production heavy tank to be fielded as an answer to the German Tiger tank, historical emphasis has been on the latter. The tank showed up too late in the war to have a lasting impact and after the war was won it enjoyed only a brief service life. It was important in Korea, but even there it was replaced by its improved variant, the M46, after not even a year in country. The M26 was significant, however. Its existence helped stabilize sagging American morale when American forces were faced with an armor crisis in 1944, and its success in action in 1945 reaffirmed the integrity of the American armor developmental program. The tank's interwar developments helped to serve as an unintended bridge between the armor needs of the Second World War and after. The M26's service in Korea was instrumental in this development.

Admittedly, the M26 had its flaws. It was underpowered and sluggish when compared to the M4 Sherman. Mobility wise, (in rugged terrain) it was not the equal of the M4 Sherman, and its torqmatic transmission had considerable teething issues, but it was better than many give credit. For example, in Korea, its lower and wider stance was more controllable on ice than the M4, a value to tankers on narrow cliff-hugging mountain roads. Most importantly, however, the Pershing spurred future tank developments and, as the first modern American heavy tank, served as the basic platform upon which the iconic Patton series--M46, M47, M48, and M60--would be based. In total, over 36,000 Patton series (1,160 M46, 8,576 M47, approx. 12,000 M48, and approx. 15,000 M60) tanks were built, representing the backbone of America's frontline armored force for more than three decades.<sup>1</sup>

---

<sup>1</sup> The numbers given are approximate. Hunnicutt's work on the Patton Series was consulted to find exact production numbers, but no production reference data is given. This is likely due to the large number of models and

Several historians have included the basic story of the General Pershing as part of their telling of the wider story of the closing year of the European Theatre of Operations in World War II. George Forty, for example, in his *United States Tanks of World War II in Action* (1983), devotes a brief eight-page chapter to the M26 entitled “The Tiger Tamer.” Forty summarizes the developmental history, combat action, and wartime variants of the M26. He concludes the chapter with a brief judgement on “How good was the Pershing?”, wherein deferring to Richard Hunnicutt’s assessment.<sup>2</sup> Christopher Foss’s *The Encyclopedia of Tanks and Armored Fighting Vehicles* (2002) also gives a one-page write-up on the M26 that provides a surprisingly detailed summary of the tank’s specifications and wartime existence. He interestingly points out that the British received several Pershings for testing before war’s end.<sup>3</sup>

Charles Bailey’s *Faint Praise: American Tanks and Tank Destroyers during World War II* (1983) should also be noted. This book was the first to look at the heated debate between the Ordnance Department and the Army Ground Forces (AGF) over the fielding of the T26. Regarding the question of why was the T26 not fielded sooner, Bailey comes down hard on the Army Ordnance program and points to Lieut. Gen. Leslie McNair, commander AGF, as the Ordnance Department’s scapegoat.<sup>4</sup> His arguments have much merit and are worthy of study.

---

variants that existed for each basic type, making tabulation very difficult. See R. P. Hunnicutt, *Patton: A History of the American Main Battle Tank*, vol. 1 (Brattleboro, Vermont: Echo Point Books & Media, 1984).

<sup>2</sup> George Forty, *United States Tanks of World War II in Action* (Dorset, U.K.: Blandford Press, 1983), 140-141. For Hunnicutt’s assessment see: R. P. Hunnicutt, *Pershing: A History of the Medium Tank T20 Series* (Brattleboro, Vermont: Echo Point Books & Media, 2015), 199-202. Hunnicutt compares the PzKpfw V ausf. G, Panther, PzKpfw VI ausf. E, Tiger I, and M26 Pershing (T26E3). Looking at firepower, mobility, and protection, Hunnicutt remarks “The Pershing, Panther, and Tiger I were close enough in fighting power so that each could defeat the others under favorable circumstances....the Pershing on occasion destroyed both German vehicles and was in turn knocked out by them.” (199) Hunnicutt ranks the Panther first, followed by the Pershing and then the Tiger I. (200)

<sup>3</sup> Christopher F. Foss, ed. *The Encyclopedia of Tanks and Armored Fighting Vehicles: The Comprehensive Guide to Over 900 Armored Fighting Vehicles From 1915 to the Present Day* (San Diego, California: Thunder Bay Press, 2002), 38.

<sup>4</sup> Charles M. Baily, *Faint Praise: American Tanks and Tank Destroyers during World War II* (Hamden, CT: Archon Books, 1983), 140 and 142.

Alternatively, the excellent United States Army in World War II series, *The Technical Services*, written by the Ordnance Department immediately following the war, unsurprisingly offer a very pro-Ordnance narrative. The Ordnance Department's arguments concerning the T20 series are specifically contained in Constance Green's *The Ordnance Department: Planning Munitions for War* (2017) and Lida Mayo's, *The Ordnance Department: On Beachhead and Battlefield* (2009). Despite the clear Ordnance bent, these works are impressive and use a wide range of sources employed. Both works have brief but dedicated sections devoted to the history of the T26E3/M26.<sup>5</sup>

Marc Milner, in his *Stopping the Panzers* (2014), provides a thorough account of Allied action, specifically Canadian, during and after D-Day but largely ignores the Pershing. He does however allude to John Toland's *The Last 100 Days* (1966) for the details of the Pershing in action in Germany, specifically during the advance on the Rhine River and the dramatic capture of the Ludendorff Bridge at Remagen on March 7-8 1945.<sup>6</sup> Andrew Rawson's *Remagen Bridge* (2004), is an excellent companion to this pivotal battle, which involved the Pershing's part. No study of the M26 is complete without a viewing of the January 1945 War Department *TM9-735: Pershing Heavy Tank T26E3 Technical Manual*, and its valuable detailed descriptions, schematics, and operating instructions.

The M26 Pershing played a pivotal role in the first year of the Korean War. As such, Korean War historians have given it greater attention. Roy Appleman's excellent addition to the

---

<sup>5</sup> For sections in official histories devoted to M26 see: Lida Mayo, *The Ordnance Department: On Beachhead and Battlefield*, United States Army in World War II, The Technical Services (Washington, D. C.: Center of Military History United States Army, 2009), 237-239, 278-288, 328-338, 404, 473. Also see, Constance M. Green, Harry C. Thomson, and Peter C. Roots, *The Ordnance Department: Planning Munitions for War*, United States Army in World War II, The Technical Services (Washington, D. C.: Center of Military History United States Army, 2017), 236-239, 278-288, 512.

<sup>6</sup> For a highly detailed account of the capture of the Ludendorff Bridge from both allied and German perspectives, see John Toland, *The Last 100 Days: The Tumultuous and Controversial Story of the Final Days of World War II in Europe* (New York: Modern Library, 2003), 202-211.

United States Army in the Korean War series, *South to the Naktong, North to the Yalu* (1992), gives specific detail on the M26 and M46. Appleman's exhaustive work is completely constructed from primary sources and frequently mentions armor engagements throughout. Almost exclusively, Appleman relies on H. W. MacDonald's Operation Research Office (ORO) report, *The Employment of Armor in Korea* (1951), for his armor accounts. The report provides an invaluable assessment of the M26 while the cordite was still fresh in the air. MacDonald's account is quick to praise the Pershing's operational successes and defend its maintenance performance while making informed future recommendations. However, his closeness to the action does limit his work. As an example, he cites the M26 as being more mobile than the T-34, an assessment that was simply not true.<sup>7</sup> While excellent, neither Appleman nor MacDonald's works were intended as stand-alone histories, focused strictly on the M26, and neither gives any real perspective from the turret.

Only two authors have attempted to tell the M26's full story: Richard Hunnicutt and Steven Zaloga. Both Hunnicutt and Zaloga have conducted extensive research and produced the most detailed analysis to date. Hunnicutt's *Pershing: A History of the Medium Tank T20 Series* (1996), a 238-page bolt-by-bolt study, is without argument the defining work on the M26. Zaloga's works serve as a good supplement to Hunnicutt's perspective. Zaloga tells the story in Osprey's New Vanguard Series *M26/M46 Pershing Tank*. He then takes his study a step further in Osprey's Duel Series and conducts a fascinating comparison between the M26 and both the

---

<sup>7</sup> H. W. MacDonald et al., *The Employment of Armor in Korea*. (Operations Research Office, General Headquarters, Far East Command, 1951), 54. MacDonald writes: "The US tanks, especially the M46, are equal or superior in mobility and probably are equal in agility to the T34." For a fair assessment of mobility see Steven J. Zaloga, *T-34-85 vs M26 Pershing: Korea 1950*, *Duel*, no. 32 (Oxford, UK: Osprey Publishing Ltd., 2010), 31. Zaloga argues: "In terms of basic automotive performance, the T-34-85 had marginally better speed and range than its American opponents....As the T-34-85 was light, it had a slightly better power-to-weight ratio compared to the M4A3E8, and a markedly better ratio compared to the M26."

Tiger I and T-34/85 in *Pershing vs Tiger* and *T-34/85 vs M26 Pershing* respectively. The works of both men remain largely focused on the developmental history of the Pershing, placing greater detail on each developmental hurdle crossed rather than fully fleshing out the greater narrative at large. They do provide some narrative, however, and to be fair, both accounts include a combat history and expand on variants and service life. Both as well cover the M26 from conception to retirement but the minutia that is focused on is largely developmental in nature and somewhat lacking in first-person anecdotal quality.

This thesis builds upon the works of Hunnicutt and Zaloga and could not have been completed without their extensive works. However, a study of, and in many cases a rehashing of, their arguments remains critical. Hunnicutt and Zaloga's works are each handicapped when it comes to the narrative. Hunnicutt is considered the best source on American tanks because he studied and included every minute aspect of every variation of each tank. The double edge here is that it becomes easy for all but the most ardent tank enthusiast to get bogged down in the attention to detail, specifically the thoroughness to every developmental change that occurred. For Zaloga's part, all of his works pertaining to the T26E3/M26 are Osprey Publishing books, and therein lies the opposite problem. These books are excellent and are highly recommended, but from a historical standpoint are often too narrowly focused. Topically devoted ride-a-long histories are needed to supplement. The Osprey books normally only cover a limited slice of each topic in question and divide coverage of the topic into as many small books as possible.

Osprey has employed Zaloga's talents to produce three works directly pertaining to the M26, the same three mentioned above. Two are from the *Duel* series, namely *Pershing vs Tiger: Germany 1945* (2017) and *T-34-85 vs M26 Pershing: Korea 1950* (2010), both at 80 pages, and the other is a fairly comprehensive dedicated study, *M26/M46 Pershing Tank, 1943-1953* (2000),

at a brisk 48 pages. The capitalistic effort is commendable, but the end result, necessarily abbreviated and forced together narratives, leaves the reader jumping from one work to another to assemble a fuller understanding. Zaloga, no doubt knows this and adds value by writing each storyline with a different thrust. But this approach also reveals problems as Zaloga's works, on occasion, offer conflicting evidences. For example, in *M26/46* he records that, due to misplaced trust in the 76mm gun, Eisenhower turned down T26 production.<sup>8</sup> In *Pershing vs. Tiger* however, Zaloga states otherwise, mentioning that Eisenhower endorsed the tank's production during the same period.<sup>9</sup>

In the tank world, Hunnicutt and Zaloga's works are the monoliths against which all others are compared, and, rightly so; however, both historians never include footnotes, making follow-up study a nightmare. Zaloga does give further reading lists, whereas Hunnicutt lists his sources at the end of his work but gives no detailed location information. This omission and the others above suggest that there is still room for an exhaustive study of this important armored fighting vehicle (AFV). This thesis only scratches the surface on the total sources available. Moreover, fresh sets of eyes on the same archival materials will undoubtedly create exciting new and important arguments. To a very limited degree, that took place with this work. This thesis offers a narrative-friendly perspective that includes personal accounts and uses new sources wherever possible. It attempts to linger where Zaloga and Hunnicutt have summarized, particularly with combat accounts of the M26 and in the telling of the controversially slow fielding of the Pershing.

---

<sup>8</sup> Steven J. Zaloga, Tony Bryan, and Jim Laurier, *M26/M46 Pershing Tank, 1943-1953*, New Vanguard, no. 35 (Oxford, UK: Osprey Publishing Ltd., 2000), 11.

<sup>9</sup> Steven J. Zaloga, *Pershing vs Tiger: Germany 1945*. *Duel*, no. 80 (Oxford, UK: Osprey Publishing Ltd., 2017), 18.

Research efforts for this work, outside of secondary sources, were divided between perusing the papers of General Jacob L. Devers at the York County Historical Center in York, Pennsylvania, studying the Ernest Nason Harmon and John William Leonard Papers at the U.S. Army Heritage and Research Center (USAHEC) in Carlisle, Pennsylvania, and mining for sources at the National Archives and Records Administration (NARA), College Park, Maryland. USAHEC has a wealth of first-hand accounts from interviews with soldiers made after the battle for Remagen, some of which are incorporated below. Many Ordnance records are located at National Archives, especially extensive production numbers and testing reports. Additionally, the Library of Congress holds the Charles L. Scott Papers, the findings of his 1944 report are mentioned further below. Finally, the Marshall Research Library, in Lexington Virginia, houses the Thomas T. Handy Papers and several rare books, like Baily's *Faint Praise: American Tanks and Tank Destroyers during World War II*. I owe a special thanks to the highly professional staff at all of these sites. Their patience and guidance were instrumental in the creation of this thesis. However, any deficiencies in research are my own.

The first chapter traces the developmental of the T20 series, culminating in the M26 tank. Where the aforementioned Hunnicutt and Zaloga have amassed research, this chapter will attempt to summarize, largely relying on their expertise for reference. The chapter is devoted to the intricacies of the doctrinal showdown and developmental foot-dragging that was involved with the fielding of the Pershing, however it opens with a detailed, and perhaps tedious, description of the M26. This is useful for the reader to not only conceptualize the basic capabilities and characteristics of this tank, but to serve as a reference to complement the narrative and personal accounts in the following chapters. The developmental story of the T20 series is told, and emphasis is placed on the personal opinions and decisions of General Leslie

McNair, AGF commander, Lieut. Gen. Jacob Devers, the head of the Armored Force and later commander of the ETO, and Brig. Gen. Gladeon Barnes, the Chief of the Ordnance Department's Research and Development Branch, and the later head of the Zebra Project. General Dwight Eisenhower and George Marshall also had key parts to play. The chapter's closing is devoted to revealing personal accounts showing the need for a better American tank in 1944.

The second chapter focuses strictly to the M26's combat experience in the Second World War, relying heavily upon several of the United States Army in World War II volumes as well as Zaloga's comparisons with the Tiger, but providing a more comprehensive approach by combining all available accounts into one telling. Specific attention is given to the combat action of the T26E3 tanks of the Zebra project. A following brief chapter is devoted to the interwar period where many of the tests for this tank finally took place. The new developmental currents that took place are also navigated.

Tests at Aberdeen Proving Grounds and the Armored Board, Fort Knox, Kentucky, are heavily relied upon as well as the findings of a 1950 Congressional subcommittee on tanks tasked with briefing President Truman, though the latter was actually released after the Korean War had started. The final two chapters are devoted to the service of the M26 in Korea. The first offers complete narrative of nearly all tank-verses-tank combat seen by the Pershing, while the last reveals the additional roles this tank fulfilled during the war. The thesis closes by summarizing the key arguments and briefly looking at the developmental legacy of the Pershing. In all chapters, as much as possible, first-hand accounts accompany the narrative.

The end result of this thesis is that it employs many available primary sources relating to the M26, heavily incorporates the work of leading tank historians, and gleans from the great

primary works on World War II and Korea, to create thorough history that is Pershing-centric. By combining of multiple sources into a single narrative, as well as adding personal accounts, it provides a fuller understanding of an underappreciated weapon in American military history.

## Chapter 1 - Development of the T26

The T26E3, which became standardized as the heavy tank M26 (nicknamed General Pershing) in March of 1945 after it entered combat in the ETO, was described in its technical manual as a “heavily armored, full track-laying, low silhouette combat vehicle with a 90-mm gun mounted in a fully enclosed power-operated turret which can be traversed 360 degrees. The vehicle is powered by an 8-cylinder, V-type, liquid-cooled, Ford, model GAF, gasoline tank engine.” Under the heading ‘Construction Features,’ the manual mentions that “The vehicle is supported on its steel tracks by twelve dual road wheels with individual torsion bar springs, and four large cylindrical shock absorbers on each side....The upper portion of the track is covered by stowage boxes, fenders, and sand shields at the ends and sides.”<sup>1</sup>

The T26E3 was 109.4 inches (9 feet 1 inches) tall, 138.3 inches (11 feet 6 inches) wide, and 249.1 inches (20 foot 9 inches) long (without the gun, which added another 91.4 inches).<sup>2</sup> It weighed 46.2 tons (92,355 pounds) fully loaded. It had six dual roadwheels to a side and a rear mounted drive sprocket that had 13 teeth.<sup>3</sup> At the front of each track it had a 26 x 6 inch forward idler, used to keep the vehicle’s tracks taut.<sup>4</sup> Two different types of all-steel center-guided tracks were used, namely the 24-inch-wide single pin (T81) and the 23 inch wide double pin (T80E1). The tracks were kept in place by five return rollers at the top of each side, equally spaced between the sprocket and idler.

---

<sup>1</sup> War Department, *Pershing Heavy Tank T26E3 Technical Manual*, TM 9-735 (Washington, D.C.: Government Printing Office, 1945), 3.

<sup>2</sup> Hunnicutt, *Pershing History*, 217.

<sup>3</sup> Ibid.

<sup>4</sup> *U.S. Army, FB-191* (Washington, D.C.: Government Printing Office, 1945) quoted in Jeff Quitney, “Pershing Tank ‘The Heavy Tank T26E3’ p1-2 1945 US Army FB-191” (video), 8 July, 2014, accessed on 24 March, 2018, [https://www.youtube.com/watch?v=XWF83bNq\\_LQ](https://www.youtube.com/watch?v=XWF83bNq_LQ) The video refers to the idler as the “compensator wheel,” see 2:46.

The T26E3 was well armed and armored, especially frontally, with 4 inches of rolled and cast homogenous steel angled at 46 degrees for the glacis plate, and 3 inches of armor sloped at 53 degrees for the bottom plate.<sup>5</sup> The heaviest armor on the tank was the cast steel T99E1 gun shield, at 4 ½ inch thick (not sloped, but rounded), while the rest of the turret front was at 4 inches; the sides and rear of the turret were 3 inches thick.<sup>6</sup> The T26E3 had 3-inch thick armor on the forward side armor and 2-inch thick armor at rearward. Two-inch armor protected the upper rear of the tank, while ¾ inch the bottom rear. Seven Eighths (.875) inch armor protected the top.<sup>7</sup> The bottom front of the tank was protected by 1-inch of armor and the bottom rear had only ½ inch. The T26E3's turret was large, but fit the same diameter turret ring as the medium tank M4 (Sherman), at 69 inches (measured internally).<sup>8</sup> It housed the powerful M3 90-mm (3.54 inch) gun, and, thanks to a ten-round ready rack in the turret, in combination with stowage bins in the hull floor, could carry 70 rounds of ammunition.<sup>9</sup> It also had one .50 caliber HB M2 machine gun on the turret roof in a flexible AA mount, and two .30 caliber M1919A4 machine guns, one mounted coaxially to the main gun and the other in a bow mount.<sup>10</sup>

The T26E3's 90-mm gun M3 could hurl a 23.29-pound high explosive (HE) projectile 17,885 meters (11.1 miles).<sup>11</sup> An armored piercing (AP) shell had a range of 3,200 meters (2 miles). The weight of the gun and tube was 3,725 pounds (1.86 tons); it took the turret 17 seconds to hydraulically traverse 360 degree (21.2 degrees per second).<sup>12</sup> The gun could be elevated 20 degrees and depressed 10. The maximum rate of 'aimed' fire was eight rounds a

---

<sup>5</sup> Hunnicutt, *Pershing History*, 217.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

<sup>9</sup> Ibid.

<sup>10</sup> Ibid.

<sup>11</sup> *90-mm Gun M3 Mounted in Combat Vehicles*, War Department, TM 9-374 (Washington, D.C.: Government Printing Office, 1944), 12, 90. (Hereafter M3 Manual)

<sup>12</sup> Ibid., 7, 12. It could also be manually traversed at a slower rate.

minute.<sup>13</sup> The max rate of fire could be maintained for 160 rounds, or 20 minutes, before causing damage to the barrel. One round a minute could be fired indefinitely without fear of damage.

Five different types of live shells were available: the M71 HE, the M77 AP, an obsolescent model used for training only, the T33 AP-T (tungsten), M82 APC-T (armor piercing capped-tungsten, described in detail further below), and the T30E16 HVAP-T (hyper velocity armor piercing – tungsten, described below). The T33 AP-T shell was a modification of the obsolete M77 AP, specifically it was reheat-treated to increase its harness, and a windshield was added to improve aerodynamic performance.<sup>14</sup> The HE and AP shells left the gun at a respectable 2,700 fps, while the APC round moved at a comparable 2,670 fps.<sup>15</sup> The HVAP round, however, screamed out of the barrel at 3,350 fps. The manual describes the purpose of the HVAP ammunition as follows:

This is a special hyper-velocity, armor piercing round for attack of heavily armored vehicles. It gives greatly increased penetrative performance up to 2,000 yards range over the standard A.P.C.-T., Projectile, 90mm, M82. It is especially effective at shorter ranges. Since tungsten carbide is a critical material these projectiles should be used sparingly and only when the situation requires increased armor penetration. The shot will penetrate all plates of the German Pz Kpfw V “Panther” and “King Tiger” Tanks. IT WILL DEFEAT THE GLACIS PLATE OF THE “PANTHER” AT RANGES UP TO 450 YARDS AND OF THE “KING TIGER” AT 100 YARDS RANGE. UP TO RANGES OF 800 YARDS THE SHOT WILL PENETRATE THE GUN MANTLET AND TURRET FRONT OF BOTH THE “PANTHER” AND “KING TIGER” TANKS.<sup>16</sup>

The purpose of the T33 AP-T round is highlighted in the Ordnance manual similarly as follows:

“This is the most effective shot for the defeat of high obliquity caliber thickness homogeneous

---

<sup>13</sup> Research Analysis Corporation (RAC), “Technical Situation Report No. 38, September 18, 1945,” Quoted in “90-mm Gun M3 and M3A1 Rate of Fire,” May 6, 2017, War Thunder (blog), accessed on 25 March, 2018. <https://forum.warthunder.com/index.php?/topic/362945-id0057186-12may2017-90mm-gun-m3-and-m3a1-rate-of-fire/> (hereafter referred to as RAC Report).

<sup>14</sup> *Armor-Piercing Ammunition for Gun, 90-mm, M3*, Office of the Chief of Ordnance (Washington, D.C.: Government Printing Office, 1945), 6. (Hereafter M3 Ammunition)

<sup>15</sup> M3 Manual, 7.

<sup>16</sup> M3 Ammunition, 1.

armor plate. The shot will defeat all plates of the German Pz Kpfw V “Panther” Tank except the gun mantlet. IT WILL PENETRATE THE GLACIS OF the “PANTHER” TANK UP TO 1,100 YARDS RANGE.”<sup>17</sup>

In addition to first rate ammunition, the T26E3 boasted excellent fire control and vision devices. The gunner’s primary sight was the M10F periscope, which featured a x6 power telescope for normal engagements and a unity sight for observation and close-quarters engagements.<sup>18</sup> Additionally, the gunner had the x5 power M71C auxiliary telescope as a back-up if his primary sight went down. It is of interest that, the M71C was mounted very low and near to the gun barrel so it could alternatively be used to see if the gun was clear of nearby obstructions before firing.<sup>19</sup> The commander’s cupola, on the right side of the turret, contained six direct vision prisms which offered a 360-degree view from inside the tank as well. The cupola was on rollers and had an azimuth scale built in so the commander could quickly reference, with great accuracy, his viewed direction/target direction in relation to the gun.<sup>20</sup> However, when the tank commander rode with his hatch opened over rough terrain, it had a nasty habit of working its way loose, swinging forward, and striking him in the head.<sup>21</sup> The tank’s loader also had his own hatch on the left side of the turret, as well as a pistol port from which he could fire on nearby ground forces.

The pistol port also proved useful for venting gun fumes if they built up inside the turret, as well as providing a convenient means of throwing expended 90-mm brass outside of the tank during combat, thus avoiding them from piling up at the tank crew’s feet. The T20 series had a

---

<sup>17</sup> Ibid., 6.

<sup>18</sup> Nicholas Moran, “Inside the Chieftain’s Hatch: M26 “Pershing” Part 2,” The Chieftain (video), September 19, 2012, accessed March 18, 2018, [https://www.youtube.com/watch?v=\\_gONk5PS4zM](https://www.youtube.com/watch?v=_gONk5PS4zM).

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid. Moran mentions the manual recommending a field expedient fix, drilling holes through the hatch system and installing a cotter pin.

Rotocloner blower mounted in the hull front that could cycle air in the crew compartment at a rate of 400 cubic feet per minute, keeping fumes from building up under normal conditions. The positioning of the blower created a distinctive armored-covered, bulge at the top center of the glacis plate, just below the turret. This bulge is an identifying feature and is characteristic of every model of the T20 series as well as the M46 tank. Both of the drivers had their own hatches and dedicated periscope. The assistant driver/ bow gunner had his own complete set of driving controls, but his normal responsibility was to his bow gun. He used the tracers of his machine gun to walk fire onto targets. Additionally, each driver had an escape hatch located in the floor of the hull underneath him.

The T26E3 used a torque converter transmission with three forward and one reverse gears. The T26E3 and the M18 Hellcat tank destroyer used essentially the same, Torqmatic 900-T built by the Detroit Transmission Division of General Motors, and were the only two American vehicles to employ a torqmatic transmission during the war.<sup>22</sup> The transmission was developed through the combination of a Hydraulic Torque Converter with a three planetary gear arrangement of the Hydra-Matic transmission. A 1944 General Motors publication declared that the torqmatic "...could accomplish new wonders in the heavy vehicle field."<sup>23</sup> Similarly, the manual boasted that it "...practically relieves the driver of all concerns about transmission shifting except under extreme conditions, and leaves him free to concentrate on his other

---

<sup>22</sup> David D. Jackson, "Detroit Transmission (Hydra-Matic) Division of General Motors Corporation in World War Two: The Detroit Transmission Torqmatic Model 900-T – as used in the M18 Hellcat Tank Destroyer and M26 Pershing," *The American Automobile Industry in World War Two: An American Auto Industry Heritage Tribute*, December 27 2016, accessed on April 6 2018, <http://usautoindustryworldwartwo.com/General%20Motors/detroit-transmission-%20the%20Torqmatic%20transmission%20900-T.htm>.

<sup>23</sup> Detroit Transmission Division, *Teamwork in Peace and War* (Detroit, Michigan: General Motors Corporation, 1944), 27.

functions.”<sup>24</sup> Despite these in-house endorsements, an electrical drive was favored for the T20 series and took the lead until testing proved it impractical in mid-1943, thereafter, the torqmatic was permanently adopted.

The T26E3 was powered by the gasoline Ford GAF engine, developing 500 hp at 2600 rpms.<sup>25</sup> In combination with the torqmatic transmission, it could go to 9 mph in the first gear, 18 mph in the second, and up to 30 in the third (sustainable road speed was typically 25 mph on level ground).<sup>26</sup> The T26E3 could handle a sixty percent grade and could negotiate an eight foot wide trench.<sup>27</sup> Steering was managed by the application of the brake to one side of the differential at a time, so forward momentum was required to turn, negating the ability to neutral-steer.<sup>28</sup> Its turning radius was 20 feet. The T26E3 had a four-cylinder auxiliary motor for driving the generator to charge the batteries as well as operation of electrical equipment (such as the turret motor) when the main Ford engine was not running.<sup>29</sup> It generated 13.6 hp at a constant 1,800 rpms. The vehicle had two large fuel tanks, one on the left side of the engine compartment, holding 116 gallons, and one on the right, holding only 75 gallons, because room was needed for the auxiliary engine.<sup>30</sup> Eighty octane gasoline was used to fill them. The T26E3 had an operating range of approximately 100 miles (using roads), for a consumption rate of about ½ mile per gallon.

The development of the T20 series began in April 1942, after Lt. Col. Joseph M. Colby, Chief of the Ordnance Department Development Branch, returned from North Africa. The

---

<sup>24</sup> Detroit Transmission Division, *The Torqmatic Transmission: Model 900-T*, no. 262 (Detroit, Michigan: General Motors Corporation, 1944), 6.

<sup>25</sup> Hunnicutt, *Pershing History*, 217.

<sup>26</sup> Moran, “Pershing Part 2.”

<sup>27</sup> FB-191, at 0:55.

<sup>28</sup> Moran, “Pershing Part 2.”

<sup>29</sup> Nicholas Moran, “Inside the Chieftain’s Hatch: M26 “Pershing” Part 1,” *The Chieftain* (video), September 12, 2012, accessed March 18, 2018, <https://www.youtube.com/watch?v=73e-MUZNb1Y>.

<sup>30</sup> *Ibid.*

production of the medium tank M4 (General Sherman) was just coming into full stride, and given its performance in the desert, many considered it the best tank on the battlefield.<sup>31</sup> However, an unsettling trend of German armor gaining increased firepower and protection had been identified. The J model of the Panzer III or Mark III (Pz.Kpfw. III Ausf. J) had increased front armor and used a long 5cm L/60 cannon (L/60 denotes the length of the gun in calibers) and had been employed in force during the Battle of Gazala in late May 1942.<sup>32</sup> Soon after, a new version of the Panzer IV or Mark IV (Pz.Kpfw. IV Ausf. F2) was fielded employing a 7.5cm KwK 40 gun (KwK denotes tank cannon, while 40 represents the year of development), significantly more powerful than the 75-mm gun employed on the Sherman.<sup>33</sup>

The Ordnance Department declared it time for the development of a successor for the main American medium tank.<sup>34</sup> The new tank needed improvements in all three basic concerns of tank design, namely, firepower, mobility, and protection, and would take advantage of new advances made in technology while incorporating lessons learned from the battlefield.<sup>35</sup> Maj. Gen. Gladeon M. Barnes, Chief of the Ordnance Department Research and Development Service, and Lt. Col Colby conceptualized the new tank and a mock-up was constructed by the Product Study Division of General Motors Corporation in May 1942.<sup>36</sup> General Jacob L. Devers, Chief of the Armored Force, headquartered at Fort Knox, Kentucky, and General Brehon B. Somervell, head of the Army Service Force (ASF), both approved of the new design, which was soon designated the T20 by the Ordnance Department.<sup>37</sup>

---

<sup>31</sup> Hunnicutt, *Pershing History*, 49.

<sup>32</sup> *Ibid.*

<sup>33</sup> *Ibid.*

<sup>34</sup> *Ibid.*

<sup>35</sup> Zaloga, *M26/M46*, 6-7.

<sup>36</sup> Hunnicutt, *Pershing History*, 50.

