

RONSONS, ZIPPOS, BREW-UPS, AND TOMMYCOOKERS:
THE M4 SHERMAN TANK AND AMERICAN ARMORED
DEVELOPMENT DURING WORLD WAR II

by

JOHN MICHAEL MULLER

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ABSTRACT

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John Michael Muller, M.A.

The University of Texas at Arlington, 2012

Supervising Professor: Joyce Goldberg

In January 1945 the M4 Sherman tank became embroiled in bitter controversy for its inability to match-up with certain tanks of the German Army. Citing many deficiencies of the Sherman, angry American tankers vented their frustrations to the media during the Battle of the Bulge in December 1944 and January 1945. Questioning the effectiveness of the Ordnance Department and U.S. Army doctrine that governed the tanks produced, members of the media demanded a congressional investigation why American tanks appeared to be substantially inferior in mobility, firepower, and protection in comparison to German tanks. High-level commanders tried to quell the controversy by touting the Sherman as a war-winning weapon and asserting that the heavily armed and armored tanks were few in number and possessed qualities ill-suited for the type of warfare waged by the U.S. Army. Postwar, some members of the Ordnance Department claimed that far better tanks would have been available to the Army as early as the Normandy invasion in the summer of 1944 had it not been for the interference of Army Ground Forces (AGF) and its commander General Leslie J. McNair. This thesis will reveal that while AGF played a role in the difficult situation experienced by American tankers, far more responsibility actually lay in the efforts of the Ordnance department and the failure of intelligence to properly assess the threat of new German vehicles.

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CHAPTER 1

INTRODUCTION

Major General Gladeon M. Barnes, Chief of Research and Development for the Ordnance Department of the United States Army, had much to contemplate as he set out on the afternoon of 7 February, 1945 bound for Newfoundland on the first leg of Zebra Mission. Barnes had overseen efforts to develop the new Heavy Tank T26E3, Pershing, twenty of which were now being rushed to Europe as a part of a high priority mission to introduce them to combat units in the European Theater of Operations (ETO).¹ Ordnance had expended considerable effort over the previous three years to introduce more heavily armed and armored tanks to either supplement or replace the standard weapon of Allied armored units, the Medium Tank M4 Sherman, a weapon now embroiled in a firestorm of controversy over its merits in relation to current German tank designs. Since the Normandy invasion, tank-to-tank combat with more heavily armed and armored German opponents had glaringly exposed the weaknesses of the Sherman. The American press learned of the issue when GIs began to grouse to correspondents in January of 1945 about the Sherman's performance during the Battle of the Bulge. The media called for a congressional investigation to explain why the Sherman was so outmatched by its German counterparts.² Barnes, having anticipated such consequences while attempting, unsuccessfully, to standardize new tank designs, might have wanted to shout, "I told you so!" to anyone who would listen regarding the current controversy.³ Yet, any satisfaction he might have harbored over finally being able to introduce a better tank may have been tempered by thoughts of why it had taken so long, and of the tragic consequences the continued use of the Sherman was having for Allied tankers.

¹ *Report of Heavy Tank Mission*, 6 March 1945, Folder: "Commendations," Box A772, Entry 646A, RG 156, National Archives, College Park, Maryland [hereafter referred to as NARA II]; G. MacLeod Ross *The Business of Tanks*, 1933 to 1945 (Ilfracombe, England: Stockwell, 1976), 272; Lida Mayo, *The Ordnance Department: On Beachhead and Battlefield* (Washington, DC: OCMH, 1968), 332.

² Hanson W. Baldwin, "The German Blow-III," *New York Times*, 5 January, 1945. Microfilm collection, United States Army Military History Institute, Carlisle Barracks, Carlisle, Pennsylvania [hereafter referred to as USAMHI].

³ *History of the Medium Tank T20 Series*, 4 October, 1943 and 9 December entries, Box A797, Entry 646A, RG 156, NARA II [best described as a daily journal of the development process of the T20 series of U.S. tanks, and hereafter referred to as *T20 History*, followed by entry dates].

First introduced into combat at the crucial Battle of El Alamein in late 1942 and deemed by Allied observers to be the best tank on the North African battlefield, by 1945 the Sherman was obsolete, with many inherent, and fatal, shortcomings in the opinion of most of the men who manned them. Flaws in armor protection on the initial models used by the British immediately prompted the Germans to nickname the tanks "Tommie Cookers" for their propensity to burn. Allied tankers labeled them "Ronsons" and "Zippos" after the popular cigarette lighters of the day and even following modifications the tank retained a particularly disconcerting habit of catching fire. Its tall silhouette made it easy to spot, and the narrow tracks of the original design performed poorly in deep mud, snow, and on ice. Well armed and armored for combating soft targets, including most of the tanks on the North African battlefield of late 1942, the power of the Sherman's low-velocity 75mm gun and protection of its poorly-shaped two and one-half inch armor quickly fell behind as the German opponent began adding thicker armor and high-velocity guns to existing designs in late 1942 and early 1943.⁴

In fall 1942, the first of two completely new German tank designs, a heavy tank influenced by experience in the Soviet Union, was committed to action near Leningrad. The second of these German vehicles, a medium tank with features derived directly from Soviet designs, debuted in July 1943 at the Battle of Kursk, an offensive delayed specifically to allow the use of the new weapon.⁵ Far superior in gun power and protection, these new tanks completely outclassed the Sherman. A direct response to ongoing engagements with superior Soviet armor the Wehrmacht (German Army) first encountered in the summer of 1941 during "Operation Barbarossa," the appearance of these new German vehicles presaged an accelerated arms race in tank design. Few of these vehicles appeared in the peripheral theaters of the western Allies until summer 1944. The United States and Great Britain proved slow to respond to the

⁴ Rick Atkinson, *An Army at Dawn: The War in North Africa, 1942-1943* (New York: Henry Holt and Company, 2002), 218-219; Max Hastings, *Armageddon: The Battle for Germany 1944-1945* (New York: Vintage Books, 2004), 84-86; Evelyn M. Monahan and Rosemary Neidel-Greenlee, *And If I Die: Frontline U.S. Army Nurses in World War II* (New York: Anchor Books, 2004), 419; Robert A. Slayton, *Arms of Destruction: Ranking the World's Best Land Weapons of World War II* (New York: Citadel Press, 2004), 175-176.

⁵ David M. Glantz and Jonathan M. House, *The Battle of Kursk* (Lawrence, Kansas: University of Kansas Press, 1999), 17-20; Dennis Showalter, *Hitler's Panzers: The Lightning Attacks That Revolutionized Warfare* (New York: The Berkley Publishing Group, 2009), 258.

threat because, unlike the Germans and Soviets, the inadequacies of their tanks were not “revealed by large, frequent tank battles” until the summer and fall of 1944.⁶

The controversy surrounding the Sherman tank in March of 1945 is a study of sharp contrasts. Generals spoke of the Sherman as a weapons system perfectly designed for its mission. They claimed that its mobility and reliability had enabled the armies of the western allies to advance to the doorstep of victory over Nazi Germany. Lieutenant General George S. Patton flatly proclaimed that “American tanks are the best in the world.”⁷ Yet, tankers in the field bitterly referred to them as “Deathtraps.”⁸ According to the troops, the tank was under gunned, too thinly armored, and not as nimble as its larger, heavier German adversaries in adverse conditions. What makes the issue so compelling, even today, is that both assessments are essentially correct.

The Sherman may best be characterized by its contradictions. It was both a war winner and a hazard to its crews. An understanding of both the successes and the failures of the Sherman requires a nuanced approach that focuses not on the tank itself, but rather on the doctrine it was tasked with executing, and whether or not efforts to replace it were hampered by that doctrine, or by the performance of Barnes and the Ordnance Department. Questionable doctrinal concerns and unfocused efforts by Ordnance combined with a failure to assess the extent of the threat new German tank designs constituted, and led to the Sherman simply being required to soldier on too long. Legitimate logistical issues involved with the transportation of heavy vehicles overseas further complicated efforts to standardize heavier tanks. The Sherman should have been either replaced or supplemented by tanks better suited for combating contemporary German armor before the invasion of northwest Europe. Unfortunately, Barnes’ twenty T26E3s were “far too little and much too late.”⁹

⁶ Charles M. Baily, *Faint Praise: American Tanks and Tank Destroyers during World War II* (Hamden, Connecticut: Archon Books, 1983), 35.

⁷ Office, Chief of Ordnance Research and Development Division, File: “Press Releases,” Box A746, Entry 646A, RG 156, NARA II.

⁸ Belton Y. Cooper, *Deathtraps: The Survival of an American Armored Division in World War II* (New York: Ballantine Books, 1998), iii.

⁹ Baily, *Faint Praise*, 139.

Barnes' problems were not due to lack of developmental time for a replacement or failure to recognize new trends in tank technology. Studies for a replacement had begun as early as spring 1942, six months before the Sherman's combat debut, and the Ordnance Department was fully cognizant of German armored development, as the Soviets kept their western Allies well-apprised of German technological advances. Before the end of 1942, again, prior to the introduction of the Sherman, the Ordnance Corps had in its possession, at the Aberdeen Proving Ground in Maryland, examples of the two Soviet tanks that had led the Germans to produce the tanks that were dominating the Sherman.¹⁰ The basic characteristics of the German tank designs that caused such problems for the western Allies in 1944 were obviously aimed at achieving superiority over these tanks. This fact was reflected in the majority of the designs Ordnance developed that eventually featured lower silhouettes, sloped armor, wide tracks, and larger guns similar to the troublesome German tanks. Yet, three years after initiating studies for a Sherman replacement, the twenty Pershing's of Zebra Mission were the sole concrete result on the battlefield of ongoing efforts by American designers to produce a better tank.

After the war defenders again lauded the Sherman, as the generals had in 1945, for its reliability and mobility. Historians and military men defending the tank always cite these qualities, coupled with the tank's availability in large numbers, in touting the Sherman as a war winning weapon of the first order. Sherman success in the exploitation phase following Operation Cobra, the breakout from the Normandy bridgehead, provided positive testimony to the importance of these qualities, which were again highlighted in the final series of Allied offensives conducted in spring 1945. These brilliant moments for the Sherman reflect the fact that, in official American armored doctrine, the tanks of the armored divisions were never intended to fight other tanks.

The Sherman was specifically tasked, according to the doctrine of the armored division, as a weapon of exploitation. Following a breakthrough, tank forces would rapidly advance through the rear areas of the enemy towards distant and strategic objectives. Strong opposition like tanks, fortifications, or

¹⁰ George. B. Jarrett, *Ordnance: The Theme Song of Military History* (Unpublished manuscript), 146, *Jarrett Papers*, USAMHI. Jarrett was an Ordnance officer during the war. Postwar, he founded the Ordnance Museum at the Aberdeen Proving Grounds.

dug-in infantry well supported by artillery and anti-tank guns would be bypassed. Additional doctrine, developed in 1940 and 1941 at the height of German Blitzkrieg, placed a premium on stopping enemy armor and focused not on the tanks of the Armored Force, but instead on the mobile assets of a new combat arm, Tank Destroyer Command, as the means of opposing attacking mechanized forces. In all circumstances, countering an opponent with an aggressive combined arms approach using infantry, artillery, armor, and close air support was stressed.¹¹ Fortunately for the Allied war effort, the overall doctrine stressing combined arms eventually disguised the flaws in the doctrine governing tanks and tank destroyers. Unfortunately for Allied tankers manning under-gunned, thinly armored Shermans in Europe from June 1944 until war's end, the devil lay in the details of the doctrine.

Failure to replace or supplement the Sherman with a tank better suited to fight other tanks was the result of a variety of reasons, but tank destroyer doctrine deserves special consideration, as it directly affected the weapons built to combat enemy armor. Some postwar analysis placed considerable blame on the shoulders of Army Ground Forces (AGF) and, specifically, on its commander, Lieutenant General Leslie J. McNair for allowing doctrinal concerns to retard the process of tank development.¹² While considerable responsibility for approval of production of new weapons lay with AGF, the organization and its commander did nothing to hinder development. However, adamant AGF adherence to doctrine meant that, initially, only the mobile gun carriages of the Tank Destroyer Force were allowed to be produced with weapons, like a 76mm gun developed by Ordnance in 1942, to kill tanks. The shortcomings of this weapon in both the tank destroyer and the Sherman led Ordnance to initiate a crash program to introduce both tanks and tank destroyers with a 90mm gun in late 1944. Ordnance began advocating the 90mm gun in early 1943, but efforts to mount it, and the 76mm gun, in production vehicles were consistently stymied by AGF. At the request of theater commanders in the spring of 1944, General George C.

¹¹ *FM 100-5, War Department Field Service Regulations: Operations*, 263, USAMHI. Released in May 1941, this is the official Field Manual, thus *FM*, outlining overall combined arms doctrine and the role of armored units.

¹² Major General (Ret.) Gladeon M. Barnes, *History of Tank Development by Ordnance Department in World War II* (Written on 12 June 1951 for *Records of the Office of the Chief of Ordnance*), 11-13, Box A778, Entry 646A, RG 156, NARA II. In this short essay written for an unpublished postwar Ordnance history, Barnes claims McNair told him "he would never approve a heavy tank for the United States Army"; Baily, *Faint Praise*, 2, 140-142. Baily believes such criticism "does both a disservice to history and Lesley J. McNair."

Marshall, Army Chief of Staff, finally overrode continued objections.¹³ The T26E3s that Barnes rushed to northwest Europe almost a year later proved to be a belated byproduct of this decision.

Inflexible adherence to doctrine compounded the failure of Allied intelligence to properly assess the threat advances in German armored development constituted. Extreme satisfaction with the performance of the Sherman in North Africa, and strict adherence to doctrine that stifled the standardization of better designs, meant that the same basic features of the Sherman of late 1942 would be retained in the Sherman that equipped the armored formations invading the European continent in the summer of 1944. First encountered by the western Allies during the closing stages of the North African campaign, the new German armor, committed in limited numbers, failed to impress most observers. These circumstances combined with the misplaced satisfaction with the Sherman to create a general lack of urgency regarding the need for new tanks. Overwhelming Allied air superiority and the massed use of artillery and supporting naval gunfire largely nullified the effectiveness of the new German tanks committed, again, in small numbers in subsequent encounters during the invasions of Sicily, Anzio, and Salerno. While these circumstances once again dampened the effect of these same tanks during the battle for Normandy, the appearance of new German vehicles in significant numbers proved an ominous cause for concern for Allied tankers. The success of the Sherman in the breakout from Normandy then temporarily delayed any sense of urgency towards the introduction of new tanks until the Battle of the Bulge, where the new German tanks constituted a significant portion of the enemy armor committed. The subsequent controversy in the American press undoubtedly expedited the introduction of the Pershing.