<sup>37</sup> *Ibid.*

The T20 design was a revolutionary American design and improved upon the Sherman in many ways. The propulsion layout of the Sherman emulated German designs in that its engine was rearward in its own compartment but the transmission was placed in the front of the tank between the driver and assistant driver/bow gunner (radio operator/bow gunner in German tanks). The transmission was then linked through the differential and final drive to a drive sprocket wheel in the front of the tank that propelled the vehicle. This forward powered arrangement eliminated lengthy linkages and steering controls to the driver's position, but required a power shaft to be run the length of the vehicle from the engine to the transmission. This shaft, coupled with the large diameter Continental R975 radial engine (an adaption of an airplane engine) of the earlier models, made the M4 very tall, seen best by its characteristic side sponsons (armored vertical projections that served as the hull's sides).<sup>38</sup>

The T20 eliminated the vehicle-length shaft by placing the engine, transmission, differential, final drive, and sprocket all at the rear of the vehicle in a well-thought-out and space-saving configuration. A low-profile Ford GAN engine (developing 500 hp at 2600 rpm) was used, essentially the same motor as the Ford GAA in the M4A3 (Sherman) only modified for a low-silhouette vehicle.<sup>39</sup> These modifications allowed for a substantial reduction in overall vehicle height of 14 inches.<sup>40</sup> Barnes and Colby also sought to provide advantage to the T20 by

---

<sup>38</sup> The *Webster's New Collegiate Dictionary* defines sponson as: "a projection (such as a gun platform) from a ship or tank." Noah Webster and John P. Bethel. *Webster's New Collegiate Dictionary ; Based on Webster's New International Dictionary* (London: Bell, 1960).

<sup>39</sup> *Ibid.*

<sup>40</sup> Joseph M. Colby to John K. Christmas, "Comparison of Characteristics of Tanks," September 11, 1943, Memorandum, Tank Automotive Center (Hereafter referred as TAC), Christmas, National Archives of the United States, College Park, MD (hereafter referred as NACP), Record Group 156 (Hereafter referred as RG), Entry (NM-26) 931, Box- L106, Folder- '451.3 Tanks 1943' (hereafter referred to as Tank Characteristics). To complicate the matter some, Zaloga lists the height of the M4A3 as being 134 inches (11 feet 2 inches), see *Panther Vs. Sherman*, 19. Meanwhile, Hunnicutt gives the height of the T20 at 96 inches (see *Pershing: A History of the Medium Tank T20 Series*, 204), however, this is only to the machine gun mount and does not include the height to the top of the machine gun as the former figure does. Elsewhere, Zaloga gives the total height of the M26 as being 109 inches, see *M26/46 Pershing Tank*, 28, but here still there is obviously some discrepancy as the difference does not come near

removing the “work” of the tank driver’s job. They installed a torqmatic transmission and the steering was “one finger.” Installation of an automatic transmission went hand in hand with a rear-powered-sprocket design, as it again eliminated the necessity of running gear linkages the length of the vehicle to the driver’s position.

The greatest ingenuity of the T20, however, was in its hull design. Barnes and Colby realized that by reducing the total space volume of the hull, an increased amount of armor could be added while still maintaining a comparable weight. As such, they went with a very simple boxlike structure that minimized volume wherever possible.<sup>41</sup> Much of the Sherman’s equipment was stowed internally inside the crew compartment. The T20, in contrast, moved all nonessential items outside the hull and into stowage bins placed over the tracks. The overall reduction in volume allowed the T20, which had the same armor layout as the Sherman, to weigh three tons less--- 32.9 tons (65,758 pounds) as opposed to 36 tons (72,000 pounds) (both are combat loaded weights).<sup>42</sup> The new design was also much wider, at 138 inches (11 feet 6 inches), to the Sherman’s 106.8 inches (8.9 feet).<sup>43</sup>

The lower, wider design had several advantages. First and foremost, its lower stance presented less target for the enemy to engage. The lower silhouette reduced “...by twenty-five percent the area of profile of hull which may be hit.”<sup>44</sup> A survey completed after the war determined that 31 percent of gunfire hits on Allied tanks occurred on the turret and 52 percent on the upper hull, whereas only 17 percent hit the lower portions of the vehicle--- a vehicle

---

the 14 inches mentioned by the Ordnance personnel. To be fair, the height varied from model to model of both the Sherman and the T20 series.

<sup>41</sup> Hunnicutt, *Pershing History*, 50.

<sup>42</sup> *Ibid.*, 204.

<sup>43</sup> Steven J. Zaloga, *Panther vs Sherman: Battle of the Bulge 1944*, *Duel*, no. 13 (Oxford, UK: Osprey Publishing Ltd., 2008), 19.

<sup>44</sup> Joseph M. Colby to John K. Christmas, “Early Production of a Heavily Armored Tank,” November 7, 1943, Memorandum, NACP, TAC, RG 156, entry (NM-26) 931, Box-L106, folder-‘451.3 Tanks 1943.

closer to the ground seemingly had a decreased chance of being hit.<sup>45</sup> Tanks assumed a “hull down” position (defensive posture where the tank was dug in or behind cover and only presented the turret front to the enemy; though the Americans were often on the offense and did not often have this luxury) whenever possible; thus, the T20’s silhouette being 14 inches lower to the ground would have been beneficial in this regard. Furthermore, in a later memorandum to Brigadier General John K. Christmas, Assistant Chief of the Tank Automotive Center, Colby pointed out that “it has a lower center of gravity, providing for greater stability of firing platform and greater obstacle crossing ability.... It has greater width, providing a more stable firing platform and greater maneuverability.”<sup>46</sup>

Similarly, the greater width of the vehicle granted better weight distribution, and by extension, superior mobility. To best compare, the ground pressure on the M4A3 was 14.5 pounds per square inch while the T20’s was 13.5.<sup>47</sup> The M4A3, however, as a greatly improved variant of the Sherman, had been in development longer and efforts had been made prior to improve its flotation (ability to remain above and keep from digging into soft ground), mainly by increasing the width of its tracks. Admittedly however, with “duck bill” end connectors added to the M4A3’s tracks, its footprint was reduced to 12.3 psi.<sup>48</sup> Regardless, the comparison here becomes more telling when the M4A3 is compared with the T26E3, the tank that would become standardized as the M26 (General Pershing) in March of 1945. The T26E3, despite its combat

---

<sup>45</sup> Survey of Allied Tank Casualties of World War II: Technical Memorandum ORO-T-117, by Alvin D. Coox and L. Van Loan Naisawald. The Director, Operations Research Office, Ft. Lesley J. McNair, Washington, D.C., March 1, 1951. Merriam Press Military Archives Series (hereafter referred as Tank Casualties).

<sup>46</sup> Ibid.

<sup>47</sup> Zaloga, *Panther Sherman*, 19.

<sup>48</sup> Ibid.

weight of 46.2 tons (92,355 pounds), ten tons heavier than the Sherman, had a ground pressure of only 12.5 psi.<sup>49</sup>

The developmental story of the T26E3 and its T20 series predecessors is closely associated with the ongoing controversy between the Ordnance Department and the Army Ground Forces (AGF), specifically, the chief of the Ordnance Department's research section, Maj. Gen. Gladeon Barnes, and the headquarters of AGF, headed by Lt. Gen. Lesley McNair.<sup>50</sup> Interestingly, McNair, an artillery officer (and veteran of the First World War), determined American armored policy and approved or disapproved of new tank designs. Armor doctrine under McNair devoted tanks to two specific roles, namely, breakthrough exploitation and infantry support. Enemy tanks were not to be engaged by American tanks except if unavoidable. Instead, enemy armor was to be dealt with by reserve tank destroyer units.<sup>51</sup>

McNair's policy directed the acquisition of new tanks for the U.S. Army around the satisfaction of two broad requirements, specifically battle need and battle worthiness. Battle need initiated new armor designs only after the Armored Force identified problems from the front and requested new equipment, while battle worthiness emphasized durability, simplicity of design, ease of maintenance, and reliability, requiring that any tanks (and other equipment) be tested thoroughly before being sent to foreign theatres. Initial developmental tests were conducted at Aberdeen proving Ground in Maryland, while operational tests took place afterwards with the Armored Board, in Fort Knox, Kentucky.<sup>52</sup>

---

<sup>49</sup> Hunnicutt, *Pershing History*, 204. Combat weight refers to the weight of the vehicle while fully mission loaded (i.e., weapons, ammunition, radios, etc.) minus the weight of the crew.

<sup>50</sup> Zaloga, *Pershing vs Tiger*, 15.

<sup>51</sup> *Tank Destroyer Field Manual, Organization and Tactics of Tank Destroyer Units, 1942*, War Department, FM 18-5 (Washington, D.C.: Government Printing Office, 1942), 7. The manual describes the specific role of tank destroyers as: "Tank destroyer units are especially designed for offensive action against hostile armored forces."

<sup>52</sup> Zaloga, *Pershing Tiger*, 15.

Maj. Gen. Barnes disagreed with AGP policy and felt that the combat arms were not informed on the technical side and that Ordnance should have more autonomy in promoting designs. As such, the T20 program was in violation of AGF policy as need was never established; rather, Ordnance went through with the program on its own volition. In the absence of any user requirements, the designers of the T20 series used the tank as a means of experimenting with different armaments, transmissions, and suspensions in hopes of finding the best combination. The program represented a further departure from previous American designs like the Sherman in that it switched from relying on the engineers at Rock Island Arsenal, Illinois and Aberdeen Proving Ground, to the far larger pool of talented technicians of the U.S. automotive industry, specifically Fisher Body of General Motors, in Detroit.<sup>53</sup> The people at Fisher, in large part, after receiving guidance from Barnes, designed and built the T20 series.<sup>54</sup>

After the contract for the first two T20 pilots was given to the Fisher Body Division, it was soon expanded by four to allow work on two pilots for each of three pilot series, the T20, T22, and T23. Each series tested a different transmission, specifically: the T20 and its variants used a torqmatic transmission (adapted from the one used on the heavy tank M6); the T22 employed a manual transmission (adapted from the 30-30B transmission in the M4); and the T23 series was built with an electric drive (first used in the heavy tank T1E1).<sup>55</sup> The precedent of trying multiple transmissions did not originate with the development of the T20 series, however, but with that of the heavy tank M6. In order to propel the 60-ton tank, which ultimately proved an ungainly and overall unsatisfactory design, allowances were made to house a 1000 horsepower Wright Whirlwind engine, the largest engine put into an automotive vehicle up to

---

<sup>53</sup> Ibid., 16.

<sup>54</sup> Ibid.

<sup>55</sup> Zaloga, *M26/M46*, 6. For information on the M4 transmission used see Hunnicutt's *Pershing History*, 52.

that point.<sup>56</sup> Transmission technology of the period could not build a geared transmission that could handle the corresponding torque of such a motor so the leading engineers of the automotive industry, specifically the Ordnance Automotive Advisory Committee, were called upon to design a working drivetrain.<sup>57</sup> They decided upon three types of transmissions, namely, an electric transmission, designed by the General Electric Company, a torque converter transmission with two speeds, and a hydra-matic.<sup>58</sup> Both the electric and torqmatic transmissions proved effective, though the electric was thought to be the more successful of the two, and were the direct predecessors of the transmissions used in the T20 series.

At this point in early 1942, the 76-mm (being developed for the tank destroyer M18) was not yet established, so it was desired to mount other guns for trials on the pilots as well, specifically a 75-mm with an autoloader, and the 3-inch (76.2 mm) gun M5 (found on the tank destroyer M10, and the heavy tank M6).<sup>59</sup> The 75-mm with autoloader was only mounted on the number one pilot of the T22 series, while the M5 did not leave the planning board. It was discovered that the M5 was ballistically identical but weighed significantly more than the 76-mm. The remainder of pilots mounted the 76-mm gun. An interesting side note is that the 76-mm gun was called such, and not “3-inch,” only to avoid confusion with the handling of ammunition. The weapon had been designed by Barnes and necessarily incorporated a redesigned chamber for the limited space of the M4 turret, creating rounds of the same caliber but different overall shape.<sup>60</sup>

---

<sup>56</sup> Gladeon, M. Barnes to historical branch of Office of the Chief of Ordnance, “History of Tank Development by Ordnance Department in World War II,” transcript, June 12 1951, quoted in Moran, Nicholas, “The Chieftain’s Hatch: Ordnance Department Tank Development,” World of Tanks, November 28, 2012, accessed April 5, 2018, <https://worldoftanks.com/en/news/chieftain/chieftains-hatch-ordnance-dept-tank-development/> (hereafter Barnes paper).

<sup>57</sup> Ibid.

<sup>58</sup> Ibid.

<sup>59</sup> Zaloga, *M26/M46*, 6.

<sup>60</sup> Barnes paper.

The designers also desired to test different suspensions. The number two pilot of the T20 series, designated the T20E3 (the T20E2, T22E2, and T23E2 designations were skipped, presumably, because the pilots mounting the 3 inch gun M5 were dropped), mounted a new torsion bar suspension, using twelve individually sprung roadwheels (six to a side), measuring 26 x 4.5 inches each.<sup>61</sup> This was the first time a torsion bar suspension had been used by the Ordnance department.<sup>62</sup> The remainder of the pilots utilized a more traditional variation of the Chrystie-style vertical volute spring suspension (VVSS) and the horizontal volute spring suspension (HVSS), made famous by the M4. This system employed twelve roadwheels in six bogies (three bogies per track), with each roadwheel measuring 20 x 9 inches.<sup>63</sup> All of the T20 pilots used the same type of 16 9/16" width tracks as the M4 as well.<sup>64</sup>

In January 1943, a conference between Ordnance and the Armored Force allowed some discussion of the design and led to improvements concerning the sitting heights of the drivers, as well as enlargement of their main hatches.<sup>65</sup> Ordnance hoped to begin production to replace the M4 series in 1944, arguing for the need to stay ahead of German development. In April 1943, Ordnance presented the T23 pilot to Army Chief of Staff General George C. Marshall, McNair, and the head of the Armored Force, Lieut. Gen. Jacob Devers.<sup>66</sup> An informal agreement to produce 250 was made on site. The number one T20 pilot was ready by May 1943, but by that spring, Ordnance placed all serious consideration towards the T23 design.<sup>67</sup> In July 1943, Barnes recommended that the T23E3 be standardized as the medium tank M27 and the T20E3, with

---

<sup>61</sup> Hunnicutt, *Pershing History*, 205.

<sup>62</sup> Zaloga, *M26/M46*, 6.

<sup>63</sup> Hunnicutt, *Pershing History*, 208.

<sup>64</sup> *Ibid.*, 52.

<sup>65</sup> *Ibid.*

<sup>66</sup> Zaloga, *M26/M46*, 7.

<sup>67</sup> *Ibid.*

torqmatic drive and torsion bar suspension, as the M27B1.<sup>68</sup> The Armored Board at Ft. Knox, Kentucky, opposed the measure because of strong reservations with the untested electric drive, believing it impractical, both in operational terms and in maintenance requirements. Nonetheless, Ordnance was still permitted to produce fifty T23E3s for developmental purposes.

In April 1943, the ASF, which managed the U.S. industrial effort, approved production of 250 T23E3s. Production of the tanks began in November 1943 and finished in December 1944.<sup>69</sup> The T23E3 was armed with the 76-mm gun and had an electric drive and torsion bar suspension. In May, a 90-mm gun was first mounted on a T23E3. (After reports from Cairo indicated that the Germans were using their 8.8cm guns to engage tanks in Libya, efforts were begun to adapt the 90-mm anti-aircraft gun for use on tanks and assault guns, culminating in the standardization of the M3 anti-tank gun in September 1943.<sup>70</sup>) Barnes supported the move, along with General Levin H. Campbell, the Chief of Ordnance. Devers, commander of the Armored Force, was in opposition, however, as he felt the 76-mm was adequate.<sup>71</sup> Undaunted, Ordnance moved ahead towards the creation of a second design mounting the 90-mm.<sup>72</sup>

The Allies first encountered the Tiger tank on 28 November 1942 during a major British assault 13 miles west of Tunis, Tunisia.<sup>73</sup> However, the Germans had only four of the massive 60-ton tanks employed defensively for their first combat test in North Africa, and they did not play a crucial role. The United States Army would first encounter the Tiger on 14 February 1943 at the Battle of Kasserine Pass, and again during the invasion of Sicily in July and August of

---

<sup>68</sup> Ibid.

<sup>69</sup> Ibid., 8.

<sup>70</sup> Mayo, *Beachhead Battlefront*, 328.

<sup>71</sup> Ibid., 329.

<sup>72</sup> Ibid., The official Ordnance history implies that it was the Ordnance Department's idea to reattempt to mount the 90-mm on a different vehicle and not requested by the Armored Force, as Zaloga argues. See Zaloga, *M26/M46*, 10.

<sup>73</sup> Charles R. Anderson, *Tunisia, 17 November 1942—13 May 1943*, The U.S. Army Campaigns of World War II (Washington, D.C.: U.S. Army Center of Military History, 2004), 10.

1943. On 13 January 1943, a month before the first American encounter, Colonel G. M. Ross relayed communications between the War Office with the Middle East to the Assistant Chief of the Tank Automotive Center (TAC), Brigadier General John K. Christmas, informing him about the German Tiger tank.<sup>74</sup> Christmas had the specifications of the Tiger (including exact armor thicknesses and hardness level) and in at least one case shared the tank's details, specifically in a 2 August 1943 memorandum with Major General T. J. Hayes, the Chief of the Industrial Division.<sup>75</sup>

Interestingly, Christmas foresaw a need for a heavily armored tank “early in 1944.” In a 7 October memorandum to Barnes, Christmas prophetically suggested: “I consider such a demand [for a heavily armored tank] very likely to arise from our troops overseas. The British are already very concerned over this and the fact that both the Russians and Germans have such tanks are signs of the trend developed in very large battles in open country or ‘tank-terrain.’”<sup>76</sup> Christmas reflected that it was too late to develop a new design to answer this threat, and after careful consideration of every American tank currently either in production or development, announced that, “...regardless of military value the time factor forces us to choose the Medium Tank M4 with ‘auxiliary armor’.”<sup>77</sup> He recommended that 1,000 M4s be outfitted with auxiliary armor “...so as to approach the protection of the Medium Tank T28 [He likely meant the T28 super heavy tank] and have them ready by 1 March 1944.” By extension, he asked the project be given high priority and the full backing of the War Department. The modified vehicles would need to be “...delivered in the U.K. by 1 May 1944; sixty days prior to this (1 March) these tanks must

---

<sup>74</sup> G. M. Ross to John K. Christmas, January 13, 1943, Memorandum, NACP, TAC, RG 156, entry (NM-26) 931, Box-L107, Folder-‘451.3 Heavy Tanks 1943.’

<sup>75</sup> John K. Christmas to T. J. Hayes, August 2, 1943, Memorandum, NACP, TAC, RG 156, entry (NM-26) 931, Box- L107, Folder- ‘451.3 Heavy Tanks 1943.’

<sup>76</sup> John K. Christmas to Gladeon M. Barnes, “Early Production of a Heavily Armored Tank,” October 7, 1943, Memorandum, NACP, TAC, RG 156, entry (NM-26) 931, Box-L106, folder-‘451.3 Tanks 1943.’)

<sup>77</sup> Ibid.

leave the tank factories in the United States.”<sup>78</sup> As far as it can be determined, Christmas’ recommendations went unheeded.

Similarly, a report from the War Office of the Director Royal Armoured Corps (DRAC) in London also was ignored. The office recognized Allied armor (British and American) as inferior and urged, within three years, the production of “...a tank as quickly as possible which is comparable to the known best of the Axis Forces. At once get out a specification, design, and commence a tank which is far superior in every characteristic to the PZKW VI.”<sup>79</sup> In stark contrast to American efforts to keep designs conservative, the War Office advocated for heavier armor:

Improvement in all facilities for obtaining information of the enemy, under conditions of modern war, have made the achievement of tactical surprise extremely difficult. The ‘surprise of material’ is, however, still possible and provided the surprise is big enough, the side gaining such advantage may well achieve such success as to seriously shorten the war.<sup>80</sup>

Regarding firepower, the office reaffirmed the tank’s primary role in the exploitation role, but also suggested that, “...if we are logical...” the tank’s gun should “...be capable of penetration, at good range, the armour of any tank the Axis Forces are likely to deploy.”<sup>81</sup>

Notwithstanding the DRAC recommendations and Christmas’ later report failing to generate excitement, his earlier report on the Tiger gained some traction. It showed concern over an increased German tank threat: “Mass production of the above described tank is expected soon. A new Panther design collateral with Tiger has been found in evidence but not confirmed. Details and photographs are on their way by plane.” The photos and specifications that

---

<sup>78</sup> Ibid.

<sup>79</sup> “Appreciation of Tank Policy 1943,” Report, NACP, TAC, RG 156, entry (NM-26) 931, Box-L106, folder-451.3 Tanks 1943.

<sup>80</sup> Ibid.

<sup>81</sup> Ibid.

Christmas spoke of were courtesy of the Red Army's capture of several Panthers during the Battle of Kursk (July 5-16, 1943), and the Soviets subsequent allowance of British and American liaison officers in Moscow to photograph one, as well as receive its basic technical data.<sup>82</sup>

Regardless, the Tiger I was infrequently met and did not affect the tactical situation on the ground, and hence did not stir up great consternation in the Armored Force; however, the new tanks were not ignored either and a call went out to the Ordnance Department for heavier armor and a more powerful gun.

As a result, two more derivatives of the T23E3 were added, namely the T25 and T26, however, Ordnance's focus remained on the T23E3.<sup>83</sup> It was decided that fifty of the 250 T23E3s that were to be built should be mounted with the 90mm gun. Forty of these were built with a three-inch front glacis plate (75 mm) and ten with a four inch (100 mm) and were designated as the T25 and T26 respectively. Both designs were also given wider tracks. The mandate for the T26 insisted that it possess "equivalent or superior" armor to the Tiger I.<sup>84</sup> Of note, in a memorandum regarding the early production of a heavily armored tank dated 7 November 1943, Colby recommended to Christmas the immediate production of the T26.

The Medium Tank, T26, which has 4" of armor at 45 degrees, offers an effective ballistic front of close to 8". I recommend production of this vehicle at once, using the electric drive. The Medium Tank, T26E1, which is basically the same tank except that it has the torsion bar suspension and Torqmatic transmission, can be made into a good tank. However, from the standpoint of efficiency and operation, I feel that the electric drive is definitely superior.<sup>85</sup>

---

<sup>82</sup> Zaloga, *Panther Sherman*, 18. In another work, Zaloga points to a major U.S. intelligence failure regarding the Panther. Rather than being just another heavy tank employed in very limited numbers, as was supposed, the Panther was in actuality a medium tank that was intended for large-scale production and to be a replacement for the Wehrmacht's main medium tank, the Panzer 4. See Zaloga, *M26/M46*, 13-14.

<sup>83</sup> Zaloga, *M26/M46*, 8.

<sup>84</sup> Zaloga, *Pershing Tiger*, 17.

<sup>85</sup> Joseph M. Colby to John K. Christmas, "Early Production of a Heavily Armored Tank," November 7, 1943, Memorandum, NACP, Ordnance Department, TAC, Christmas, RG 156, entry (NM-26) 931, Box- L106, Folder- '451.3 Tanks 1943.'

However, with the weight beginning to mount on the 42-ton T25 and 47.6-ton T26, the designing engineers recommended removal of the heavy electric drive in favor of the torqmatic transmission.<sup>86</sup> In August 1943, the new vehicles that reflected this change were designated the T25E1 and T26E1, now weighing in at 39 and 43.5 tons respectively.<sup>87</sup> The move away from the electric drive with the T25E1 and T26E1 would prove fortuitous, as the T23 would encounter many issues in testing.

On 22 August, 1944, the Armored Force Board (AFB) reported on tests done to determine the “suitability of production models [T23] for use by Armored Command.”<sup>88</sup> The report concluded that the production version of the T23 was “not satisfactory for training or combat...”, citing a myriad of deficiencies including all of the following: failure of the engine revolution counter on the Ford GAN engine, issues concerning the pulleys, gearing, housing, and positioning of the Amplidyne drive (electric motor and generator), “control, braking, and/or steering” being lost upon engine failure, carburation in need of correction, unsatisfactory engine cooling, inadequate tracks and suspension (thrown tracks were causing a great deal of trouble), and 76-mm Ammunition stowage measures requiring modification and still being insufficient afterwards to house the desired 70 rounds per tank minimum.<sup>89</sup>

The two T25 pilots with an electric drive were still tested in January 1944 at Aberdeen Proving Grounds and again at Ft. Knox in April.<sup>90</sup> A solitary T26 pilot was sent to Ft. Knox in October 1944, but the test never occurred as the electric drive had met widespread disapproval at that point and had all but been ruled out. Forty T25E1 and ten T26E1 pilots, with their torqmatic

---

<sup>86</sup> Ibid.

<sup>87</sup> Hunnicutt, *Pershing History*, 213, 215.

<sup>88</sup> Frank R. Williams, “First Partial Report of Test of Ten (10) Production Models of Medium Tank, T23: Armored Board, Fort Knox, KY,” August 22, 1944, report, NACP, Ordnance Department, Armored Board Reports, RG 156, entry (NM-26) 916B, Box- J970.

<sup>89</sup> Ibid.

<sup>90</sup> Ibid., 19.

transmissions, were produced for at the Fisher Tank Arsenal at Grand Blanc, Michigan from February to May of 1944 and then sent for testing.<sup>91</sup> In May, Aberdeen Proving Grounds deemed the T26E1 satisfactory, but it was remarked that the turret basket and ammo capacity needed improving. The Armored Board did not report as favorably.

In a letter dated 25 March, 1944, the Army Ground Forces directed the AFB to test the T26E1 medium heavy tank (along with the T25E1 medium tank). The AFB reported back on 20 May with their findings after ten days of conducting tests at Fort Knox.<sup>92</sup> It reported, “During this period the Medium Heavy Tank, T26E1, was operated 246 miles over gravel roads and 28 miles cross-country, with an average fuel economy of .694 miles per gallon. No cross-country operation of this vehicle was observed due to failure of the torqmatic transmission.”<sup>93</sup> The board found that the T26E1 was not “a fightable vehicle.” It could, however, be made so with modification, specifically: “restowage of the ammunition, general turret stowage... and correction of the mechanical defects revealed during the tests.”<sup>94</sup> The report also singled out issues with the gun, remarking that the addition of a blast deflector and special propellant ammunition was a “MUST” to keep the vehicle from being reduced to a “one shot” weapon (Untrammeeled, the blast of the 90-mm gun stirred up great clouds of dust and obstructed the crew’s view, hindering the possibility of follow-up shots).

When Tigers were encountered in Italy in September of 1943, Barnes advocated that 500 T25s and 500 T26s be produced immediately to allow for their availability in the summer of 1944. Barnes’s request met significant resistance. The Armored Force felt the M4 was adequate

---

<sup>91</sup> Zaloga, *M26/M46*, 8.

<sup>92</sup> Frank R. Williams, “Letter Report on Medium Heavy Tank, T26E1,” May 20, 1944, report, NACP, Armored Force Board, RG 156, entry (NM-26) 916B, Box- J969, Folder- ‘Medium Heavy Tank T26E1.’ (Hereafter T26E1 Report)

<sup>93</sup> *Ibid.*

<sup>94</sup> *Ibid.*

and that the 90-mm was overkill, and if such a weapon was to be fielded, it should be mounted on the proven and available Sherman. There was also a general feeling that only a 90-mm M4 could be developed in time for the summer invasion of France. Additionally, Barnes's track record was sullied, as he had previously advocated for the fielding of the heavy tank M6 as well as the T23.<sup>95</sup> Since the Armored Force did not endorse Barnes's request, providing battle need, McNair's AGF and the ASF opposed it as well. Barnes appealed to the former commander of the Armored Board, Lieut. Gen. Devers, who was temporarily covering as the head of ETOUSA in England until Eisenhower replaced him. Devers was an armor officer who had gone out of his way to learn much of the technical specifications surrounding tank design, particularly engines, and he was also a known proponent for an American heavy tank.

On 13 November, 1943, Devers sided with Barnes and requested the development of the T26E1 be accelerated and that 250 produced as soon as possible at a ratio of one to every five M4s being built.<sup>96</sup> Though the AFB was not on board with the idea, Devers's request created battle need, forcing McNair's hand. Additionally, Barnes concurred with Devers's request but added his own recommendation of 1,000 T23s being produced simultaneously.<sup>97</sup> The War Department passed both of these requests on to McNair, who turned them both down flatly. On 30 November, 1943, McNair wrote a letter to Gen. Marshall, stating his position:

There can be no basis for the T26 tank other than the conception of a tank versus tank duel – which is believed unsound and unnecessary....There is no indication that the 76mm anti-tank gun is inadequate against the German Mark VI tank...Certainly the T26 tank, weighing upwards of 43 tons, is not well adapted to the primary mission of tanks.<sup>98</sup>

---

<sup>95</sup> Ibid., 17. The M6 was an archaic design, with numerous automotive problems. It was also severely restricted by width regulations, making it an excessively tall vehicle.

<sup>96</sup> Ibid., 18.

<sup>97</sup> Zaloga, *M26/M46*, 9.

<sup>98</sup> Zaloga, *Pershing Tiger*, 18.

Additionally, on 21 January 1944, Marshall was advised by the Joint Chiefs of Staff to not support the T26, but to wait on any ruling until Eisenhower replaced Devers as Commander ETOUSA. Instead, Marshall deferred to the more qualified opinion of Lt. Gen. Thomas T. Handy, head of G-4 (operations) General Staff.<sup>99</sup> Handy recommended:

...We should go ahead with this project unless Eisenhower reports unfavorably...The Germans are making and using heavy tanks. It is another case of having to go ahead without waiting for long field tests. We may make a mistake and be blamed for it. That is far better than not having a weapon that is needed.<sup>100</sup>

Based on Handy's view, Marshall gave the green light on T26 production. Eisenhower had been repeatedly told of the excellent attributes of the 76-mm gun and thus believed that the 90-mm was unnecessary. He therefore viewed the T26E1 as too heavy for only adding armor protection value and turned down the request.<sup>101</sup> With the issue unresolved, ASF appealed to the War Department to decide the case.<sup>102</sup> On 16 December 1943, the War Department ruled that 250 T26E1 tanks should be produced by April 1945.<sup>103</sup> The issue was not settled, however, as shortly after, Washington directed the Armored Board in Fort Knox, Kentucky to find the best solution for the armor question in 1944.<sup>104</sup> The chief of the Armored Center, Gen Charles L. Scott, headed the team. On 17 April 1944, he reported on his findings. The report pointed to the supremacy of the M4 in North Africa as being almost immediately eclipsed by German development efforts, specifically highlighting improvements in "...quality and design of suspension systems, performance of guns, caliber for caliber, and in fire control equipment."<sup>105</sup>

---

<sup>99</sup> Ibid.

<sup>100</sup> Ibid.

<sup>101</sup> Zaloga, *M26/46*, 11. In *Pershing Vs. Tiger: Germany 1945*, 18, Zaloga mentions that Eisenhower endorsed the request in mid-January.

<sup>102</sup> Zaloga, *M26/46*, 12.

<sup>103</sup> Ibid.

<sup>104</sup> Zaloga, *Pershing Tiger*, 18.

<sup>105</sup> Ibid.

Scott's report also called into question AGF-imposed armored doctrine by demonstrating the importance of superior tanks, in that experience reflected that American armored exploitations were inevitably counterattacked by German armor.<sup>106</sup>

Furthermore, the Scott report was skeptical whether either the T25 or the T26 could be fielded immediately, predicting useful numbers not being available until July of 1945.<sup>107</sup> Instead, it recommended that the turrets for the T25 and T26 be mounted on the M4A3, in a similar fashion to how the T23 turret was first mounted on an M4A1 in August 1943.<sup>108</sup> The AFB requested that a thousand M4A3s be mounted with 90-mm guns, believing that only the M4 would be available in time for the summer invasion.<sup>109</sup> Interestingly, Barnes, the leading proponent for getting a better tank than the M4 to the battlefield in 1944, did not support the proposal, believing the 90-mm would make for "too much of an unbalanced design" and turned it down. He also countered with the argument that the modified M4 could not be produced any faster than the T25 and T26. Not surprisingly, General McNair rejected the proposal as well.<sup>110</sup> In hindsight, this recommendation made a lot of sense, but was not given full consideration.<sup>111</sup>

---

<sup>106</sup> Ibid. 19.

<sup>107</sup> Ibid.

<sup>108</sup> "#15 Turrets: They Are the Combat Power of the Tank," November 22, 2015, The Sherman Tank Site, accessed April 15, 2018, [www.theshermantank.com/tag/76mm-turret/](http://www.theshermantank.com/tag/76mm-turret/). Besides serving as a stepping stone for the creation of the T25/T26, the T23's direct legacy can be found with its turret. In August of 1943 a T23 turret with its M1A1 76-mm gun was first mounted on an M4A1 Sherman. Production began on the M4A1(76)W, America's first 76-mm armed Sherman, in January 1944 and continued till December 1944. Other 76-mm models of the Sherman, including the M4A1(76)W HVSS, M4A2(76)W, M4A2(76)W HVSS, M4A3(76)W, and M4A3(76)W HVSS (also known as M4A3E8 "Easy Eight"), were also produced during the war, though many, depending of the variant, did not reach the ETO in time to be of use. They each used T23 turrets. Rather than overcome the rather daunting task of redesigning the already cramped 75-mm Sherman turret to mount a 76-mm gun, the T23's turret, which fit the same 69 inch turret ring as the M4 and had been designed for accommodating a 76, were used instead. The T23 turret, while four thousand pounds heavier than the older turret, was more spacious, boasted improved side and rear armor, but also had the 360 degree, six-vision-prism commander's cupola and loader's hatch mentioned above.

<sup>109</sup> Mayo, *Beachhead Battlefront*, 328-229.

<sup>110</sup> Ibid.

<sup>111</sup> Several scholars, namely Lida Mayo, Charles Baily, and Stephen Zaloga, agree upon this assessment. See, Baily, *Faint Praise*, 144; Mayo, *Beachhead Battlefront*, 331 and Zaloga, *M26/M46*, 15.

In March 1944, Maj. Gen. Barnes again tried to get tanks of the T20 series into action. He hoped that combat tests would show to the troops that Ordnance had equipment that met their needs despite the AGF never requesting them.<sup>112</sup> He suggested five each of the T23 and T25, as well as one T26, be sent to the U.S. Army's North African Theater of Operations (NATOUSA).<sup>113</sup> Barnes suggested NATOUSA instead of ETOUSA because after his posting in England, Lt. Gen. Devers was given command of the Mediterranean Theater.<sup>114</sup> In predictable fashion, Gen. McNair argued that the types in question were not battle worthy because they had not been tested by the Armored Board.

The two armored divisions committed to the initial landings at Normandy sustained 32 percent tank casualties, much higher than the anticipated 7 percent.<sup>115</sup> The reports of shockingly heavy casualties after the landings startled all parties. Eisenhower, in particular, was irate at the ineffectiveness of the M4's 76-mm gun and felt he had been deceived. In a conversation with Lt. Gen. Omar Bradley, Eisenhower fumed: "You mean our 76 won't knock these Panthers out? I thought it was going to be the wonder gun of the war.... Why is it that I am always the last to hear about this stuff? Ordnance told me this 76 would take care of anything the Germans had. Now I find you can't knock out a damn thing with it."<sup>116</sup> A scramble resulted, and all attention went to the T26E1, as it offered the best armored protection for its crews. The T25E1 program was abandoned. Interestingly, on 29 June, 1944, the T26 and all its variants were quietly redesignated as heavy tanks.<sup>117</sup> This move was no doubt attempted as a means of bolstering

---

<sup>112</sup> Green, *Technical Services*, 237.

<sup>113</sup> Mayo, *Beachhead Battlefield*, 328-229.

<sup>114</sup> Ibid.

<sup>115</sup> Zaloga, *M26/46*, 15.

<sup>116</sup> Omar Nelson Bradley, *A Soldier's Story: Omar N. Bradley* (New York: Holt, 1994), 322-323.

<sup>117</sup> Hunnicutt, *Pershing History*, 117. The T26E1's 43.6 tons qualified it as a heavy tank, but towards the end of the war medium tanks were averaging around 45-50 tons and designers wanted heavy tanks to be closer to 70 tons.

flagging confidence in American tanks and the Ordnance Department and improving tanker morale; a tanker in the ETO would no doubt feel better knowing a “heavy tank” was on its way.

In August of 1944, Barnes requested combat testing, yet again. This time he requested a platoon of T26s be sent to Italy.<sup>118</sup> The General Staff supported the proposal, but the AGF rejected the move, killing it. Barnes would finally receive permission from Secretary of War Stimson and Marshall.<sup>119</sup> At the end of October, Barnes coordinated with the Ordnance Office in Detroit to ship twenty tanks to the ETO.<sup>120</sup> In November, production of the T26E3 began at Fisher Tank Arsenal in Grand Blanc, Michigan, with ten produced by the end of the month. Thirty more were produced in December. AGF tried to halt sending the tanks to the ETO by arguing that since they had not been tested by the Armored Board, they were not battle-worthy.<sup>121</sup> Barnes objected that such tests would add a month to the tanks’ deployment date.

Meanwhile, following the Battle of the Bulge, Eisenhower learned further of the dissatisfaction in the armored ranks with the shortcomings of the M4 through press reports, which harped on the battle being the “costliest in American history.”<sup>122</sup> For example, in January 1945, *New York Times* journalist Hanson Baldwin wrote:

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 armed German monsters know the truth. It is high time that Congress got to the bottom of a situation that does no credit to the War Department. This does not mean that our tanks are bad. They are not; they are good. They are the best tanks in the world—next to the Germans.<sup>123</sup>

---

<sup>118</sup> Zaloga, *Pershing Tiger*, 20.

<sup>119</sup> Green, *Technical Services*, 238.

<sup>120</sup> *Ibid.*, 20,22.

<sup>121</sup> *Ibid.*

<sup>122</sup> Dwight D. Eisenhower to George C. Marshall, Cable FWD 17402, February 27, 1945, letter, quoted in Dwight D Eisenhower, *The Papers of Dwight David Eisenhower, The War Years: IV*, ed. Alfred D. Chandler, et al., vol. 4 (London: Johns Hopkins Press, 1970), 2499, no. 2302.

<sup>123</sup> *The New York Times*, January 5 1945, p. 4, quoted in Mayo, *Beachhead Battlefront*, 278.

The press were making the situation out to be a full-blown crisis, a reaction that benefitted no one, so the Supreme Allied Commander sought to dispel unwarranted fears by getting to the bottom of the matter through honest inquiry of subordinates. In an 18 March 1945 letter, Eisenhower addressed two of his field commanders, Major Generals Maurice Rose and Isaac White, commanders of the 3rd and 2nd Armored Divisions respectively, seeking feedback from the fighting men in their commands regarding the quality of American tanks in comparison with those of the Germans (sadly, Rose would be killed less than two weeks later on 30 March, being the highest ranking American killed by enemy fire in the ETO).<sup>124</sup>

On a secondary level, Eisenhower also sought comparisons on other items of equipment, as well as requesting comment on the new T26. He got little in the way of response back concerning the latter despite ten T26E3s being recently employed by the 3<sup>rd</sup> Armored in the action in and around Cologne, Germany. Further explanation of these tanks in action is described below. In the letter, Eisenhower first conveyed his impressions of the armor situation in Europe gleaned through casual conversation:

Our men, in general, realize that the Sherman is not capable of standing up in a ding-dong, head-on fight with a Panther. Neither in gun power nor in armor is the present Sherman justified in undertaking such a contest. On the other hand, most of them realize that we have got a job of shipping tanks overseas and therefore do not want unwieldy monsters; that our tank has great reliability, good mobility, and that the gun in it has been vastly improved. Most of them feel also that they have developed tactics that allow them to employ their superior numbers to defeat the Panther tank as long as they are not surprised and can discover the Panther before it has gotten in three or four good shots. I think that most of them know also that we have improved models coming out which even in head-on action are not helpless in front of the Panther and the Tiger.<sup>125</sup>

---

<sup>124</sup> “General Rose Murdered By Huns After Capture,” *Denver Post*, April 3, 1945, Front Page, Home edition, Page 1 and 5.

<sup>125</sup> Eisenhower to White, March 18, 1945, letter, quoted in, Isaac D. White, “A Report on United States vs. German Armor: Prepared for General of the Army Dwight D. Eisenhower, Supreme Commander, Allied Expeditionary Force,” March 20, 1945, report, U.S. Army Heritage and Education Center, Carlisle, PA.

White responded to Eisenhower's request with a collection of letters from subordinate commanders and noncommissioned officers within his command attesting to the insufficiency/sufficiency of American equipment in frontline use, particularly tanks, in comparison to their German counterparts.<sup>126</sup> White began his own response to Eisenhower by summarizing the general views of the men under his command. White first cited a lack of the latest version of the Sherman, the M4A3E8, known as the "easy eight," --- with only two seeing combat during Operation "Grenade" (crossing of the Roer River into Germany by the Ninth Army).<sup>127</sup> The M4A3E8 (or M4A3(76)W HVSS) had the new 76-mm gun mounted in a revised turret, improved full cast armor, wet stowage for ammunition, and the improved Horizontal Volute Suspension System (HVSS), as well as wider tracks for increased flotation. He also pointed out that only 29 percent of his Shermans were equipped with the 76-mm gun.

White used the letter as an opportunity to beg Eisenhower for more high velocity armor piercing ammunition (HVAP), as those few 76-mm tanks that he had had been given only four rounds each of HVAP, and the expended rounds were not soon replaced. The HVAP ammunition represented a concerted effort to increase the effectiveness of the 76-mm gun after the landings at Normandy, where the standard M62A1 armor piecing shell proved incapable of penetrating the Panther's front glacis at any range. However, it could consistently penetrate the Panther's gun mantle at 230 meters or less, a decided disadvantage, especially in the thick hedgerows where flanking German tanks was very difficult.<sup>128</sup> The new ammunition, which began to arrive in August 1944, however, remained scarce due to a limited availability of tungsten carbide.<sup>129</sup>

---

<sup>126</sup> Isaac D. White, "A Report on United States vs. German Armor: Prepared for General of the Army Dwight D. Eisenhower, Supreme Commander, Allied Expeditionary Force," March 20, 1945, report, U.S. Army Heritage and Education Center, Carlisle, PA (hereafter referred to as White Report).

<sup>127</sup> Ibid.

<sup>128</sup> Zaloga, *Panther Sherman*, 25.

<sup>129</sup> Ibid.

In 1944, the United States had a munitions production need of thirty million tons of tungsten, but could only produce half of that amount.<sup>130</sup> The T4 HVAP projectile used a sub-caliber tungsten penetrator in combination with powerful new propellant. It could penetrate 208 mms of armor at 500 meters, adequate for the 145 mm effective thickness of the Panther's glacis plate.<sup>131</sup> As White mentions, "However, the 76-mm gun, even with HVAP ammunition, is not effective at the required ranges at which we must be able to effectively engage enemy armor."<sup>132</sup>

One of White's subordinates, Colonel S. R. Hinds, Commander of Combat Command "B", also had an insightful opinion on the unbalanced armor situation:

Mechanically our tanks are at least the equal of any German tank and on good, firm terrain or on roads are more mobile... In my opinion, the reason our armor has engaged the German tanks as successfully as it has is not due by any means to a superior tank but to our superior numbers of tanks on the battlefield and the willingness of our tankers to take their losses while maneuvering to a position from which a penetrating shot can be put through a weak spot of the enemy tank... The new tanks now being received [likely referring to M4A3 variants] are a far step in the proper direction but still do not possess the gun power necessary to penetrate the German tank for a crippling shot on the first hit. In spite of the often quoted tactical rule that one should not fight a tank versus tank battle, I have found it necessary, almost invariably, in order to accomplish the mission.<sup>133</sup>

Similarly, Colonel Paul A. Disney, Commander of the 67th Armored Regiment, after gathering a digest of opinions from tankers in his command, remarked that: "...in general the M4 with 75-mm and 76-mm gun is definitely inferior to enemy tanks. This opinion is based on many instances in which our tanks have engaged enemy tanks only to observe rounds ricochet off them, and in many cases to have been hit themselves by the same enemy tanks and destroyed."<sup>134</sup>

---

<sup>130</sup> Mildred G. Andrew, *Tungsten: The Story of an Indispensable Metal* (Washington, D.C.: The Tungsten Institute, 1955), 11.

<sup>131</sup> Zaloga, *Panther Sherman*, 21, 25. On page 13 of *M26/M46 Pershing Tank: 1943-1953*, Zaloga lists the effective thickness of the Panther's glacis plate as being 185mms.

<sup>132</sup> White Report.

<sup>133</sup> S. R. Hinds, letter to Isaac White entitled: "Comparison of United States Equipment With Similar German Equipment," March 20, 1945, letter, Exhibit no. 2 of White Report.

<sup>134</sup> Paul A. Disney, letter to Isaac White, Exhibit no. 1 of White Report.

Disney also highlighted that the Panther enjoyed a distinct advantage over the Sherman with regards to turning radius, speed of turn, and mobility in muddy terrain.

The American tankers on the ground understood and responded to the realities of the armor gap situation better than any, and as such, their observations were saturated with a sense of urgency, and yet arguably provide the most clarity. Sgt. Rains M. Robbins, a 3rd Armored Division tank commander, and his driver, Cpl. Walter McGrail, had landed in France with the division and shared their assessment:

... we've seen countless numbers of American tanks knocked out and burned with resultant high loss of American lives, due, we believe, to our inferior tanks.

Of course, we must take into consideration the fact that, due to the nature and course of the war, the German tank usually gets in the first shot. Instead of making up this disadvantage in equipping us with guns of high muzzle velocity and hitting power, in addition to more armor protection, as matters stand now we can't compete with them in either. To take a specific case, the German Mark V tank, mounting a 75mm gun with a muzzle velocity of about 3200 feet per second, able to travel on a highway at 38 miles per hour, 15 to 20 miles per hour cross-country in soft going...<sup>135</sup>

The two tankers went on to relay telling details from their combat experiences, describing a very real gap in effective engagement ranges: "...one of our medium tanks was hit and burned at a range of approximately 2500 yards...minutes later, we fired on and bounced several rounds of AP broadside off a Jerry tank at a range of 1500 yards, and were unable to knock it out." They also reported that their 76-mm gun could not deal with a Panther's front armor at 600 yards.<sup>136</sup> The men concluded: "The consensus of opinion is that the German Mark V can outspeed, outmaneuver and outgun us, in addition to their added protection of heavier armor."<sup>137</sup>

---

<sup>135</sup> Rains M. Robbins and Walter McGrail. Letter to Isaac White, March 20 1945, Exhibit no. 3 of White Report.

<sup>136</sup> Ibid.

<sup>137</sup> Ibid.

Another junior NCO, Cpl. Clarence E. Land, a tank driver and gunner, reiterated: “I have seen our 75-mm and 76-mm AP bounce off of German Mark V and Mark VI tanks. I have seen German AP shells go through our M4 tank turrets. I haven’t seen a German tank knocked out, that was hit in the front; you always have to hit them in the side or rear compartment.”<sup>138</sup> Clearly, there was a need for a better tank in the ETO.

---

<sup>138</sup> Clarence E. Land, Letter to Isaac White, March 20 1945, Exhibit no. 3 of White Report.

## Chapter 2 - The M26 in Action in World War II

The T26E3 had its combat debut in the latter months of the Second World War, too late to have any real effect on the outcome, and too late to gain a thorough assessment of its combat value. However, it did prove to be a capable design, one that could effectively deal with both the German Panther and Tiger, while not clearly superior to either. This chapter focuses on the first twenty T26E3s of the “Zebra Project” shipped to the ETO, specifically the 3rd Armored Division’s Pershings in the fighting in and around Cologne, Germany and the Pershings of Task Force Engeman, of the 9th Armored Division, in the all-important capture of the Ludendorf Bridge at Remagen, Germany. Though later shipments of the T26E3 (M26, after its standardization in March) arrived in theater, only limited combat records exist and all available sources point to these tanks only seeing minor action. A noteworthy limitation to their employment was that, being much wider than the M4 and ten tons heavier when combat loaded, all the T26E3s in the ETO were greatly restricted by both the European bridge network as well as the Army’s own system of Bailey Bridges. Following victory in Europe, a handful of M26s were rushed to the Pacific, specifically Okinawa, but these arrived after hostilities on the island had ceased. The M26 was anticipated to be used during the invasion of the Japanese mainland, but the end of the war in August 1945 ended this mission.

In the late fall of 1944, Barnes suggested that twenty of the first forty T26E3s produced in the Fisher Tank Arsenal in November 1944 be sent immediately to the European Theater of Operations, while the remaining twenty Pershings be sent to Fort Knox, Kentucky for tests conducted by the Armored Board.<sup>1</sup> The AGF objected to Barnes’ plan, instead insisting that all

---

<sup>1</sup> Hunnicutt, *Pershing History*, 13. Beginning in March 1945, the Chrysler Tank Arsenal at Warren, Michigan was also producing T26E3s, but none of these later tanks would arrive in time to see action in the ETO. For more on this as well as the contributions made by the American auto industry, particularly the Fisher Body Tank Arsenal at Grand Blanc, Michigan, see David D. Jackson, “The American Automobile Industry in World War Two:

forty of the tanks be sent for testing and approval by the Armored Board. Barnes threatened to go to General Marshall but instead found immediate support from Major General Russell Maxwell, the Assistant Chief of Staff.<sup>2</sup> As a result, twenty T26E3s, Serial No. 22 through 41, were shipped to Antwerp, Belgium, arriving in January 1945.

Barnes personally led the project, codenamed Zebra, to expedite getting the new tanks, as well as several other new weapons, into action. However, Barnes and his accompanying team of experts would not arrive in Paris until 9 February.<sup>3</sup> A meeting with General Eisenhower confirmed that the T26E3s would be brought to the fight as soon as possible. The tanks were assigned to General Omar Bradley's 12th Army Group, and all twenty went to Lieutenant General Courtney Hodges's First Army. They were then divided with ten tanks each being sent to both the 3rd and 9th Armored Divisions. The two divisions had been previously brought in reserve to recover from the heavy losses sustained in December during the Battle of the Bulge.<sup>4</sup> One of Barnes's team members, Captain Elmer Gray from the Tank Automotive Command, was given the lead for the T26 portion of the Zebra project. He and other team members headed for Antwerp on 11 February.<sup>5</sup>

Before Gray's arrival, German V-1 "buzz bombs" targeted Antwerp heavily so the tanks were loaded on and around 9 February on M25 tank transporters, modified to handle the additional weight and width of the T26E3s, and sent twenty-eight miles south to Brussels. After also traveling to Brussels, Captain Gray was turned around and sent to meet up with General Barnes and Colonel Joseph Colby, also from the Tank Automotive Command, at General

---

An American Auto Industry Heritage Tribute," March 24, 2018, [Usautoindustryworldwartwo.com](http://usautoindustryworldwartwo.com), accessed on April 19, 2018, <http://usautoindustryworldwartwo.com/M26-M46tanks.htm>.

<sup>2</sup> Ibid

<sup>3</sup> Ibid

<sup>4</sup> Arrigo Velicogna, "Jake Devers' Tank: The M26 Pershing, Part Two," *Avalanche Press* (February, 2017), accessed February 11, 2018, <http://www.avalanchepress.com/Pershing2.php>.

<sup>5</sup> Hunnicutt, *Pershing History*, 14.

Hodges' First Army Headquarters at Spa, France.<sup>6</sup> Here he received orders to move the tanks to Aachen, Germany, which lay right along the German border with Belgium and the Netherlands. On the morning of 17 February, Gray led the convoy the ninety miles east to Aachen.

Once at Aachen, soldiers of the 559th Heavy Maintenance Tank Company began to prepare the T26s for combat, while Gray and company met with the ten tank crews that had been sent from the 3rd Armored Division.<sup>7</sup> The crews received classroom instruction from Gray on the basic mechanics and components of the T26E3. Captain Gifford, from the Aberdeen Proving Ground, taught the operating procedures, while L. R. (Slim) Price, a civilian expert on the 90-mm main gun also from Aberdeen Proving Ground, gave classes on gunnery to tank gunners, commanders, and loaders.<sup>8</sup> Similarly, corresponding classes were given to the maintenance battalion men sent from the 3rd and 9th Armored Divisions.

The 9th Armored Division tank crews soon arrived and received their own classroom instruction as the 3rd Armored Division men finished up on 20 February.<sup>9</sup> After the Pershings had been certified mechanically, the last step for the tankers was to boresight their guns and get a few rounds of trigger time. Also, on 20 February, Price sent the tankers to a range, where each crew was allotted 28 rounds for familiarization. Price defended the accuracy of the 90-mm M3 gun but harped upon the importance of a proper boresight to ensure its effectiveness. He also instructed the tankers to target a specific spot on the target rather than the whole thing. After nineteen of the twenty tank crews had failed to meet his high standards for boresighting, Price conducted a live fire demonstration to reaffirm the effectiveness of his methods, successfully hitting designated spots on target vehicles.

---

<sup>6</sup> Ibid

<sup>7</sup> Ibid

<sup>8</sup> Ibid

<sup>9</sup> Zaloga, *M26/M46 Pershing Tank*, 19.

At a later date, to demonstrate his same point to some of Patton's tank crews in the 11th Armored Division, he used German helmets as targets and pegged them across a lake with single shots from the 90-mm gun from 625 meters.<sup>10</sup> Upon seeing this, any of the veteran tankers who may have balked at receiving instruction from a civilian were suddenly all right with the idea. Not to be outdone, however, the tankers soon duplicated his marksmanship as they grew accustomed to the weapon and got the "feel" of it.<sup>11</sup> On 23 February, the crews finished boresighting and test firing of the tanks. Each division then incorporated the T26s into their organization, but in different ways. The 3rd Armored Division had two armored regiments, the 32nd and 33rd, and each of these regiments received five T26s. In hopes of embedding available heavy tank support with the most units possible, the 32nd Armored Regiment had a single T26 assigned to D, E, G, H, and I Companies, respectively, and similarly, the 33rd Armored Regiment had a single T26 assigned to D, E, F, H, and I Companies.<sup>12</sup>

The 9th Armored Division, which was divided into three tank battalions rather than two armored regiments, in contrast, tried a slightly different approach with the allocation of its ten T26s. Its 19th Tank Battalion received five tanks, assigning one T26 to A Company and two each to its B and C Companies. The 14th Tank Battalion, however, had all five of its T26s assigned to a single platoon in its A Company, commanded by Lieutenant John Grimball. For reference, each American tank company had three tank platoons with five tanks each, one tank in each platoon being for the platoon leader. The headquarters platoon of each company had two more tanks, one for the commander and company first sergeant. Additionally, the HQ platoon had one 105mm assault tank, or M7 Priest (self-propelled artillery) if an M4 was unavailable, for

---

<sup>10</sup> Hunnicutt, *Pershing History*, 16-17, 38.

<sup>11</sup> *Ibid.*, 16-17.

<sup>12</sup> *Ibid.*, 17.

organic artillery support. In total, an American tank company had eighteen tanks/assault tanks.<sup>13)</sup> The men and tanks of the 3rd Armored Division went into battle on 25 February, and the 9th Armored on the 28<sup>th</sup> of the month. Captain Gray and his team established themselves with the 3rd Armored's maintenance battalion at Düren, Germany, which lay twenty miles further east on the east bank of the Roer River. From there they followed the tanks into action, supervising repairs as necessary, and making reports of the T26E3s performance.<sup>14</sup>

3rd Armored Division's T26s crossed the Roer on 25 February, along with the rest of the division and were the first Zebra project Pershings to see action. On the night of 26 February, at Elsdorf, Germany (by road, twenty miles northeast of Düren and twenty-two miles west of the major west central German city of Cologne), the first T26, named "fireball" from F Company, 33rd Armored Regiment, was knocked out of action. The tank had been given the task of overwatching a roadblock. Though it sat behind the roadblock with only its turret exposed, its overall position was not well considered. Surrounding fires allowed its turret to be silhouetted in the night sky. Hidden behind a building a 100 meters away, a Tiger I fired three shots at the tank with its 8.8 cm gun. The first shot entered the turret through the coaxial machine gun port, killing the gunner and loader. The next struck the end of the T26E3's gun splitting the muzzle brake and jarring the gun so that the shell in the chamber exploded. The exploded round managed to expel its charge down the barrel but not before the irregular explosion caused the barrel to swell at its halfway point. The third and final round fired glanced off the upper-right of the turret and ripped the commander's cupola hatch, that had been left open, away with it. After firing, the Tiger I

---

<sup>13</sup> "#17 The WWII Medium Tank Battalion: The Heart of an Armored Division, Or the Heavy Gun Support to an Infantry Division," The Sherman Tank Site, November 22 2015, accessed April 8 2018, [www.theshermantank.com/sherman/the-wwii-medium-tank-battalion/](http://www.theshermantank.com/sherman/the-wwii-medium-tank-battalion/).

<sup>14</sup> Hunnicutt, *Pershing History*, 17.

attempted to withdraw from the area but immobilized itself on a pile of rubble behind it as it backed up.<sup>15</sup>

“Fireball” was brought back to Düren by Captain Gray where it was quickly repaired and returned to service on 7 March. Due to an unavailability of replacement M3 gun barrels, a 90-mm gun from an M36 tank destroyer was used instead. Back at Elsdorf, a T26 from a sister company, E Company, 33rd Armored Regiment (Serial No. 40), avenged the loss of “Fireball” the following day, 27 February. Zaloga succinctly sums up the action:

The next day, a T26E3 of Co. E, 33<sup>rd</sup> Armored Regiment knocked out a Tiger I and two PzKpfw IV tanks from the 9.Pz.Div. near Elsdorf. The Tiger was hit at a range of about 900 yards with a round of the new T30E16 HVAP, followed by a round of normal T33 armor piercing, which entered the turret and set off an internal explosion. The two PzKpfw IVs were knocked out at the impressive range of 1,200 yards, beyond the normal engagement ranges for US tanks in World War II.<sup>16</sup>

The T26 used one round each of T33 to dispatch the PzKpfw IVs or Mark IVs. Two additional high explosive shells were used to eliminate the enemy crew members as they fled their vehicles.<sup>17</sup> This same tank crew would later take out another Mark IV during the drive to Cologne.

3rd Division’s T26s would see an increase in combat and noncombat incidents as the division pushed towards the Rhine. The T26E3 assigned to Company I, 33rd Armored Regiment suffered an engine failure, and two other undisclosed Pershings had to be recovered as well. One from engine failure, and the other found halfway on and halfway off a bridge over the Erft Canal.<sup>18</sup> During the fighting for Cologne on 6 March, H Company, 33rd Armored Regiment’s T26 was knocked out. Because of the fighting in the city, Captain Gray was unable to recover the

---

<sup>15</sup> Ibid., 18.

<sup>16</sup> Zaloga, *M26/46 Pershing*, 19-20.

<sup>17</sup> Hunnicutt, *Pershing History*, 20.

<sup>18</sup> Ibid., 22.

tank until the next day, 7 March, where it was found on the north side of Cologne, near the Rhine River. The tank had been destroyed by a single shell from an 8.8 cm self-propelled gun from a range of under 300 meters. The impacting round went through the lower plate of the frontal armor, between the legs of the driver, and into crew compartment where it set the turret on fire. All of the Pershing's crew were able to escape unharmed, however, before the stowed rounds in the turret ignited and destroyed the tank. Rather than repair it, which would have taken several months, Gray elected to have the vehicle sent to the rear for cannibalization of its much-needed spare parts.<sup>19</sup> This tank, Serial No. 25, was the only Pershing involved in any sort of combat to not survive the war.<sup>20</sup>

The Pershings of the 32nd Armored Regiment would perform well during the 6 March fight for Cologne, as well during the concurrent drives for other regimental objectives along the Rhine, with three of the five tanks assigned each knocking out German tanks. Company D's T26, Serial No. 36, knocked out a Tiger I with two rounds of T33 ammunition, and Company G's, Serial No. 33, took out a Mark IV at Manheim (another city on the Rhine 50 miles southeast of Cologne) with three rounds of M82 APC (armor-piercing-capped).<sup>21</sup> As a side note, the M82 APC rounds had a temperature hardened outer cap designed to defeat the hardened outer layer of enemy armor. Underneath the outer cap was a relatively soft core of armor designed to spread out the point of impact to an area the size of the head of the round. This allowed the force of the projectile beneath the soft core to be evenly distributed, reducing the risk of the projectile's sharp tip sheering off.<sup>22</sup> Company E's T26, Serial No. 26, commanded by Sergeant Robert Early would

---

<sup>19</sup> Ibid

<sup>20</sup> Ibid., Hunnicutt's exact wording is: "...of the Zebra Mission, this was the only one which did not finish the war on active service."

<sup>21</sup> Ibid., 25.

<sup>22</sup> Brian Keith, "90mm M82, APC projectile," *U.S. Militaria Forum* (June 9, 2009), accessed February 11, 2018, [www.usmilitariaforum.com/forums/index.php?/topic/44694-90mm-m82-apc-projectile/](http://www.usmilitariaforum.com/forums/index.php?/topic/44694-90mm-m82-apc-projectile/).

make one of the most famous tank kills of the war, largely because the encounter was captured on film.

Early's tank knocked out a Panther (Mark V) tank that was parked in the courtyard in front of the Cologne Cathedral minutes after it had just destroyed a Sherman. Two of the Sherman's crewmen escaped the vehicle, one from the turret missing a leg.<sup>23</sup> The Pershing was called up and soon fired a first round at the Panther through a building, collapsing the building but having no effect on the parked German tank. Early then moved his tank further down the street where he got into a flanking position and fired three shots in quick succession. Early's gunner, Cpl. Clarence Smoyer, fired the first shot on the move, with T33 ammunition, scoring a hit on the base of the turret to the left of the gun tube.<sup>24</sup> The second round penetrated the right sponson, and the third struck and penetrated the right hull front.

A 16-mm film of the Panther's destruction was captured by Sgt. Jim Bates, a First Army Signal Corps photographer who had been attached to the 3rd Armored Division.<sup>25</sup> He captured the film while on a mezzanine overlooking the German tank only 100 meters away. After showing the first round impacting and igniting the tank, his film reveals the tank commander roll out of the turret and onto the front deck, his legs severed. With only adrenaline perhaps keeping him alive, the tank commander flipped himself onto the ground on the noncombat side of the vehicle and briefly out of sight. Another crew member, presumably either the radio operator or driver, fled from the stricken vehicle, pausing only for a second to assist the tank commander as

---

<sup>23</sup> "U.S. 3rd Armored Division in Cologne, World War II," Recorded March 6, 1945, YouTube, accessed February 11, 2018, <https://www.bing.com/videos/search?q=Panther+destroyed+outside+of+Cologne+&&view=detail&mid=7F38B66E6542CA9FD22B7F38B66E6542CA9FD22B&&FORM=VRDGAR>.

<sup>24</sup> Hunnicutt, *Pershing History*, 25.

<sup>25</sup> Nick Morgan and Dan Fong, "Clarence Smoyer at Work: E Co, 32nd A.R., 3rd Armored Division, March 6, 1945," *The 3rd Armored Division History Foundation*, accessed on 12 February, 2018, <http://www.3ad.com/history/wwll/memoirs.pages/smoyer.pages/bates.index.htm>. Sgt. Bates would receive a Bronze Star for the filming of the engagement.

he crawled away from the now burning tank. The crewman ran behind a nearby corner of a building while the tank commander lay motionless. No other crewmembers emerged as the tank was impacted two more times by 90-mm shells; flames poured from the commander's cupola.