Exacerbating the failure to produce a successor to the Sherman was the fact that, unlike contemporary 1942 German and Russian designs, upgrades to the original vehicle either came too late or were largely unsuccessful in significantly improving combat performance, especially in the area of firepower.¹⁴ The 76mm gun developed by the Ordnance Department to up-gun the Sherman, for example, failed to live up to expectations, and an improved suspension for the tank featuring wider tracks barely

¹³ *Ibid*, 124-125.

¹⁴ *Ibid*, 144-145.

beat the Pershing into production. Designed to combat the German armor of the early war period, the failed efforts of American designers to replace or properly upgrade the Sherman reflected stagnation in the technical process. Focused more on producing a new tank, Ordnance virtually neglected the Sherman's potential for improvement.

The only significant, relatively successful, upgrade made to the Sherman prior to "Operation Overlord" was the British installation of a 76mm gun of their own design that they referred to as the 17-pounder. Although the 17-pounder was a fine weapon, nearly the equal of German weapons of the same size, the fact that they were forced to mount it in the turret of an American tank spoke volumes about the state of British armored development.¹⁵ The good performance of this weapon was offset by its limited availability. Only one out of every four British Sherman's ever carried 17-pounders. These tanks, known as Fireflies, were easily identified by their long gun tubes and invariably targeted early in an engagement by German gunners out of respect for their armament. The problem of availability might have been solved had the United States opted to produce and use the 17-pounder, but Ordnance instead chose to equip some Sherman's with the mediocre new 76mm gun and develop a 90mm anti-aircraft gun as a possible future upgrade. The failure to provide the tank with a good weapon magnified the other shortcomings of the Sherman.¹⁶ Thus, in the midst of the ever accelerating arms race in tank technology, the western Allies fell well behind the other main combatants of the European war, Germany and the Soviet Union, and did not catch up until it was too late.

An assessment of the performance of American tanks, both during and immediately after the war, depends entirely upon who is doing the assessing. Those arguing on behalf of the Sherman generally tended to be higher ranking officers who usually had no direct experience in the actual brutality of armored warfare. Annoyingly to Allied tankers, during the war the Generals followed the company line

¹⁵ George. B. Jarrett, File: *Matters of Interest for the Ordnance Museum* [Unpublished essay on British 17-pounder], *Jarrett Papers*, USAMHI.

¹⁶ Major General Isaac D. White, *A Report on United States vs. German Armor*, 20-21, 51 [March 1945 report prepared for Eisenhower by 2nd Armored Division hereafter referred to as *White Report*], USAMHI.

that American weapons were the “best in the world.”¹⁷ In the postwar era these men cited production rates, shipping weights, limitations of bridging equipment, and the necessities of doctrine in defending the continued use of the Sherman in 1944 and 1945. That these were all legitimate concerns is undeniable. That the officers and men of the Armored Force cared little for such concerns is equally undeniable. For the survivors of frontline armored units, any perceptions of the Sherman as a war winning weapon were clouded instead by memories of the tank as a “Deathtrap.” The failure to replace or supplement the Sherman with a tank better suited to combating heavy German armor cost an incalculable number of unnecessary casualties and represented the worst error in the equipping of a major combat arm during the Second World War. Relying on tactics of movement, while seeking to maneuver for shots to the more vulnerable sides or rear of superior German tanks, was a bloody business when it was forced on Allied tankers. Fortunately for the Allied war effort, the overall doctrine of combined arms adopted in 1941 allowed the Sherman to prevail. The Allies won the war in spite of the tank in large part because overwhelming firepower from tactical air assets and artillery proved to be the preferred option to direct tactical engagement with far superior German armor.

¹⁷ *Office, Chief of Ordnance Research and Development Division*, File: “*Press Releases*,” Box A746, Entry 646A, RG 156, NARA II.

CHAPTER 2

LEARNING FROM THE GERMANS

The airplane and the tank, tactically useful in 1918, were transformed by technological advances between the world wars into weapons with extraordinary strategic potential by the end of the 1930s. First conceived by the Allied Powers to break the stalemate of trench warfare during the First World War, the tank greatly enhanced its reputation as an offensive weapon and realized its full potential in German hands in the opening stages of the second great war of the twentieth century. The mechanically cantankerous vehicles of the first war were always able to breach defensive lines, yet incapable of exploiting initial success. The advent of far more reliable tanks between the wars, capable of rapid, sustained operations, dramatically altered the potential of armor. When organized into armored divisions by the Germans, and supported by aircraft of equally advanced combat capabilities, tanks emerged as a potent weapon in a new type of combined arms warfare known as Blitzkrieg or “lightening war.”¹

The U.S. Army finally awakened to the real potential of tanks following the German invasion of Poland in September 1939. Overcoming years of neglect and limited initial funding, the Army managed to assemble an embryonic armored force over the next two years. These efforts, based on observations of German success with tanks, were essentially reactive in nature and led some Army leaders to draw incorrect conclusions regarding the use of armor.² Continued German successes with Blitzkrieg fostered a singular focus on stopping an assault by massed tanks. This resulted in the concept of a specialized weapon system combining outstanding mobility and great firepower for the killing of tanks. Tank destroyers, or TDs, which proved to be neither very mobile nor particularly destructive, arose from this

¹ Kenneth Macksey and John H. Batchelor, *Tank: A History of the Armoured Fighting Vehicle* (New York: Ballantine Books, 1971), 20-25, 48-50, 72-74.

² Peter Chamberlain and Chris Ellis, *British and American Tanks of World War II: The Complete Illustrated History of British, American and Commonwealth Tanks, Gun Motor Carriages and Special Purpose Vehicles, 1939-1945* (New York: Arco Publishing, Inc., 1981), 9-10, 105-106; Lieutenant Colonel Robert J. Icks, *Evolution of American and German Medium Tanks*, p. 1. [20 January, 1943 report prepared as reference material for an unpublished history to have been entitled *Ordnance Department in World War II*], Box 799, Entry 646A, RG 156.

theory. The tank destroyers in turn created doctrinal concerns that would have detrimental effects on the development of U.S. armored vehicles, particularly tanks. In 1939, however, bureaucratic infighting over weapons and doctrine mattered little to an army with neither.

The ease and speed of Germany's victory in Poland seemed to owe much to the use of massed armor, setting all nations to work on organizing their own large armored units. Unlike the Germans, other nations tended toward the piecemeal deployment of medium and heavy tanks in support of infantry or the use of light tanks in the reconnaissance role. The former represented an armored doctrine little different than that practiced in 1918. Subordination of armor to the traditional branches of the infantry and cavalry was the rule in the U.S. Army as well.³ The French and the British desperately began organizing their existing tanks into armored brigades and divisions following the conquest of Poland.⁴ German success in 1939 finally settled the argument over how to use tanks in the future.

The fact that the British and French were forced to throw together armored divisions hurriedly in the winter of 1939-1940 was a testament to the conservative nature of most general staffs of the day. It took a live demonstration in Poland to remind British and French leaders of the possibilities of the tank that they themselves had demonstrated so vividly to the Germans in the First World War. Having scratched the surface of the tanks potential in 1916-1918, Britain and France squandered their head start in both doctrine and equipment by choosing to tie down armored units in supporting roles for the infantry and cavalry. The independent role of armor advocated by far-sighted thinkers like British General J. F. C. Fuller was instead taken up enthusiastically in Germany by officers like Captain Heinz Guderian in the 1920s.⁵

By 1939, the army victimized by armored attacks in the First World War seemed to have a complete grasp of how best to use tanks. The rest of the world tried desperately to catch up. Germany's lead in the use of armor existed in spite of limitations placed on its military by the Versailles Treaty.

³ Baily, *Faint Praise*, 4-5.

⁴ Bryan Perrett, *Knights of the Black Cross: Hitler's Panzerwaffe and Its Leaders* (New York: St. Martin's Press, 1986), 52-53.

⁵ Macksey and Batchelor, *Tank*, 22-28.

Forbidden tanks, and with the Army limited to 100,000 men, the 1920s Reichswehr (Under Hitler the Wehrmacht) nevertheless managed to experiment secretly with armored designs and tactics with the cooperation of the Soviet Union. Unlike tank enthusiasts in other nations, Guderian enjoyed free reign in the development of armored doctrine and weapons. Considering the prevalence of Prussian conservatism in the German military, the subordination of tanks to the traditional arms of cavalry and infantry, the rule in other prewar armies, could easily have been the case in Germany as well, but Guderian enjoyed the support of powerful benefactors. Supported in the 1920s by the commander of the Reichswehr, General Hans von Seeckt, and later by Adolf Hitler, Guderian laid the groundwork for the success of the Panzerwaffe (armored force).⁶

As Nazi Germany grew more belligerent in the late 1930s, the existence of the Panzerwaffe was no secret to potential adversaries like France, Great Britain, and the Soviet Union. The United States also closely followed how the Germans used their Panzers. In a memorandum to the Assistant Commandant of the Army War College in April 1938, the Spanish Civil War had provided Lieutenant Colonel Gladeon Barnes, then a student at the college, with fodder for an assessment of lessons to be learned from armor deployed by both sides during the conflict. This memorandum focused on tank development, listing both the limitations and positive characteristics of tanks. Barnes related that light tanks of both German and Russian origin were of little use and observed that unsupported armored attacks usually failed. He stressed the need for employing tanks in mass, and recognized the need to balance firepower with mobility. Barnes even proposed a design for a seven ton, two-man “heavy” tank, illustrating the blurring of lines between what constituted light, medium, and heavy tanks. Had Barnes been aware that forty-plus ton tanks would, in five years, be classified as mediums, he would have been astonished.⁷

Ongoing armored development rendered the light tanks of the Spanish Civil War essentially obsolete by 1939. Possessing many, the Germans compensated for their weaknesses with a doctrine

⁶ Matthew Hughes and Chris Mann, *The Panther Tank* (Osceola, Wisconsin: MBI Publishing Company, 2000), 8-11; Perrett, *Knights of the Black Cross*, 17-24.

⁷ Gladeon M. Barnes, 1938 memorandum to the Assistant Commandant of the Army War College, Folder: *Development of Heavy Tanks*, Box A798, Entry 646A, RG 156, NARA II.

stressing the combined assets of infantry and artillery on the ground assisted by close air support from the Luftwaffe (German air force). All assets of the combined arms, controlled via a superior radio communications system, overcame the tactical limitations of individual components. The success of the light tanks in Poland was based strictly on their mobility, and the flexibility of the combined arms concept practiced by the Germans.

There were two types of German light tanks, the five ton Panzerkampfwagen I (Mk. I) armed with two machine guns, and the ten ton Panzerkampfwagen II (Mk. II) armed with a 20mm cannon. Both tanks carried their armament in a fully traversable turret. The Mk. I, originally designed as a training vehicle, was useless against other tanks and helpless against all but small arms fire. Used because of its availability in substantial numbers, the Mk. I continued to serve well beyond its expiration date in 1939. The Mk. II proved marginally more effective than the Mk. I due, mainly, to its 20mm armament, but by 1940 this amounted to nothing more than a slow firing, heavy machine gun. As Germany prepared for an offensive in the west in the spring of 1940, half the Wehrmacht's tanks severely lacked firepower to combat potential French and British opposition. Fortunately for the Germans, they possessed two far more effective medium tank designs in the 15 ton Panzerkampfwagen III (Mk. III), with 37mm main armament, and 17 ton Panzerkampfwagen IV (Mk. IV), mounting a short-barreled 75mm gun. Over 600 of these tanks, intended to be the primary future weapons of the Panzer divisions, were available for the attack in the west in 1940. The spearhead divisions of Guderian's armored corps, tasked with the crucial breakthrough at Sedan, were generously equipped with these vehicles.⁸

Heavily armored French B-1 bis and British Matilda II tanks did indeed prove impervious to the weapons of the Mark Is and Mark IIs when the German offensive finally came in May 1940. Even the Mk. IIIs and IVs struggled to knock out these allied tanks. Using tactics that would have been familiar to the tankers of the western Allies in 1944 and 1945, the Germans maneuvered their Mk. IIIs and Mk. IVs for

⁸ *Military Intelligence Division Correspondence*, 1917-1941, report 2218-B-18, no. 6, from Military Attaché (MA) in Berlin 28 May 1939 [Hereafter referred to as *MID Correspondence*, followed by numerical identification and date of report], Entry A1-65, RG 165, NARA II. Perrett, *Knights of the Black Cross*, 29-30, 54. The designation: Mk., followed by a number will be used by the author in identifying German tanks. Other variations of abbreviations for "Mark" or "Panzerkampfwagen" will occasionally appear as originally used in primary source documents.

side and rear shots, or simply relied on the firepower of artillery and air support as specified in combined arms doctrine to overcome the threat posed by more heavily armored vehicles. The German 88mm anti-aircraft gun even contributed as a tank killer in stopping several counterattacks led by the French tank aficionado, General Charles deGaulle, against the flanks of the Sedan breakthrough.⁹ DeGaulle's efforts notwithstanding, combined arms doctrine succeeded spectacularly. Allied numerical superiority in tanks and other arms were entirely negated by their piecemeal deployment and the superior tactics of the Germans. The German offensive launched on 7 May, 1940 ended with the formal surrender of France on 25 June.

Germany's crushing defeat of the French Army and the British Expeditionary Force in the spring of 1940 completely erased any lingering doubts about the need for the employment of tanks en masse. Only the miraculous escape of 338,000 men from the French port of Dunkirk averted total disaster. The loss of all their equipment, including over 300 tanks comprising half of the nation's armored force, compounded the British defeat.¹⁰ For the United States, tending to the neglected needs of the American military and devising means to aid a British nation now isolated and under the threat of German invasion became priorities almost overnight.

The annihilation of the Polish Army and the thorough defeat of France and Britain contained important lessons for American intelligence experts to examine. As a pro-Allied neutral power, the United States benefitted from formal diplomatic access in Germany and the occupied territories. Shortly after the defeat of Poland, an intelligence memo highlighting the objectives of observers in Europe circulated among American military attachés. Every aspect of the German military was highlighted and crucial questions regarding each were presented. The weapons and tactics used by German armored formations seemed of particular interest to analysts. The section on armor sought to answer the extent to which tanks were "being used in relation to infantry." The memo recommended special attention be paid to

⁹ *MID Correspondence*, report 2058-566, no. 23, from MA in New York, 2 June 1941.

¹⁰ Douglas H. Pratt, *Ordnance Department in World War II* (Folder: March and November 1942 letters from members of British Tank Commission in reference material for unpublished history), Box 799, Entry 646A, RG 156. Pratt lost all 100 tanks of his battalion in France.

determine if “tanks are being used in semi-independent operations, or in close coordination with attacks of foot troops,” to whether or not tanks are “employed in mass or in small groups,” and sought to answer “what practical means of coordinating the operations of tanks and foot troops are proving best?” Assessments of the effectiveness of light and heavy tanks, the proportions of each, and how they were used became essential.¹¹ Military Intelligence Division (MID) reports poured in from American military attachés in a variety of locations.