According to Smoyer:

We were told to just move into the intersection far enough to fire into the side of the enemy tank, which had their gun facing up the other street. However, as we entered the intersection, our driver had his periscope turned toward the Germans and saw their gun turning to meet us. When I turned our turret, I was looking into the Mark V gun tube; so instead of stopping to fire, our driver drove into the middle of the intersection so we wouldn't be a sitting target. As we were moving, I fired once. Then we stopped and I fired two more shells to make sure they wouldn't fire at our side. All three of our shells penetrated, one under the gun shield and two on the side. The two side hits went completely through and out the other side.

As for the German tank crew, I spent many years wondering if they survived. Only recently, after receiving the Bates' tape, did I find the answer. The tape revealed that three died outside of the tank. A letter from another soldier who looked through one of the shell holes said he saw one burned to death inside the tank. Apparently none of them survived the ordeal. The M 26 Pershing Tank with the 90 mm gun was the best tank we had during the war. We kept it till the end of the war; however, we were hit twice with panzerfausts at Paderborn and had to have repairs done.<sup>26</sup>

Lieutenant Grimball's platoon of five T26s, Serial No. 22, 27, 28, 35, and 39, part of A Company, 14th Tank Battalion, crossed the Roer River on 28 February along with the rest of the 9th Armored Division.<sup>27</sup> Almost immediately, No. 27 threw a piston and had to be recovered for repairs. It would be back in service on 5 March, however.<sup>28</sup> On the night of 1 March, No. 22 was struck by an estimated 15cm high explosive shell as it sat parked near a road junction to the east of the Roer.<sup>29</sup> It impacted near the rear sprocket, mangling the tank's tracks and setting the

---

<sup>26</sup> Clarence Smoyer, interview by Rob Lihani, 1 September, 2000, video, quoted in Jim Zbick, "My Experience In Cologne March 6, 1945," *The Third Armored Spearhead Division*, accessed on 12 February, 2018, <http://3adspearhead.com/Smoyer.html>.

<sup>27</sup> Hunnicutt, *Pershing History*, 17.

<sup>28</sup> *Ibid.*, 10.

<sup>29</sup> *Ibid.*

engine compartment on fire. The tank commander, Platoon Sergeant Chester Key, had his crew dismount and was fighting the fire when a second high explosive shell impacted the middle of the turret, killing him instantly.<sup>30</sup> The turret had nearly been blow off the tank, and the commander's cupola was thrown 25 feet away. Despite the extensive repairs needed, No. 22 was returned to duty on 12 March.

Throughout the drive towards the Rhine, many smaller streams had to be crossed, and the T26s had difficulty getting over the narrow bridges that spanned them. In addition, prefabricated Bailey Bridges, thrown up by Army Corps of Engineers, were damaged by the T26s, causing unexpected delays for follow on forces as the bridges were repaired.<sup>31</sup> According to Hunnicutt, the T26 was just barely narrow enough to fit on a sixty-ton Bailey Bridge and needed to drive over large timbers to keep the bridge's curbs from being damaged. He gives photographic evidence of just such a crossing being made by a T26E1 during stateside testing.<sup>32</sup> The U.S. Army Field Manual on the Bailey Bridge, FM 5-277, makes the matter a little less clear, however. A diagram depicting a normal M2 Bridge, in a single double (refers to the tress layout) single lane bridge configuration, gives the standard allotted roadway portion as being 12 feet 6 inches (150 inches) wide, more than enough space to accommodate the T26E3's 11 foot 6 inch (138 inch) tread width, notwithstanding the total clearance between the trusses on the bridge given at 14 feet 3 inches (171 inches).<sup>33</sup> Captain Cecil Roberts, an operations officer with the 14th Tank Battalion, mentioned the Pershing tanks of his unit getting folded in to their sister company, the 19th Tank Battalion, in exchange for M4A3 Shermans because: "...the M26 tracks

---

<sup>30</sup> Ibid

<sup>31</sup> Ibid., 9.

<sup>32</sup> Ibid., 109.

<sup>33</sup> U.S. Army, *Bailey Bridge*, Headquarters, Department of the Army, FM 5-277 (Washington, D.C.: Government Printing Office, 1986), 3.

were so wide they could not cross obstacles on the U.S. Army Treadway bridging.”<sup>34</sup> Regardless, the T26s were held back to allow other elements to cross first, keeping them well away from frontline combat.

On 7 March the last of these minor obstacles were largely behind them and the chain of command ushered Grimball’s platoon to the frontline for the final push on Remagen, which was thirty miles southeast of Cologne and on the west bank of the Rhine. Remagen was known to have had a major crossing, the Ludendorf Railroad Bridge. American forces hoped to capture the bridge but did not believe it would still be standing. American bombers had destroyed many of the bridges and the Germans were destroying the rest to prevent the Allies from crossing the Rhine. The Hohenzollern Bridge in Cologne, for example, had been blown just ahead of advancing American troops.<sup>35</sup>

Grimball’s platoon was part of Task Force Engeman, named for its commander Lieutenant Colonel Leonard Engeman, which in turn was part of Combat Command B, commanded by Brigadier General William Hoge.<sup>36</sup> Task Force Engeman was the northern column of Combat Command B during the drive on Remagen.<sup>37</sup> Prior to departure from the town of Stadt Meckenheim, approximately ten miles north by northwest of Remagen, Engeman arranged the order of movement of his combined elements as follows: he ordered a platoon from C Co., 89th Cav. Reconnaissance Squadron (mechanized), to scout out the route ahead and screen the advancing convoy’s left flank; one platoon from A Co., 27th Armored Infantry Bn., in

---

<sup>34</sup> Col. Cecil Roberts, Letter to Bryan J. Dickerson, 28 June 1998, quoted in Bryan J. Dickerson, “The U.S. 9th Armored Division in the Liberation of Western Czechoslovakia 1945,” *Globe At War*, accessed on 15 February, 2018, [www.globeatwar.com/article/us-9th-armored-division-liberation-western-czechoslovakia-1945](http://www.globeatwar.com/article/us-9th-armored-division-liberation-western-czechoslovakia-1945) (hereafter referred to as Roberts Letter).

<sup>35</sup> Toland, *Last Days*, 192.

<sup>36</sup> Hunnicutt, *Pershing History*, 10.

<sup>37</sup> George P. Soumas, interview by Robert E. Maxwell, March 15, 1945, transcript, pg. 3, USAHEC, John William Leonard Papers (hereafter referred to as JWLP), box 4, folder entitled ‘After Action Reports 9th Armored Division February – May 1945’ (hereafter referred to as Soumas Interview).

M3 half-tracks; Lt. Grimball's platoon of T26s from A Co., 14th Tank Bn. (minus one Pershing; Serial No. 22 was still undergoing repairs from the high explosive shell damage); the balance of A Co., 27th Armored Inf. Bn.; one platoon of B Co., 9th Armd Engr. Bn.; C Co., 27th Armd Inf. Bn.; and the remaining tanks (all Shermans) of A Co., 14th Tk. Bn.<sup>38</sup>

The morning of 7 March, General William Hoge asked LTC Engeman how fast he wished to go, and after he replied "10 mile per hour," the general ensured that none of Combat Command B's rate of march exceeded that mark. At 0900, the column left Stadt Meckenheim, where they had spent the previous night.<sup>39</sup> The task force then advanced along the road that went through Birresdorf, five miles to the west of Remagen, and received sporadic small arms fire, "light artillery," and "a little AAA fire" as they went.<sup>40</sup> At noon, Hoge assigned Engeman's task force with the task of taking Remagen and Kripp, another town along the Rhine two miles southeast of Remagen, also known to have had a bridge, and kept the rest of Combat Command B following in reserve.<sup>41</sup> In the early afternoon, LTC Engeman dismounted and walked out on the high ground near a small cathedral at Apollinarisberg (Apollinarskirche) overlooking Remagen to the southeast, as well as much of the Rhine.

Peering through his field glasses, he immediately saw below what every American field commander in the ETO had been yearning to see, an intact bridge crossing the Rhine River. Only

---

<sup>38</sup> Leonard Engeman, interview by Kenneth W. Hechler, March 14, 1945, transcript, pg. 1, USAHEC, JWLP, box 4, folder entitled 'After Action Reports 9th Armored Division February – May 1945' (hereafter referred to as Engeman Interview). To clarify, Engeman had under his command a short battalion of two infantry companies, A and C Co., 27th Armored Infantry Bn., with a tank company, A Co., 14th Tk. Bn., attached. Additionally attached was a platoon of mounted scouts from C Co., 89th Cav. Recon. Sqn. and a platoon of engineers from B Co., 9th Armd Engr. Bn. Given their forward position in the convoy and the fact that they were first to enter Remagen, it is presumed that, that A Co., 27th Armored Inf. Bn. and the platoon of Pershings were the designated main effort for the task force. By extension, it is presumed that C Co., 27th Armored Inf. Bn., the Shermans of A Co., 14th Tk. Bn. and the two platoon attachments were designated as follow-on forces that supported the main effort as necessary. The historical account seems to support this assumption.

<sup>39</sup> Ibid., 2.

<sup>40</sup> Ibid., 1.

<sup>41</sup> Ibid

one mile away, Engeman saw German troops, vehicles, and civilians, all mixed together, retreating toward the far side. He did not observe any enemy armor.<sup>42</sup> Interestingly, Engeman's first inclination was to call in an artillery strike on the bridge. "I wanted some time fire placed on the bridge...." The request for artillery was denied because the near proximity of friendly troops.<sup>43</sup> From there, Engeman "...smelled that they wanted to take the bridge intact."

He quickly called a council of war with Lt. Grimball and the CO of A Company, 27th Armored Infantry Bn., Lt. Carl Timmerman. As Engeman spoke with the young officers, two enemy locomotives on the far side of the river were producing clouds of steam. Lt. Grimball said he would take care of that "little detail".<sup>44</sup> It would not be Grimball, however, but one of his tankers, Sgt. Howard Shaffer, who would destroy one of the locomotives as it fled (mentioned below). Engeman ordered A Company to dismount, move down the hill, and occupy the town, sweeping toward the bridge. He considered leaving the infantry mounted in the halftracks and making a mounted dash, but decided against the move not knowing what the Germans had in the town. With Grimball's platoon of T26s, however, he was more cavalier: "...barrel down the hill and go through the town and cover the bridge with tank fire, and if anybody attempted to demolish the bridge ... liquidate them."<sup>45</sup>

There was some enemy machine gun fire as the Americans moved out and moved into the town. Grimball's tanks "barreled" down the road only to be abruptly stopped by a large crater at the bottom of the hill. "Never mind the crater, get going toward the bridge," Engeman radioed.<sup>46</sup> When Timmerman's infantry came under machine gun fire in the town square, two of

---

<sup>42</sup> Ibid., 1-2.

<sup>43</sup> Ibid., 2. Engeman requested 'time fire' as it had been directed for use on the Ludendorff span. Time fire shells exploded before hitting the ground, and thus would have been effective against the traffic moving across the bridge but would have only minimal damage to the bridge itself. See Toland, *Last Days*, 199.

<sup>44</sup> Ibid., 3.

<sup>45</sup> Ibid., 2.

<sup>46</sup> Ibid., 3.

Grimball's T26s quickly eliminated the threat with their 90-mms.<sup>47</sup> Around 1500 hours, the tankers and infantryman reached the vicinity of the bridge. All the enemy foot and vehicle traffic had already made its way across the span. Grimball employed his tanks in a blocking position near the bridge, placing one tank on the approach road covering the railway track and the other three were lined along the road engaging targets on the East bank.<sup>48</sup> Timmerman's infantryman advanced towards the bridge approach but were driven back by enemy gun fire. While the infantry regrouped, the T26s accurately engaged enemy positions across the river as they appeared with both .30 caliber machine gun and 90-mm fire.<sup>49</sup>

At 1550, the enemy set off a pre-emplaced demolition charge creating a large crater, approximately 15 feet wide and 10 feet deep, on the near-side approach to the bridge, preventing any armor from attempting to cross.<sup>50</sup> Several minutes later, the Germans detonated another set of pre-planted charges on the bridge.<sup>51</sup> The bridge was damaged but, amazingly, still left passable for infantry. In the smoky haze, it was unclear whether the bridge was stable enough to cross, or whether additional charges had been set. Timmerman's infantry soon bravely began crossing the Ludendorff span. However, the soldiers of the company were initially hesitant to leave their positions; Timmerman stood exposed on the approach to the bridge, trying to rally his men to advance. Movement finally began when, Sergeant Anthony Samele, of 1st Platoon, A Company, the first unit to cross, encouraged his platoon leader, Sergeant Michael Chinchar: "C'mon, Mike, we'll just walk it over."<sup>52</sup>

---

<sup>47</sup> Hunnicutt, *Pershing History*, 10.

<sup>48</sup> Andrew Rawson, *Remagen Bridge: 9th Armored Division, Battleground Europe: Crossing the Rhine* (Barnsley, South Yorkshire: Leo Cooper, 2004), 61.

<sup>49</sup> *Ibid.*

<sup>50</sup> Hunnicutt, *Pershing History*, 10.

<sup>51</sup> Engeman Interview, 4.

<sup>52</sup> Rawson, *Remagen Bridge*, 66.

Colonel Engeman had his attached tank destroyers and 105mm assault guns lined up on the high ground at Apollinaris Church, near the step off point for the advance on the town, and fire white phosphorous shells. When combined with additional mortar fire from the 27<sup>th</sup> Armored Infantry Battalion, a thick smoke screen was established on the far bank.<sup>53</sup> Despite the screen, enemy machine gun, indirect, high-velocity, and sniper fire began in earnest. Some enemy 20mm fire came from high ground to the south on the near side of the river, and a detachment from D Company, 14th Tank Bn., was sent to deal with it. Grimball's tank eliminated an enemy machine gun emplacement on one of the bridge's far side towers with a 90-mm round. The enemy machine gun fire immediately slackened.<sup>54</sup> A differing account has the tank engaging the tower to remove a sniper threat.<sup>55</sup>

Around 1500, the enemy locomotive mentioned earlier, trailing many flatcars and some boxcars, was attempting to flee the area south and just got underway when a 90-mm round from Shaffer's T26 immobilized it, approximately 700 meters south of the bridge.<sup>56</sup> Meanwhile, a Sherman equipped with a dozer blade came forward to fill the crater on the bridge's western approach. The crater, however, was covered by German fire from small arms and two 40-mm flak guns.<sup>57</sup> The tanks soon eliminated the flak positions and the dozer was able to move in and start his work. Soon after, a sniper began firing on the dozer from a half-submerged barge in the Rhine.<sup>58</sup> Quickly identified, the sniper was soon eliminated by infantry on the bridge as well as a Sherman's 75-mm gun as he belatedly attempted to raise a white flag.<sup>59</sup>

---

<sup>53</sup> Ibid.

<sup>54</sup> Hunnicutt, *Pershing History*, 11.

<sup>55</sup> Soumas Interview, 3.

<sup>56</sup> Ibid., 3-4.

<sup>57</sup> Ibid

<sup>58</sup> Ibid

<sup>59</sup> Hunnicutt, *Pershing History*, 11.

LTC Engeman ordered Lt. Eugene Mott, B Co., 9th Armd Engr. Bn., to check the demolition charges remaining on the bridge. Even as infantrymen still moved across, Mott swept the bridge for explosives, finding unexploded TNT whose initiators had detonated but failed to ignite their main charges. At dusk, the crater was filled in and the bridge was made sound enough for vehicles, but it would not be until 2200 when tanks would be ordered to cross. After unexplained delays with anti-tank guns that were supposed to cross ahead of the tanks, a column of nine Shermans from A Company, 14th Tank Battalion moved ahead in line and began to cross the bridge shortly after midnight on 8 March.<sup>60</sup> The 8 x 8 beams that had been used to repair a section of the decking on the bridge, creaked ominously under the thirty-six ton Shermans as they passed.<sup>61</sup> These tanks would be the first Allied tanks on the east bank of the Rhine. The American commanders determined the Pershings at 46 tons were too heavy to risk passage.<sup>62</sup>

Being held back again, Grimball's platoon was ferried across the Rhine on barges five days later, 12 March.<sup>63</sup> His men and tanks had played an instrumental part in the Battle of Remagen though. At the pivotal moment, they helped secure the near side of a valuable tactical objective and facilitated the crossing to and securing of the far side, turning a tactical victory into an operational breakthrough. They had performed admirably. In short, the capture of the Ludendorff Bridge and the subsequent beachhead opened the Allied way into the heartland of Germany. The troops of the First Army received fitting praise in a letter from the top:

The whole Allied force is delighted to cheer the U.S. First Army whose speed and boldness have won the race to establish our first bridgehead over the Rhine. Please tell all ranks how proud I am.

Eisenhower

---

<sup>60</sup> Soumas Interview, 5.

<sup>61</sup> Ibid

<sup>62</sup> Zaloga, *M26/M46 Pershing*, 28.

<sup>63</sup> Hunnicutt, *Pershing History*, 12.

To the men of the First Army who won this race I extend my congratulations. I share the pride of the Supreme Commander in your fine achievement.

Lieutenant General Courtney Hodges  
Commander, First Army<sup>64</sup>

The original twenty Pershings continued to fight on with their parent organizations, the 3rd and 9th Armored Divisions, through March, April, and into May 1945. But to what extent the tanks were employed remains in large part a mystery. As mentioned above, Grimball's five Pershings of the 14th Tank Battalion were transferred to the 19th Tank Battalion in exchange for Shermans in early April.<sup>65</sup> The move is telling of the combat situation faced by the tankers this late in the war, one indicative of a lack of enemy armor threat and where not slowing the rate of advance counted more than increased tank fighting ability.<sup>66</sup> The American rate of advance was so fast that most of the after-action reports that followed lack detail. The following excerpt from a 14th Tk. Bn., 9th Armored Division after action report describes the unit's last twenty-four hours of combat. It illustrates some sense of the breakneck pace of events.

Under radio silence, the battalion moved out at 060800 May 1945. A approximately 0950 hours the 14th Tank Battalion moved into Czechoslovakia. East of Cheb...Czechoslovakia, the force passed thru the lines of the 1st Infantry Division for Karlsbad, Czechoslovakia, First resistance was met at Kornov.... At this point, finding that the leading reconnaissance elements were too thinly armored, Company A took the lead until one platoon of Company D could pass thru the column and continue the attack.

For the remainder of the day all movement was slow due to the numerous obstacles encountered. Bazooka and burp gun fire halted the column at P-400780. The infantry dismounted and rounded up the enemy. A mile and a half down the road a battery of five 88's knocked out a light tank before they could be silenced. Near Steinhof (P-481780) and Goldorf (P-451791) more road blocks were encountered. Fire from the woods beyond Goldorf knocked out a second light tank. Here again the infantry dismounted, flanked the wooded sector, and cleaned

---

<sup>64</sup> Dwight Eisenhower and Courtney Hodges, letter of Commendation to First Army, 12 March 1945, memorandum, quoted in David E. Pergrin, and Eric M. Hammel, *First Across the Rhine: The 291st Engineer Combat Battalion in France, Belgium, and Germany* (Pacifica, Calif: Pacifica Press, 1999), 268.

<sup>65</sup> Roberts Letter.

<sup>66</sup> Ibid.

out the woods and supporting positions. Another two 88's were knocked out by the lead elements.

Finally, after disposing of four more road-blocks, the column closed at [ineligible name of a town] (P-485815), Czechoslovakia. The time was 2145 hours, and the total distance traveled was 24.7 miles. The towns passed thru were: Mitternich (P-233599) and [ineligible name of town] (P-271660) Germany, Cheb (P-315746), Kornov (P-384770), Kulsam (P-393776), [ineligible]teinhof (P-431780), Goldorf (P-451789), and [ineligible name of town] (P-485815) Czechoslovakia....

At 070615 May 1945, the 14th Tank Battalion moved out to continue the attack of the 1st Infantry Division. By 0700 hours the column was in [ineligible]alknov (P-500476) heading toward [ineligible] (Locket) (P-580033). No resistance was being met. At 0945 hours an order was received from Combat Command A, 9th Armored Division to cease all forward movement, take local security measures and await further instructions. The last shot fired by the 14th Tank Battalion was at 070925 May 1945. Lead elements had advanced into Czechoslovakia to a point approximately half way between [illegible name of town] and Karlsbad....<sup>67</sup>

If ammunition expenditure lists reveal anything, then between five and seven hundred 90-mm rounds were expended by the 9th Armored Division during combat operations in March, though it should be admitted that during that month, 75 percent of the total ammunition expended was used in the first ten days.<sup>68</sup> Regardless, even if the lower figure is consulted, the number of rounds fired in anger is still substantial by any measure. However, it should also be taken into account that the M36 tank destroyers also fired the same 90-mm rounds; just how many remains unclear, however, as the 9th Armored Division did not have an organic tank destroyer battalion.<sup>69</sup> The reports that exist are somewhat ambiguous in another way as well. They make clear mention of every German tank destroyed or captured by various units as they advanced, being careful to identify them as "Mark IV" (PzKpfw IV), "Mark V" or "Panther"

---

<sup>67</sup> "After Action Report, 14th Tank Battalion, 9th Armored Division, 1-8 May, 1945," report, USAHEC, JWLP, box 6.

<sup>68</sup> "Report After Action Against Enemy, 1-31 March 1945," 1 April 1945, report, USAHEC, JWLP, box 4, folder entitled 'After Action Reports 9th Armored Division February – May 1945'.

<sup>69</sup> Unit list of 9th Armored Division, memorandum, USAHEC, JWLP, box 6, folder entitled 'List of Organic Units – 9th Armored Division, List of Unit Citations, 1945'.

(PzKpfw V), “Mark VI” or “Tiger” (PzKpfw VI), or “Tiger Royal” (Sd. Kfz. 182), but the same reports almost exclusively refer to friendly armor only as “tank.”

Lt. Grimball’s platoon and the other fifteen T26s of the Zebra project were not the only Pershings to be sent to the ETO. They would, however, be the only American heavy tanks (T26s) to see extensive combat. On 8 March 1945, Barnes visited the Supreme Headquarters Allied Expeditionary Force (SHAEF) at Rheims, Germany, where he showed Eisenhower some sketches, presumably for the T26E3. The same day, Eisenhower cabled General Brehon B. Somervell, Commander AGF, requesting immediate shipment of any available T26 tanks.

Combat operations to date, while limited, convince me that the T-26 tank has what it takes. Barnes thinks you may have some 200 available for shipment now. Urge strongly that you get every tank this type to us as quick as possible displacing M-4s or other types as necessary to find requisite tonnage. Would appreciate immediate advice as to what you can do so we can arrange assignment and get maximum number into current action at earliest possible date.<sup>70</sup>

At the end of March, a second group of forty M26s (the T26E3 had been standardized as the M26 in March) arrived at Antwerp and then a group of thirty more followed in April. The second group was sent to the Ninth Army, with twenty-two tanks going to the 2nd Armored Division and eighteen going to the 5th.<sup>71</sup> The thirty tanks that arrived in the third delivery went to the 11th Armored Division of Patton’s Third Army.<sup>72</sup> These tanks did see limited action, but few records exist to support a narrative of such. In total, 310 Pershings would be brought to the ETO by war’s end, but only the ninety already described saw action.<sup>73</sup> There was one exception, however.

---

<sup>70</sup> Dwight D. Eisenhower to Brehon B. Somervell, Cable F 17649, March 8, 1945, letter, quoted in Dwight D. Eisenhower, *The Papers of Dwight David Eisenhower, The War Years: IV*, ed. Alfred D. Chandler, et al., vol. 4 (London: Johns Hopkins Press, 1970), 2511, no. 2320.

<sup>71</sup> Zaloga, *M26/46 Pershing*, 22.

<sup>72</sup> *Ibid.*

<sup>73</sup> *Ibid.*

In mid-March a solitary Pershing tank was brought to Germany that was not like the others. The appearance of the King Tiger tank in August 1944, with its powerful 8.8cm KwK43, caused trepidations amongst armored force commanders and created a desire for a tank that could match it in firepower.<sup>74</sup> Stateside, the first of the ten original T26E1 pilots was equipped with an experimental T15E1 90-mm gun that offered comparable performance to the King Tiger's 8.8cm KwK43. Using a longer more cumbersome version of the new T30E16 HVAP round, the T15E1 could penetrate 220 mm of armor sloped at thirty degrees from a distance of 900 meters.<sup>75</sup> After its new modifications, the T26E1 used for the project was designated a T26E4.<sup>76</sup> The "Super Pershing," as the modified pilot became known in the ETO, required two large cylindrical recoil absorbers to be mounted externally on top of the turret in order for the T15E1 gun to function properly. It was shipped to Aberdeen Proving Ground on 12 January for proof firing, and then from there to the ETO.<sup>77</sup> Once in Germany, more than five tons of armor plate was welded to its frontal armor and gun mantle to make its protection comparable to the King Tiger's. Though the new tank would never meet its intended nemesis, it did enter combat on 4 April along the Weser River, firing its main gun only once, yet destroying an enemy tank (likely a Panther or Tiger) from approximately 1400 meters.<sup>78</sup>

While the war was all but won in Europe, the end was not immediately in sight in the Pacific. The Battle for Okinawa raged and an unexpected number of Sherman tanks were being destroyed by the Japanese 47-mm anti-tank guns.<sup>79</sup> On 19 May, Gen. Marshall was notified that

---

<sup>74</sup> Hunnicutt, *Pershing History*, 140.

<sup>75</sup> Zaloga, *M26/M46 Pershing*, 21.

<sup>76</sup> Hunnicutt, *Pershing History*, 28.

<sup>77</sup> *Ibid.*, 141.

<sup>78</sup> Zaloga, *M26/46 Pershing*, 22.

<sup>79</sup> Hunnicutt, *Pershing History*, 41.

“Twelve of the M-26 tanks were loaded 18 May in Seattle for direct shipment to Okinawa.”<sup>80</sup>

The vehicles were originally scheduled to travel to Hawaii first, but with time quickly passing it was recommended they be sent directly to Okinawa.<sup>81</sup> Marshall gave his approval, simply sprawling “Good” on the note.<sup>82</sup>

The real reason behind the mission it seems, however, was to send the M26 for combat tests. In a Top Secret 26 May War Department memorandum it was suggested “...that conferences be arranged between representatives of CINCAFFAC [Commander-in Chief, U.S. Army Air Forces, Pacific], COMGEN-POA [Commanding General, U.S. Army Forces, Pacific Ocean Areas], COMGEN’s 10th, 6th & 8th Armies, and the WD [War Department] to determine suitability of this equipment, based on Okinawa tests.”<sup>83</sup> ‘Suitability,’ it is presumed, meant not only mobility performance in the austere terrain and soft ground of Okinawa, but the overall viability of the tank for expected operations against the Japanese mainland. The memo qualified this assumption with the remark: “No additional heavy tanks, M26 to be shipped, pending combat tests of twelve now en route to Okinawa.”<sup>84</sup> A similar memorandum, dated two days earlier (24 May), elaborated: “Suitability of M26 heavy tank is questionable because of its weight and width. Terrain features and restricted communications nets in DIABOLIC, as well as difficulties in handling shipment and over-land movement must be considered.” The same memo also accurately predicted: “It appears doubtful that shipments from US or by direct redeployment

---

<sup>80</sup> John E. Hull to George C. Marshall, 19 May 1945, George C. Marshall Research Library (hereafter GCMRL), Lexington, VA, Verifax 3066. The tanks sent were all from the Fisher Body facility at Grand Blanc, Michigan. Specifically, Serial No. 586, 603, 606, 608, 609, 614, 617, 621, 623, 625, 629, 632. See Hunnicutt, *Pershing History*, 46.

<sup>81</sup> “Shipment of M-26 Tanks to POA,” OPD 400 TS, 26 May 1945, memorandum, GCMRL, reel 119, item 2945, 5.

<sup>82</sup> *Ibid.*

<sup>83</sup> *Ibid.*

<sup>84</sup> *Ibid.*

would arrive for use in ICEBERG [Okinawa].”<sup>85</sup> The tanks were rushed to the battle, only to land on 31 July 1945 after hostilities had ended.<sup>86</sup>

Even before the twelve M26s had landed on Okinawa, the planned invasion of Japan, code named Downfall, was fast becoming a reality, and several battalions of Pershings were being formed. CINCAFAC (Commander-in Chief, U.S. Army Forces in the Pacific), General Douglas MacArthur, requested fifty-four M26s to equip the 767th Tank Battalion staging in Hawaii, and seventy-one M26s to equip the 706th Tank Battalion staging at Luzon.<sup>87</sup> Interestingly, his request mentioned that, “The M-26 heavy tank and the M-24 light tank [mentioned below] are the preferred items of equipment for the Pacific and procurement is based on this fact.”<sup>88</sup> Amidst debate, massive orders of new experimental heavy tanks, the T29 and T30 (essentially the same vehicle but mounting a 105mm and 155mm gun, respectively) were placed even though they were still in development. As of 25 April 1945, 1,152 T29s and 504 T30s were under order.<sup>89</sup>

General Somervell had recommended a reduced number (125 T29s and 100 T30s) with the belief that they would arrive to the war too late.<sup>90</sup> Deputy Chief of Staff, General Thomas T. Handy, disagreed, and instead recommended to Somervell to not make the same mistakes made with the T20 series:

A lengthy conservative process of testing and estimating before deciding upon quantity production resulted in the T26 tank arriving in the theater of operations too few and too late. Implementation of the Heavy Tank Program without further delay is necessary to permit the maximum number of the most effective ground

---

<sup>85</sup> “Shipment of M-26 Tanks to POA,” OPD 400 TS, 24 May 1945, memorandum, GCMRL, reel 119, item 2945, 2.

<sup>86</sup> Hunnicutt, *Pershing History*, 44.

<sup>87</sup> “Requirements for M26 Heavy Tanks,” OPD 400 TS, 2 July 1945, memorandum, GCMRL, reel 119, item 2945, 10.

<sup>88</sup> *Ibid.*

<sup>89</sup> Thomas T. Handy to Brehon B. Somervell, “T29 and T30 Heavy Tank Program,” April 25 1945, memorandum, GCMRL, reel 370, item 5395, 2. (hereafter Handy Memo)

<sup>90</sup> *Ibid.*

weapons being in the hands of troops at the earliest possible time. . . . A decision now to produce 1152 T29 and 504 T30 tanks, the number necessary to equip certain units and to insure an operating reserve, will, it is estimated, save between six months and a year.<sup>91</sup>

The Commander of AGF, General Joseph Stilwell, agreed with Handy and did not want the simultaneous production of M26s to be interfered with.<sup>92</sup> Ultimately, 3,559 M26s were scheduled for production in 1945 and 2,251 for 1946.<sup>93</sup> President Truman's decision to drop atomic bombs on Hiroshima and Nagasaki brought the war to a sudden close, however, with the Empire of Japan's surrender on 2 September. Ironically enough, Handy transmitted the order for the bombing raids from the President.<sup>94</sup> Production of the M26 continued until October of 1945, with a total of 2,212 units being produced.

In the years that followed, the analogy "Too little, too late," served as a popular assessment of the T26 tank during the Second World War and following along the same vein, leading historians have come to a similar conclusion.<sup>95</sup> After considering both, it is hard to come to any different conclusion, with the exception of relying strictly on the "too late" part. As Lt. John Grimball and every other tankerman who sat in America's only production heavy tank to be fielded during the Second World War was reminded of when they came to a bridge, or faced off against an enemy tank, the T26E3 was not "too little."