German heavy tanks received attention far out of proportion to their actual availability in MID reports in both 1940 and 1941. One report forwarded to the Office of the Chief of Ordnance stated that “a 70 ton tank is reported to be undergoing trials” and warned that tanks of “up to 90 tons” are in development. This same report also noted the existence of Panzerkampfwagen Vs and VIs of 32 tons or more.¹² Reports of these tanks appeared regularly in other communiqués throughout 1940 and 1941.¹³ At one point, an intelligence report stated that 785 of these tanks had been produced. In fact, only five of the supposed Mk. Vs and one Mk. VI, all obsolete prototypes from a long abandoned development program, actually existed. Five of these tanks, landing in Oslo, Norway during the Nazi occupation in April 1940, received considerable attention in the German press, and from the American military attaché in Berlin, when they were photographed shortly after their disembarkation.¹⁴ Purely a propaganda ploy, this was the only deployment of these vehicles. The numerous sightings of heavy tanks in France served as testimony to the effectiveness of this ploy.¹⁵ Beginning in late 1942, Allied tankers had the misfortune to become all too familiar with a new generation of Mk. Vs and Mk. VIs in the accelerated tank arms race.

Information regarding the performance of medium and light tanks during the campaign in France proved far more accurate than the reports of phantom Mk. Vs and Mk. VIs. The Mk. IV received the best reviews in MID reports. A report from the military attaché in Vichy quoted French authorities stating that

¹¹ *MID Correspondence*, report 265-364, no. 11, MID office in New York to the Assistant Chief of Staff, G-2, 29 September, 1939.

¹² *Ibid*, report 2724-523, no. 3, MID office in New York to Office of the Chief of Ordnance, 23 October, 1940.

¹³ *Ibid*, report 2657-234, no. 17, from MA Berlin, 20 May, 1940 and report 2281-B-18, no. 11, from MA Berlin, 19 April, 1940.

¹⁴ *Ibid*, report 2281-B-18, no. 17, from MA Berlin, 14 May, 1940.

¹⁵ Perett, *Knights of the Black Cross*, 50.

their B-1 bis and the German P.Z. Kw. 4 were “the most effective tanks on the battlefield.” The advantage of the German tank compared to the French was the mounting of its main 75mm armament in a fully traversing turret. The French tank also carried a good 75mm gun, but its position “lower down and forward” in the hull “limited” its effectiveness. Other reports refer to this weakness in the design of the B-1 bis, a point of great importance to designers contemplating the layout of future American tanks.¹⁶

The military attachés also concentrated on tactics in the MID reports. A communiqué from the attaché in Berlin related that “German officers stated that the French generally placed their antitank mines across the roads at desirable points such as defiles, and their antitank guns were usually placed at or near a crossroads. The attacking German tanks habitually avoided roads and crossroads. They attacked such positions from the flank and rear.” This same report warned that “a few antitank guns should not be considered as adequate protection against a hostile tank attack” because tanks used in mass could overwhelm them. The idea that antitank guns, also deployed in mass, might have a better chance to stop such an attack helped give rise to the concept of the mobile tank destroyer in the U.S. Army. This same report heaps more abuse on the French B-1 bis for being “too slow to get away from the German advance.”¹⁷

Other reports outlined the organization of the Panzer divisions,¹⁸ the appearance of a new high-velocity 50mm gun mounted in the Mk.III,¹⁹ and thicker armor on German medium tanks.²⁰ German tactics, along with trends in tank and antitank technology, were of utmost importance to both the designers of doctrine and equipment. For the most part, both were to be copied from the Germans by the U.S. Army. The prospect of stopping a German offensive led by the Panzerwaffe, however, became of overriding importance at the highest levels of command, and led to an antitank doctrine that had long-term consequences in the equipment provided to U.S. armored units.

¹⁶ *MID Correspondence*, report 2281-C-160, no. 5, from MA Vichy, 8 April, 1940.

¹⁷ *Ibid*, report 2281-65, no. 1, from MA Berlin, 20 June, 1940.

¹⁸ *Ibid*, report 2016-1257, no. 16, from MA Berlin, 3 March, 1941.

¹⁹ *Ibid*, report 2016-1236, no. 19, from MA Berlin, 29 April, 1941.

²⁰ *Ibid*, report 2016-1236, no. 18, from MA Berlin, 21 April, 1941.

The fall of France immediately jolted American political leadership into focusing on effective measures towards military preparedness. The National Munitions Program adopted on 30 June, 1940 took one step in this direction. An order from General Headquarters creating the Armored Force in July 1940 was another. On 15 August, 1940 a contract was awarded to Chrysler for the production of 100 tanks per month at the Detroit Tank Arsenal. The state of U.S. unpreparedness was reflected in the fact that the contract was to begin within a year at an, as yet, nonexistent factory. Not counting strategic reserves or units along the eastern border of the Reich, Germany committed 136 divisions to the invasion of France and the Low Countries in the spring of 1940. At that time the U.S. Army could muster five. A few hundred obsolete tanks, spread out in infantry and cavalry formations, were all the United States possessed. Germany used over 2400 tanks in the defeat of the British and French.²¹

The M2A1 medium tank, the vehicle that the future Detroit Tank Arsenal would build, was already obsolete by the summer of 1940. Like the German Mk. I and Mk. II, the M2A1 proved useful as a training vehicle and would, fortunately, only see service in this role. With the German Mk. III up gunning to a 50mm main armament, and the Mk. IV already mounting a 75mm gun, the wisdom of producing the M2A1 with its 37mm gun immediately came into question. Despite limitations inherent in the French B-1 bis, a similar design derived from the M2A1 and mounting a 75mm main gun in the hull emerged as a compromise until a better tank could be engineered.²²

The resultant Medium Tank M3 was the first American medium tank to see the field of battle in the Second World War, but its production run would be brief. Viewed by Ordnance and the Armored Force from the beginning as a stopgap design until a tank with a fully traversable turret mounting the 75mm could be perfected, the M3 had many flaws. The need to expose the entire vehicle to use the low mounted 75mm main armament was a major problem. The hull mounted gun and front drive required tall hull sides. This fact, combined with the addition of a turret mounting a 37mm gun, meant the M3 medium

²¹ Atkinson, *An Army at Dawn*, 5-9. U.S. Army ranked seventeenth in the world, behind Romania, in September 1939 according to a *Newsweek* article quoted by Atkinson; Perrett, *Knights of the Black Cross*, 55. Perrett records 2,439 tanks available.

²² Chamberlain and Ellis, *British and American Tanks of World War II*, 105-109; David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army, 1917-1945* (Ithaca, New York: Cornell University Press, 1998), 123.

tank stood over ten feet high and thus presented an easily discernible silhouette, a further drawback. An American tanker in North Africa later remarked that “it looked like a damn cathedral coming down the road.”²³

Following the fall of France, the attention of the designers of doctrine and weapons focused on a new theater of war. A disastrous Italian bid to seize Egypt in the fall of 1940 led to the Germans reinforcing their Axis allies in North Africa. On 14 February 1941, the first armored units of General Erwin Rommel’s Panzer Group Africa disembarked at Tripoli.²⁴ The war in North Africa provided an opportunity to aid the British and test American equipment. Both the Medium Tank M3, and its eventual successor, the Sherman, would see their first action in the deserts of North Africa in the hands of British tankers.

In spite of their proven limitations, light tanks were also included in American armored divisions. Existing “combat cars,” formerly used by the cavalry, were designated as light tanks when the division between infantry and cavalry was abolished following the creation of the Armored Force in July 1940. While useful for training, these vehicles needed to be replaced by a better light tank. Hastily derived from the “combat cars,” the Light Tank M3, with 37mm main armament, was quickly approved by the Armored Force Board and standardized in July 1940. With the initiation of production in June 1941 of M3 mediums, the United States, confusingly, possessed two M3 tanks. In May 1941, a wooden mock-up of a vehicle designated Medium Tank T6 was completed for Armored Force Board approval. This design, soon to become the M4 Sherman, along with the two M3s, would eventually equip the first American armored units to go to war.²⁵

The need to get tanks into production quickly meant that equipment had been chosen as doctrine was being established. Fortunately, close cooperation between the Ordnance Department, industry, and the newly established Armored Force resulted in tanks that fit well into the doctrine that emerged. In this doctrine, codified in *FM 100-5, Field Service Regulations: Operations* and released in May 1941, the lessons the Germans provided were apparent. Massed armor supported by the combined arms of every

²³ Atkinson, *An Army at Dawn*, 207.

²⁴ Perrett, *Knights of the Black Cross*, 137-138.

²⁵ Chamberlin and Ellis, *British and American Tanks of World War II*, 84-86, 88, 105-106, and 114.

available asset would have a strategic role in offensive operations. Largely the result of the efforts of a board headed by Brigadier General Adna M. Chaffee,²⁶ *FM 100-5* clearly defined the offensive nature of the armored division in stating that its “*primary role is in offensive operations against hostile rear areas.*”²⁷ This doctrine reflected Chaffee’s cavalry background and served as the basis for the focus on exploitation eventually attached to the armored division.

With the offensive role of the armored division established, concern at the highest level over how to stop armor led to one of the most important decisions of the war. On 14 May 1941, General Marshall sent a memorandum to Brigadier General R. L. Twaddle, head of G-4 (Planning), directing the formation of “a small planning and exploring organization, composed of visionary officers, with nothing else to do but think out improvements in methods of warfare, study developments abroad and tackle such unsolved problems as measures against armored force action.” A Planning Branch formed under the direction of Lieutenant Colonel Andrew D. Bruce quickly set about trying to establish the doctrine and identify the potential weapons to arm an antitank organization.²⁸ A separate antitank organization, a function usually integral in major combat formations of other armies, would emerge from Bruce’s Planning Branch. Only the United States Army adopted this approach as the primary means for combating opposing armor.

As the two M3 tanks went into production, and the M4 proceeded beyond the mock-up stage in the summer of 1941, the U.S. Army set about practicing with what little armor it had. Most of the tanks the nation possessed were assembled in Tennessee in June 1941 to conduct the first corps sized maneuvers of the Armored Force. The success of the light tanks of the 2nd Armored Division under Major General George Patton convincingly verified the aggressive tactics formulated by General Chaffee and set forth in *FM 100-5*.²⁹ As these maneuvers were being conducted, however, an event half a world away lent even

²⁶ Johnson, *Fast Tanks and Heavy Bombers*, 142-147.

²⁷ *FM 100-5* (Emphasis is in original text), 263; *Notes on G-3, Anti-tank Conference July 14-20, 1941*, p. 7, *Andrew D. Bruce Papers*, USAMHI. [Hereafter referred to as *Anti-tank Conference*, followed by page numbers].

²⁸ Baily, *Faint Praise*, 13-17. Marshall sent this message on 14 May 1941. Bruce’s Planning Branch was formed the following day.

²⁹ Johnson, *Fast Tanks and Heavy Bombers*, 148-149; Christopher R. Gabel, *The U.S. Army GHQ Maneuvers of 1941* (Washington, D.C.: CMH, 1991), 52-53.

more credence to already deep concerns over how to stop German armor and exponentially increased the ante in the tank arms race.

CHAPTER 3
U.S. TANK DESTROYERS AND THE
IMPACT OF SOVIET ARMOR

In summer 1941, the Wehrmacht turned its attention to the east. Initially, expert execution of Blitzkrieg in the Soviet Union appeared on the verge of achieving yet another quick victory for Germany. Already alarmed following the fall of France, American military leaders desperately sought an antidote to the armored offensive. The U.S. Army's focus on stopping German Blitzkrieg led to considerable time, effort, and resources being devoted to the ways and means of stopping armored attacks while much of the offensive power of the Panzerwaffe was expended on the Russian Steppe. For the Germans, the successes of the first six months of the campaign in the Soviet Union were tempered by frightening encounters with Red Army tanks featuring superior qualities. The need to counter these vehicles led directly to a German response that radically altered the pace of armored development for the remainder of the war.

Operation Barbarossa, the German invasion of the Soviet Union unleashed on 22 June 1941, struck a foe completely unprepared and essentially unable to resist. Armored spearheads of three German Army Groups pushed aside a confused and disorganized Red Army and easily drove deep into Soviet territory. The skillful use of encircling Panzergruppen (Panzer Groups) resulted in battles of annihilation on a previously unimaginable scale. Army Group Center, its axis of advance aimed directly east along the Berlin-Moscow Highway, constituted the main thrust of the German offensive. Panzer Group III, commanded by General Hermann Hoth, and General Heinz Guderian's Panzer Group II served as spearheads for the Army Group. These two formations, possessing nine Panzer divisions between them, advanced parallel to one another along the northern and southern flanks of the army group. Their results were astounding. The two Panzer Groups raced 200 miles past their start lines and prepared to meet east of Minsk by 27 June. On 3 July, surrounded pockets at Bialystok and Minsk surrendered,

yielding 290,000 Red Army prisoners along with thousands of tanks and guns. Soviet Premiere Josef Stalin promptly issued an order for the arrest of the commander of the Soviet Special Western Military District, General Dmitry Pavlov. By the second week in July further disaster loomed for the Soviets near Smolensk despite changes in command. General Pavlov and several members of his staff would be shot following the subsequent surrender of the Smolensk Pocket two weeks later.¹ Against this backdrop, the need to establish a doctrine for stopping an armored offensive, already apparent following the success of German Blitzkrieg in Poland and France, appeared even more urgent to America's military leaders. On 14 July 1941, a seven day Anti-Tank Conference convened in Washington, D.C. to address the issue of how the U.S. Army might accomplish this task.

Shortly after 10:00 a.m. on the first morning of the conference, Brigadier General R. L. Twaddle succinctly summarized the challenge facing the one hundred officers gathered before him at the Army War College when he stated that "Stopping enemy tanks and other mechanized vehicles is the biggest job confronting our Army today. The operations of the war in Europe in all theatres show that an Army must have the means available at the outbreak of hostilities for proper anti-mechanized combat and that the troops must be trained in the most effective employment of the means. We cannot wait until the outbreak of hostilities to start securing the means and training the Army in their employment." The purpose of the weeklong Anti-tank Conference, according to Twaddle, was "to inform anti tank officers of the anti-mechanized problem; the proposed test in maneuvers later this year; the latest mechanized and anti-mechanized doctrine; the latest developments in mechanized and anti-mechanized means; and the duties of anti tank officers in organizations."²

While large formations of armor engaged in vicious battles in the Ukraine and Western Russia, Twaddle informed his audience that "an experimental battalion" was being formed and "equipped with combinations of existing weapons and transportation" to field-test ideas for stopping opposing armor

¹ Chris Bellamy, *Absolute War: Soviet Russia in the Second World War* (New York: Vintage Books, 2008), 179-181, 191-192; Perrett, *Knights of the Black Cross*, 90-91.

² *Anti-tank Conference*, p. 7. The conference attendees were all officers in command of various anti-tank organizations already in existence in the U.S. Army.

during upcoming fall maneuvers. Twaddle viewed cobbling together means for an anti-tank capability from the pool of existing weapons as just the first phase in assembling such assets. He envisioned a second phase of “developing weapons and other means to go beyond any foreign development” to “gradually replace original equipment.” Twaddle also stated that the second phase of “development must never stop” and that “further developments must continue.”³ This certainly ended up being the case, as the search for the perfect tank destroyer, or TD, continued throughout the war.

Also speaking on the first day of the conference, Lieutenant Colonel Andrew D. Bruce, director of the Planning Branch charged with studying the problem of stopping armor, introduced the term “tank destroyer” and proposed GHQ antitank units as “an offensive weapon and organization.” Part of the reason for grouping anti-tank assets in GHQ units was their limited availability, according to Bruce. He noted that making antitank capability an integral part of all frontline units, as did other nations, was preferable in commenting that “most foreign divisions now have a regiment of antitank guns; we can’t have them now because we do not have enough guns, but we could give them a regiment in certain cases.” Bruce also noted that “we shall have limbered weapons for some time to come but we shall develop and try out the self-propelled mount.” He tried to instill confidence in the capabilities of the existing towed antitank guns by declaring “There are thousands of tanks in the world today that can be put out of use by a 37mm gun.” On the third day of the conference, Bruce took the participants to the Aberdeen Proving Ground to see a self-propelled mounting of a 75mm gun in the standard M3 half-track troop carrier.⁴ These, along with the 37mm towed guns, would equip the first U.S. tank destroyer units slated for combat.

Responding at the Anti-tank Conference to Colonel Richard C. Burtleson’s concern that “the proposed tank destroyers are too light” and that “the proposed organization is not the practical solution to the problem,” Bruce conceded that he “would prefer to have the medium tank for the GHQ antitank reserve, but we cannot produce tanks fast enough for this purpose only.” Continuing, Bruce said that “In

³ *Ibid.*

⁴ *Ibid.*, 26-28.

analyzing our foreign reports, it appears that defeated forces either lacked guns or guts. I know that we have the guts, but we have got to produce the guns. The tank destroyer that we have in mind is in reality similar to the battle cruiser. Its tactics in operating against the tank (the battleship) have to be different from the tactics we would employ in operating the tank (battleship) against the tank (battleship). Speed, visibility, and hitting power of the tank destroyer should compensate to some degree its lack of armor.” Bruce also underscored another essential consideration when he pronounced that “The tank destroyer must be cheaper in time and material for production than the tank.”⁵

This exchange is significant as it highlights the initial makeshift nature of the Army’s embryonic efforts to combat armor. Bruce’s stated preference for tanks to equip the GHQ anti-tank units was closely followed by an explanation conceding that the weapons under consideration were essentially substitutes dictated by the present rate of tank production. The hopes Bruce placed on the speed, visibility, and hitting power of the tank destroyer being able to compensate for a lack of armor turned out to be an unachievable dream. The towed 37mm guns and the 75mm armed half-tracks proved to be the worst of several attempts to field effective tank destroyers. The “guts” Bruce expected of American soldiers were never matched with the guns necessary for the concept to succeed as envisioned. The quest for speed and mobility, for example, eventually resulted in a preference for light armament like the mediocre 76mm gun. Regardless of the form taken, the tank destroyer remained a poor substitute for a tank throughout the war.

The conference continued with Lieutenant Colonel Truman Smith of the G-2 section (Army Intelligence) speaking about the state of “European mechanized and antimechanized means.”⁶ Smith’s address is especially enlightening for anyone seeking to grasp how much the U. S. Army knew about the Wehrmacht in the summer of 1941. Smith spent the bulk of his time addressing trends in the German use of anti-tank guns. He noted the move away from 37mm antitank weapons and the increasing use of 88mm anti-aircraft guns against tanks. American intelligence had already correctly assessed that the

⁵ *Ibid*, 28-32.

⁶ *Ibid*, 9.

Germans were moving quickly towards more powerful guns both to wage and oppose armored warfare. Another important trend identified was the move away from light tanks. Smith stated that the “light tanks were retained but from 1937 on it is believed that 9/10 of the manufacturing program went into medium and heavy tanks.” The best role for these vehicles emerged when “the Germans recognized that these light tanks had their limitations, and they were laid aside as reconnaissance vehicles.”⁷ That the United States still used light tanks with 37mm guns and failed to grasp the potential for heavily armed and armored German tanks using deadly guns like the 88mm, indicated a fatal reluctance to recognize the obvious.

Smith articulated a major problem that plagued American armored development when he observed that the Wehrmacht “was always in a state of transition. The German Army at one time possessed a certain type of equipment. Simultaneously they were working behind the scenes toward totally new equipment. Unfortunately we could not see the equipment which was being prepared. We could only guess at the equipment which would appear in the next year or so.”⁸ This was the essence of the problem facing the weapon designer, and Smith’s concern regarding equipment that might “appear in the next year or so” illustrated the failure of some officers in the Army to appreciate the job facing Ordnance in anticipating and answering future enemy development. It was not difficult to recognize a next logical step forward in design. For example, the Germans up-gunning the Mk. III from a 37mm to a 50mm gun could be easily anticipated. Projecting ahead two, three, or even more steps in the process to gain and maintain an advantage proved crucial to creating the most effective weapons. Furthermore, recognizing the need for better suspensions, bigger guns, or thicker armor on tanks and designing such vehicles constituted only part of the process. The need for the production of improved designs needed to be recognized in a timely manner by all the proper authorities or the weapon would reach the battlefield too late, exactly as happened with the Pershing. Ordnance recognized the trends, but a plethora of

⁷ *Ibid*, 10.

⁸ *Ibid*.

projects, each in a constant state of flux, led to vehicles that were not fully developed, hindering their prospects for production.

Smith added that “we have become accustomed to thinking of tanks as all-powerful but there have been two instances this spring when tank attacks were repulsed and which are illustrative of the problem of anti-tank defense.” At Toubruk, the British decisively checked a German-Italian tank attack with fixed fortifications and artillery. In the second case, the Germans defeated a large British armored attack with the use of combined arms. The British lost two hundred tanks in this operation, mainly to 88mm guns, a fact featured prominently in an MID report of the action. While the use of the 88mm anti-aircraft guns played a key role in this defense, in his closing remarks Smith emphasized the importance to the Germans of the combined arms concept in defeating armor: “As a final thought I want to stress the fact that in the German Army there is no single purpose weapon against tanks. Success is to be achieved by the employment of every weapon, and none must be stressed too much over the other.”⁹

Many armor experts believed the ideal tank destroyer already existed in the form of the tank. In 1932, Major General J.F.C. Fuller, the father of the concept behind Blitzkrieg, wrote that “the answer to the tank is the tank,” and envisioned battles involving only armored vehicles.¹⁰ Two weeks prior to the Anti-tank Conference, General George A. Lynch, the chief of infantry, asserted that “the best anti-tank defense lies in the defeat of hostile armored forces by our own armored units.” Colonel K. B. Edmunds, assistant commandant under General Leslie J. McNair at the Command and General Staff College disagreed with McNair during the debate that occurred in July 1940 over how to stop tanks. He, like Lynch, preferred to fight tanks with tanks. Commenting a year later on McNair’s decision to form a force of specialized tank destroyers, Edmunds called them “a compromise and open to the weaknesses of all compromises.” Major General Jacob L. Devers, the chief of the new Armored Force, also had doubts about the usefulness of the tank destroyers. While agreeing with McNair that “tank versus tank is an

⁹ *Ibid*, 12-13; *MID Correspondence*, report 2016-1236, no. 20, from MA Cairo, 14 June, 1941.

¹⁰ J.F.C. Fuller, *Lectures on F.S.R III (Operations Between Mechanized Forces)*, (London: Sifton Praed & Co., 1932), 39.

expensive and undesirable procedure,” Devers was equally “sure that it was not going to be totally avoidable in future battles.”¹¹ Combat experience eventually proved this to be the case.

Lacking this experience, the tank destroyer concept, already approved in the spring by General Marshall, was adopted. The as yet undetermined weapons of Tank Destroyer Command would be deployed en masse as the primary defense against massed enemy tanks. A desire to mount the best tank-killing guns on tank destroyers led directly to the Sherman being under gunned. During the war, tank destroyers “became part and parcel of the controversy over tank development.”¹²

The Anti-tank Conference continued with numerous ideas for anti-tank defense discussed, including one particularly disconcerting experiment carried out with a type of “Molotov Cocktail.”¹³ General McNair ultimately closed the conference by noting that “the anti-tank question, as I see it, is the knottiest problem of the Army today.” McNair then went on to say:

I appreciate that many aspects of antitank action and equipment are controversial, and have no intention of attempting to indicate antitank doctrine. It seems appropriate, however, to consider for a moment why we have tanks. The World War brought forth the tank, as I see it, in answer to the machine gun, which was causing terrific losses in the ranks of foot troops. But if the protection afforded by the tank permitted advance against machine guns, why not substitute for the machine gun a weapon against which the tank is not protected? Tankers reply that the tank will not face the antitank gun, but will go around it. But the antitank guns of today also are mobile and can match movement. Thus we have the question of whether the tank or the antitank gun is superior in the struggle of fire and maneuver.

McNair clearly indicated his preference for towed anti-tank guns by asserting that “certainly it is poor economy to use a \$35,000 medium tank to destroy another tank when the job can be done by a gun costing a fraction as much.”¹⁴ This argument would be repeated many times by McNair over the next few

¹¹ Johnson, *Fast Tanks and Heavy Bombers*, 150-152.

¹² Baily, *Faint Praise*, 9-11.

¹³ *Anti-tank Conference*, 51.

¹⁴ *Ibid*, 82-83.

years to further the use of towed weapons. With McNair's speech the Anti-tank Conference came to a close.

As the Anti-tank Conference concluded, none of the attendees knew of the dramatic turn in the tank arms race taking place in the Soviet Union. Although Blitzkrieg apparently still succeeded on the strategic level in the Soviet Union, some disconcerting developments at the tactical level contained ominous signs for the Germans. Much to their consternation, German tankers encountered Soviet tanks far superior to the Mk. IIIs and IVs, which constituted the cream of the Panzerwaffe.¹⁵ The German response to this superiority triggered an exponential acceleration in the tank arms race that rendered even the future weapons of American tank destroyers obsolete before they were ever constructed.

The Soviet Union possessed the largest tank force in the world, numbering at least 20,000 vehicles at the outbreak of hostilities, more than all other armies combined. The vast majority of these vehicles were old designs from the 1920s, and their age combined with poor maintenance meant that many were not even "runners" when the Germans attacked.¹⁶ Still, the Germans destroyed or captured them by the thousands during the first six months of Operation Barbarossa. Encounters with newer Soviet tank designs, however, caused great difficulty whenever they appeared. Although only deployed in small numbers and usually as poorly handled as the aging vehicles, two previously unknown types of Soviet tanks sent shock waves through the Panzerwaffe. Encounters with these vehicles from the first day of Operation Barbarossa substantially altered the course of German tank development in the Second World War and led directly to the deadly situation faced by the tankers of the western Allies from 1944-1945.

One particular incident vividly illustrates the impact of a well-handled armored vehicle featuring superior qualities. On 25 June, the fourth day of Operation Barbarossa, elements of the 6th Panzer Division of Army Group North, encountered twenty heavy tanks of a "previously unknown type" after repulsing a counterattack by a larger tank force. The new tanks overran an armored infantry regiment, destroyed a battery of artillery, and defeated a force of 100 German tanks, literally crushing several

¹⁵ Showalter, *Hitler's Panzers*, 165.

¹⁶ David M. Glantz, *Colossus Reborn: The Red Army at War, 1941-1943* (Lawrence, Kansas: University Press of Kansas, 2005), 246-247; Bryan Perrett, *A History of Blitzkrieg* (New York: Stein and Day, 1984), 125.

Czech-built t38's in the process. The tanks finally withdrew after 88mm antiaircraft guns knocked out a few of their number. Unfortunately for the Germans, one remained in the area. This new threat was the 43 ton "Klementi Voroshilov," or KV, heavy tank. Well protected with four inches of armored plate and armed with a high velocity 76mm gun, this particular version, a KV-I, was parked by its crew along the main supply route of the advance where they stubbornly resisted every effort by the Germans to neutralize it "for several days."¹⁷

After ambushing and destroying the first unsuspecting supply trucks to come up the road, the lone KV decimated a battery of the new 50mm anti-tank guns dispatched to destroy it, resisting fourteen hits from 500 yards in the process. According to the Germans these strikes on the KV "merely produced blue spots on its armor." As darkness approached, the KV crew stymied an attempt to set up an 88mm gun in a camouflaged position, first allowing the Germans to begin positioning the weapon before destroying it. A midnight attempt by engineers succeeded in laying demolitions under the treads of the tank, but the heavy track links resisted the charges with minimal damage and the KV remained mobile. The Germans finally sent fifty tanks to draw the attention of the crew and managed to emplace another 88mm gun behind the KV. Three of the twelve shots fired by the 88 succeeded in penetrating the tank, finally putting it out of operation.¹⁸

As formidable as the KV proved to be, it was not even the best tank on the Eastern Front. While the KV's gun, armor, and the mobility afforded by its torsion bar suspension and wide tracks made it far superior to anything the Germans had, its engine and drive train were overtaxed by the weight of its thick armor. More KV's broke down than were destroyed by the Germans. The Soviets eventually solved these reliability problems and later developments of the basic KV design proved to be even more formidable than the original. In the meantime, the Red Army already possessed a war-winning tank. The most outstanding armored vehicle on the battlefield in 1941 was not the KV, but the truly revolutionary T-34

¹⁷ Peter G. Tsouras, editor *Fighting in Hell: The German Ordeal on the Eastern Front* (New York: Ivy Books, 1995), 71-72. This is a three part compilation of accounts on the fighting in the Soviet Union written by German generals after the war and published in the 1950's as the *German Report Series*. The KV account is from *Part One: Russian Combat Methods in World War II* by Colonel General Erhard Rauss and appears in many secondary sources.