---

<sup>91</sup> Ibid.

<sup>92</sup> Ibid. General McNair had been killed by friendly misdropped bombs in July 1944, during Operation Cobra. He was replaced by Lieut. Gen. Ben Lear, who retired in July 1945 and was then replaced by Stilwell. See Robert R. Palmer, Bell I. Wiley, and William R. Keast, *The Army Ground Forces: The Procurement and Training of Ground Combat Troops* United States Army in World War II (Washington, D.C.: Center of Military History United States Army, 1991), 282.

<sup>93</sup> War Department Office of the Chief of Staff to Thomas T. Handy, "T29 and T30 Heavy Tank Program," May 11 1945, memorandum, GCMRL, reel 370, item 5395, 6.

<sup>94</sup> J.Y. Smith, "Gen. Thomas T. Handy Marshall's Deputy, Dies," *The Washington Post*, April 17 1982.

<sup>95</sup> Zaloga, *M26/46 Pershing*, 22.

### Chapter 3- The Interwar Period

The interwar years, between World War II and Korea, brought an interesting mix of stagnation and innovation to American tank development. The stagnation came largely as a result of the developmental budget being slashed after the conclusion of the Second World War, and much of the innovation that did occur came as a direct result of developments begun during the war. Many post-war developments never left the testing fields. The tests of the T26E3 in the final months of 1944 and early 1945 showed many flaws with the new tank. Armored Board tests of the M26 in September 1945 only reinforced these findings. Developmental progress eventually addressed much of the M26's problems that had surfaced, especially with the engine and transmission, but circumstance would ensure that many M26s were fielded again in the same or worse condition they were in at the end of World War II. Only a new interim generation, the first of the Patton series, would see major improvements. In 1948, Cold War events reinvigorated a flagging tank developmental program, but the Korean War interrupted the new measures and led to further interim solutions.

In the late fall of 1944, while the first twenty T26E3s of the Zebra Project were being shipped to Europe, the next twenty tanks off Fisher's Grand Blanc production line, Serial No. 42 through 61, were sent to Fort Knox, Kentucky for testing by the Armored Board. The purpose of the tests was "To determine the suitability of the Heavy Tank, T26E3, for use in armored divisions or separate tank battalions."<sup>1</sup> However, a letter from AGF dated 14 December 1944 ordered seven of the T26E3s to be diverted to the Armored School for "instructing teams of specialists for use overseas."<sup>2</sup> Additionally, another T26E3 was assigned to the Armored Medical

---

<sup>1</sup> "Final Report of Test of Two Heavy Tanks, M26," 24 September, 1945, report, Ord. Dept., Armd. Brd. Repts., NACP, RG 156, entry (NM-26) 916B, box J973. (Hereafter referred to as Final Test, M26)

<sup>2</sup> Ibid.

Research Laboratory for the purpose of "...conducting tests relative to the physiological aspects of the subject vehicle."<sup>3</sup> Of the remaining twelve tanks, four arrived too late to be included in the full testing by the Armored Board, and were thus used only for components testing. The final eight T26E3s, however, were subjected to a "400-engine-hour or 4,000-mile endurance test."<sup>4</sup>

The Armored Board report summarized the results of the test as follows:

In 321 operating days, totals of 3310:16 engine hours and 23,122 test miles were amassed with an overall fuel economy of .35 miles per gallon and an oil economy of 15.2 miles per quart. ...All operation was conducted during the winter season with a minimum of dust. The mileages over different types of terrain are divided as follows: 12,282 miles highway operation and 10,840 miles extremely muddy cross-country operation. The unusually good engine performance indicates that reasonable engine life may be expected provided that adequate cooling of the engine and cleaning of the engine air is obtained."<sup>5</sup>

One of the tested tanks, given the Armored Board designator of No. 640, did not complete the 400-engine-hour test: a water leak in the cooling system had caused the engine to overheat.

Three other T26E3s were subjected to a breakdown test; No. 634 failed at 487:38 engine hours (3,252 test miles), No. 633 at 523:16 hours (3,813 miles). "Armored Board Vehicle No. 630 was still operating as of 2400 hours 30 March 1945, with a total of 551:37 engine hours (3684 test miles)."<sup>6</sup> The Armored Board prepared weekly reports for the AGF, and by 20 January 1945, the T26E3 was recommended "...for approval as battleworthy." However, a weakness in the elevation gear housing was considered a "disabling defect" and a forged housing replacement was strongly urged.<sup>7</sup> Additionally, the final report, dated 9 May 1945, remarked on the M26's poor fuel economy: "The average cruising radius of 65 miles or 9.3 engine hours of operations

---

<sup>3</sup> "Test of Heavy Tank, T26E3, Final Report of Armored Board, Fort Knox, KY," 9 May, 1945, report, Ord. Dept., Armd. Brd. Repts., NACP, RG 156, entry (NM-26) 916B, box J973. (Hereafter referred to as Final Test, T26E3)

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

obtained during tests may prove unsatisfactory or even critical. Fuel capacity should permit a minimum of 10 hours combat operations before refueling.” It was admitted, however, that “Extreme terrain conditions were encountered throughout the test.”<sup>8</sup>

Tests on the T26E3 at the Armored Medical Research Laboratory revealed a need for improved ventilation of powder fumes and recommended the Rotoclone blower be upgraded from the 400 cfm one installed to a 1,000 cfm unit.<sup>9</sup> The bulge opening on the top center of the glacis plate was enlarged to accommodate the new blower; the bulge was also reinforced to offer increased ballistic protection, as prior ballistic tests had found the area to be vulnerable.<sup>10</sup> The recommendations were followed and production models of the M26 soon reflected the modifications, beginning with tank numbers 550 and 235 at the Fisher and Chrysler plants respectively.<sup>11</sup>

In September 1945, Aberdeen Proving Grounds conducted the final tests on two M26s, serial numbers 646 and 647, with the stated purpose of determining “...the general suitability of these production type vehicles manufactured by Chrysler Corporation for combat service.”<sup>12</sup> The Ordnance men ultimately concluded that: “The Heavy Tank, M26, as produced by the Chrysler Corporation be considered suitable for combat.”<sup>13</sup> Nonetheless, the Proving Ground tests found numerous issues. “The fuel economy...is low...and the maximum cruising range is inadequate.”

---

<sup>8</sup> Ibid.

<sup>9</sup> Hunnicutt, *Pershing History*, 121. Reports from an earlier test on the T26E1, dated 19 July 1944, made similar findings. “The original ventilating system [Rotoclone 400 in T26E1] was found to provide inadequate control of gun fumes. This was true with the turret hatches open as well as with the tank completely closed....The static pressure and air volume provided by the 1000 cfm fan were found to give adequate control of gun fumes from the 90 mm gun and the two machine guns, with the tank completely buttoned-up or with one or both turret hatches open.” Why the recommended change was not incorporated in the pilot models of the T26E3 remains unclear. See “First Partial Report on: Project No. 41 – Physiological Characteristics of the T25E1-T26E1 Tank, Subject: Control of Gun Fume Hazard,” 19 July, 1944, report, Armored Medical Research Laboratory, Fort Knox, Ky, NACP, RG 156, entry (NM-26) 916B, box J978, folder entitled ‘Physiological Characteristics of T25E1-T26E1 Tank.’

<sup>10</sup> Ibid.

<sup>11</sup> Ibid.

<sup>12</sup> Final Test, M26.

<sup>13</sup> Ibid.

The average miles per gallon for the tests was appalling, at .27, and no doubt led to the recommendation that “Further effort be made to increase the present fuel capacity.”<sup>14</sup> The report also labeled the maintenance for both the T80E1 tracks and the cooling system as “excessive.”<sup>15</sup>

The following quote from the Proving Ground report, while on the technical side, excellently explains underlying track issues with a rear-powered arrangement. It also highlights the susceptibility of the T80E1 track to damage when thrown and, by extension, the corresponding compounded risk the damaged track had for repeat damage.

Since the Heavy Tank, M26, is a rear drive vehicle the same tendency towards sprocket tooth jumping exists in all forward speeds as on the M4 series medium tanks in reverse speed. With the T81 single pin track and integrally cast center guide, sprocket tooth jumping had very little effect on the track or the center guide. However, with the T80E1 track, jumping of the sprocket teeth damaged the wedges and wedge nuts and track throwing was prevalent due to the bolted type center guide which can be sheared allowing the track to be thrown.<sup>16</sup>

The tank track showed issues on steep terrain as well: “Heavy Tank, 647, attempted to climb the incline over the old trail across a rock strata with a slope of 55 percent. The tank was unable to get traction on the rock and slipped its left track.” U-turns on roads also proved problematic: “U’ turn was made while operating at speeds varying from 5 mph to 15 mph. The test tracks started to slide noticeably at around 10 mph and at 15 mph the tank was out of control. The

---

<sup>14</sup> Ibid. It would not be until the advent of the M60 Patton in 1960 that the operational range issues of the M26/Patton series would be resolved. The M60 employed a Continental AVDS-1790-2 V12, air-cooled twin-turbo diesel engine, developing 750 bhp, as opposed to the Continental AV-1790-5B/7/7B/7C 12 cylinder gasoline engine, developing 810 bhp, used in the M48. The diesel motor practically doubled the effective operating range of the tank, and led tankers of the 1960’s to exclaim: “now the army has legs.” See David B., “105mm Gun Tank M60,” November 18, 2014, Tank Encyclopedia, accessed on April 19, 2018, [http://www.tanks-encyclopedia.com/coldwar/US/M60\\_Patton.php](http://www.tanks-encyclopedia.com/coldwar/US/M60_Patton.php). See also, “90mm Gun Tank M48 Patton III,” November 18, 2014, Tank Encyclopedia, accessed on April 19, 2018, [http://www.tanks-encyclopedia.com/coldwar/US/M48\\_Patton.php](http://www.tanks-encyclopedia.com/coldwar/US/M48_Patton.php).

<sup>15</sup> Ibid.

<sup>16</sup> Ibid. Put another way, a rear-mounted sprocket has to essentially ‘throw’ the track forward to propel the vehicle; the forward-mounted pulls the vehicle along, which is preferred in this regard.

standard T80E1 tracks slid noticeably at 12 mph and at 15 mph they slid badly at the end of the ‘U’ turn.”<sup>17</sup>

The cooling system, in particular, caused considerable headache for the Ordnance men, requiring them to “clean transmission oil coolers and the engine compartment of oil from leaking oil fittings or damaged hose.” Interestingly, the report showed a variance in quality between M26s produced by different manufacturers, pointing to the tanks built at the Chrysler Tank Arsenal in Warren, Michigan, as being inferior to one’s built at Fisher Body Tank Arsenal in Grand Blanc, Michigan. “A summation of the man hours maintenance for the cooling group gives a total of 254:20 man hours compared to the 58:52 man hours for a similar group of Fisher built tanks.”<sup>18</sup>

The report attempted to quantify this startling discrepancy by asserting that “This difference may be directly attributable to operation of the subject vehicles during a hot, dusty season where the narrow safety margin in the Heavy Tank, M26, cooling system is quickly lost and operating difficulties encountered.” If the latter conclusion by the Aberdeen men was the case, then the M26 was little more than an oil sieve in the summertime. Assessments of armor in Korea made after the summer of 1950, offer little in the way of corroborating evidence, and do not suggest any chronic or excessive cooling issues; admittedly however, they do not deny the issue either. Without further information, therefore, the quality of M26s based upon manufacturer seems open to speculation.

While the Armored Board’s tests of the T26E3 were under way in early 1945, the first T26E1 pilot that had been modified to mount the powerful T15E1 90-mm gun, was shipped to Germany for combat tests. The “Super Pershing’s” T15E1 90-mm gun was an impressive 73

---

<sup>17</sup> Ibid.

<sup>18</sup> Ibid.

calibers in length and had a lengthened high capacity chamber.<sup>19</sup> The new T33 round's projectile left the barrel at a speed of 3,200 fps and could penetrate the Panther frontally at nearly 2,400 meters. While the combination of the longer gun and higher capacity ammunition was powerful, the ammunition was too cumbersome; the T33 round was 50 inches in length and proved very difficult to handle in a cramped tank turret during tests.<sup>20</sup> The long rounds also created stowage issues. Therefore, the gun was redesigned to fire two-piece ammunition, the resulting weapon designated as the T15E2.

The T15E2 was first mounted on a production T26E3, Serial No. 97, and in March 1945 the Ordnance Department designated the vehicle as the T26E4. Additionally, they planned to replace 1,000 M26s scheduled to be produced with T26E4s.<sup>21</sup> The T26E4 pilot still had the two large equilibrator springs, characteristic of the "Super Pershing," mounted on top of its turret. However, before production of the series began, a new hydropneumatic equilibrator that was internally mounted was developed, and thus incorporated into all production vehicles.<sup>22</sup> Only twenty-five T26E4s were produced at the Fisher Tank Arsenal before the end of the war brought production to a close. The two-piece ammunition proved to be too slow in loading during post-war firing tests in Aberdeen, and was made obsolescent by new gun developments.

The end of the war kept another variant of the T26 to a very limited production run and relegated it to obscurity, namely the T26E5. The T26E5 was an assault tank version of the M26 and was built upon the successes and in the same vein as the M4A3E2 "Jumbo," the assault tank version of the M4. The final version of the T26E5 design incorporated glacis plate armor 6 inches thick at 45 degrees; bottom front armor measured 4 inches at 54 degrees. The turret

---

<sup>19</sup> Hunnicutt, *Pershing History*, 140.

<sup>20</sup> *Ibid.*

<sup>21</sup> *Ibid.*, 141.

<sup>22</sup> *Ibid.*, 142.

boasted 7 ½ inch front, 3 ½ inch side, and 5 inch rear armor, while the gun shield, a weak spot on the M26 at 4 ½ inches, was now 11 inches thick.<sup>23</sup> Five-inch extenders were added to the T80E1 track, and despite the weight of the vehicle going up from 46.2 tons (92,355 pounds) to 51.2 tons (102,300 pounds), an increase of five tons (9,945 pounds), ground pressure was reduced from 12.5 pounds per square inch to 11.9.<sup>24</sup> However, during tests at Aberdeen in July 1945 it was found that unless cross country speed was greatly reduced the added weight damaged the suspension system.<sup>25</sup> Only twenty-seven T26E5s were produced.

The 90-mm gun T54 was developed to create a gun that matched the ballistic performance of the T15E2 in the T26E4, while using manageable one-piece ammunition. Identical ballistics were achieved with a similar barrel. However, the round used, was both shorter and fatter, making for convenient handling inside of a tank turret.<sup>26</sup> Additionally, the forward baffle on a standard M3's muzzle brake was machined off then added to the T54, leaving only a single baffle brake. In June 1945, Ordnance ordered the T54 to be mounted in two M26 pilots, giving them the designation of M26E1. Not surprising, the M26E1 was very similar to the T26E4. The M26E1 did have a new concentric recoil mechanism and new periscope, the M83C. Also, the .30 cal. coaxial machine gun in the turret was substituted in favor of a coaxial .50 cal. machine gun HB M2.<sup>27</sup> Thirty-six main gun rounds were stowed in bins in the turret floor and five were kept on the ready rack, for a total of forty-one. According to Hunnicutt, the performance of the T54 in testing was exceptional. He notes, "The tests at Aberdeen, from February 1947 to January 1949, indicated that the accuracy of fire from the 90-mm gun T54 and

---

<sup>23</sup> Ibid., 146.

<sup>24</sup> Ibid., 146, 217, 219.

<sup>25</sup> Ibid., 147.

<sup>26</sup> Ibid., 150.

<sup>27</sup> Ibid.

the reliability of its concentric recoil mechanism were excellent. The weapon was considered superior to all other U.S. tank guns tested up to that time.<sup>28</sup>

With the close of the Second World War, the Defense Department's budget was reduced greatly almost overnight, and funds for tank development immediately dried up. Interestingly, the U.S. Army foresaw the creation of heavier tanks and in May 1946 changed the designation of the M26 from a heavy tank to a medium tank.<sup>29</sup> Being limited with new vehicle development, the Ordnance Department chose to focus on the more economical option of component development, specifically engines and transmissions. As Hunnicutt points out, this is the same approach that was taken prior to World War II in the 1930's, and the right components needed were available in 1940.<sup>30</sup> The Ordnance personnel were not starting from scratch, however. The two most important components needed for the modernization of the M26, the General Motors CD-850 cross-drive transmission and the air-cooled Continental AV-1790 engine, were both wartime developments.<sup>31</sup> The CD-850-1 had first been tested in a T25 series tank, and was later used in both the T29 and T30 heavy tanks. The two heavy tanks employed Continental AV-1790 series engines in conjunction with the CD-850-1; the T29 used the earlier AV-1790-1, and the T30

---

<sup>28</sup> Ibid.

<sup>29</sup> Michael Green, *American Tanks and AFVs of World War II* (New York: Bloomsbury Publishing, 2014), 195. It is also mentioned that the U.S. Army changed the weight classifications for tanks. "Light tanks could weigh up to 25 tons. Anything between 26 and 55 tons was classified as a medium tank. Heavy tanks ranged in weight from 56 to 85 tons. Tank weighing over 86 tons would be classified as super heavy tanks."

<sup>30</sup> Hunnicutt, *Pershing History*, 150.

<sup>31</sup> The CD-850 series transmission was developed by General Motors. In 1946, GM transferred the technology of the cross-drive transmission to the Allison Division in Indianapolis. Thereafter, Allison, today known as Allison Transmission, took credit for GM's work without giving recognition. "Torqmatic is a trade name for transmission built by Allison Transmission." See Jackson, "Detroit Transmission." Regarding the 'AV' in AV-1790: 'A' signifies that the engine was 'Air-cooled,' and 'V' identifies the engine as being 'V-shaped.' The AV-1790 engine originates with Ordnance Committee action dated 22 July 1943. See Hunnicutt, *Patton History*, 11.

used the following enhanced AV-1790-3, developing 740 and 810 hp at 2,600 and 2,800 rpm respectively.<sup>32</sup>

In early 1948, the same engine/transmission combination as the T29 (AV-1790-1/CD-850-1) was mounted in an M26 and given the designation of M26E2. In May, the vehicle arrived for testing at Aberdeen Proving Grounds.<sup>33</sup> The Continental AV-1790-1's 740 horsepower brought a substantial improvement in performance over the original Ford GAF motor, which only produced 500 hp. This increase in horsepower from the large engine was only made possible, however, because of the CD-850-1 cross-drive transmission. More than just a transmission, the CD-850-1 was also used for steering and braking.<sup>34</sup> The CD-850 series were extremely compact in design, and combined with mounting ingenuity facilitated the use of the bigger engine. For comparison, the power package of the M26 consisted of the 45 ½ inch long Ford GAF engine, the 31 ½ inch Torqmatic transmission, and the 25-inch controlled differential, for a total length of 102 inches.<sup>35</sup> The power package of the M26E2 consisted of the 67 ½ inch AV-1790-1 engine combined with only the 29 ½ inch CD-850-1, for a total length of only 97 inches, five inches less than the old system. Not only did the new combination take up less space, but thanks to the use of new aluminum components instead of the customary steel, the total weight of the power package was reduced by 1,000 pounds! Additionally, the cross-drive transmission also allowed for a true neutral steer, permitting the tank to pivot in place.

Installation of the new components required modification though. Significantly more armored grilling was added to the engine top deck to help circulate the air needed to cool the

---

<sup>32</sup> Nicholas Moran, "The Chieftain's Hatch: Testing T29, T30," World of Tanks, July 12, 2013, accessed April 22, 2018, [https://worldoftanks.com/en/news/chieftain/The\\_Chieftains\\_Hatch\\_T29T30/](https://worldoftanks.com/en/news/chieftain/The_Chieftains_Hatch_T29T30/). See also Hunnicutt, *Patton History*, 13.

<sup>33</sup> Hunnicutt, *Patton History*, 12.

<sup>34</sup> *Ibid.*, 11.

<sup>35</sup> *Ibid.*, 12.

AV-1790 engine. The outside grills allowed cool air to be sucked into the compartment, which in turn was pulled up past the fuel tanks, past up along the engine, and out the center grills.<sup>36</sup> The two engine exhaust pipes exited at the top center of the engine deck and led into mufflers that laid exposed on the top of each fender. In addition, three armor covered ports were installed in the rear hull armor to provide access to the cross-drive transmission.<sup>37</sup>

There was some serious initial consideration by the Ordnance Department to mounting the T54 gun of the M26E1 in the new M26E2. Additionally, the high velocity 3-inch gun T98 was also considered and was later mounted in a M26E1 for testing. A meeting between the Ordnance Department and the Army Field Forces in the spring of 1948 would alter these plans, however.<sup>38</sup> The meeting ruled that the original gun M3 would be used, but a bore evacuator would be added and a single baffle muzzle brake installed in place of the usual double brake. The primary concern of the muzzle brake was not to reduce recoil, but to redirect muzzle blast to the sides. As mentioned above, too much blast directed at the ground would kick up significant amounts of dust that would impair targeting.<sup>39</sup> Regardless, the new gun was designated the

---

<sup>36</sup> Ibid., 13.

<sup>37</sup> Ibid.

<sup>38</sup> Ibid., 12. The decision to modify the standard M3 rather than employ a more powerful gun was based off the U.S. Army's hesitation to field new, heavier types of 90-mm ammunition. See Zaloga, *M26/M46*, 35. It is the author's opinion that this decision was unwise, and had the Soviet Union granted North Korea large numbers of JS-3 or 'Stalin 3' heavy tanks instead of T-34/85 medium tanks, the NK advance southward may have been successful. The ability of the UN forces to eventually stem the advance of NK armor (covered in the following chapter) would have been significantly impaired had the armor superiority, enjoyed by the M26 over the T-34, not been realized. The JS-3 had frontal armor that could not be penetrated by the M26/M46. "There are no tanks in the U.S. Army capable of successfully engaging the most numerous and most powerful potential enemy types. None are in production and none have been developed." See Harmon Report (Vol. 1, Tab A, Page 1), quoted in Subcommittee Report, 7. "Even after remodeling the medium tank (M26) there will exist no medium or heavy tanks for mobilization which could successfully combat similar type vehicles now available to our potential enemy in large numbers." See Harmon Report (Vol. 1, Tab A, Page 7), quoted in Subcommittee Report, 5. Other types of American armor would have been completely useless as well. "Had enemy heavy armor been employed in Korea, the M-24 and M4A3 would have been definitely outclassed. The M-26 and the M-46, with their armor and gun power superiority to that of the M-24 and M4A3, would have appeared in a relatively more favorable light." See MacDonald, *Employment Armor*, 2.

<sup>39</sup> T26E1 Report.

M3A1.<sup>40</sup> In addition, the standard M10F periscope was replaced with the improved M83 telescope that had first been installed on the M26E1.<sup>41</sup> After the revisions for the M26E2 were agreed upon, the vehicle was re-designated as the T40.

There were several major design changes that occurred after the redesignation. Specifically, a small track tension idler was added on each side of the vehicle between the rear roadwheel and the sprocket. The new idler helped maintain track tension during turns and over rough terrain, and was intended to help correct some of the track throwing issues that had arisen in earlier testing. Also, the AV-1790-1 engine was dropped in favor of its improved variant, the AV-1790-3. The CD-850-1 was used initially, but similarly dropped in favor of the improved CD-850-2. The fiscal budget for 1948 allowed for the production of ten medium tank T40s, and in August 1949, the first production T40 arrived for testing at Aberdeen.<sup>42</sup> To confuse the matter somewhat, Ordnance action on 30 July 1948 standardized the vehicle as the medium tank M46 and marked the M26 as limited standard.<sup>43</sup> Additionally, the M46 was nicknamed the General Patton. With no funding for new production available, modernization of the 2000 plus Pershings in the U.S. Army inventory was the logical way forward.<sup>44</sup>

Tumultuous Cold War events in 1948 led to deteriorating relations between the Soviet Union and the United States, and brought the atrophic readiness of the American military into

---

<sup>40</sup> Zaloga, *M26/M46*, 43. The new M3A1 barrels were plentiful enough so that a number of M26s destined for Korea were also fitted with them, thereby changing their designation from M26 to M26A1. The Chinese captured several M26A1 and M46 tanks, both with the new M3A1 gun. A few were passed on to the Soviets, allowing them to develop bore evacuator technology.

<sup>41</sup> Hunnicutt, *Patton History*, 12.

<sup>42</sup> *Ibid.*

<sup>43</sup> *Ibid.*, 14. Tank historian Michael Green defines the Ordnance term “limited standard” as when: “...an item is intended to be maintained by cannibalization or to be scrapped when no longer serviceable.” He continues, “Limited Standard was seen quite a bit in World War II, when initial runs of items replaced by more modern equipment remained in use to prevent them from going to waste. Limited standard vehicles were often used for training.” See Green, *American Tanks*, 10.

<sup>44</sup> *Ibid.*, 10.

perspective with the real possibility of American intervention in a military conflict through conventional means.<sup>45</sup> A special Congressional subcommittee, the final report of which was not presented until late 1949, reported that American tank development was lagging far behind Soviet heavy tank designs both in terms of numbers and capability.<sup>46</sup> Additionally, the American tank inventory possessed only outdated vehicles. Together these realizations brought new efforts to accelerate the T40/M46 program. The 1949 budget provided for \$74 million to convert 743 M26s to M46 standard with 1,215 M26s that were available for the following year.<sup>47</sup>

In November 1945, the Stilwell Board, named for its president Brig. Gen. Joseph W. Stilwell, was convened to conduct a study on existing weapons and make recommendations for the future.<sup>48</sup> The findings of the board, released 19 January 1946, were largely approved on 22 May.<sup>49</sup> The board made in-depth recommendations for tanks and was the source of post-war component focused development. The board recommended specific standards for a new medium

---

<sup>45</sup> Zaloga, *M26/M46*, 35. In February 1948, Mao Zedong's army recaptured Yan'an, and beginning in May Communist forces won major victories in Shandong and Manchuria, defeating premier Nationalist forces, namely the 60th and 7th Armies. See C. Martin Wilbur and Ernest P. Young, "War Between Nationalists and Communists," *Encyclopedia Britannica*, accessed on April 22, 2018, <https://www.britannica.com/place/China/War-between-Nationalists-and-communists>. In February, Communists seized power in Czechoslovakia, the last non-communist state East of West Germany, through a coup d'état. See Vladislav M. Zubok, *A Failed Empire: The Soviet Union in the Cold War, From Stalin to Gorbachev* (Chapel Hill: University of North Carolina Press, 2009), 75. In May, Kim Il Sung consolidated his communist regime in North Korea and India and Pakistan were at an impasse over the Kashmir region. See "Kim Il-Sung: President of North Korea," *Encyclopedia Britannica*, April 8, 2018, accessed on April 22, 2018, <https://www.britannica.com/biography/Kim-II-Sung>, and also Robert J. McMahon, *The Cold War on the Periphery, The United States, India, and Pakistan* (New York: Columbia University Press, 2010), 50. The communist blockade of Berlin from the West, caused the allies to conduct the Berlin airlift. While the outcome of the event favored the Allies, it was obvious to many that it could have "led to a big war." See Zubok, *Failed Empire*, 76-77. For a condensed overview of the events of 1948 see Carole K. Fink, *Cold War: An International History* (Boulder, Colorado: Westview Press, 2014), 64-72.

<sup>46</sup> Carl Vinson to George C. Marshall, "Brief of Initial Report of Congressional Special Subcommittee on Tanks to the President," November 14, 1950, report, GCMRL, reel 132, item 3419, 17. (Hereafter Subcommittee Report) The U.S. did not have any production heavy tanks at the time since the M26 had been designated a medium tank in May 1946.

<sup>47</sup> Subcommittee Report, 6. See also Hunnicutt, *Patton History*, 14.

<sup>48</sup> *Ibid.* Hunnicutt points out that the Stilwell Board was preceded by an AGF Equipment Review Board. The earlier board began on 2 January 1945 and released its findings 20 June 1945. Stilwell's board was considerably higher profile, but, regarding tanks, it adopted nearly all of the recommendations from the earlier board. See Hunnicutt, *Patton History*, 9.

<sup>49</sup> *Ibid.*, See also Hunnicutt, *Patton History*, 9.

tank, but it would not be until late 1948, however, before the program was funded in any fashion. The Army received \$4,200,000 for developing the recommended tank, dubbed the T42. In its final form, the T42 was better armored than the M26, had a greatly improved 90-mm gun T119, employed the latest optics and fire control measures, and only weighed 37.25 tons (74,500 pounds).<sup>50</sup> Unfortunately, however, the tank's Continental AOS-895-3 (Air-cooled, Opposed, Supercharged) engine was significantly underpowered, developing only 500hp at 2,800 rpms.

The Korean War suddenly began on 25 June 1950 and disrupted both the modernization and the T42 programs. Admittedly, however, the T42's insufficient power plant issues ultimately doomed the design and not the war; the project was cancelled in 1953. By the fall of 1950 though, only roughly 400 M46s Pattons had been created through the modernization effort and the armor emergency on the Korean Peninsula demanded that nearly all M26s be sent overseas. The 73rd Tank Battalion, in Fort Benning, Georgia, for example, had to fill its ranks with M26s from training units and pulled off of pedestals around the base. World-wide inventory of M26s was only at 1800 and even the Patton was beginning to be obsolete in 1950. However, even with the armor crisis, 75 M46 Pattons were still being manufactured per month, and the modernization effort was eventually stepped up to 160 per month.<sup>51</sup> The total to be converted was reduced to 983. The cost for each conversion was \$100,000. Additionally, production of 942 new M46s was scheduled to begin in January 1951.<sup>52</sup> American industry was once again gearing up to aid the nation, meanwhile U.S. tankers prepared for a fight.

---

<sup>50</sup> Ibid., 423.

<sup>51</sup> Subcommittee Report.

<sup>52</sup> Ibid.

## Chapter 4 - The M26 in Korea

The M26 Pershing and the M46 Patton contributed enormously to UN efforts during the Korean War; for the M46 though, these contributions would not begin until September 1950 when it first arrived, and for the M26, would be limited to the first year of combat. The following narrative, including several first-hand accounts of these tanks in action, illustrates the important part that the M26 especially played in stabilizing the American efforts during the first year of the war. One of the M26's greatest services was its part in dispatching the aura of invincibility that surrounded the Soviet-built tank used by the North Koreans, the T-34/85. By continuation, the M26 was instrumental in the dismantling of the NKPA's tank force in the first few months of combat. Ultimately, the M26, while an aging relic of the Second World War, performed admirably in Korea and contributed largely to the positive reversal of allied fortunes throughout the war's first year.

Steven Zaloga lists the number of tank-verses-tank engagements during the war at 119.<sup>1</sup> Though an impressive number for what is generally considered an infantry war, these numbers in no way begin to reflect the full combat service life of these tanks. To fully understand the extent that the M26 participated in the war, however, would require an exacting chronologic unit study of each battalion to field these tanks, namely the U.S. Army's 70th, 73rd, and 6th, and the U.S. Marines' 1st Tank Battalion – a colossal undertaking. Interviews as well, with surviving tankers, would need to be both collected and arranged. The excellent unit histories of these battalions have already done some of this legwork, and their study would be a logical starting point, and, to a limited degree, these histories were consulted in the writing of this chapter. However, study of these battalions' after-action reports, located at National Archives, College Park, MD would be

---

<sup>1</sup> Zaloga, *M26/M46*, 74.

equally important. For this study, the after-action reports of the 70th, 73rd, and 6th Battalions were accessed.