¹⁸ *Ibid*, 72-73.

medium tank. Adjudged by many historians to be the most significant tank of the Second World War, the T-34 represented the state of the art in armored technology and set a completely new standard for tank design.¹⁹

Developed from the BT series of fast tanks derived from the designs of an American, J. Walter Christie, the T-34 possessed a perfect balance of firepower, protection, and mobility. The key to the superb performance of the T-34 lay in its sloped armor protection. Set at an angle of 32 degrees, the front hull armor, known as the glacis plate, achieved an effective thickness double that of vertical plate. The hull sides sloped somewhat less, as did the turret, but the tank's overall shape resulted in a vast improvement in protection. Thinner plate angled to achieve maximum protection saved weight, which in turn improved mobility. Further weight savings resulted from the use of aluminum for the engine block and cylinder heads of the 500 horsepower V-12 diesel motor. A rear mounted transmission and final drive facilitated a low silhouette. The combination of good power and a weight of only 26.5 tons made the T-34 as fast as German light tanks and every bit as maneuverable. Nineteen inch wide tracks featuring a low ground pressure allowed the T-34 to traverse soft terrain that bogged down other tanks. In the severe winter conditions of the Eastern Front no tank performed better, prompting the Germans to nickname it the "Snow King."²⁰

The existence of the KV and the T-34 fundamentally changed armored development. Every existing tank in the Panzerwaffe and all development projects were immediately rendered obsolete. When the 4th Panzer Division of his Panzer Group suffered a mauling by T-34's near Orel in central Russia in October 1941, Guderian demanded action in a report to the headquarters of Army Group Center. After outlining the superiority of the T-34, Guderian "concluded by urging that a commission be sent

¹⁹ Perrett, *Knights of the Black Cross*, 83; Showalter, *Hitler's Panzers*, 165; Slayton, *Arms of Destruction*, 145.

²⁰ Slayton, *Arms of Destruction*, 105-111.

immediately to my sector of the front, and that it consist of representatives of the Army Ordnance Office, the Armaments Ministry, the tank designers and the firms which built the tanks.”²¹

The commission subsequently gathered on 18 November 1941 radically altered the course of German armored development. Dr. Ferdinand Porsche, Hitler’s favorite designer and the inventor of the Volkswagen, figured prominently among the representatives of industry present. Porsche, along with representatives from the armament concerns of Steyr, Verinigte Stalwerke, Daimler-Benz, Krupp, Henschel, MAN, and Rheinmetall gathered at Guderian’s headquarters where the General laid out the problems presented by the T-34. Many of the German officers present advocated simply copying the T-34, but certain aspects of the tank were not so easily duplicated. Raw materials shortages, for instance, precluded mass production of an aluminum diesel engine. The T-34, also did not meet German standards for crew comfort, an important consideration for maintaining maximum efficiency during sustained combat operations. Crewed by only four men, the tactical efficiency of the T-34 suffered from the tank commander’s additional responsibilities as gunner, and the fact that only formation commanders had radios. In contrast, all German tanks featured five man crews and good tactical radios. The overall crude construction of Soviet tanks also offended the refined engineering sensibilities of the Germans. Recognizing the potential for improvements in both the T-34 and the KV became an important consideration of any new German design. Basic qualities of new German tanks needed to anticipate and exceed any future Soviet development.²² Efforts to achieve these goals eventually resulted in some of the most powerfully armed and heavily armored tanks of the Second World War.

By 14 November, Guderian’s once powerful Panzer group was down to 50 serviceable tanks out of the 600 it possessed at the outset of Operation Barbarossa.²³ With the German advance slowed to a crawl, and at a standstill by the end of the month in worsening winter weather, the Soviets counterattacked on 6 December with fresh troops supported by large numbers of KVs and T34s. The next

²¹ Heinz Guderian, *Panzer Leader* (New York: Ballentine, 1965), 237-238.; David Glantz and Jonathan House, *When Titans Clashed: How the Red Army Stopped Hitler* (Lawrence, Kansas: University Press of Kansas, 1995), 80-81.

²² *Ibid.*, 276-279; Hughes and Mann *The Panther Tank*, 23-24.

²³ Perrett, *Knights of the Black Cross*, 97.

day brought stronger attacks and the Japanese bombing of Pearl Harbor. Hitler's decision to declare war on the United States on 11 December seemed incredibly bold as the once spectacular German advance ground to a halt within sight of Moscow.²⁴ Before the year ended, Guderian would be relieved of command for disagreeing with Hitler's response to the crisis.²⁵ As 1942 approached, the once certain prospects for a quick and decisive victory over the Soviet Union faded into a realization that Germany now faced a protracted struggle in the east.

Germany's need to respond to the threat of the T-34 and the KV, and ongoing engagements between large armored formations, meant that the Eastern Front set the pace of armored development for the remainder of the war. As the arms race in tank design rapidly accelerated, the United States had only the stopgap M3 design to go along with the Sherman, which would not go into production until February 1942. Unaware of either the T-34 or urgent German efforts to surpass it, the United States was already at a disadvantage in the race in tank technology. The MID reports, inaccurate as they sometimes were, had still provided the United States with a considerable amount of good intelligence on the Panzerwaffe. This source went away with Hitler's declaration of war. Unfortunately, the signs that more armor and bigger guns constituted the future of the state of the art did not become apparent to the western Allies until it was too late to rectify the situation.

The first maneuvers held by the U.S. Army in Tennessee in June seemingly verified the weapons and doctrine for the Armored Force modeled on German practices. However, much of the success of the 2nd Armored Division under Major General George S. Patton in Tennessee occurred due to the lack of anti-tank capability of the opposing force. The next maneuvers, held in September in Louisiana, introduced a deterrent in the form of three newly formed General Headquarters (GHQ) anti-tank units. These new formations, first proposed at the Anti-Ttank Conference, performed well enough to justify continued testing of the antitank concept. When the final phase of the maneuvers resumed in November in the Carolinas, three more GHQ anti-tank groups were added to the defending force. The stronger anti-

²⁴ Bellamy, *Absolute War*, 326-329.

²⁵ Guderian, *Panzer Leader*, 264-270.

tank force succeeded in stopping all unsupported tank attacks with some help from rules of engagement favoring the defenders. This performance seemingly validated the anti-tank concept and led to a reduction in the ratio of light to medium tanks in the Armored Force from 2:1 to 1:2.²⁶ The latter conclusion could have been reached from simple observation of the Germans, who were already relegating the light tanks to the reconnaissance role as noted by Colonel Smith at the Anti-tank Conference. The former conclusion laid the groundwork for the controversy that followed, as the decision to use GHQ anti-tank units as mobile reserves operating under a separate doctrine inexorably clashed with the doctrine for tanks and effected the equipment of both.

In an unprecedented move, the U.S. Army essentially established a new combat arm for the express purpose of opposing armored attacks. Based first at Fort Meade in Maryland, and later at Camp Hood in Texas, the Tank Destroyer Tactical and Firing Center, activated on 27 November 1941 under Lieutenant Colonel Andrew Bruce, was created to oversee the continued refinement of the weapons and tactics for anti-tank defense.²⁷ A separate Tank Destroyer Command under Bruce eventually resulted from these developments. In spite of the reservations about the weapons, voiced by officers like Colonel Burleson, the aggressive nature expected of the new anti-tank force was reflected in a 3 December 1941 War Department order renaming the anti-tank battalions "Tank Destroyer" battalions.²⁸ With this decision, the armor and anti-armor assets for equipping the U.S. Army in the initial phase of the war against Germany were in place, but British Tommie's, not American GIs, would be the first to use them against the Germans.

²⁶ Johnson, *Fast Tanks and Heavy Bombers*, 148-149; Gabel, *The U.S. Army GHQ Maneuvers of 1941*, 176-177.

²⁷ Christopher R. Gabel, *Seek, Strike and Destroy: U.S. Army Tank Destroyer Doctrine in World War II* (Fort Leavenworth, Kansas: Combat Studies Institute, 1985), 17-18.

²⁸ *Ibid*, 176; Baily, *Faint Praise*, 15-17.

CHAPTER 4
U.S. TANKS ENTER
AN ACCELERATING ARMS RACE

The years 1942-1943 proved to be pivotal in U.S. tank development. As American tanks entered combat, Ordnance became familiar with the T-34 and the KV-1 as well as German improvements to existing tanks intended to counter these Soviet vehicles. Numerous projects initiated at Ordnance significantly advanced the state of the art in American armor, but production of these designs was stymied, in most cases for perfectly good reasons, by a new organization formed in March 1942 under General Leslie J. McNair, Army Ground Forces (AGF). Meanwhile, the Sherman performed so well in North Africa that any urgency to replace it seemed misplaced. When new German tanks began appearing early in 1943, a thorough misreading of available intelligence about these vehicles prior to spring 1944 meant that Allied tankers were forced to fight with the Sherman for the balance of the European war.

U.S. armor first entered service in North Africa where, in British parlance, the two M3 tanks became known variously as Honeys, Stuarts, Grants, and Lees.¹ This continued a British tradition, first begun with lend-lease aircraft, of naming American weapons. Names bestowed upon weapons by the British eventually became their most recognizable form of identification. The Lockheed P-38, Republic P-47, and North American P-51 fighter aircraft, therefore, will always be remembered historically as Lightnings, Thunderbolts, and Mustangs.² This is also the case with the M4 Sherman tank. With a term like M3 being applicable to numerous pieces of American equipment, it is little wonder the British continued the practice of naming the U.S. tanks they acquired.

The M3 light tank was the first American tank the British used in combat. Arriving in the first lend-lease shipment of July 1941 and designated "Jeb Stuart" by British officialdom, the tank was dubbed the

¹ Chamberlain and Ellis, *British and American Tanks of World War II*, 88, 91, 112.

² Geoffrey Perret, *Winged Victory: The Army Air Forces in World War II* (New York: Random House, 1993), 110, 117, 119.

“Honey” by the tankers of the Eighth Army for its reliability. This also reflects the fact that most British tankers were less than pleased with their own nation’s efforts at producing effective armored vehicles. The nomenclature used to classify British tanks reflected the infantry and cavalry roles to which armor had been relegated in the pre-Blitzkrieg British Army. Light tanks of the Cruiser class traced their roots to the cavalry. The role of the Infantry tank needs no explanation. Infantry tanks like the Matilda II presented the Germans some difficulty due to their thick armor, but were woefully under-gunned for tank-to-tank combat. The Matilda series of tanks, conceived in the early 1930s, was obsolete by 1942. Its successor, the Valentine, continued the tradition of being under-gunned, but like the Matilda was successful against Italian armor until the appearance of Rommel’s Afrika Korps and the 88mm anti-aircraft gun in 1941.³

The state of the light tanks of the British cruiser class in summer of 1941 became the reason the M3 Stuart was deemed such a Honey. Eighth Army’s new cruiser tank, the Crusader, proved to be remarkably unreliable in the brutal desert conditions, and two models of older cruisers were simply obsolete. First committed to action near Toubruk in November 1941, the M3 Stuart performed well.⁴ The M3s 37mm gun, while no better than the comparably sized 2-pounder of the British cruisers, was at least consistently able to be on the battlefield and firing, unlike the Crusader.

Built to fulfill a specific British order, the first 200 M3 medium tanks to arrive in the Western Desert in early 1942 differed from standard American models by a distinctive overhang in the turret that resulted from the mounting of British radio equipment. This version received the name, “General Grant.” Later American built models, lacking the turret overhang of the first 200, were called “General Lee” in British service, but the Grant name stuck for all M3 mediums used by the Americans. Of the first 200 Grants, 167 figured prominently in a large tank battle in Eastern Libya near Gazala at the end of May 1942.⁵

The hull-mounted 75mm main gun of the Grant gave the British a weapon that outranged the German Mk. III’s and Mk. IV’s for the first time in the war in the Western Desert. This proved fortunate

³ Chamberlain and Ellis, *British and American Tanks of World War II*, 56-61.

⁴ *Ibid*, 30-39; Perrett, *Knights of the Black Cross*, 145, 149.

⁵ Chamberlain and Ellis, *British and American Tanks of World War II*, 108-112.

since the tank's tall silhouette made it visible from a great distance. To employ the low-mounted main armament, the whole tank had to be exposed. An additional drawback was that the entire vehicle had to be maneuvered to aim the main gun. The preferred method for tanks engaging opposing armor was to assume what was known as a "hull-down" position by using terrain whenever possible to expose only the turret. The Grant's 37mm turret armament rendered this tactic useless against all but light tanks.⁶

The next American medium tank to be used by the British corrected the majority of the flaws of the Grant.⁷ Having progressed beyond the wooden mock-up stage, a pilot model of the M4 was built at the Lima Locomotive Company in Lima, Ohio in February 1942. Within a month, the tank the British named "General Sherman" was in full production at three factories in the United States. The Lima plant built the first M4's under British contract. According to Michael Dewer, head of the British Tank Commission, "All except two of the M-4 tanks from the Lima Locomotive contract instead of being delivered to the British were allotted to the U.S. armored force, and it wasn't until after the crisis in Egypt in June that these tanks were shipped to Libya."⁸

The crisis Dewer mentioned referred to a disastrous action that followed the engagement at Gazala where the Grants had debuted. A British offensive initiated on 5 June 1942 turned into a rout of the Eighth Army, which by the end of the month had been driven into Egypt by the Afrika Korps. On 13 June, a day known as "Black Saturday," the British lost 230 tanks. Virtually stripped of armor, the Eighth Army assumed last ditch defenses at El Alamein. Theater commander General Sir Claude Auchinleck took over from Lieutenant General Sir Neil Ritchie at the end of June and stabilized the situation in the first days of July. On 8 August, Auchinleck appointed Lieutenant General Bernard Law Montgomery to turn

⁶ Atkinson, *An Army at Dawn*, 207-208; Chamberlain and Ellis, *British and American Tanks of World War II*, 111-112.

⁷ Lieutenant Colonel Robert J. Icks, *Evolution of American and German Medium Tanks* (20 January 1943 report prepared as reference material for an unpublished history to have been entitled *Ordnance Department in World War II*), 1-2, Box A799, Entry 646A, RG 156, NARA II.

⁸ Michael Dewer, Folder: March and November 1942 letters from members of British Tank Commission in reference material for *Ordnance Department in World War II*, Box A799, Entry 646A, RG 156, NARA II.

around the fortunes of Eighth Army. By October, 252 M4A1 Shermans, taken from the U.S. 1st Armored Division, had arrived in the Middle East to aid Eighth Army in this quest.⁹

As British forces in Egypt prepared their Shermans for the upcoming Battle of El Alamein, the first signs of improvements to existing German tanks engendered by experience on the Eastern Front were beginning to appear on the North African battlefield. In August 1942, following an unsuccessful German offensive against the El Alamein defenses near Alam Halfa, Major George B. Jarrett, an American technical advisor from the Ordnance Department, examined a new long-barreled 75mm gun mounting in two Mk. IVs abandoned by the Germans during their withdrawal from the battlefield. A group of American tankers “fresh from the U.S. Tank School at Fort Knox” under the command of Colonel Henry Cabot Lodge, Jr. manned a number of British M3 Grant’s during the battle and one of their number attracted Jarrett’s attention with “a new German solid shot, which he had picked off of the floor of his tank, after it had penetrated.”¹⁰ Fortunately for the fledgling American tanker, the round failed to explode after penetrating the Grant’s armor. The appearance of the new round led Jarrett to examine the long-barreled Mk. IVs. The longer gun incorporated a distinctive bell-shaped device known as a muzzle-brake on the end of the barrel to expel some of the weapons’ blast effect to the sides and to reduce the powerful recoil produced by the propellant charge of the ammunition used to increase the velocity of the shot.¹¹ Known to the Germans as the Panzerkampfwagen IV Ausf F2, this modification of the basic Mk. IV was a direct response to the T-34s and KVs encountered in the Soviet Union. The Germans, unable to up-gun the Mk. III because of the small diameter of its turret ring, turned to the Mk. IV since it already featured a larger diameter turret for mounting a short-barreled 75mm gun.¹² All subsequent Mk. IV production vehicles featured long-barreled high-velocity 75mm guns and constituted the bulk of the tank strength of the Panzerwaffe for the remainder of the war.

⁹ George B. Jarrett, *Ordnance: The Theme Song of Military History*, 64-65, *Jarrett Papers*, USAMHI; Chamberlain and Ellis, *British and American Tanks of World War II*, 130; Robert Goralski, *World War II Almanac: 1931-1945* (New York: G.P. Putnam’s Sons, 1981), 221-222, 227; Perrett, *Knights of the Black Cross*, 151-154.

¹⁰ Jarrett, *Ordnance: The Theme Song of Military History*, 82, *Jarrett Papers*, USAMHI.

¹¹ *Ibid*, 82-85; Perrett, *Knights of the Black Cross*, 154.

¹² *Ibid*, 105.

The up-gunning of the Mk. III with a similar weapon eventually was accomplished by removing the tank's turret and replacing it with a slightly built up superstructure for mounting the gun with limited traverse. While this type of arrangement meant the vehicle suffered from some of the same limitations in using the main armament that plagued the Grant, this was offset by the creation of a weapon with a low silhouette. Called "Sturmgeschutz," or assault guns, these were extremely effective antitank weapons that proved easy to conceal and excelled in the defensive role. Compared to a Grant, standing over ten feet in height, the Sturmgeschutz was only six feet tall. A version of the German Mk. III first appeared with a short-barreled 75mm gun mounted in this fashion in 1940 as an expedient to augment the limited numbers of Mk. IVs available at that time.¹³ Up-gunning to a long-barreled high velocity 75mm gun required little modification and greatly improved the firepower of the original conversion. The Sturmgeschutz III or "StuG III" kept the basic Mk. III chassis relevant for the remainder of the war. Assault guns ended up being the preferred mobile anti-tank weapons of choice for both the Wehrmacht and the Red Army, appearing in a variety of incarnations on virtually every tank chassis available.¹⁴ Like the tank destroyers of the U.S. Army, assault guns had the added advantage of being easier and cheaper to manufacture than a tank. Unlike American tank destroyers, the assault guns used by the Germans and Soviets usually featured thick armor and always mounted weapons far more suited for actually destroying tanks.

The introduction of a towed 75mm antitank gun for German infantry in 1942 signaled a final turn away from 37mm and 50mm weapons for dealing with armor.¹⁵ Although it took time to phase out such weapons entirely, by the time the Western allies became engaged in continuous conflict with the Wehrmacht in the summer of 1944, high velocity 75mm guns represented the minimal standard in German mobile antitank capability. The up-gunning of German tanks was paralleled by a manifold increase in the deadliness of hand-held anti-tank weapons for the German infantry. German weapons featuring excellent armor penetrating capability became the standard due to the need to continuously

¹³ *MID Correspondence*, report 2281-B18, no. 6 from MA Berlin, 29 June, 1941.

¹⁴ Glantz and House, *The Battle of Kursk*, 18-19.

¹⁵ Jarrett, *Ordnance: The Theme Song of Military History*, 161-162, *Jarrett Papers*, USAMHI.

combat Soviet armor. Tragic consequences ensued for the tankers of the western allies as a result of this need.

Technical information on new enemy weapons was a priority for the Ordnance Department, making the evaluation of German equipment in the field an important job for Ordnance officers like Major Jarrett. Another technical specialist of the Ordnance department, Major Joseph M. Colby, had reported from North Africa in late December 1941 that “the most dangerous weapon to tanks was the 88mm gun.”¹⁶ In May 1942, Jarrett shipped an 88mm anti-aircraft gun to Aberdeen Proving Grounds, the first weapon of this type to be evaluated in the United States.¹⁷ The appearance of the long-barreled 75mm gun in the Mk. IV signaled the beginning of a disconcerting trend that inevitably led to the mounting of the excellent 88mm gun and an even deadlier version of the 75mm gun in a new series of German tanks. Gun power, always lacking in American tanks, became the hallmark of German tanks for the remainder of the war. Since it took some time for the Germans to re-equip the entire Panzerwaffe with high-velocity weapons, existing designs soldiered on to avoid an interruption in the flow of tanks to the front while preparations were made for the production of new vehicles. The Mk. III tank, for instance, continued in production until the end of 1943, after which the chassis was used only for the construction of the far more effective StuGs.¹⁸ By the time the western Allies landed in Normandy in the summer of 1944, every tank and assault gun in the Panzerwaffe carried, at the very least, a high-velocity 75mm main armament.

The gathering and dissemination of technical information on new enemy weapons were key responsibilities of the Ordnance Department. The organization excelled at the former, but its efforts in the latter capacity were questionable. Officers like Jarrett and Colby performed their jobs well, gathering considerable amounts of intelligence and hardware for examination. Evaluation of foreign equipment was not limited just to that belonging to the Axis; there was much to be learned from America’s allies as well. Both British and Soviet tank design directly influenced Ordnance efforts throughout the war. For instance, British input during the design and production process resulted in the cast steel turret, turret basket,

¹⁶ Mayo, *The Ordnance Department: On Beachhead and Battlefield*, 25.

¹⁷ Ross, *The Business of Tanks*, 299.

¹⁸ Eric Grove, *World War II Tanks* (New York: Excalibur Books, 1976), 15.

hydro-electric power traverse for the turret, and stowage used on the Grant. Michael Dewer of the British Tank Commission stated in March 1942 that the M4 Sherman design was “at present the best compromise between American automobile reliability and British fighting experience.”¹⁹

In the autumn of 1942, the Soviet Union shipped two T-34s and two KV-1s to the western Allies, one example of each being allotted to Britain and the United States. Jarrett returned from North Africa a few weeks after the Soviet tanks arrived at Aberdeen Proving Grounds and immediately became fascinated with the vehicles. Colby, assigned in late 1942 to the Tank-Automotive Command at the Detroit Tank Arsenal, was also “intrigued” by the Soviet vehicles, especially the T-34. Jarrett suggested after the war that many features of American tanks developed after 1942 were derived from these Soviet vehicles. The KV-1 proved to be Jarrett’s favorite. Describing “the Perryman area” of Aberdeen Proving Ground, “which had nothing but holes and ditches and most of the time was inundated with water or a thick soupy mud,” Jarrett related that the KV-1 “was the only vehicle which could enter this mess and be coupled up to a stranded tank and drag it out on high ground.” Jarrett noted that the performance of this heavy tank in such conditions owed much to the “extremely wide tracks for that time” that the tank possessed.²⁰

Regardless of where the ideas originated, many subsequent American tank designs featured rear-mounted transmissions and main drives, large road wheels, wide tracks, torsion-bar suspensions, low silhouettes, and sloped armor. Each of these features had been inherent in one or the other of the Soviet tanks delivered to Aberdeen at the end of 1942. Responsible for gathering intelligence on new German weapons, Ordnance grasped the need to incorporate corresponding improvements in future weapons and wasted little time in doing so. In late May 1942, five months before the combat debut of the Sherman at El Alamein, a project initially designated M4X, was approved by the Services of Supply (SOS) to develop a new medium tank.²¹ Difficulties in convincing SOS and other organizations within the

¹⁹ Michael Dewer, *Ordnance Department in World War II*, Box 799, Entry 646A, RG 156, NARA II.

²⁰ Jarrett, *Ordnance: The Theme Song of Military History*, 146-149, *Jarrett Papers*, USAMHI. Jarrett was certain that the U.S. M24 Chaffee light tank of 1944 was designed by Colby to be a smaller version of the T-34.

²¹ *T20 History*, 24 May 1942 entry.

Army of the need for better tanks resulted because Ordnance failed to demonstrate the necessity for such weapons.

SOS, a new organization, existed because of significant changes in the command structure of the U.S. Army instituted in March 1942. Under the old structure, numerous chiefs of the various services within the Army enjoyed direct access to the Chief of Staff, General George C. Marshall. With over sixty agencies reporting to him, Marshall found himself inundated with the daily concerns of every entity in the Army from the Air Corps to Coastal Artillery. The establishment of General Headquarters (GHQ) under General McNair in July 1940 to tend to the immediate need of training personnel, temporarily eased some of Marshall's responsibilities, but this organization, modeled on the headquarters of the American Expeditionary Force of the First World War, soon became a "bloated monstrosity." Brigadier General Joseph T. McNarney, an Air Corps officer whom Marshall assigned to study the problem of reorganization, proposed a three-way split of the War Department. Services of Supply, later renamed Army Service Forces (ASF), would tend to the needs of the Army Air Forces (AAF) and Army Ground Forces (AGF).²² Technically responsible for ordering new tank designs into production, ASF never did so without the approval of AGF. Commanded by McNair, AGF became a source of "almost daily differences of opinion" with the Ordnance Department, especially in regards to tank development.²³ After the war, Gladeon Barnes flatly stated that the belated arrival of tanks like the Pershing "was due entirely to the action of General McNair as commander of the Ground Forces."²⁴ In saying this, however, Barnes assumed that every tank Ordnance recommended for production was perfectly fit for service. Such was simply not the case.

In the fall of 1942, however, bickering over such matters was still months away and events of the upcoming year did little to highlight any pressing need for a better tank than the Sherman. For the Allies in general and for Allied tankers in particular, November 1942 proved to be an especially successful month.

²² Perret, *Winged Victory*, 135-136; Baily, *Faint Praise*, 23-25.

²³ *Ordnance Relations With Other Agencies in the Development Field* (Chapter Three, Vol. Two of unpublished postwar Ordnance history), p. 21, Box A744, Entry 646A, RG 156, NARA II.

²⁴ Gladeon Barnes, *History of Tank Development by Ordnance Department in World War II* (Barnes postwar essay in *Military Historical Files*), p. 13, Box A778, Entry 646A, RG 156, NARA II.

In North Africa, the British Eighth Army, under General Montgomery, inflicted a crippling defeat on Field Marshall Erwin Rommel's Afrika Korps at El Alamein, and Operation Torch, commanded by General Dwight David Eisenhower, introduced American servicemen to combat and threatened Rommel's supply lines as he retreated from Egypt. Meanwhile, on the Eastern Front, Soviet forces commanded by Marshall Georgi Zhukov surrounded and besieged the German Sixth Army at Stalingrad on the Volga River. The Sherman and the T-34 played key roles in both these events, generally recognized by historians as significant turning points in the war against Germany.

Montgomery's well-prepared counter-offensive, designed to drive the Afrika Korps out of Egypt, began on 23 October 1942. Rommel possessed just a few dozen of the Mk. IV F2s of the type Jarrett examined and altogether he could muster only a little over 500 tanks. Half of these were fielded by his Italian Allies and were substandard. The British Eighth Army possessed over 2,200 tanks including 250 M4s assigned to the best armored units. The set-piece battle of attrition Montgomery planned ultimately ended on 4 November with Rommel's disengagement of his surviving armor and the beginning of a long retreat by the Afrika Korps back into Libya.²⁵

Although the Sherman emerged as the best tank available (in quantity) on the battlefield, a fatal flaw in the tanks' armor quickly became obvious. Like many tanks of the era, the Sherman featured sponsons, a part of the hull side extending out over the tracks. The Sherman featured a particularly tall sponson to allow enough height within the hull for the turret basket to clear the driveshaft running from the engine, in the rear, to the front mounted transmission. This also contributed to another inherent drawback of the Sherman, its tall silhouette. While the front glacis plate of the Sherman sloped, the side armor of the sponson was vertical plate. Use of the sponson for the storage of main-gun ammunition meant that any enemy round piercing the side armor near the crew compartment had a high likelihood of striking live ammo. The results of such penetration were always catastrophic and earned the Sherman the derogatory name of "Ronson" after the lighter of the day, which advertised that it "always lights the first time."²⁶

²⁵ Perrett, *Knights of the Black Cross*, 154-156.

²⁶ Slayton, *Arms of Destruction*, 174-176.

Another nickname, "Brew-ups," derived from the British ritual of tea-time.²⁷ A temporary solution involving the welding of appliqué plates to existing tanks failed to address the problem fully, but as early as January 1943 Ordnance began exploring a more permanent solution involving the storage of ammunition in the floor of the vehicle. This idea derived from examination of the Soviet tanks at Aberdeen Proving Grounds and eventually became a standard feature of later models of the Sherman as well as every derivation of the line of T20 tanks developed by Ordnance, including the Pershing.²⁸

As Rommel retreated into Libya, another Allied blow, Operation Torch, under the command of General Dwight D. Eisenhower, threatened the existence of the Afrika Korps. Far to the west of Rommel's forces, American troops landed in Morocco and Algeria on 8 November with the key ports of Casablanca, Oran, and Algiers as their main objectives. The rapid collapse of resistance by Vichy French forces after sporadic fighting opened the way for an Allied advance into Tunisia.²⁹ The Afrika Korps, assailed by Montgomery's western pursuit from El Alamein and an American offensive advancing east from Tunisia, seemed destined for annihilation.

While the Germans quickly moved to avert disaster in North Africa by airlifting troops into Tunisia,³⁰ an even greater crisis befell the Wehrmacht in the Soviet Union. Unable to renew the general offensive that had fallen short of enveloping Moscow in the closing months of 1941, the Germans had concentrated their offensive power in the Soviet Union on the front of Army Group South in the spring of 1942.³¹ The resulting advance carried the Wehrmacht to the western bank of the Volga River at Stalingrad and opened up an enticing opportunity to advance south into the Caucasus. With the oilfields of Baku within reach and the possibility of a linkup with Rommel's then victorious forces advancing from Egypt seemingly feasible, Hitler chose, against the advice of his generals, to split his forces.³² The Wehrmacht's Sixth Army, under the command of General Friedrich von Paulus, began a drawn-out battle

²⁷ Mark Calhoun, *Defeat at Kasserine: American Armor Doctrine, Training and Battle Command in Northwest Africa, World War II* (MA Thesis, U.S. Army Command and General Staff College, Ft. Leavenworth, Kansas, 2003), 43.