This chapter chronicles the major events of the first few months of the Korean War in four sections: first is a brief discussion of the North Korean invasion, with special attention to the South Korean military reaction. Second, the UN decision and opening military intervention is examined. Third, the M26's first battlefield appearance in Korea is covered. The fourth and final section is devoted to the M26 in the anti-tank role. Every major tank-vs-tank engagement involving the M26 is mentioned, retracing Hunnicutt and Zaloga's lead in this regard.

The Korean War was unprecedented in many ways, not least of which was its demand for immediate American mobilization. During the urgent first days of the conflict in the summer of 1950, when the American demand for both material and personnel was furious, the M26 and to a lesser degree the M46, were available. These tanks proved to be towers of strength against the communist storm thrown at Korean and American fighting men - helping preserve a nation and allowing many American soldiers and Marines to live and return home to remember a "forgotten war" in peace.

### The Invasion

On June 8, 1950 newspapers in Pyongyang, the capital of North Korea, published a manifesto from the Central Committee of the United Democratic Patriotic Front calling for both the north and south to hold elections and thus create a parliament. The newly elected body was to meet in Seoul no later than August 15, the fiftieth anniversary of Korea's first becoming a protectorate under Japanese rule.<sup>2</sup> Korean War historian T. R. Fehrenbach calls the manifesto a

---

<sup>2</sup> T. R. Fehrenbach, *This Kind of War: The Classic Korean War History* (Washington, D.C.: Brassey's, 1994), 3. The Democratic People's Republic of Korea, which was established 9 September 1948, claimed sovereignty over all of Korea. See Walter G. Hermes, *Truce Tent and Fighting Front*, United States Army in the Korean War (Washington, D.C.: Center of Military History, United States Army, 1992), 8. Interestingly, the

“storm signal,” a signal that was ignored entirely by the West.<sup>3</sup> Beginning on 15 June, the *Inmun Gun*, the North Korean People’s Army (NKPA), began positioning its divisions at key locations just north of the 38th parallel. In the predawn hours of Sunday 25 June, over 90,000 soldiers, including seven infantry divisions and one armored brigade, crossed into the south and achieved complete surprise. The massive unannounced invasion across the 38th Parallel was a “blitzkrieg” offensive intent upon quickly overrunning the Republic of Korea (ROK) Army and all of South Korea, achieving by force what the manifesto could not, namely allowing for the unification of the peninsula under communist control.

The North Koreans committed 150 Soviet-supplied T-34/85s. Thirty of these tanks were shifted to the *7th Infantry Division* at Inje in east central Korea, and the remaining 120 stayed with the *105th Armored Brigade*, the main powerhouse of the North Korean advance.<sup>4</sup> Roy E. Appleman explains that the *105th* included three tank regiments the *107th*, *109th*, and *203d*—each with forty tanks, and a mechanized infantry regiment, the *206th*, with a strength of about 2,500 men.<sup>5</sup> The North Korean tanks spearheaded the NKPA advance and helped to lead to the rapid capture of Seoul, entering the northern edges of the South Korean capital by midnight of the third day of the fighting, June 27.

For its part, the ROK Army was not prepared for the invasion. It had four infantry divisions and one additional regiment stationed along their defensive line. However, an attack was not expected and only one regiment from each division and one battalion from the additional regiment were actually on the line. The ROK forces, though only slightly fewer in number than

---

government of the Republic of Korea, which had been formally established on 15 August 1948, also claimed authority over the entire peninsula. See Roy E. Appleman, *South to the Naktong, North to the Yalu: June-November 1950*, United States in the Korean War, ed. Stetson Conn (Washington, D. C.: Center of Military History, United States Army, 1992), 5.

<sup>3</sup> Ibid.

<sup>4</sup> Hunnicutt, *Pershing History*, 175.

<sup>5</sup> Appleman, *South Naktong*, 10.

the NKPA aggressors, were largely newer troops who were facing off with hardened NKPA forces who were in majority veterans.<sup>6</sup> The ROK units were woefully under-equipped as well. All of their weapons were second-string American relics of the Second World War. Their American M3 105-mm howitzers had inferior range to the enemy's artillery by several thousand yards, permitting the North Koreans to strike ROK batteries, with no fear of return fire.<sup>7</sup> Specifically, the Soviet-built 112-mm howitzers had a maximum range of 12,980 yards as opposed to the M3's 7,600.<sup>8</sup> Also, the ROK anti-tank resources, 37-mm anti-tank guns and 2.36 inch "bazooka" rockets were incapable of destroying enemy T-34/85s. Perhaps, the greatest handicap for the ROK forces was their lack of anti-tank (AT) mines; they only had the anti-personnel (AP) variety.<sup>9</sup>

The ROK Army did not have a single tank. Interestingly, in October of 1949 the ROK Minister of National Defense had requested 189 M26 tanks, but Colonel William H. Sterling Wright, acting for the chief of the United States Military Advisory Group to the Republic of Korea (K MAG), founded in January of 1949, told the U.S. Army Chief of Staff, General J. Lawton Collins to ignore the request.<sup>10</sup> Collins informed the ROK minister that "rough terrain, poor roads, and primitive bridges militated against efficient tank operations."<sup>11</sup> Around the same time, K MAG acting chief, Colonel John E. Baird, without the permission of Chief K MAG, Brig. Gen. William L. Roberts, informed the American Ambassador in South Korea, John Joseph

---

<sup>6</sup> Ibid., 8-9. Appleman explains, "Many of these soldiers were hardened veterans who had fought with the Chinese Communist and Soviet Armies in World War II."

<sup>7</sup> Ibid., 17.

<sup>8</sup> James F. Schnabel, *Policy and Direction: The First Year, United States Army in the Korean War* ed. Maurice Matloff (Washington, D.C.: Center of Military History, United States Army, 1992), 36.

<sup>9</sup> Appleman, *South Naktong*, 31.

<sup>10</sup> Schnabel, *Policy Direction*, 36. See also Appleman, *South Naktong*, 16.

<sup>11</sup> Ibid.

Muccio, that the ROK forces were outnumbered by the North in all weapons except small arms. Muccio dutifully passed Baird's warnings along to Washington.

Paradoxically, however, Bryan R. Gibby records Roberts as the voice of reason to Muccio where, in his opinion, the ROK Army "urgently require[d] strengthening."<sup>12</sup> Regardless, even the creation of the People's Republic of China did not dissuade the Joint Chiefs of Staff, which had been lulled into a false sense of security concerning South Korea, largely based upon KMAG reports. In line with this, several months earlier, in June of 1949, Maj. Gen. Charles L. Bolté, Director, Plans and Operations Division, Department of the Army had announced that the ROK forces were actually better equipped than the NKPA.<sup>13</sup> His announcement as well was also largely based on the KMAG chief's reports. Also at play was the reality that the United States feared giving Syngman Rhee, the head of state of the provisional Republic of Korea, anything other than defensive weapons, as some believed he would try to consolidate the two Koreas under his rule.<sup>14</sup>

The disposition of the ROK forces at the time of the invasion also warrants brief mention. The ROK defense of the town of Ch'unch'on in eastern central Korea from 25-28 June, in particular, shows that if ROK units had not been caught unprepared, they could have made a better showing of themselves. In Ch'unch'on, the defending ROK 6th Division had refused

---

<sup>12</sup> Bryan R. Gibby, *The Will to Win: American Military Advisors in Korea, 1946-1953* (Tuscaloosa: University of Alabama Press, 2012), 69.

<sup>13</sup> Schnabel, *Policy Direction*, 35.

<sup>14</sup> Korean War historian Robert Sawyer cites three main reasons for KMAG denying heavy weapons to ROK. He explains: "The Americans did not include tanks, 155-mm. howitzers, and certain other heavy items of equipment...in part because the items could not be fitted within the dollar limitations of the military aid program for Korea, and in part because the KMAG staff felt that the roads and bridges of South Korea did not lend themselves to efficient tank operations. There is evidence, too, based possibly on a remark by President Rhee to Secretary of the Army Kenneth C. Royall in February 1949, that some Americans feared the Republic of Korea would embark upon military adventures of its own into North Korea if it had "offensive-type" equipment. However, it is much more likely that terrain factors and dollar limitations were actually responsible..." See Robert C. Sawyer, *Military Advisors in Korea: KMAG in Peace and War*, Army Historical, ed. Walter G. Hermes (Washington, D.C.: Center of Military History, United States Army, 1988), 100-101.

weekend passes to its soldiers, and as result the defenders were at full strength. Defending from concrete pillboxes on high ground north of the city and with effective use of artillery, the ROK 6th Division stopped the enemy *2d Infantry Division*, inflicting more than forty percent casualties.<sup>15</sup> On the night of the 26th, the *7th Infantry Division* arrived to reinforce the *2d*, bringing with it its T-34/85s. Through the 27th the two enemy divisions combined to assault the ROK defenders without dislodging them. However, with the collapsing ROK front elsewhere, the ROK 6th Division had to abandon the town, and did so early on the 28th. Nine of the *7th's* T-34/85s led the main body of the enemy as they occupied the town later the same day.<sup>16</sup>

Neither the ROK troops nor the American forces in Korea had an answer to the T-34/85. According to Colonel Lloyd H. Rockwell, the ranking American advisor on scene during the defense of the Munsan-ni-Ko-rangp'o-ri area, near the Imjin River north of Seoul, the ROK 13th Regiment fought admirably but vainly. They tried desperately to repel the North Korean *1st Division* and supporting tanks of the *105th Armored Brigade* after they had crossed the Imjin. Roy Appleman writes of their efforts against the enemy T-34/85s:

At first some ROK soldiers of the 13th Regiment engaged in suicide tactics, hurling themselves and the high explosives they carried under the tanks. Others approached the tanks with satchel or pole charges. Still others mounted the tanks and tried desperately to open the hatches with hooks to drop grenades inside. These men volunteered for this duty. They destroyed a few tanks but most of them were killed, and volunteers for this duty became scarce.<sup>17</sup>

Appleman's sources suggest that about ninety ROK soldiers died valiantly in these attempts to destroy enemy tanks during the battle near the Imjin River.<sup>18</sup>

### Intervention

---

<sup>15</sup> Schnabel, *Policy Direction*, 26-27.

<sup>16</sup> Appleman, *South Naktong*, 27.

<sup>17</sup> *Ibid.*, 24.

<sup>18</sup> *Ibid.*

The United Nations Security Council quickly responded to the invasion even before the plight of the ROK soldiers was apparent. The member nations began their session at 2 p.m., June 25 (New York time).<sup>19</sup> A unanimous vote, nine in favor and one abstention (Yugoslavia) soon passed a resolution demanding, a cease to the fighting, North Korean to withdraw, and every member nation to “render every assistance...in the execution of this resolution” and to “refrain from giving assistance to the North Korean authorities.”<sup>20</sup> A second resolution passed on the night of the 27th called for member nations to give military aid to South Korea in repelling the North Korean attack.<sup>21</sup> However, the passing of these resolutions was only possible because the Soviet delegate, Yakov Malik, was not present with the Security Council due to an ongoing boycott of the UN in protestation of Nationalist China being represented there.<sup>22</sup> Had Malik been present, he could have vetoed the action since he was representing one of the five nations with veto powers.

Nonetheless, President Truman received a grim reporting of the Korea situation on the 26th from the United States commander in the East, General Douglas MacArthur, which led him to authorize MacArthur to use American naval and air power to aid the struggling ROK forces. On 29 June, MacArthur personally investigated the situation in Korea. Shortly after 1000 hours, he arrived at Suwon Airfield, approximately fifteen miles south of the southern edges of Seoul. He was immediately informed by Maj. Gen. John H. Church, who had been sent ahead to bolster South Korean resistance, that the accounted for ROK forces were expected to number only 25,000 by the end of the day.<sup>23</sup> MacArthur insisted upon traveling northeast to the Han River

---

<sup>19</sup> Ibid., 37.

<sup>20</sup> Ibid.

<sup>21</sup> Ibid., 38.

<sup>22</sup> Stanley Sandler, *The Korean War: No Victors, No Vanquished* (Cornwall, UK: The University Press of Kentucky, 1999), 151.

<sup>23</sup> Appleman, *South Naktong*, 45-46

which, running west to east, bisected the South Korean capital. During his trip to the southern bank of the river and back, MacArthur saw countless numbers of refugees and thousands of disorganized ROK troops fleeing from the encroaching enemy.<sup>24</sup> MacArthur felt the situation called for American troops intervening. His 29 June report, which stated as much, was received by the Pentagon and immediately relayed to the President. The very next day, Truman authorized MacArthur to use American ground forces.<sup>25</sup>

Only four American divisions, performing occupation duty in Japan, were available in the Far East, the 24th Infantry, 25th Infantry, 1st Cavalry, and the 7th Infantry. The 29th RCT (Regimental Combat Team) was also available. Collectively, they fell under the umbrella of the Eighth Army. Each division was assigned its own tank battalion, but these battalions each only had one full company of tanks which were M24 light tanks. The M24 tank was ideal for occupation duty because its light weight allowed it to do the minimum amount of damage to Japanese bridges and roads.<sup>26</sup> It was a reconnaissance tank, however, and was never intended to go toe-to-toe with medium tanks such as the T-34/85. Nevertheless, on 10 July several M24s were committed to battle near Chonui in western South Korea. Two M24s were soon knocked out; the 75-mm main gun of the M24 proving useless against the T-34/85, and the American tank's light armor protection proved equally worthless at stopping the 85-mm rounds. Before and after this first tank-verses-tank encounter, ground forces were frantically rushed into Korea in an effort to at first stop and then just slow the NKPA advance enough to permit time for the buildup of friendly forces at the southeastern port of Pusan.<sup>27</sup>

---

<sup>24</sup> Ibid., 45.

<sup>25</sup> Ibid., 46.

<sup>26</sup> Hunnicutt, *Pershing History*, 175.

<sup>27</sup> Sandler, *Korean War*, 54-56.

In the pre-dawn hours of 5 July, five days before the disappointing showing of the M24, the men of the 1st Battalion, 21st Infantry Regiment, 24th Infantry Division dug in to defend astride the road to Pusan eight miles south of Suwan. The battalion, given the name Task Force Smith after its commander Lieut. Col. Charles B. Smith, was ordered by the commander of the 24th Infantry Division, Maj. Gen. William Dean, to block the NKPA route to Pusan. Every anticipation was that these first Americans to meet the enemy would be successful. Lieutenant Jack Doody, present that day, later tellingly recalled: “We thought the North Koreans would back off once they saw American uniforms.”<sup>28</sup> At dawn, eight enemy T-34/85s of the *107th Tank Regiment, 105th Armored Division*, advanced on the American position.<sup>29</sup>

All of the Task Force’s available anti-armor assets: including a battery of supporting 105-mm M3 howitzers, the battalion’s 75-mm M20 recoilless rifle platoon, and all available 2.36-inch M18 bazookas, engaged the enemy tanks. Unfortunately, none of the weapons had any effect as the armor continued to advance. A forward positioned howitzer was finally able to disable the two leading tanks with the Task Force’s only six High Explosive Anti-Tank (HEAT) rounds, but that would be the only good news. Within two hours of the battle’s beginning, thirty-three enemy tanks had passed through the American lines, inflicting heavy casualties as they went. A large enemy infantry-tank force arrived at 1100 hours. Smith’s men unleashed a barrage that surprised the enemy column, but they were not dispersed. Instead, the enemy tanks moved in close to the American line and raked it with heavy cannon and machine gun fire.<sup>30</sup> The battalion’s ammunition was nearly depleted and the men were under withering enemy fire. Smith

---

<sup>28</sup> Jack Doody, quoted in “Thoughts, Short Excerpts and Quotes,” Voices Education, accessed on May 24, 2018. <http://voiceseducation.org/node/315>.

<sup>29</sup> Sandler, *Korean War*, 56. At the end of June 1950, after the capture of Seoul, the *105th Armored Brigade* was upgraded to division status and given the honorary title “Seoul Division” by Kim Il Sung, therefore becoming the *105th Armored Division*. See Appleman, *South Naktong*, 10, 35.

<sup>30</sup> *Ibid.*, 57.

attempted to coordinate an orderly retreat, but efforts towards control degenerated amidst the carnage. The U.S. soldiers fled, abandoning much of their equipment.<sup>31</sup>

### The M26 Enters the War

During the immediate scramble after the NKPA invasion, on June 28 Colonel Olaf P. Winningstad, the Eighth Army Ordnance chief, located three M26 tanks at the Tokyo Ordnance Depot.<sup>32</sup> Having been neglected for years, they were in very poor condition and in need of engine rebuilds. Army mechanics began extensive work to repair the tanks immediately and completed the work on July 13. Since the proper fan belts were not available, Japanese replacements were substituted. This proved a lasting problem. Despite multiple emergency orders, the belts were consistently either too tight or too loose. Also, it was soon discovered that the improper fan belts had the tendency to stretch once fitted causing the motors to overheat.<sup>33</sup> Regardless, the tanks were assigned to 1st Lieutenant Samuel R. Fowler and his fourteen-man enlisted section, allotting the standard five crewman per tank: tank commander (TC), gunner, loader, driver, and assistant driver (bow gunner). On 16 July, Fowler's three Pershings landed at Pusan, being the first Allied medium tanks to arrive in Korea.<sup>34</sup> The tankers, having previously only been trained on and accustomed to the M24 light tank, immediately sought to zero their tanks' guns and familiarize themselves with the heavier M26s.

The Eighth Army soon sent Fowler's small tank force to help slow the enemy drive. They went by rail to Chinju, a little over fifty miles west of Pusan, arriving at 0300 July 28.<sup>35</sup> They unloaded at the Rail Transportation Office on the south side of the Nam River. Fowler had his

---

<sup>31</sup> Charles E. Heller and William A. Stofft, trans., *America's First Battles: 1776-1965* (Lawrence, KS: University Press of Kansas, 1986), 281.

<sup>32</sup> Appleman, *South Naktong*, 231.

<sup>33</sup> *Ibid.*

<sup>34</sup> Hunnicutt, *Pershing History*, 178.

<sup>35</sup> Appleman, *South Naktong*, 232.

section remain in place as they awaited replacement fan belts. On the morning of July 31, the NKPA *6th Division* entered Chinju, although Fowler's section was not involved.<sup>36</sup> Appleman mentions that flatcars were sent west to evacuate the tanks, but while they had passed through Masan, they did not make it any further than Chungam-ni, twenty-five miles from Chinju.<sup>37</sup> The flatcars had been held up by congestion caused by the evacuation of supplies for the 19th Infantry Regiment, of the 24th Infantry Division. At daybreak, Fowler received guidance from his commander, Colonel Moore, by telephone. If the 19th Infantry Regiment northwest of Chinju was overrun and he was unable to evacuate his tanks under their own power, then he was to destroy them and evacuate his men by truck.<sup>38</sup>

After learning that flatcars had been sent to evacuate his tanks, Fowler elected to stay, not realizing the cars were stuck in Chungam-ni. In the meantime, the 19th Regiment had been overrun and the firing in Chinju began to go quiet. Around noon an ROK soldier informed Fowler that only a handful of friendly troops were still in the town. Fowler still occupying the rail station, was then strangely visited by William R. Moore, an Associated Press correspondent, who reported that an unknown body of men were heading up the rail line. Around 1300, the men were close enough for Fowler to have an interpreter call to them. They were soon identified as North Koreans and a close-action firefight erupted. Lieutenant Fowler's men opened up with their tanks' .30 and .50 caliber machine guns, receiving a hail of enemy small arms fire. Fowler was shot in his left side in the exchange, but his crew was able to pull him into his tank. The enemy element, now identified as about platoon-sized in strength, was mostly killed or wounded. The tankers, with their commander wounded, headed east along the road toward Masan.<sup>39</sup>

---

<sup>36</sup> Ibid.

<sup>37</sup> Ibid.

<sup>38</sup> Ibid., 232.

<sup>39</sup> Ibid.

Two miles from the rail station the M26s arrived at a blown bridge. The men dismounted and prepared to evacuate by foot. After Lieutenant Fowler had been removed from his tank, his men constructed a litter for him. He ordered the tanks destroyed by a grenade being dropped in each one. As the three men designated for this task started forward, the North Koreans struck by surprise. About half of the section sought cover underneath the blown bridge. Master Sergeant Bryant E. W. Shrader had been the only man on the tanks at the moment of the ambush. He returned fire with a .30 caliber machine gun. Eerily, a North Korean called out in English for the men to surrender.<sup>40</sup> Ignoring the enemy, Shrader drove his tank alongside another. From there he opened the two escape hatches, located on the tank's underside, and pulled in six others.<sup>41</sup> He could not get to the men trapped under the bridge, however, and drove back towards Chinju. The tank engine soon overheated, stopped, and refused to restart. The men bailed out and darted into bamboo thickets that lined the Nam River. After a great ordeal, the seven men safely reached the friendly lines of the 25th Infantry Division near Masan. The men under the bridge were less fortunate. All were killed, wounded, or captured. A few ran into nearby fields but were either gunned down or captured.<sup>42</sup> One of the men that was captured later stated that he saw the bodies of Fowler and Moore floating in the water.

#### The M26 in the Anti-Tank Role

Thus, the first three M26s in the Korean War were captured by NKPA forces. Fortunately, large numbers of American medium tanks were on their way to Pusan. The first to arrive was the 8072nd Medium Tank Battalion, assembled from reclaimed M4A3 Shermans that were scattered across the Pacific. The "roll-up" of lost equipment, which began in 1945 and

---

<sup>40</sup> Ibid.

<sup>41</sup> Hunnicutt, *Pershing History*, 128.

<sup>42</sup> Appleman, *South Naktong*, 233.

continued through the Korean War, was ramped into high gear when hostilities in Korea had begun.<sup>43</sup> Of the 787 tanks to arrive in 1950, 45 percent were from these reclamation efforts.<sup>44</sup> A Co, 8072nd Tank Battalion landed first on July 31, and the remainder of the battalion followed on August 4. Three days later the 8072 was redesignated the 89th Tank Battalion. A Co, 1st Marine Tank Battalion, with their M26s, was the first stateside unit to land on August 2nd and they would also be the first to be sent into combat.<sup>45</sup> Three other medium tank battalions were shipped from the United States along with their trained crews; the 73rd Tank Battalion was equipped with M26s, the 70th with M26s and M4A3s, and the 6th with M46s.<sup>46</sup>

The M46s and the M26s of the 6th and 73rd Tank Battalions, respectively, as well as the combined M26s and M4A3s of the 70th all began arriving at Pusan on August 8.<sup>47</sup> The tank units were immediately sent to bolster the perimeter defense around Pusan. The 6th was sent to the Taegu area, sixty miles northwest of Pusan, as part of the Eighth Army's reserve and the 70th to the west to support the 1st Cavalry Division, which was above the 24th Infantry Division along the east side of the Naktong River.<sup>48</sup> The three companies of the 73<sup>rd</sup>, each with twelve tanks, were split up. A Co went to Ulsan, thirty miles northeast of Pusan, B Co went to the Kyongju area, twenty miles north of Ulsan, and C Co reinforced the 27th Infantry Regiment "Wolfhounds," 25th Infantry Division north of Taegu, an area soon to be known as the "Bowling Alley."<sup>49</sup> Meanwhile, the 72nd Tank Battalion and the remaining companies of the 1st Marine Tank Battalion arrived at Pusan. By late August there were over 500 tanks within the perimeter.

---

<sup>43</sup> Terrence J. Gough, *U.S. Army Mobilization and Logistics in the Korean War: A Research Approach* (Washington, D.C.: Center of Military History, United States Army, 1987), 59.

<sup>44</sup> *Ibid.*

<sup>45</sup> Zaloga, *T-34/85 M26*, 57.

<sup>46</sup> *Ibid.* See also, Zaloga, *M26/M46*, 37.

<sup>47</sup> Hunnicutt, *Pershing History*, 180.

<sup>48</sup> *Ibid.*

<sup>49</sup> *Ibid.*

Excluding the M46s of the 6th Tank Battalion, there were roughly equal numbers of M26s and M4A3s.<sup>50</sup>

On August 17, the M26s of 3rd Platoon, A Co., 1st Marine Tank Battalion would be the first allied medium tanks to fight NKPA T-34/85s.<sup>51</sup> Lt. Granville Sweet's four tanks were sent to support the 1st Provisional Marine Brigade (5th Marines) in the seizing of Obong-Ni Ridge, located well on the east side of the Naktong River approximately twenty miles north of Masan.<sup>52</sup> They were opposed by the *4th Infantry Division* and their armored support, the *2nd Battalion, 109th Tank Regiment*.<sup>53</sup> Around 2000 hours, while the tanks were refueling, Sweet was radioed "Flash Purple," Marine code for imminent tank attack.<sup>54</sup> He quickly moved his tanks into an ambush position behind a hill on a bend in the road. Sweet positioned three of his tanks TSgt. Cecil Fullerton's A-34, Sgt. Gerald Swinicke's A-33, and Sgt. Basilo Chavarria's A-32 in a line on the road itself, while his tank, A-31, fell in behind them (Sweet's tank had a faulty gun elevation mechanism).<sup>55</sup> The road ran generally east-west and divided the 9th Infantry Regiment, which defended the north side, from the 1st Battalion, 5th Marines (1/5) in the south. On Sweet's left, the southside of the road, a moderate hill that provided observation of the area was defended by a Marine 75-mm recoilless rifle company and teams of Marines with 3.5-inch "super bazookas" overwatching the road.<sup>56</sup> The 9th Infantry had infantry teams equipped with the 3.5-inch "super bazookas" in their sector as well, though they were well forward of Sweet's tank position.

---

<sup>50</sup> Ibid.

<sup>51</sup> "Honoring Marine Service," *Marine Corps Gazette* 85, no. 7 (Jul 2001): 88.

<sup>52</sup> Zaloga, *T-34/85 M26*, 58-59.

<sup>53</sup> Ibid., 59.

<sup>54</sup> Ibid.

<sup>55</sup> Ibid.

<sup>56</sup> Ibid., 62.

Four enemy T-34/85s made their way east down the road. The tank platoon had supporting infantry, but when Marine F4U Corsairs attacked the column these were largely dealt with.<sup>57</sup> The Marine pilots also claimed to have damaged one of the tanks as well. Marines on the hill opposite of Sweet then opened up with bazooka and recoilless rifle fire on the tanks, igniting some of their external fuel tanks but doing little else. The T-34/85s continued on undeterred. Sweet radioed his platoon to use HVAP ammunition and then the lead enemy tank rounded the bend in the road. Fullerton's tank, A-34, fired first and then the other two. Zaloga explains:

Fullerton complained to his gunner, Sgt. Stanley Tarnowski, "You missed, Ski!" Tarnowski replied "I don't miss, Sergeant Fullerton." Tarnowski had a reputation in the unit as a crack shot, and it would be hard to miss at point-blank range. In fact, the HVAP was such an overmatch for the T-34/85 glacis armor at such short range that the rounds had passed through the tank. The first round had struck the glacis near the hull machine gun, killing the gunner and killing or wounding the loader before punching through the rear plate. Marines on a neighboring hill thought they themselves were under fire when the three rounds impacted near them. Curiously enough, the Marine tanks then burst into flames, though not from enemy action. In the haste to finish refueling, a considerable amount of gas had been spilled on the decks of some of the Pershings. The initial gun blasts ignited the gasoline fumes; these were extinguished by the subsequent gun blast, only to be ignited by the next shot in a curious pyrotechnic display.<sup>58</sup>

The HVAP rounds had gone through the lead tank so cleanly that no explosive fireball was present to clue the next enemy tank in line on its fate. The second T-34/85 continued on around the stopped lead tank and was slammed by a volley of Marine tank fire.<sup>59</sup> In Hunnicutt's account of the battle, the second kill is attributed to Marine bazooka fire and not the M26s.<sup>60</sup> One round, whether bazooka or tank, struck the enemy tank's turret which began to spin uncontrollably towards the left. The tank fired but discharged the round harmlessly into the bank of a hill. The third T-34/85 attempted to fire past the knocked-out tanks but was soon also

---

<sup>57</sup> Ibid.

<sup>58</sup> Ibid.

<sup>59</sup> Ibid.

<sup>60</sup> Hunnicutt, *Pershing History*, 182.

pummeled by tank fire.<sup>61</sup> Three of the tank's crew managed to escape the tank, but they were soon killed by small arms fire. The fourth T-34/85 did the only sensible thing and fled back down the road it had come. It was ambushed and knocked out by soldiers from F Co, 9th Infantry with bazookas. The tank, number 314, turned out to be the *2nd Battalion, 109th Regiment* commander's. The T-34/85 was invincible in Korea no longer.

Soon after the fighting of the 17th, the NKPA was having success against ROK units north of Taegu in the Tabu-dong area. Consequently, the 27th Infantry "Wolfhounds," with C Co, 73rd Tank Battalion in support, were sent by the commander of Eight Army, Lieut. Gen. Walton Walker, to stabilize the lines.<sup>62</sup> They had to defend the 27th Inf. occupying a large ridge-lined valley. The ROK troops occupied the high ridges on either side of the valley. On the evening of 21 August, the North Koreans began shelling the American positions, and just before midnight the enemy *13th Division* launched an attack against both the ROKs and the Americans. In the valley, the NKPA attacked, having infantry attacking on either side, and nine tanks and several self-propelled (SP) guns move down the road.<sup>63</sup> The enemy armor, aiming at the 73rd's Pershings, fired rapidly and their armor piercing shells screamed down the valley and impacted to the rear of the Americans. The streaking tracers of the enemy shells combined with the cacophonous report of the enemy guns echoing endlessly in the valley caused soldiers from F Co, 27th Infantry to dub the area the "Bowling Alley."<sup>64</sup>

American indirect mortar and artillery fell on the approaching enemy. When the North Korean troops entered the minefields that had been emplaced 150 yards in front of friendly lines American machine guns opened up. The Pershings of the 73rd Tank Battalion held their fire as

---

<sup>61</sup> Zaloga, *T-34/85 M26*, 59.

<sup>62</sup> Appleman, *South Naktong*, 354.

<sup>63</sup> *Ibid.*, 359.

<sup>64</sup> *Ibid.*, 360.

well, not engaging the lead T-34/85 in the enemy column until it was only 125 yards away. 3.5 in bazooka teams hit the second and third vehicles, both self-propelled guns. According to Appleman's account "Artillery and 90-mm. tank fire destroyed seven more enemy tanks, three more SP guns, and several trucks and personnel carriers. This night battle lasted about five hours. The fire from both sides was intense."<sup>65</sup> Over 1300 of the enemy were killed their battalions had been reduced by seventy-five percent strength.<sup>66</sup> Another enemy attack on the 27th met similar results. After two days of fighting, the NKPA attacks were repulsed by the 27th Infantry and the Pershings. They destroyed thirteen more T-34/85s and five SU-76M assault guns with no Pershings lost.<sup>67</sup> One cannot help but be curious how Task Force Smith mentioned above would have fared had they been reinforced with such tank support.

The last large-scale tank-verses-tank actions occurred soon after the landing of the American X Corp at Inchon on September 16. The successful landings, a mere twenty miles west of Seoul, contributed to forcing the NKPA to retreat back to the North. The North Korean soldiers were nearing exhaustion even before the landings. Since the June 25 invasion, the march down the peninsula had constantly attrited their numbers, tanks, transport vehicles, and other pieces of equipment. A good number of the enemy T-34/85s had broken down during the lengthy marches and were simply left on the side of the road, even more were eliminated by UN air power, however. Incessant air attack forced the North Koreans to only move their tanks at night and come up with creative methods to camouflage them during the day.<sup>68</sup> After 1 September, the

---

<sup>65</sup> Ibid., 359.

<sup>66</sup> Ibid., 60.

<sup>67</sup> Ibid., 65.

<sup>68</sup> Order of Battle Handbook (NKPA), Special Planning Staff, G2 GHQ, FEC, Sec. 6, 1, 4, 5, quoted in "Enemy Tactics" (monograph, Headquarters, Eighth U.S. Army Korea, 1952), 58, accessed on April 26, 2018, [http://www.koreanwar-educator.org/topics/reports/after\\_action/enemy\\_tactics\\_in\\_korea\\_field\\_study\\_dec\\_1951.pdf](http://www.koreanwar-educator.org/topics/reports/after_action/enemy_tactics_in_korea_field_study_dec_1951.pdf). "The enemy adapted many camouflage measures in order to deceive United Nations airmen. When UN aircraft approached, the enemy tank crews lit smudge posts or oily rags near the tanks to give the impression that the tanks

NKPA tellingly dispersed the tanks of the *105th Armored Division* amongst the infantry divisions surrounding Pusan.<sup>69</sup> The move no doubt was an effort to bolster the infantry lines, but it also reflected an attempt to minimize tank casualties. Concentrated tank assembly areas invited UN air attack. Furthermore, the move was indicative of an enemy realization that gone were the days of the NKPA armored spearhead.

A wartime study of armor conducted by the Operations Research Office (ORO) examined 239 knocked out or abandoned T-34s spread across the theater from Pusan to Pyongyang.<sup>70</sup> The ORO report sheds special light on enemy tank casualties, concluding that 102 or 43 percent had been destroyed by UN aircraft. Napalm was the most effective weapon, destroying 60 of these tanks.<sup>71</sup> The second greatest cause of loss, surprisingly, was due to mechanical issue, as 59 or nearly 25 percent had been abandoned by their crews. The third largest contributor was tank fire, with 39 or 16 percent being destroyed.<sup>72</sup> Admittedly, some confession was made in the findings to suggest that exact numbers could not be obtained as the enemy was able to recover some vehicles. The results were muddled further by the fact that the enemy had no spare parts to speak

---

were burning. Other tanks used United States markings. Still others crashed into houses or used thatched roofs as concealment. Others parked beside destroyed trucks or tanks.”

<sup>69</sup> HQ IX Corps G-2 Sect. to Commandant of the Army War College, “Enemy Tactics, Techniques and Doctrine,” 32, September 14, 1951, booklet, U.S. Army Military History Research Collection, No. 183, accessed on April 26, 2018, [http://www.koreanwar-educator.org/topics/reports/after\\_action/enemy\\_tactics\\_techniques\\_doctrine\\_intelligence\\_studies\\_1951.pdf](http://www.koreanwar-educator.org/topics/reports/after_action/enemy_tactics_techniques_doctrine_intelligence_studies_1951.pdf).

<sup>70</sup> MacDonald, *Employment Armor*, 35.

<sup>71</sup> *Ibid.*, 37. The report interestingly expounded on the effectiveness of napalm: “With the possible exception of the relatively rare occurrence of a direct hit, napalm does not of itself destroy or seriously damage a tank. However, it is fully capable of starting a chain of events which may bring about the loss of the vehicle. A napalm bomb, if a hit is registered sufficiently close to the tank, will splash its burning fluid on the tank. Because of the fire, the crew may suffer burns or be induced to abandon the tank. However from the prisoner of war interrogations it appears that tank crews usually had sufficient time to get clear before the fire had spread ....However, the abandonment of the tank ultimately led to its destruction, for the napalm from the first or successive strikes had sufficient time to ignite the rubber on the road wheels, heat the ammunition to the point of detonation, and set fire to the fuel. Any or all of these factors brought about the loss of the tank.”

<sup>72</sup> *Ibid.*

of and cannibalization of damaged tanks was frequent. Therefore, a tank that may well have been recoverable under better circumstances was made a total loss for lack of parts.

To make matters worse for the enemy, the major NKPA offensives of August and September against the defense around Pusan were costly and, while they had affected breakthroughs in the UN line, they had not achieved their desired result of collapsing the perimeter. The NKPA had tried and failed to capture key road hubs within the north (Taegu) and west (coastal roads) parts of the perimeter. Success in either region would have seriously endangered the supply of allied forces, endangering Pusan, and likely led to the consequent collapse of the perimeter.<sup>73</sup> Several reinforcing NKPA divisions were sent to help regain the initiative but not to refill the many seriously depleted units. Replacement T-34/85s were also sent, but UN aircraft kept these from having any real affect.<sup>74</sup> Despite reinforcement attempts, NKPA numbers and morale dwindled. Supply lines were precariously overextended and half-starved, despairing enemy soldiers were only kept in line by fanatical NKPA junior leadership.<sup>75</sup>

American leadership pre-decided to delay the Eighth's general offensive one day, allowing time for word of the American landings in the NKPA rear to reach the enemy troops

---

<sup>73</sup> Oscar E. Gilbert, *Marine Corps Tank Battles in Korea* (Havertown, PA, Casemate, 2003), 22.

<sup>74</sup> "The North Korean Steamroller," February 14, 2017, Weapons and Warfare, accessed on April 24, 2018, <https://weaponsandwarfare.com/2017/02/14/the-north-korean-steamroller/>.

<sup>75</sup> James A. Field, "Holding the Line 4. 21-31 August: Coastal Operations and Carrier Strikes," in "History of United States Naval Operations – Korea," in *The Sea Services in the Korean War: 1950-1953*, ed. John W. Ripley, William S. Dudley, and Robert M. Browning (Annapolis, Maryland: Naval Institute Press, 2000). Field comprehensively sums up the deteriorating NKPA supply situation. "A campaign planned for ten days was approaching the end of its second month, the informal logistic procedures of the invaders were becoming increasingly inadequate, and attempts to live off the country were producing a half-starved soldiery. Supply of more specifically military items, unavailable through confiscation, had broken down as a result of naval and Air Force attacks on lines of communication. Despite...the enemy's best efforts...Not only was he checked in his advance but his morale was suffering, and the growing effectiveness of U.N. operations was evidenced by the increasing number of prisoners taken." For reference to fanatical junior leadership holding together NKPA, see Lynn Montross and Nicholas A. Canzona, "Chapter 8. On to Kimpo: Enemy Counterattack at Kimpo," in "The Inchon-Seoul Operations," in *The Sea Services in the Korean War: 1950-1953*, ed. John W. Ripley, William S. Dudley, and Robert M. Browning (Annapolis, Maryland: Naval Institute Press, 2000). Therein, the authors refer to the NKPA defensive reaction to 5th Marines after landings at Inchon, but the case of fanaticism sustaining the enemy force was no less the case at Pusan.

around the perimeter. However, on September 17, after the landings at Inchon, North Korean leadership opted not to inform their men of the situation. Thus, NKPA resistance was initially stiff when the Eighth Army started its planned breakout. Many UN units were still even on the defensive, but North Korean resolve soon melted and panic took its place. The NKPA retreat in front of forces in the south soon turned into an open route. MacArthur's bold decision to land the X Corps at Inchon had paid off, and the North Korean military leadership were caught completely off guard with overextended forces.<sup>76</sup>

North Korean generals withdrew the *105th Armored Division* from around the Pusan perimeter and sent the unit northward to attack the American beachhead. Little would come from this move, however. The NKPA had relatively few forces in the Seoul area at the time, and the only armor to speak of were the eighteen T-34/85s of the *42nd Mechanized Regiment*, a recently formed unit.<sup>77</sup> The *42nd Mechanized* was all but wiped out by September 20. According to Zaloga, three T-34/85s attacked the beachhead on the first day of the American landings and were destroyed by allied aircraft.<sup>78</sup> Oscar E. Gilbert corroborates Zaloga's account but goes further, showing that there were six T-34/85s heading south from Seoul to the beachhead and that the Air Force only got three of them.<sup>79</sup>

According to Gilbert, the three remaining enemy tanks were destroyed by tanks from Lt. Granville Sweet's tank platoon. When Sweet's tanks and accompanying Marine infantry arrived at the hills where the air force had reportedly destroyed three T-34/85s, he ordered two of his tanks, commanded by Cecil Fullerton and Joe Sleger, to move up onto a hill that had observation

---

<sup>76</sup> Dale B. Woodhouse, "Operational Lessons Learned in the Korean War" (monograph, School of Advanced Military Studies United States Army Command and General Staff College, Fort Leavenworth, KS, Jan-Dec 2011), 26, accessed April 26, 2018, <http://www.dtic.mil/dtic/tr/fulltext/u2/a557709.pdf>.

<sup>77</sup> Zaloga, *M26/M46*, 39.

<sup>78</sup> *Ibid.*

<sup>79</sup> Gilbert, *Marine Corps*, 69-70.

down a blind curve the Marine infantry were about to go around.<sup>80</sup> Once there, the two tankers spotted three T-34/85s waiting to ambush the infantry. Sleger recollects: “We looked down, and just beyond the bend, there’s three tanks—T-34s... We positioned ourselves abreast of each other, and pumped rounds into the broadside of these three tanks. I think we put about twenty rounds of ammunition into them.”<sup>81</sup> Since the Second World War, American tankers were in the practice of shooting enemy tanks until they burned.

At 0615 the following morning, September 17, six more T-34/85s from the *42nd Mechanized* escorted by two to three hundred infantry from the *18th Infantry Division*, made their way to recapture Kimpo Airfield located south of the Han River on the western edge of Seoul. Near the airfield, the enemy force stumbled into a prepared position of the 2d Battalion, 5th Marines supported with M26s from 1st Platoon, A Co., 1<sup>st</sup> Marine Tank Battalion. The Marines and tanks eliminated the enemy force within five minutes at the cost of only two Marines wounded.<sup>82</sup> The M26s opened up on the enemy tanks at 600 yards, firing at the trail tank and working their way to the front to ensure they got them all.<sup>83</sup> Interestingly, the Marine tankers had made the same mistake that Lt. Sweet’s men had made one month earlier near Oblong-Ni. They had HVAP loaded. “We loaded anticipating the tanks,” said Bob Miller, one of the tank commanders, “. . . I fired two rounds and it looked like I missed the damn thing! I decided what I was doing was going in one side and out the other. We loaded HEs, and that blew the darn turrets off. That busted ‘em up.”<sup>84</sup>

---

<sup>80</sup> Ibid., 70.

<sup>81</sup> Ibid.

<sup>82</sup> Ibid.

<sup>83</sup> Ibid. 73.

<sup>84</sup> Ibid.

The Marines were not always on the giving end of an ambush, however. During the fighting outside of Seoul, on the road to the town of Sosa, 2nd Platoon, B Company, 1st Marine Tank Battalion's was suddenly hit by an NKPA ambush.<sup>85</sup> As the lead tank, commanded by Lt. Bryan Cumming, entered a narrow cut in a north-south running ridge heavy enemy small arms, several anti-tank guns, and a hidden T-34/85 tank engaged it. The Marines' accompanying infantry were knocked off the deck of the M26, and enemy infantry swept down from their positions to overwhelm the tank. The following account reveals well the chaos of what close action in an M26 was like:

The lieutenant barely had time to grab one of the riflemen by the collar and pull him through the hatch and into the tank before enemy infantry swarmed down the embankments and onto the vehicle. The Tank's crew, meanwhile returned fire with machine guns and cannon. Before long a well-placed enemy round broke the track, immobilizing the tank. Acrid fumes from the machine guns and the gas that rushed out whenever the loader opened the breech of the main gun filled the vehicle. The harried Cummings discovered what many World War II tankers had learned the hard way: otherwise hardened infantrymen grew extremely claustrophobic when locked inside cramped tanks with enemy fire hammering on the hull. When the rifleman he had just saved from death or capture went berserk inside the besieged vehicle, Cummings knocked him unconscious.

Gasping for breath, Cummings opened the pistol port on the side of the turret to let some of the choking gas escape. Almost immediately a North Korean grenade flew through the opening and exploded inside the turret. The shrapnel wounded Cummings, his gunner, and the incapacitated rifleman. With no time to spare, Sergeant Marion Altaire moved his own M26 into the road cut and "scratched the back" of Cummings' immobilized tank with machine gun fire, knocking the NKPA attackers to the ground. More help was on the way. Sergeant Arthur R. "Slope Plate" MacDonald led his section into the cut to assist the trapped Americans. He slammed round after round at the anti-tank guns at close range. Although at the time no one could see the effect of the fire, after the chaotic fight ended the Marines counted six anti-tank guns and a T-34 destroyed.<sup>86</sup>

After the September 17 ambush, the remaining dozen tanks of the *42nd Mechanized* were eliminated over the course of the next three days. Another new unit, the *43rd Tank Regiment* was also sent south to combat the Americans near Seoul on September 25th.<sup>87</sup> The *43rd* immediately

---

<sup>85</sup> Ibid., 75.

<sup>86</sup> Ibid., 75-76.

<sup>87</sup> Zaloga, *M26/M46*, 39.

lost twelve T-34/85s, seven of which being destroyed by Marine M26s. During the fighting for Seoul itself, the M26s were not needed to combat enemy tanks but were used rather to support infantry in close urban action and for knocking down the many barricades that the NKPA had thrown up across the city's streets. By early October, the NKPA tank force was largely eliminated, the *105th Armored Division* included.<sup>88</sup>

General MacArthur adamantly wished to pursue the enemy into North Korea. On 27 September, the Joint Chiefs of Staff delivered to MacArthur Washington's approval for the Eighth Army to cross the 38th parallel in pursuit of the NKPA.<sup>89</sup> And by 26 October, UN forces had reached the Yalu River, the natural boundary between North Korea and Manchuria, at Chosan; specifically a reconnaissance platoon of 7th Regiment, 6th ROK Division, ROK II Corps.<sup>90</sup> The men even filled bottles of water for souvenirs, but their celebration would be short-lived.<sup>91</sup>

---

<sup>88</sup> Ibid.

<sup>89</sup> Appleman, *South Naktong*, 607.

<sup>90</sup> B. L. Kortegaard, "China Enters the Korean War," 1950-1953 Korean War Documentary: History Through Annotated Combat Photos... Complete Contemporary Texts, accessed April 27, 2018, <http://www.koreanwaronline.com/arms/yalu.htm>.

<sup>91</sup> Page 2 of chapter XXVII in Helie Lee, *In the Absence of Sun: A Korean American Woman's Promise to Reunite Three Lost Generations of Her Family* (New York: Three Rivers Press, 2016). The author mentions that many ROK soldiers bottled water from the Yalu and brought it back to present them to Syngman Rhee. In addition, the author had an Evian bottle filled with Yalu water that her father had given her. She writes regarding the Yalu River: "It was the purest and cleanest water in all of Korea then."

## Chapter 5 - The M26 in the Infantry Support Role

The accounts included in the last chapter are a little deceptive, because they focus heavily on the M26's encounters with NKPA T-34/85s. The primary role that the M26, as well as the M4A3 and M46, fulfilled in Korea was infantry support, especially after the NKPA tanks were defeated by November 1950, and even more so when the Chinese entered the war. Between 14 and 20 October, the Chinese secretly sent elements of the Chinese People's Volunteer Army (PVA), namely the *38th*, *39th*, *40th*, and *42nd Armies*, with three divisions each, into North Korea. Accordingly, the stakes were raised when these forces first engaged UN forces on 25 October.<sup>1</sup> Thereafter, UN tank support was often the difference between mission success and rout. For example, on 1 November, the Eighth Army's center, near Unsan, was hard pressed and a number of M46s from the 6th Tank Battalion and one platoon of M26s from B Company, 70th Tank Battalion were sent to help. The tanks greatly assisted elements of the ROK 12th Regiment in an attempt to regain ground just north of the city.<sup>2</sup> Actions like this were common for American tanks in Korea. They served in a variety of capacities supporting ground forces.

To best illustrate this, the 1st Marine Division was rescued, in large part, because of a single M26. Donald C. Snedeker's November 2000 article in the *Marine Corps Gazette*, "One was enough," details the account fully. SSG Russell A. Munsell and his crew in the M26 Pershing, D-23, played an invaluable role in the withdraw of 1st Division Marines from the Chosin Reservoir area on 29 November – 3 December 1950. Snedeker contends...

In the pre-dawn hours of 27 November, elements of eight Chinese divisions from the CCF IX Army Group had emerged from hiding and advanced toward the Marine positions just

---

<sup>1</sup> Appleman, *South Naktong*, 766.

<sup>2</sup> *Ibid.*, 679.

west of the Chosin Reservoir, near the Yalu.<sup>3</sup> MacArthur had underestimated the new enemy's resolve and strength, informing his command that they would be 'home by Christmas.'<sup>4</sup> U.N. forces, following their commander's lead, looked forward to a planned victory parade in Tokyo. The same morning, the 5th and 7th Marines, 1st Marine Division, with the 11th Marines providing artillery support, attacked towards the Yalu. Chinese forces were reported everywhere and Marine progress was slow. The division commander, Maj. Gen. Oliver P. Smith felt armor would assist the attack, saying: "get some tanks up to Yudam-ni."<sup>5</sup> Years later, Smith said of the battle:

Litzenberg [Commander 7th Marines] went on up the road and met these people just below Chinhung-ni, and they had quite a fight. Litzenberg had 43 killed and a couple of hundred wounded, but they absolutely decimated this 124th CCF Division. Then we took it kind of slow from there on out. I was hoping that we wouldn't have to get up on that plateau, which was 4,000 feet up with winter descending and only one road going up there. And the Army had become somewhat sobered by the experiences of the 1st Cavalry Division in the West. The Chinese had sent in an advance force over there just like they had sent in an advance force over on our side, and the 1st Cavalry Division lost practically an entire regiment. It was surrounded and chopped up.<sup>6</sup>

One platoon of four Shermans from the 1st Marine Tank Battalion's inventory was sent north from the division's HQ at Hagaru-ri, sixteen miles to the south. Four miles up, all four tanks skidded to the side of the icy road.<sup>7</sup> Three were able to regain the road and turn around but the fourth threw a track and was left to be recovered the next day. The decision was for the best, no doubt, as the 4,700-foot-high Toktong Pass, with sheer cliffs on both sides, lay three miles further up the road.<sup>8</sup> Sadly, tanks being lost in this way was not unheard of. The U.S. Army 72d

---

<sup>3</sup> Donald C. Snedeker, "One was Enough," *Marine Corps Gazette* 84, no. 11 (Nov 2000): 71-77.

<sup>4</sup> Max Hastings, *The Korean War* (New York: Simon and Schuster, 1987), 140.

<sup>5</sup> Snedeker, "One War Enough."

<sup>6</sup> Oliver P. Smith, interview by Ben Frank, June, 1969, transcript, quoted in Pat Roe, "General O. P Smith Interview," Chosin Reservoir Korea: November – December 1950, accessed on April 29, 2018, <http://www.chosinreservoir.com/smithinterview.htm>.

<sup>7</sup> Snedeker, "One Was Enough."

<sup>8</sup> Ibid.

Tank Battalion, for example, lost two Shermans to terrain early on the next year. At midnight on 3 February 1951, “Two M-4 tanks from ‘C’ Co. rolled over a cliff enroute to WONJU.”<sup>9</sup> That was the entirety of the battalion’s S-3 Journal entry.

Nevertheless, the Marine tankers believed their M26s, with their wide tracks, greater width and weight, as well as torqmatic transmission, would fare better.<sup>10</sup> As a test, 1st Lieut. Richard A. Primrose and his best driver, Sgt. Clyde Kidd, took a single M26 from his platoon, D-23, up the treacherous road. He made it to Yudam-ni without incident in the early afternoon.<sup>11</sup> Primrose and Kidd flew back to Hagaru-ri. The lieutenant intended to bring his platoon up early the following day, but conditions on the ground had changed. The Marine attack had stalled by the afternoon on the 27th and during the night the large numbers of enemy had established roadblocks cutting the road on both sides of Hagaru-ri.

The morning of the 28th, Primrose’s platoon of M26s and Marine infantry attempted to advance in force north to Yudam-ni. Three miles up the road, the Marines met fierce resistance and were forced to return. By this time the situation was dire for the Marines in Yudam-ni and Col. Homer Litzenberg, commander 7th Marines, put out a call for a tank crew. The situation was equally as calamitous for the Marines in Hagaru-ri, however, and Primrose needed every man in his platoon. His tanks helped protect the perimeter through desperate fighting, cutting down hundreds of enemy attackers. On the 29th, Primrose would make another attempt to advance in force to relieve the beleaguered Marines in Yudam-ni, but this attempt also would get turned back.<sup>12</sup>

---

<sup>9</sup> 72d Tank Battalion, “S-3 Journal,” February 1-28, 1951, NACP, RG 338, Entry No. UD 37042.

<sup>10</sup> Snedeker, “One Was Enough.”

<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

SSG Munsell and his crew, from C Co., 1st Tank Battalion, volunteered to man M26 D-23. The Marine tankers were flown in to Hagaru-ri on the morning of the 29th, while Lt. Primrose's led the second attack north. Munsell and crew were then flown to Yudam-ni where they immediately worked to get the M26 serviceable. Without having been started in two days, the tank's batteries were now dead and its fan belts were frozen to the consistency of hard plastic.<sup>13</sup> The necessary parts were replaced and the tank was made ready for operation. Fortunately, the enemy did not attack Yudam-ni that night. Maj. Gen. Smith received permission to withdraw the bulk of his division at Yudam-ni back to Hagaru-ri. While much of Eighth Army openly fled before Chinese attacks, Smith, in true Marine fashion, kept his fighting edge intact. "Retreat, Hell! We're just attacking in another direction."<sup>14</sup>

Lt. Col. Raymond L. Murray, commander of 5th Marines, and Col. Litzenberg of 7th Marines planned and implemented the breakout, and at 0900 1 December, the Marine infantry advanced along the high ground on either side of the road, fighting through enemy positions as they went. At noon, SSG Munsell's D-23 led the remaining combat elements out along the road, encountering an enemy roadblock almost immediately.<sup>15</sup> The Marines ground forward amidst heavy losses and despite bitter cold, harsh terrain, and fanatical enemy resistance.<sup>16</sup> Roadblocks were encountered along the road about one every mile, but fortunately the enemy did not have any anti-tank weapons covering them, only machine gun emplacements. These were systematically eliminated by cannon and machine gun fire from the M26.

The Marines fought on for more than four days without sleep and in twenty-below temperatures. In total, D-23 helped destroy seven roadblocks and countless enemy

---

<sup>13</sup> Ibid.

<sup>14</sup> "Retreat of the 20,000," *Time*, December 18, 1950, 26.

<sup>15</sup> Snedeker, "One Was Enough."

<sup>16</sup> Ibid.

emplacements, but SSG Munsell and his crew did not just contend with the enemy. Keeping their vehicle fueled was a constant struggle and the tankers at one point had to siphon gas from abandoned vehicles along the route to continue.<sup>17</sup> H.W. MacDonald sheds further light on the fuel economy of these tanks: “Fuel consumption at present is not as high as it was during the cold winter weather; on approach marches the M46 uses about 4 gal/mile . . .”<sup>18</sup> However, in addition to taking place during a remorselessly cold early winter, the Marine advance was agonizingly slow. Consequentially, Snedeker points out that the M26 used 20 gallons of gas an hour just idling.<sup>19</sup>

Eventually, the newly installed batteries surrendered to the constant strain 72 hours into the battle. Munsell had planned accordingly though, and had brought spares. His men changed them under fire. Human endurance was also at a breaking point, however, and at the 96-hour mark Munsell’s loader collapsed from exhaustion, no doubt accelerated by fume inhalation.<sup>20</sup> A more than willing Marine infantry replacement was found. Soon thereafter, the M26 bottomed out on a snow drift while it maneuvered to engage enemy positions. After being stuck for six hours, Munsell, with great effort and the help of an engineer dozer, finally got the tank free. D-23 made it the sixteen miles to Hagaru-ri, but not before it ran out of gas several hundred yards from the perimeter. 5th, 7th, and 11th Marines, 1st Marine Division also made it, thanks in no small measure to this single M26 that had spearheaded the road advance for the bulk of the force as well as provided fire support for the wing advances.

The Marine ordeal was not over, however. On 6 December, the Marines made the eleven-mile fighting withdrawal from Hagaru-ri to Koto-ri, SSG Munsell and D-23 were among them.

---

<sup>17</sup> Ibid.

<sup>18</sup> MacDonald, *Employment Armor*, 306.

<sup>19</sup> Snedeker, “One Was Enough.”

<sup>20</sup> Ibid.

From there, the Marines eventually made their way to Hungnam for extraction.<sup>21</sup> Amazingly, no Marine was left behind. Dead or alive, all of the 1st Marine Division left the Chosin Reservoir area together.<sup>22</sup> Prior to stepping off for Koto-ri, however, some of 1st Marine's officers questioned whether the march was possible with such a large enemy presence still in the vicinity and with a physically exhausted and depleted force. Col. Lewis Burwell "Chesty" Puller, commander 1st Marines, 1st Marine Division, replied, saying it best: "I don't give a good goddamn how many Chinese laundrymen there are between us and Hungnam. There aren't enough in the world to stop a Marine regiment going where it wants to go! Christ in His mercy will see us through."<sup>23</sup>

Like with its assistance to the 1st Marine Division, the M26's role in infantry support was multifaceted. It was employed in all of the following roles: (1) mobile artillery, (2) enemy strongpoint elimination, (3) convoy escort, (4) casualty recovery, (5) battlefield-expedient ambulance, (6) heating food, (7) assisting other vehicles in crossing fords, (8) perimeter defense, and (9) deep penetrations of enemy lines. The M26 was frequently rolled up on embankments where the maximum range of its 90-mm M3 guns could be achieved. Doing so increased the maximum elevation of the gun M3/M3A1 beyond the 20 degrees elevation possible on level ground.<sup>24</sup> At 45 degree, 37 mins, the gun could launch an H.E. shell 17,886 meters (11.1 miles).<sup>25</sup> Located just above the M26's recoil cylinders was the Elevation Quadrant M9, a standard device on all American tanks.<sup>26</sup> It permitted the tank gun, normally a direct-fire

---

<sup>21</sup> Hastings, *Korean War*, 161.

<sup>22</sup> Ibid.

<sup>23</sup> Lewis B. "Chesty" Puller quoted in Hastings, *Korean War*, 161.

<sup>24</sup> M3 Manual, 12.

<sup>25</sup> Ibid.

<sup>26</sup> M3 Manual, 10.

weapon, to be used for indirect fire.<sup>27</sup> The tank registered its gun much as an artillery piece would, and on such an angled platform, with its barrel pointing skyward at similar angles, the M26 even somewhat resembled one.

Accuracy was excellent. Furthermore, the M26 boasted mobility and a rate of fire that regular artillery could not match.<sup>28</sup> Oftentimes, even with these advantages, tanks were used in the artillery role only because battlefield conditions mandated thus. A unit report, dated August 1951 provides special insight into M26s being employed in the indirect artillery role:

Tank trafficability throughout the period was extremely limited due to weather conditions and an unusual amount of rain-fall, tanks were limited to operations on hard surfaced roads. Tanks of the Battalion were employed during this period in indirect fire missions with good results. Indirect fire missions were controlled thru the artillery battalion's fire direction centers. Using the tanks of the Battalion in this manner served two purposes. It enabled the tank crews to get some practical training in indirect fire methods. Also utilized the tank guns with their high rate of fire when ground conditions prohibited the use of tanks in their normal role. Throughout the period all attempts to maneuver off of the roads resulted in mired equipment.<sup>29</sup>

Tanks were commonly used as mobile artillery in Korea. Nevertheless, this report would seem to indicate that the M26 was seen as more valuable in close operational support rather than in the indirect role, as it labels the former as the "normal role."

The HE round from the 90-mm gun was most effective for strongpoint elimination. On 15 September 1950, six M26s, under the command of Lieut. Granville Sweet, landed to support the 3d Battalion, 5th Marines in the taking of Wolmi-Do (Wolmido) Island located one kilometer offshore of Inchon. One of the M26s put a 90-mm shell into a cave full of NKPA defenders.

---

<sup>27</sup> Ibid., 115. "The Elevation Quadrant M9 (fig. 68) is used for setting off the required vertical angle to which the 90-mm gun must be elevated or depressed for indirect fire."

<sup>28</sup> 72d Tank Battalion, "S-3 Monthly Summary: August 1951," NACP, RG 338, Entry No. UD 37042.

<sup>29</sup> Ibid.

Thirty enemy soldiers immediately walked out hands raised.<sup>30</sup> Soon thereafter, a section of M26s helped eliminate enemy fortified positions on Sowolmi-do, a small islet to the south of Wolmi-Do that was connected by a narrow causeway.<sup>31</sup> The M26 served as a battlefield multiplier when in close support of infantry. Not only was direct action fire support, such as eliminating enemy bunkers, tactically tangible but the simple presence of an “iron angel” could be instrumental with infantry morale.<sup>32</sup>

In contrast, however, the M26 proved ill-designed for the long road marches demanded by convoy escort. Its poor fuel economy, consequent limited range, sluggish acceleration characteristics, and high maintenance requirements made it an illogical choice for such use. Typically, using a medium tank for convoy escort was also a waste of a valuable resource. However, M26s could be effectively used to provide security for advancing columns. Such was the case with elements of the 1st Marine Division after Inchon. The Marines used amphibian tractors, that were designed only to get Marines safely to shore, as armored personnel carriers on the Inchon-Seoul highway.<sup>33</sup> Escorting M26s provided security to their flock of irregular vehicles despite NKPA ambush and anti-tank mine traps.<sup>34</sup> Nonetheless, MacDonald makes the unsurprising and hard to refute conclusion that a light tank would better fulfill the convoy escort role.<sup>35</sup>

---

<sup>30</sup> Edwin H. Simmons, “Over the Seawall: U.S. Marines at Inchon,” *Marines in the Korean War Commemorative Series* (Washington, D.C.: Marine Corps Historical Center, 2000), 28.

<sup>31</sup> *Ibid.*, 29.

<sup>32</sup> The commander of 3d Batt., 5th Marines ‘Darkhorse Battalion’ stated: “That tank leading the column, incidentally, was a tremendous morale factor for the Marines and, conversely, demoralizing for the enemy. Although the Chinese positions had to be taken by infantry, it was good to look down on the MSR and see the iron monster. Even the sound, one which only a rumbling tank can make, was reassuring.” quoted in Snedeker, “One Was Enough.” Later in the article Snedeker writes: “The resourceful crew was able to scrounge 15 gallons of gas and some bullets for the machinegun which the supporting infantry was only too glad to give to their iron angel.”

<sup>33</sup> Simmons, *Over Seawall*, 47.

<sup>34</sup> *Ibid.*

<sup>35</sup> MacDonald, *Employment Armor*, 2.

Regarding casualty recovery, the M26 was used as a means of collecting wounded infantrymen in exposed areas. The tank would simply drive over the wounded man and pull him into the tank via the two escape hatches on the tank's underside.<sup>36</sup> Similarly, in emergency situations the wounded were loaded on the engine deck of the M26 to facilitate easier transport. Also, many images exist of infantrymen riding aboard M26s in Korea simply to avoid a long foot march. Another comfort for the infantry was the Pershing's "ability" to heat food. In the sub-zero temperatures of Korea, a warm meal could be had simply by asking the tanker to start up his tank and then throwing the K-ration meal on the back plate. It would be piping hot in a couple of minutes.