²⁸ *T20 History*, 28 January 1943 entry.

²⁹ Atkinson, *An Army At Dawn*, 69-72.

³⁰ Perrett, *Knights of the Black Cross*, 157.

³¹ Bellamy, *Absolute War*, 447.

³² Earl F. Ziemke and Magna E. Bauer, *Moscow to Stalingrad: Decision in the East* (New York: Military Heritage Press, 1988), 358-359.

of attrition in Stalingrad and eventually paid the price for Hitler's ambitions. Reliance on Hungarian and Romanian forces for the security of Sixth Army's flanks backfired when Soviet forces under Marshall Zhukov launched a series of offensives on 19 November 1942. By 23 November, two Soviet Fronts spearheaded by hundreds of T-34s and KVs had easily swept aside Hitler's allies and converged 50 miles west of Stalingrad at Kalach, trapping over a quarter of a million Germans.³³

While the greatest catastrophe to date unfolded for the Wehrmacht in Southern Russia, far to the north the first new German tank designed specifically to counter the KV-1 and the T34 had its initial deployment on the Leningrad front.³⁴ Prior to the appearance of the high-velocity 75mm gun on tracked vehicles in late 1942, necessity had forced the Germans to rely heavily on the 88mm anti-aircraft gun to knock out KVs and T-34s, as it was the only weapon that could engage these tanks from a relatively safe distance. Common sense led to the mounting of this weapon on a tank.

Built by Henschel, the 88mm armed, and heavily armored, 56-ton Panzerkampfwagen VI Ausf H became one of the most feared and legendary tanks in history. More familiarly known as the "Tiger," the 1942 version of the Mk. VI featured large road wheels, wide tracks, the thickest armor yet employed on a tank, and the most powerful antitank weapon available mounted in a turret with good power-traverse. The Germans organized the Tigers into independent three-company heavy tank battalions totaling from 30 to 45 vehicles that were usually allocated to Corps or Army headquarters to bolster important operations. The first Tigers did not employ all of the lessons learned from Soviet tanks. Developing a vehicle with sloped armor as found on the T-34 posed a technical problem that required additional time to solve. To expedite production of a counter to superior Soviet tanks, an existing design already in development was up-armored and up-gunned. The resulting vehicle had vertical armor like other German tanks and a muzzle-brake of similar design to that found on the Mk. IV Ausf F2. This meant that from a distance, the Mk. IV and the Tiger presented a similar silhouette, which inevitably resulted in reports of encounters with Tigers from Allied tankers far out of proportion to their actual availability. Although many more Mk. VI

³³ *Ibid*, 473-475; Bellamy, *Absolute War*, 526-535.

³⁴ Guderian, *Panzer Leader*, 280.

Tigers were built than the previous example of a lone Mk. VI disembarked in Norway in 1940, their numbers were never great.³⁵ The impact of the Tiger on future tank design, however, was monumental.

A mere five months after the meeting of the commission sent to Guderian's front in November 1941, Tiger prototypes were presented to Hitler on his birthday in April 1942. While this chronology contributed to the conventional layout of the first versions of the tank, by August specifications were issued for a modified Tiger incorporating sloped armor. The upgraded Tiger, however, would not enter production until February 1944. In the meantime, the 1,355 tanks of the original design built between fall 1942 and summer 1944 established a deadly reputation. First employed in the Soviet Union near Leningrad in September 1942, the Tiger appeared in North Africa and was well-known to the western Allies by January 1943.³⁶

The first German tank to incorporate the sloping armor of the T-34 went into production in January 1943. Classified by the Germans as a medium tank, the 45 ton Panzerkampfwagen V Ausf D, or "Panther," significantly raised the bar in tank design and, along with the Tiger, became the bane of Allied tankers. The Panther featured a new, longer, version of the 75mm gun tube optimized for tank killing. The muzzle velocity of this weapon exceeded 3,000 feet per second using standard armor piercing (AP) rounds.³⁷ Higher muzzle velocity meant greater armor penetrating capability. In contrast to the Panther's main armament, the 75mm dual-purpose gun of the Sherman achieved a muzzle velocity of slightly over 2,000 feet per second firing a standard American AP round. Some of this difference derived from the amount of propellant used in all German AP rounds. Major Jarrett came away from his experience in North Africa with an especially favorable impression of German tank guns and AP ammunition. After he "air mailed" the muzzle brake, "cartridge case and projectile" he had examined on the Mk. IV Ausf F2 at Alam Halfa to Aberdeen, Jarrett noted that "when I tallied the score sheet in Cairo I realized that we had

³⁵ Eric Grove, *World War II Tanks* (New York: Excalibur Books, 1976), 31-33.

³⁶ Folder: *Notes On Enemy Armored Fighting Vehicles* (10 May 1945, MID Report no. R2720-45), Box 1597, Entry 79, RG 165, NARA II; Guderian, *Panzer Leader*, 280; Grove, *World War II Tanks*, 35, 40-42.

³⁷ Folder: *Technical and Tactical Summary of Foreign AFVs, No. 26*, Pgs. 5-14, from 15 September 1943 report No. 60826 from military attaché in London, Box 197, Entry 79, RG 165, NARA II. The report details the "eighteen-feet, two inches" long 75mm gun and various armor thicknesses of the Panther. The report is compiled from details obtained from the Soviets.

an unequal situation and even tho we might have many more tanks than the Germans, tank to tank fights would be quite a battle.”³⁸ This “unequal situation” existing in late 1942 only worsened with the introduction of the Tiger and Panther.

High-velocity guns firing excellent AP rounds gave German tanks and assault guns the ability to knock-out opposing armor from a distance. When Tigers and Panthers were present, this frequently was accomplished from as far away as a mile or more. This standoff capability enabled relatively small numbers of well-handled German tanks to destroy their opponents in large numbers. The early recognition of the importance of gun-power forced on the Germans by the KVs and T-34s in 1941, however, had repercussions that went far beyond the ability of a single tank to engage and destroy multiple opponents. To attain superiority in gun-power, the Germans had to re-vamp the entire Panzerwaffe. At a time when Allied tank production began increasing significantly, German rates of production began to stagnate. Tooled to produce great numbers of Mk. IIIs, German factories were instead forced to re-tool to produce upgraded Mk. IVs, or completely new designs like the Tiger and Panther. At one point the Germans even considered stopping the production of both Mk. IIIs and Mk. IVs altogether to convert every factory to construction of new designs. The realization of how much overall production would drop in relation to ever-increasing demand meant an extension on the life-span of the old models.³⁹ Regardless of efforts to increase tank production, the decision to drastically increase the gun-power of the Panzerwaffe meant that for the balance of the war the Germans would be forced to counter quantity with quality.

Introduced in combat at the critical Battle of Kursk in central Russia in the summer of 1943, the first 200 Panthers produced were grouped in two independent brigades attached to the spearheads of the two Panzer Armies assembled for Operation Citadel.⁴⁰ Since this differed little from the practice of attaching Tiger battalions to larger units, the Americans and British interpreted this to mean that few of the new tanks would be produced for limited employment. Experience in North Africa and Italy throughout

³⁸ Jarrett, *Ordnance: The Theme Song of Military History*, 82-85, *Jarrett Papers*, USAMHI.

³⁹ Guderian, *Panzer Leader*, 282.

⁴⁰ Glantz and House, *The Battle of Kursk*, 19; Guderian, *Panzer Leader*, 310.

1943 and into 1944 only seemed to verify this assumption. Despite German errors in the initial deployments of both the Tiger and Panther on the Eastern Front, the Soviets made no such assumptions, choosing instead to quickly counter the threat. This decision proved to be wise, for while the Tiger was indeed intended for limited deployment, the Panther was slated to equip one of the two tank battalions in each Panzer division. By spring 1944, upgrades to the T-34 and further development of the KV had largely redressed the imbalance in quality presented by the Tiger and Panther.⁴¹

When the western Allies finally realized the error of their assumptions in the spring of 1944, it was too late to remedy what immediately devolved into a bad situation following the Normandy invasion. The up-gunning and up-armorings of existing German tanks in 1942, followed by the appearance of the Tiger and Panther should have sounded alarm bells throughout the U.S. Army. Yet even Ordnance, clearly aware of the technical superiority of these vehicles, proved slow to respond in spite of ample time to do so. Flawed efforts by Ordnance to replace or supplement the Sherman exacerbated the failure to introduce significant upgrades to the tank as the Soviets did with the T-34. The tankers of the western Allies paid dearly for these missteps in the last eleven months of the war in Europe in deadly combat with Tigers and Panthers.

⁴¹ Baily, *Faint Praise*, 90-91; Glantz and House, *The Battle of Kursk*, 17-19.

CHAPTER 5
MISSING THE WINDOW
OF OPPORTUNITY

U.S. Army encounters with the Wehrmacht in North Africa provided Americans an opportunity to gain practical experience in the combat arts and to learn firsthand the same lessons in the use and design of tanks that their Soviet and British allies had gained through hard experience with the Panzerwaffe. On a strategic level, the overall doctrine of combined arms overcame a shaky start and emerged much improved, although not perfected. The potential of American combined arms would not be fully realized until the summer of 1944, but a good foundation was established in North Africa. Tactical problems that arose involving the use of armor, however, were addressed with mixed success. In the more specific realm of tank design, too many important clues pertaining to future development needs either were misinterpreted or missed entirely in North Africa, a problem that continued into the campaigns in Sicily and Italy.

The western Allies' window of opportunity to assess and address the threat posed by the Tiger was very narrow, only sixteen months before the invasion of France. The appearance of the Panther a scant eleven months before Operation Overlord could only be answered by tanks already in development or through meaningful upgrades to existing designs. Soviet industry responded rapidly to the threat posed by the Tiger and Panther by increasing the firepower of Red Army armored formations in 1944. Hordes of upgraded T-34 medium tanks pouring out of Soviet factories were supplemented by new heavy tanks developed from the KV series mounting huge guns.¹ Meanwhile, the United States failed to significantly upgrade old designs or introduce new vehicles to supplement them, and as a result found themselves far behind in the tank arms race in 1944.

¹ Christopher Duffy, *Red Storm on the Reich: The Soviet March on Germany, 1945* (New York: Da Capo Press, 1993), 23-24.

While the British did significantly upgrade their Shermans and introduce new designs, British production capacity never met demand for the improved vehicles. The basic Sherman, little changed from those committed to action with Montgomery's Eighth Army at El Alamein in November 1942, continued to equip the vast majority of the armored formations of the United States and the United Kingdom throughout 1944. This same vehicle also equipped Polish and Free French armored units and was provided to the Soviet Union in considerable numbers as well. While quantity was never an issue with the Sherman, the same could not be said for some of its qualities. Failure to upgrade the Sherman or produce an improved successor in a timely manner proved fatal for far too many Allied tankers of all nationalities in the last year of the war.

The first hard lesson learned in North Africa involved the effectiveness of the weapons of the tank destroyers, the use of light tanks, and highlighted the necessity for close cooperation and control of all combat assets. On Thanksgiving Day, 26 November 1942, the 1st Battalion of the 1st Armored Regiment of the U. S. 1st Armored Division engaged elements of the 10th Panzer Division in upper Tunisia in the first tank battle between American and German armored units of the Second World War. Among the plethora of firsts inherent in the "Battle of Happy Valley," were the first sickening experiences inflicted on American tankers involving encounters with superior German weaponry. The horrified crews of M3 Stuart light tanks mounting 37mm "squirrel rifles" watched helplessly as round after round bounced off the thick frontal armor of German Mk. IV F2s. Lieutenant Freeland A. Daubin, Jr. of A Company eloquently described how the German tanks, known to the troops as Mark IV Specials (a term applied throughout the war to any Mk. IV with a long gun) devastated the platoon of tanks under his command with their "incredibly long, bell-snouted, 'souped-up' 75mm Kw K40 rifle(s)."² Daubin's account of this initial encounter between American and German armor vividly demonstrated the questionable usefulness of the light tanks and tank destroyers in an armored engagement and the importance of combined arms to successful combat operations.

² Freeland A. Daubin, Jr. *"The Battle of Happy Valley,"* (Fort Knox, Kentucky: Armored School, 1948), 1-2, 4, 6, USAMHI.

The Thanksgiving Day action began following an unsuccessful attempt by several 75mm howitzer equipped half-tracked M3 tank destroyers to slow the advance of thirteen German tanks. As the ineffectual TDs withdrew, the Stuarts of A and B Company maneuvered to engage the Germans. Leading his tank platoon forward on A Company's right flank, Daubin and his loader located a good firing position and picked out one particular Mk. IV. Daubin, like all M3 Stuart commanders doubling as the tanks gunner, then "pumped more than eighteen rounds at the Jerry tank while it came in," seemingly "annoyed by these attentions." Sparks flew from the German tank as the rounds ricocheted harmlessly off its armor. The "slight defilade advantage" afforded to Daubin and his crew by their hull-down position in a wadi vanished with the Mk. IVs eventual positioning atop a "small hummock" a mere thirty yards away.³

Having ineffectually attempted to defeat the Mk. IV with accurate gunfire, Daubin decided that a "rapid retrograde movement to an alternate firing position was in order." As the Stuart began to back out of the wadi, the unequal engagement abruptly ended. The effect of the Mk. IVs long 75mm gun on the Stuart from fifty yards proved catastrophic. Blown from the tank commander's cupola, Daubin watched, helpless and wounded, as his loader was machine-gunned while attempting to seek cover after exiting the Stuart. Bizarrely, the tank, engulfed in flames and still carrying the dead driver and severely wounded bow gunner, continued to back through the battle "until stopped by friendly hands."⁴

Incredibly, the "Battle of Happy Valley" ended in a draw. Lieutenant Colonel John K. Waters, the 1st Battalion commander, had cast the Stuarts of A Company at the Germans as bait. The Mk. IVs thoroughly negated their considerable range advantage by taking the bait and closing on the attacking light tanks. Intent on destroying the Stuarts of A Company, the Mk. IV crews exposed their more vulnerable side and rear armor plate to the undetected tanks of B Company maneuvering around their flank. Even the 37mm "squirrel rifle" proved effective at close range in such circumstances.⁵

Seven Mk. IVs and seven of A Company's twelve tanks were lost in the course of the Thanksgiving Day battle, which glaringly exposed the inadequate firepower of both the M3 Stuart and the

³ *Ibid*, 1-2, 26-28.

⁴ *Ibid*, 2-3.

⁵ *Ibid*, 30.