Tanker-Infantry transactions, however, were not limited to culinary diplomacy, nor were they always pleasant. The M26 had an infantry phone on the back right side of its rear hull for use in combat. When needed, a stalwart infantryman could approach the back of the forty-six ton vehicle, pick up the phone, and be plugged in directly with the tank crew's intercom system. This allowed for clear communication, often for the coordination of direct fire, when the crew was buttoned up and radios were not available or having issue. Alternatively, however, the nature of close coordination between infantry and armor often dictated that ground forces operate out front of the Pershing, sometimes in near proximity to its "business" end.

As mentioned above, the M26's muzzle brake diverted propellant gases to either side of the muzzle, preventing dust on the ground from being stirred up but also producing terrific muzzle blast to the front and sides, especially the sides. Therefore, standing anywhere near the "business" end was unpleasant to say the least. One combat cameraman Lt. Robert L. Strickland, 71st Signal Service Battalion, recalled his time with the 1st Marine Division in the fighting for

---

<sup>36</sup> Hunnicutt, *Pershing History*, 128.

Seoul: “About that time the tanks started firing their 90s right over our heads. The blast was so terrible that I still can’t hear well today.”<sup>37</sup> Strickland also related another story where muzzle blast unsettled him: “I got ready to shoot. Just as the tank got in the frame, one of the Marines fired a carbine about six inches from my nose. The camera lens went straight up and I was madder than a wet hen until I saw a sniper fall out of a tree behind me.”<sup>38</sup>

In addition, the M26 was heavy enough that it could pull other vehicles across rivers that otherwise might risk being swept away. Similarly, Pershings were capable of self-loading, or pulling themselves and other Pershings onto railcars, making preparation for rail transport slightly less of an ordeal.<sup>39</sup> Tanks were also ideal for perimeter protection as Snedeker’s article illustrates: “As they descended into snowbound Ha garu-ri, SSgt. Munsell and his crew could see the results of the brutal CCF attack that had finally been stopped just a few hours earlier. Within 200 yards of the Provisional Tank Platoon’s 3 Shermans alone, there were over 650 enemy bodies-already frozen in the grotesque geometry of death.”<sup>40</sup>

Lastly to be mentioned, the M26 was employed heavily in the deep penetrations of enemy lines. General Mathew Ridgway developed a winning strategy after the Chinese entered the war. It included forcing the enemy to attack against solid defensive lines and willingly giving ground in favor of inflicting damage upon him. Then, he would strike deep with armored spearheads into the overextended enemy’s rear area inflicting maximum casualties on unprepared enemy forces. Though brutal, this “meat grinder” technique proved itself somewhat

---

<sup>37</sup> Westover, *Combat Support*, 106.

<sup>38</sup> *Ibid.*, 105.

<sup>39</sup> Westover, *Combat Support*, 134. The author explains: “The next morning (2 December) the loading went faster, especially since some of the tanks helped others. A tank that could be started would pull another up the ramp and onto a flatcar. The operating tank then moved forward to a second car and two tanks were loaded in one operation.”

<sup>40</sup> Snedeker, “One was enough.”

effective and a role for which the Pershing tank was well-suited.<sup>41</sup> The tank-infantry task force prototypes of this technique, however, came during Eighth Army's breakout following the landings at Inchon in mid-September 1950. The ORO report expounds on the drives of Task Force Lynch and Task Force Dolvin:

The ability of armor to exploit a breakthrough was illustrated by the 172-mile drive of Task Force Lynch from Taegu to Suwon in 48 hours to link up with the 7th Division moving inland from the Inchon beachhead, and the drive of Task Force Dolvin from Chinju to Nonean, a distance of 150 miles, between 25-30 September. Such operations were frequent during the period following the breakout from the Naktong line and the subsequent advance up the peninsula, and generally involved one or two companies of tanks, each operating in conjunction with a company of infantry, with mortar, signal, medical, and engineer detachments, and with a TACP [Tactical Air Control Party] to call in air strikes. From the experience obtained during these operations, there emerged the plan for the fully integrated tank-infantry teams which played a large part in the advance of the UN forces...<sup>42</sup>

Billy C. Mossman tells the story of the further implementation of such practices in the sections devoted to Operation Wolfhound, Task Force Johnson, and Operation Thunderbolt.<sup>43</sup> Operation Wolfhound was a single-day reconnaissance in force operation conducted towards the Suwon-Osan area on 15 January 1951.<sup>44</sup> The 27th Infantry Regiment "Wolfhounds," bolstered with a battalion of tanks and artillery and engineers, carried the attack forward. The formidable UN reconnaissance encountered only limited resistance, however, reinforcing suspicions that the Chinese only had the *50th Army* acting as a reconnaissance screen forward of their main line. At a loss of three killed and seven wounded, Operation Wolfhound inflicted 1,380 enemy casualties,

---

<sup>41</sup> Robert S. Cameron, trans., *Armor in Battle: Special Edition for the Armored Force 75<sup>th</sup> Anniversary* (Fort Benning, GA: U.S. Army Armor School), iv. "Tanks ... possess tremendous combat power, mobility, and shock effect that must be understood to maximize their impact and achieve decisive overmatch in battle."

<sup>42</sup> MacDonald, *Employment Armor*, 14.

<sup>43</sup> Mossman, *Ebb Flow*, 237-247.

<sup>44</sup> *Ibid.*, 237.

not nearly as many as intended, but impressive none the less.<sup>45</sup> Ridgeway saw the operation as successful and ordered his commanders to plan similar operations.

On 22 January, Task Force Johnson, named after Col. Harold K. Johnson, commander 8th Cavalry Regiment, 1st Cavalry Division, was launched with similar results.<sup>46</sup> The 1st Cavalry Division led attack was built around the M4A3E8s and M26s of the 70th Tank Battalion. Only limited enemy resistance was met though, prompting General Ridgeway to escalate reconnaissance in force operations to determine true enemy dispositions.<sup>47</sup> On 24 January, Operation Thunderbolt was launched. Two armored-led spearheads, roughly division-sized each, advanced northward from the IX and X Corps lines with the lower bank of the Han River as their final objective. Only pockets of enemy resistance were met initially and the reconnaissance in force quickly turned into a general attack involving the entire Eighth Army.<sup>48</sup> The advance was systematically coordinated through five east-west-running phase lines.

Eventually an enemy screen of seven divisions stiffly opposed the advance, but by 2 February, the Eighth Army began consolidating a solid new defensive line south of the Han River. Throughout all of these operations, Ridgeway saw destruction of enemy forces and the potentiality to draw him into overcommitment of his forces, while closely protecting the integrity of U.N. forces, as his only mission.<sup>49</sup> The acquisition of lost ground and political objectives, such as the recapture of Seoul, were only incidental in importance. Therefore, the offense potential of tanks, namely their firepower, mobility, and armored protection, were essential in Ridgeway's greater strategy. Every reconnaissance in force in early 1951 was spearheaded by tanks.

---

<sup>45</sup> Ibid., 238.

<sup>46</sup> Ibid., 239.

<sup>47</sup> Ibid., 240.

<sup>48</sup> Ibid., 242.

<sup>49</sup> Ibid., 246-247.

The greater armor protection and firepower of the M26/M46 as compared to the M4A3 allowed it to receive a higher combat record.<sup>50</sup> In the early months of the fighting, when encountering an NKPA T34/85 was more likely, the M26 was preferred by tank crews. In the latter part of the war the lighter and more conveniently-sized M4A3 was preferred. The fighting stalemated in the peninsula's central mountainous region where the M26's sluggish hill performance and sloppy transmission became more of a liability.<sup>51</sup> Zaloga comes down hard on the M26 in his final assessment, dramatically favoring the Sherman: "Those tankers with experience in the M4A3E8 preferred it over the M26, since it was more reliable, easier to maintain, and far more nimble to drive. Its automotive performance in the hilly Korean countryside was far superior to that of the M26, and its firepower was perfectly adequate against the now rarely encountered T-34-85."

Zaloga continues to favor the Sherman by leaving his final evaluation of the M46 open to interpretation, curtly concluding: "The M46 cured many of the problems encountered with the M26 due to the introduction of a new engine and cross-drive transmission, and so was preferred over the M26."<sup>52</sup> However, Zaloga's most famous non-Osprey book on tanks, *Armored Thunderbolt: The U.S. Army Sherman in World War II* (Stackpole Books, 2008) is devoted almost exclusively to the Sherman. Only four of its 360 pages deal with the T26, and these are mostly filled with illustrations.<sup>53</sup> By default, with two different tanks employed side-by-side, the successes of the one diminished the perceived sufficiency of the other to a comparative eye and perhaps Zaloga, with his years of study, grew understandably attached to the ubiquitous

---

<sup>50</sup> MacDonald, *Employment Armor*, 28.

<sup>51</sup> Zaloga, *M26 vs T-34/85*, 76.

<sup>52</sup> *Ibid.*

<sup>53</sup> Steven Zaloga, *Armored Thunderbolt: The U.S. Army Sherman in World War II* (Mechanicsburg, PA: Stackpole Books, 2008), 225-228.

Sherman. The author can somewhat relate. Regardless, the Sherman did have greater mechanical reliability. However, though the M26 is often labeled as having poor mobility in Korea, it was the Sherman that actually had the highest casualty rate to terrain, at 6.4 percent. The rate for the M26, which was lower, was not identified.<sup>54</sup>

The greater use of the Sherman in more austere terrain may have been the contributing factor here. Nonetheless, the M26 and M46 had similar mechanical failure rates at 40.5 and 41.6 respectively.<sup>55</sup> The Sherman's rate was the lowest of any tank used at 20 percent. Still, the ORO report grounds speculation:

It should be remembered, in any consideration of mechanical failure by types, that the M4A3 and the M24 by 1950 were products of a long period of development and modification and hence should be expected to perform with some measure of reliability. The M46 tanks were the first of this type to be built and their Korean employment was their first operational test. The M26 tanks were a later World War II development and were in a generally poor physical condition.<sup>56</sup>

The report also reveals that the M26 and M24 light tank had the most powerpack issues of any of the American tanks in country. It states that: "The lack of sufficient power was a primary cause of mechanical trouble with the 47-ton M26 (500 hp); the 49-ton M46 with an 810 hp air-cooled engine performed extremely well considering that this was its first real test."<sup>57</sup> A curious blend of design immaturity infused with aged tanks resulted in a common, if not completely deserved, negative mobility reputation for the M26 in Korea.

Regardless of its limitations, the M26 played a critical role in stabilizing the American efforts during the first year of the war. It helped to remove the enemy T-34 from Korea both as a psychological impactor and as a military consideration. The M26 and other tanks offered support

---

<sup>54</sup> MacDonald, *Employment Armor*, 28.

<sup>55</sup> Ibid.

<sup>56</sup> Ibid.

<sup>57</sup> Ibid., 168.

well beyond eliminating enemy armor. In addition to providing both direct and indirect artillery support, protective fires during defense, along with a number of other roles, it possessed the firepower, mobility, and survivability necessary to carry an attack forward. Many of these roles were exemplified by the Marine M26 D-23. Had this M26 not traversed the treacherous, icy road leading from Ha garu-ri to Yudam-ni, a road impassable for the M4, and supported the Marines in their withdrawal from the Chosin Reservoir, America's premier fighting force in Korea, the entire 1st Marine Division, over 20,000 men, would likely have been lost. Ultimately, the M26 was invaluable to U.N. infantry operations during the Korean War, even as it had been crucial in the anti-armor role.

## Conclusion

American tank technology underwent a revolution during the Second World War. Early designs, exemplified and culminating with the M4 Sherman, featured a rear mounted engine but a forward mounted transmission and sprocket. The drive shaft that ran from the engine to the transmission combined with the Continental R975 radial engine of the earlier models, made the M4 very tall, displayed by its characteristic side sponsons. In sharp contrast, the T20 series incorporated many new technological advances and design ingenuities, beginning fresh trends in American tank development. Its basic design established the standard setup that would become known as the traditional tank design. It used a rear mounted engine, transmission, and sprocket, eliminating the drive running the length of the vehicle and, coupled with the lower profile Ford GAA V8, got rid of the need for side sponsons. It boasted a much lower stance and profile.

The M26 was also the first American tank to pioneer the torsion bar suspension, forgoing the Horizontal Volute Spring Suspension (HVSS) found on later models of the Sherman. The torsion bar suspension remains the standard armored fighting vehicle suspension to this day. The current tank employed by the U.S. Army, the M1 "Abrams" series, represents a revolutionary departure from the Patton series. Nonetheless, it still possesses many features typical of a traditional design, such as its rear mounted engine, transmission, and sprocket. The M1 is the culmination of American design and tank fighting experience, however much of that culminative developmental achievement can be attributed to the M26. For example, the balance of firepower, mobility, and armor achieved by the M26 and even more so with its immediate descendent the M46, was a first for American tank designers. Though the Abrams has far and away more emphasis placed on survivability, it still follows the M26's example by placing firepower and mobility as the greatest priorities.

From early 1942 to before June 1944, the Sherman was lauded as the best balance of speed, firepower, and armor to date. Experiences with German armor and Axis anti-tank weapons in 1944 and 1945, however, revealed it to be quite vulnerable. The Allied advance in the West continued to march across Europe, but the big German tanks, the “Tiger” and “Panther,” were dealt with only through the effective use of combined arms, superior armored force tactics, and extreme bravery on the part of tank crews. The M26, despite arriving in the latter months of the war, proved itself to be capable of dispatching advanced German designs on a one-to-one basis. Yet, full effect of the M26’s tank-killing prowess would not be witnessed until a little more than five years later on the Korean Peninsula.

Nonetheless, American tank development did not end with the Second World War, and though post-war funding restricted the Ordnance Department to component development, an improved version of the M26, the M46 “Patton” was built. The M46 addressed the former interim tank’s powerpack shortfalls and thus gradually replaced the M26 during 1951 in Korea. Improved designs of the “Patton” series were soon fielded following the war in Korea, namely the M47, M48, and M60, but the lineage of these designs was never in question.

The M47 was another wartime interim tank. The armor crisis of 1950 revealed the need for the United States to begin immediate large-scale tank production again. However, the medium tank T42, which featured a more powerful 90-mm gun, ballistic range finders, and improved armor, was rejected from consideration because its powerplant was deemed insufficient by Army Field Forces.<sup>1</sup> On the other hand, mass production of the M46 did not make sense either because it no longer represented the latest technologies available. The arrived at stopgap solution was to mount the turret of the T42, with the improved T119 90-mm gun, built-

---

<sup>1</sup> Hunnicutt, *Patton History*, 52.

in Rotocloner blower, and range finders, on the chassis of the proven M46 design. In addition, the blower at the top-center of the glacis was removed and the plate was angled back to 60 degrees which gave it comparable frontal armor to the T42.<sup>2</sup> Production of the new tank began in June 1951 but it was never fielded in Korea.

While the M47 was being rushed together in the fall of 1950, the Ordnance Department initiated the designing of a fully modernized and long-term medium tank to eventually replace it. The design project was given to Chrysler's Ordnance Development Department in November 1950.<sup>3</sup> The final result of their labors was the M48. The new tank was based largely off the T43 heavy tank design, adopting its elliptical cast hull and turret as well as its 85-inch turret ring.<sup>4</sup> The T43's original 120-mm gun was dropped in favor of a 90-mm, however. The improved 90-mm T139 matched the ballistic performance of the M47's T119 but it was lighter. Additionally, the M48 used the same engine and transmission as the M47. Production began in earnest in March of 1953.

Neither the M47, nor the M48, enjoyed an especially long service life in United States military service. The former was a stopgap and the latter was lacking in firepower and operational range.<sup>5</sup> In 1958, the intended replacement of the M48A2, the T95 remained out of reach because many of its components were experimental and in need of additional development. With cost and time in mind, yet another half measure solution was implemented. The M48A2 was upgraded with an improved weapon and more fuel-efficient engine, namely the 105-mm gun T254 and the AVDS-1790 (diesel).<sup>6</sup> Because of numerous smaller upgrades the designation was

---

<sup>2</sup> Ibid., 53.

<sup>3</sup> Ibid., 85.

<sup>4</sup> Ibid., 83.

<sup>5</sup> Ibid., 152.

<sup>6</sup> Ibid.

eventually changed to M60, reflecting its production year. This tank was the only of the series not to be officially designated “Patton,” however it was the first to be labeled as a Main Battle Tank (MBT) rather than a medium tank.<sup>7</sup> The M60 served as America’s MBT for three decades and was not replaced until the late 1980’s. In the years before it was replaced its greater height and mediocre cross-country performance, when compared to European models, drew criticism. However, the same features, namely its large turret and compartments, and its great mechanical reliability, gave the design its longevity. Most notably, its spaciousness left room for continued modernizations and upgrades. The M60 is the culmination of and final representation of the M26’s lineage.

Ultimately, the M26 “General Pershing” was the patriarch to the iconic Patton series, which served as America’s front line main battle tanks for four decades of the Cold War. These tanks saw service with many countries besides the United States and in many corners of the globe, with many still in service, and many in museums of both friend and foe alike. Somehow, the M26 still gets forgotten, even with historians; but, the best American tank of the Second World War and Korea should be remembered.

The only two authors that have stepped up to the challenge of creating a full remembrance are R.P. Hunnicutt and Steven Zaloga. Hunnicutt did not have access to the most recently released information on the employment of Armor in Korea and his combat history of the tank is limited, both in World War II and Korea. Zaloga’s two Osprey books on the M26 are mostly excellent, but his narrative remains abbreviated, disjointed, and unsympathetic. Though he does deviate occasionally, his arguments tend to closely align with Hunnicutt’s as well. Every appearance is that the few dissenting points are thrown in only to differentiate the work enough

---

<sup>7</sup> Tank Encyclopedia, “105mm Gun.”

to justifying the sale of Osprey texts to tank enthusiasts. Therefore, the only real histories on the M26, while packaged differently, arrive in the same voice.

New blood is needed as the study of history is progressed only by discussion, not accepting facts at face value. Accordingly, the driving purpose of this thesis was threefold: first, to show that the M26 was important to the study of American military history. Second, to reveal the need for discussion, and third, to open the way for that discussion. However, Hunnicutt and Zaloga's lack of citations make providing much-needed countering arguments a ground-floor enterprise. Thus, enthusiastic researchers are needed, those who are willing to closely pour over the primary documents with fresh eyes. Their search will lead to the exciting discovery of new sources and fruitful historical discussion concerning a tank that has been relegated to the backstage of American military history for too long.

## Bibliography

### Primary Sources

#### Archives

George C. Marshall Research Library, Lexington, VA.

Reel 119, Item 2945.

Reel 132, Item 3419

Reel 370, Item 5395

National Archives of the United States, College Park, MD.

Record Group 156 – Records of the Office of the Chief of Ordnance.

Record Group 338 – Records of U.S. Army Operational, Tactical, and Support Organizations (World War II and Thereafter)

U.S. Army Heritage and Education Center, Carlisle, PA.

Ernest Nason Harmon Papers

John William Leonard Papers

Peter C. Hains III Papers

William M. Hoge Papers

#### Published Primary Sources

*90-mm Gun M3 Mounted in Combat Vehicles*. War Department. TM 9-374. Washington, D.C.: Government Printing Office, 1944.

*Armor-Piercing Ammunition for Gun, 90-mm, M3*. Office of the Chief of Ordnance. Washington, D.C.: Government Printing Office, 1945.

Barnes, Gladeon, M. to historical branch of Office of the Chief of Ordnance. "History of Tank Development by Ordnance Department in World War II." June 12 1951. Quoted in Moran, Nicholas. "The Chieftain's Hatch: Ordnance Department Tank Development." *World of Tanks*. November 28, 2012. Accessed April 5, 2018. <https://worldoftanks.com/en/news/chieftain/chieftains-hatch-ordnance-dept-tank-development/>

Bowers, William T., trans. *Striking Back, March-April 1951*. *Combat in Korea*. Lexington, Ky: University Press of Kentucky, 2010.

Bowers, William T., and John T. Greenwood, trans. *Passing the Test, April-June 1951*. *Combat in Korea*. Lexington, Ky: University Press of Kentucky, 2011.

Bradley, Omar Nelson. *A Soldier's Story: Omar N. Bradley*. New York: Holt, 1994.

MacDonald, H. W., E. D. Strong, W. VanRoyen, I. J. Breen, C. Billingslea, R. W. Brittain, and E. A. Johnson. *The Employment of Armor in Korea*. Operations Research Office, General Headquarters, Far East Command, 1951.

Research Analysis Corporation (RAC). "Technical Situation Report No. 38, September 18, 1945." Quoted in "90mm Gun M3 and M3A1 Rate of Fire." May 6, 2017. War Thunder (blog). Accessed on 25 March, 2018.  
<https://forum.warthunder.com/index.php?/topic/362945-id0057186-12may2017-90mm-gun-m3-and-m3a1-rate-of-fire/>

Thompson, Milton R. *Employment of Armor in Korea, the First Year: A Research Report*, Volumes 1-2. Fort Knox, Ky: Armored School, 1952.

"U.S. 3rd Armored Division in Cologne, World War II." Recorded March 6, 1945. YouTube. Accessed February 11, 2018.  
<https://www.bing.com/videos/search?q=Panther+destroyed+outside+of+Cologne+&&view=detail&mid=7F38B66E6542CA9FD22B7F38B66E6542CA9FD22B&&FORM=VRD GAR>

U.S. Army. *Bailey Bridge*. Headquarters, Department of the Army. FM 5-277. Washington, D.C.: Government Printing Office, 1986.

U.S. Army. *Pershing Heavy Tank T26E3 Technical Manual*. Department of the Army. TM 9-735. Washington, D.C.: Government Printing Office, publication year unknown.

White, Isaac D. "A Report on United States vs. German Armor: Prepared for General of the Army Dwight D. Eisenhower, Supreme Commander, Allied Expeditionary Force." Collection of letters, U.S. Army Heritage and Education Center, PA.

### Secondary Sources

Anderson, Charles R. *Tunisia, 17 November 1942—13 May 1943*. The U.S. Army Campaigns of World War II. Washington, D.C.: U.S. Army Center of Military History, 2004.

Andrew, Mildred G. *Tungsten: The Story of an Indispensable Metal*. Washington, D.C.: The Tungsten Institute, 1955.

Appleman, Roy E. *South to the Naktong, North to the Yalu: June-November 1950*. The United States Army in the Korean War. Edited by Stetson Conn. Washington, D. C.: Center of Military History, United States Army, 1992.

Baily, Charles M. *Faint Praise: American Tanks and Tank Destroyers during World War II*. Hamden, CT: Archon Books, 1983.

Calhoun, Mark T. *General Lesley J. McNair: Unsung Architect of the US Army*. Modern War Studies. Lawrence, Kansas: University Press of Kansas, 2015.

- Cole, Hugh M. *The Ardennes: Battle of the Bulge*. United States Army in World War II, The European Theater of Operations. Washington D. C.: Center of Military History, United States Army, 1994.
- Davis, Cecil G. "Tarnished Armor: The Development of Armor Doctrine in the United States." master's thesis, Central Missouri State University, 1995.
- Forty, George. *United States Tanks of World War II in Action*. Dorset, U.K.: Blandford Press, 1983.
- Greenfield, Kent R, Robert R. Palmer, and Bell I. Wiley. *The Army Ground Forces, The organization of Ground Combat Troops*. United States Army in World War II. Washington, D. C.: Center of Military History, United States Army, 2004.
- Fehrenback, T. R. *This Kind of War: The Classic Korean War History*. Washington, D.C.: Brassey's, 1994.
- Fletcher, David. "Tank Chats #44 T14 and A33 Assault Tanks." The Tank Museum (video). January 13, 2008. Accessed March 18, 2018.  
[https://www.youtube.com/watch?v=2w\\_pjEZhpzo](https://www.youtube.com/watch?v=2w_pjEZhpzo)
- Foss, Christopher F, ed. *The Encyclopedia of Tanks and Armored Fighting Vehicles: The Comprehensive Guide to Over 900 Armored Fighting Vehicles From 1915 to the Present Day*. San Diego, California: Thunder Bay Press, 2002.
- Gibby, Bryan R. *The Will to Win American Military Advisors in Korea, 1946-1953*. Tuscaloosa: University of Alabama Press, 2012.
- Gilbert, Oscar E. *Marine Corps Tank Battles in Korea*. Havertown, PA, Casemate, 2003.
- Gough, Terrence J. *U.S. Army Mobilization and Logistics in the Korean War: A Research Approach*. Washington, D.C.: Center of Military History, United States Army, 1987.
- Green, Constance McLaughlin, Harry C. Thomson, and Peter C. Roots. *The Ordnance Department: Planning Munitions for War*. United States Army in World War II, The Technical Services. Washington, D. C.: Center of Military, History United States Army, 2017.
- Green, Michael. *American Tanks and AFVs of World War II*. New York: Bloomsbury Publishing, 2014.
- Gugeler, Russell A. *Combat Actions in Korea*. Army Historical Series. Washington D. C.: Center of Military History, United States Army, 1987.
- Hastings, Max. *The Korean War*. New York: Simon and Schuster, 1987.

- Heller, Charles E. and William A. Stofft, trans. *America's First Battles: 1776-1965*. Lawrence, KS: University Press of Kansas, 1986.
- Hermes, Walter G. *Truce Tent and Fighting Front*. United States Army in the Korean War. Edited by Stetson Conn. Washington, D.C.: Center of Military History, United States Army, 1992.
- “Honoring Marine Service.” *Marine Corps Gazette* 85, no. 7 (Jul 2001): 88.
- Hunnicuttt, R. P. *Patton: A History of the American Main Battle Tank*. Vol. 1. Brattleboro, Vermont: Echo Point Books & Media, 1984.
- . *Pershing: A History of the Medium Tank T20 Series*. Brattleboro, Vermont: Echo Point Books & Media, 2015.
- Jackson, David D. “Detroit Transmission (Hydra-Matic) Division of General Motors Corporation in World War Two: The Detroit Transmission Torqmatic Model 900-T – as used in the M18 Hellcat Tank Destroyer and M26 Pershing.” *The American Automobile Industry in World War Two: An American Auto Industry Heritage Tribute*. December 27 2016. Accessed on April 6 2018.  
<http://usautoindustryworldwartwo.com/General%20Motors/detroit-transmission-%20the%20Torqmatic%20transmission%20900-T.htm>.
- Keith, Brian. “90mm M82, APC projectile.” *U.S. Militaria Forum* (June 9, 2009). Accessed February 11, 2018. [www.usmilitariaforum.com/forums/index.php?/topic/44694-90mm-m82-apc-projectile/](http://www.usmilitariaforum.com/forums/index.php?/topic/44694-90mm-m82-apc-projectile/)
- MacDonald, Charles B. *The Last Offensive*. United States Army in World War II, The European Theater of Operations. Washington, D. C.: Office of the Chief of Military History, United States Army, 1973.
- Mayo, Lida. *The Ordnance Department: On Beachhead and Battlefield*. United States Army in World War II, The Technical Services. Washington, D. C.: Center of Military History, United States Army, 2009.
- Middleton, Harry J. *The Compact History of the Korean War*. New York: Hawthorn Books, Inc., 1965.
- Millett, Allan R. *The War for Korea, 1950-1951: They Came From the North*. Lawrence, Kansas: University Press of Kansas, 2010.
- Milner, Marc. *Stopping the Panzers: The Untold Story of D-Day*. Modern War Studies. Lawrence, Kansas: University Press of Kansas, 2014.

- Moran, Nicholas. "Inside the Chieftain's Hatch: M26 "Pershing" Part 1." The Chieftain (video). September 12, 2012. Accessed March 18, 2018. <https://www.youtube.com/watch?v=73e-MUZNb1Y>
- . "Inside the Chieftain's Hatch: M26 "Pershing" Part 2." The Chieftain (video). September 19, 2012. Accessed March 18, 2018. [https://www.youtube.com/watch?v=\\_gONk5PS4zM](https://www.youtube.com/watch?v=_gONk5PS4zM)
- . "The Chieftain's Hatch: British Assault Tank." World of Tanks. August 2, 2013. Accessed March 19, 2018. <https://worldoftanks.com/en/news/chieftain/chieftains-hatch-british-assault-tanks/>
- . "The Chieftain's Hatch: Testing T29, T30." World of Tanks. July 12, 2013, Accessed April 22, 2018. [https://worldoftanks.com/en/news/chieftain/The\\_Chieftains\\_Hatch\\_T29T30/](https://worldoftanks.com/en/news/chieftain/The_Chieftains_Hatch_T29T30/).
- Mossman, Billy C. *Ebb and Flow: November 1950-July 1951*. United States Army in the Korean War. Edited by Stetson Conn. Washington, D.C.: Center of Military History, United States Army, 1990.
- Palmer, Robert R., Bell I. Wiley, and William R. Keast. *The Army Ground Forces: The Procurement and Training of Ground Combat Troops*. United States Army in World War II. Washington, D.C.: Center of Military History, United States Army, 1991.
- Rawson, Andrew. *Remagen Bridge: 9th Armored Division*. Battleground Europe: Crossing the Rhine. Barnsley, South Yorkshire: Leo Cooper, 2004.
- Ripley, John W., William S. Dudley, and Robert M. Browning, ed. *The Sea Services in the Korean War: 1950-1953*. Annapolis, Maryland: Naval Institute Press, 2000.
- Ross, MacLeod G., and Campbell Clarke. *The Business of Tanks, 1933 to 1945*. Devon, Great Britain: Arthur H. Stockwell Ltd., 1976.
- Sandler, Stanley. *The Korean War: No Victors, No Vanquished*. Cornwall, UK: The University Press of Kentucky, 1999.
- Sawyer, Robert C. *Military Advisors in Korea: KMAG in Peace and War*. Army Historical. Edited by Walter G. Hermes. Washington, D.C.: Center of Military History, United States Army, 1988.
- Schnabel, James F. *Policy and Direction: The First Year*. United States Army in the Korean War. Edited by Maurice Matloff. Washington, D.C.: Center of Military History, United States Army, 1992.
- Snedeker, Donald C. "One was enough." *Marine Corps Gazette* 84, no. 11 (Nov 2000): 71-77.

- Strike Swiftly: Korea 1950-1953: 70<sup>th</sup> Heavy Tank Battalion*. Paducah, KY: Turner Publishing Company, 2000.
- Toland, John. *The Last 100 Days: The Tumultuous and Controversial Story of the Final Days of World War II in Europe*. New York: Modern Library, 2003.
- Velicogna, Arrigo. "Jake Devers' Tank: The M26 Pershing, Part Two." *Avalanche Press* (February, 2017). Accessed February 11, 2018.  
<http://www.avalancheexpress.com/Pershing2.php>
- Westover, John G., *Combat Support in Korea*. U.S. Army in Action Series. Washington, D.C.: Center of Military History, United States Army, 1987.
- Zaloga, Steven J, and Peter Sarson. *T-34/76: Medium Tank, 1941-1945*. New Vanguard. no. 9. Edited by Lee Johnson. London: Reed International Books, 1994.
- Zaloga, Steven J. *Armored Attack 1944: U.S. Army Tank Combat in the European Theater from D-Day to the Battle of the Bulge*. Mechanicsburg, PA: Stackpole Books, 2011.
- . *Panther vs Sherman: Battle of the Bulge 1944*. Duel, no. 13. Oxford, UK: Osprey Publishing Ltd., 2008.
- . *Pershing vs Tiger: Germany 1945*. Duel, no. 80. Oxford, UK: Osprey Publishing Ltd., 2017.
- . *T-34-85 vs M26 Pershing: Korea 1950*. Duel, no. 32. Oxford, UK: Osprey Publishing Ltd., 2010.
- Zaloga, Steven J, Tony Bryan, and Jim Laurier. *M26/M46 Pershing Tank, 1943-1953*. New Vanguard, no. 35. Oxford, UK: Osprey Publishing Ltd., 2000.