M3 tank destroyer in a tank battle. A wounded German tanker, captured and riding in the same ambulance with Daubin after the battle, smugly “let it be known that we Americans would lose the war because we built such poor tanks.”⁶ To its credit, the U.S. Army responded rapidly to the problems thus revealed.⁷ American armored divisions organized along the lines of the German Panzer divisions of 1939-1941 featured far too many light tanks. The use of light tanks was reevaluated, taking the Tunisian experience into account, with great benefit. By the time of the Normandy invasion, light tanks had been drastically reduced in number and reassigned to the role of reconnaissance.⁸

The M3 half-track tank destroyers were phased out as rapidly as possible in favor of a new mobile mount designated M10. This new tank destroyer used the same drive train and basic chassis of the M4 Sherman, but featured a modified hull with thinner armor to reduce weight and thus improve mobility. The M10 mounted a modified 3-inch naval cannon designated M7 in an open top turret.⁹ Ordnance believed this 76mm weapon, featuring a higher muzzle velocity than the 75mm M3 gun of the standard Sherman, would be able to adequately counter the threat of German armor. M10s began replacing the failed initial self-propelled armaments of the Tank Destroyer Force before the final Axis surrender in North Africa in May 1943. Although it would not be the last weapon constructed in the quest for the perfect self-propelled TD, more M10s were produced than any other type functioning in the tank destroyer role. The virtually useless 37mm towed guns gave way to a new 57mm towed anti-tank gun that was only marginally more effective. McNair’s preference for towed weapons would lead to further developments that eventually resulted in a 76mm anti-tank gun as well.¹⁰

Several other problems, some seemingly insignificant, others of great importance, are identified in Daubin’s narrative. The .30 caliber machine gun mounted on the Stuart’s turret for air defense proved useless against incessant air attacks carried out by Axis aircraft leading up to the “Battle of Happy

⁶ *Ibid*, 30-31; Atkinson, *An Army at Dawn*, 202-205.

⁷ *Records of the Office of the Chief of Ordnance*, Folder: “Press Releases” (Excerpts taken from report to Lt. General J. L. Devers from Major General G.M. Barnes), Box 746A, Entry 646A, RG 156, NARA II. In this report Colonel Waters highly praised the Stuarts. Fortunately, others reconsidered its usefulness.

⁸ Baily, *Faint Praise*, 51-52.

⁹ *Ibid*, 45-46.

¹⁰ *Ibid*, 45-46; Chamberlain and Ellis, *British and American Tanks of World War II*, 140-141.

Valley.”¹¹ This seemingly small problem resulted from a much greater concern regarding air support. Simply put, the Germans enjoyed virtually unchallenged air superiority in the early stages of the advance into Tunisia. This problem eventually was mitigated with the build-up of the Twelfth Air Force under General Jimmy Doolittle, but caused unnecessary casualties early in the campaign that easily could have been prevented with proper air support and anti-aircraft weapons for the tanks. The latter problem was eventually corrected by the installation of .50 caliber M2 machine guns mounted atop the turrets of all American tanks; the former problem was solved by time and the construction of good airfields in western Tunisia.¹²

Haste in the eastward advance of American forces into Tunisia led to serious breaches of doctrine. Problems in the execution of the basic combined arms concept are reflected in Daubin’s statement that during the Thanksgiving Day action, “We had no infantry, no artillery, and no air support.”¹³ The Stuarts and practically worthless M3 tank destroyers operating in isolation were fortunate on that Thanksgiving Day that the German commander so poorly handled the forces at his disposal, a fact he paid for with dismissal from his command.¹⁴ Further German reinforcement eventually brought an end to the haphazard, poorly supported Allied advance into Tunisia. By late January 1943, Fifth Panzer Army, growing daily, and already numbering 100,000 men under Colonel General Hans-Jurgen von Arnim, had arrived through Tunisian ports or via airlift. Leaving a thin screening force at Mareth near the Libyan border to delay the advance of Montgomery’s Eighth Army, the remnants of Field Marshall Erwin Rommel’s Panzer Army Africa, including the Afrika Korps, hurried to join Fifth Panzer Army in Tunisia to give the U.S. Army a first-hand demonstration in the proper execution of combined arms operations. The first major engagement between American and German armor followed the link-up of the two German armies.¹⁵ Poorly positioned and failing again in the proper use of combined arms, the U.S. Army suffered

¹¹ Daubin, “*The Battle of Happy Valley*,” 16-19.

¹² Geoffrey Perret, *There’s a War to Be Won: The United States Army in World War II* (New York: Random House, 1991), 154-155; Perret, *Winged Victory*, 181-191.

¹³ Daubin, “*The Battle of Happy Valley*,” 24.

¹⁴ Atkinson, *An Army at Dawn*, 204.

¹⁵ *Ibid*, 319-322; Perrett, *Knights of the Black Cross*, 157-158.

its worst defeat of the war against Nazi Germany in a week-long action known as the Battle of Kasserine Pass.

The ejection of Allied forces from the key Faid Pass through the Eastern Dorsal of the Saharan Atlas Mountains at the end of January 1943 led to the establishment of defensive positions in relatively open terrain west of the pass. The disposition of American forces invited an Axis attack and the Germans were not long in obliging. In a twelve hour period on 14 February, units of the U.S. 1st Armored Division around the Tunisian town of Sidi bou Zid fell victim to a double envelopment expertly executed by elements of the Fifth Panzer Army debouching from Faid Pass. Well supported by armored infantry, mobile artillery, assault guns, and JU-87 Stuka dive bombers, one hundred tanks of the 10th Panzer Division, including twelve Tigers of the 501st Heavy Tank Battalion, struck with overwhelming force at dawn on Valentine's Day.¹⁶

In short order the well coordinated German attack destroyed sixteen American tanks, a battery of artillery, and a platoon of tank destroyers. By early afternoon, hundreds of American infantrymen situated too far apart for mutual support on high ground to the north and south of Sidi bou Zid were surrounded. The Valentine's Day debacle continued with the evisceration of counterattacking Shermans of Lieutenant Colonel Louis V. Hightower's 3rd Tank Battalion by accurate long-range 88mm fire from Tigers and 88mm anti-aircraft guns used in the anti-tank role. Including the sixteen tanks lost during the opening moments of the engagement, forty-six of fifty-two Sherman's involved in the Valentine's Day action were destroyed. Shortly after 5:00 P.M., units of the 10th Panzer Division linked-up with lead elements of the 21st Panzer Division of Rommel's Panzer Army Africa to complete the double envelopment of the American forces around Sidi bou Zid.¹⁷

The following day, the 2nd Battalion of the 1st Armored Division, under Lieutenant Colonel James D. Alger, suffered a fate similar to that of the 3rd Battalion. Moderately supported by a tank destroyer company, an infantry battalion, and a few artillery pieces, Alger set out to rescue the American infantry

¹⁶ *Ibid*, 159; Atkinson, *An Army at Dawn*, 308-311, 325, 332-335, 339.

¹⁷ *Ibid*, 339-343; Hans von Luck, *Panzer Commander: The Memoirs of Colonel Hans von Luck* (New York: Dell Publishing, 1989), 141-142.

surrounded on the hills near Sidi bou Zid. Allied intelligence estimated sixty German tanks in the vicinity of Sidi bou Zid, less than half their actual strength. Without the benefit of any type of reconnaissance, Alger led his relief force forward into another disaster. While promised support from Allied aircraft failed to appear, German Stuka's bombed with impunity. Alger's force entered the kill zone of a well-laid German trap shortly before 3:00 P.M. This time, only four tanks held back in reserve survived the destruction. The remaining fifty-two tanks of the 2nd Battalion were wiped out.¹⁸

Fortunately for the Allies, internecine conflict between Rommel and von Arnim led to indecision and delayed the planned German advance to the west on Kasserine Pass.¹⁹ Unfortunately, this delay did little to help the trapped American infantry. Freeland Daubin's former battalion commander, Lieutenant Colonel John K. Waters, was among the prisoners taken in the days after the Valentine's Day battle.²⁰ The level of attrition inflicted on the U.S. 1st Armored Division during operations prior to February 14 is reflected in the fact of Waters' command of one of the trapped infantry forces. Losses inflicted on Waters' former command, 1st Armored Battalion, led to Daubin and other survivors being withdrawn for reinforcement and refitting, temporarily freeing the colonel for other duties.²¹ By the end of the day on 15 February, the annihilation of two more battalions of the division's tanks left the 1st Armored Division an armored unit in name only.

As Waters, General George S. Patton's son-in-law, was captured along with thousands of other Americans, British General Harold Alexander took command of all ground forces in Tunisia and began feeding in reinforcements to stem the tide of the German offensive.²² After finally renewing their offensive and capturing Kasserine Pass through the Grand Dorsal of the Atlas Mountains, the Germans attacked northward intending to turn the flank of the Allied lines. A huge supply depot at Tebessa, which promised to help sustain the advance, lay tantalizingly within reach.²³ At this point Allied reinforcements, supported

¹⁸ Atkinson, *An Army at Dawn*, 350-352; Perrett, *Knights of the Black Cross*, 159.

¹⁹ Atkinson, *An Army at Dawn*, 357-360. Rommel and von Arnim apparently held grudges dating back to the 1920s.

²⁰ Daubin, "The Battle of Happy Valley," footnotes, 1; Atkinson, *An Army at Dawn*, 344.

²¹ Daubin, "The Battle of Happy Valley," 32.

²² Perrett, *Knights of the Black Cross*, 159-160.

²³ Atkinson, *An Army at Dawn*, 357-358.

by massed artillery, halted the Germans' northward momentum. Foreshadowing the future dominance of the arm, American artillery units proved especially proficient in several actions.²⁴

Facing an ever increasing assemblage of combined arms resistance, the German's called off their offensive. On the night of 22 February, Rommel skillfully disengaged and quickly withdrew through Kasserine Pass. Failing in their offensive against the Americans, the Germans were squeezed into an ever shrinking bridgehead. In ill health from years in the desert, Rommel left command of the newly renamed Army Group Africa to von Arnim on 9 March and departed Tunisia. On 12 May Von Arnim presided over a surrender of German forces comparable to that at Stalingrad.²⁵

Surprisingly, the Tigers' performance in North Africa failed to draw much attention from the western Allies. First introduced to action in piecemeal fashion on the Eastern Front in September 1942, the Tigers' impact far exceeded their numbers. Deployed to the Leningrad front, the initial action by Tigers was conducted over bad terrain with inadequate support, resulting in the disabling of all four vehicles by Soviet anti-tank guns. Fortunately for the Germans, three of the tanks were recovered that night and the fourth utterly destroyed by a generous application of demolition charges. The Tigers of the 502nd Heavy Tank Battalion overcame this dubious debut to wreck havoc on Soviet armor over the next few months.²⁶

By the end of January 1943, the secrets of the Tiger were well known to western Allied intelligence, as the Soviets had succeeded in capturing one early in the month, and promptly reported its details to their western Allies.²⁷ Reports of previously unknown heavy tanks had come from North Africa as early as 2 December when British V Corps units had been stymied in their advance through Northwestern Tunisia by several Tigers. Hightower was quite aware of the participation of Tigers of the

²⁴ *Ibid*, 381, 392.

²⁵ Perrett, *Knights of the Black Cross*, 160-162.

²⁶ Otto Carius, translated by Robert J. Edwards, *Tigers in the Mud: The Combat Career of German Panzer Commander Otto Carius* (Mechanicsburg, Pennsylvania: Stackpole Books, 1992), 26-27.

²⁷ Guderian, *Panzer Leader*, 280-281; Perrett, *Knights of the Black Cross*, 163-165; Report No. 60927 (Pg. 5) from military attaché in London, *Notes on Enemy Armored Fighting Vehicles, Section 21-Amendment No. 7*, September 1943, Box 1597, Entry 79, RG 165. This restricted document from the fall of 1943 confirms that the Allies had knowledge of the Tiger in late 1942 and relates details gleaned from several captured in North Africa. [All documents in this series will hereafter be referred to as *Notes on Enemy AFVs, Section 21* followed by report and page numbers.]

501st in the devastation of his battalion on 14 February, a fact he verified after the battle.²⁸ In the larger scheme of things, the handful of Tigers deployed in North Africa contributed little to the final outcome of the campaign. Tactically, however, the Tigers of the 501st Heavy Tank Battalion contributed devastating firepower on several occasions. While Allied tankers like Hightower were all too aware of their presence in theater, their impact went virtually unnoticed by high level commanders.

Inevitably, the Tigers did not always experience success. One particular engagement led the British to greatly underestimate the potential of the tank. On 26 February, a company of the 501st Heavy Tank Battalion deployed on unsuitable terrain took a terrific beating from British V Corps units in a battle in Northern Tunisia. A tank killing-ground prepared by the British near Beja earned the nickname of the Tiger Graveyard after half of the fourteen Tigers committed to the action were knocked out, largely by heavy artillery concentrations, in an outstanding display of the destructive power of combined arms. Using everything in their arsenal, from anti-tank guns and fighter-bomber attacks to minefields and artillery, the British destroyed the bulk of the German armor deployed in the attack. Only five of the seventy-four tanks available to Colonel Rudolf Lang on 26 February were operational by 1 March, prompting his own troops to begin referring to their commander as "Tank Killer" behind his back.²⁹ While the fate of the Tigers of Lang's battle group left the British unimpressed with the tank, U.S. Ordnance took note of the vehicles qualities and began to develop a response.

Development of the series of tanks that eventually led to the Pershing began on 24 May 1942 with authorization for the construction of a pilot model of a medium tank designated M4X.³⁰ By early September, an Ordnance Committee recommendation for the construction of a tank now designated T20 was under consideration.³¹ Approval from the Services of Supply to continue a study on this vehicle came on 15 September.³² Another design with the same hull as the T20, but featuring a revolutionary electric drive with great promise, also was under consideration. General Jacob Devers, head of the Armored

²⁸ Atkinson, *An Army at Dawn*, 348.

²⁹ *Ibid*, 406-407; Perrett, *Knights of the Black Cross*, 160-161.

³⁰ *T20 History*, 24 May 1942.

³¹ *Ibid*, 3 September 1942.

³² *Ibid*, 15 September 1942.

Force, expressed great enthusiasm for this project, eventually designated T23, as early as 15 June 1942.³³

Unfortunately, a low materials priority rating resulting from the high priority placed on the construction of the new M10 tank destroyer slowed construction of the pilot models of the T20.³⁴ This snag was finally removed when the Army and Navy Munitions Board assigned a priority rating of AA1 to three new medium tank projects under consideration on 1 October 1942. In addition to the T20 and T23, another development designated T22 would be undertaken.³⁵ All of the tanks featured a new, low silhouette, box-hull, differing only in drive system components, suspensions, turret construction and armament. By the end of October the British were very interested in the T20 series.³⁶

One important characteristic of the early developmental stages of the T20 series was the close cooperation of the Armored Force with the Ordnance Department. General Devers had an understandable interest in developing the best tanks possible for his command and worked well with General Gladeon Barnes towards that end.³⁷ Another important characteristic throughout the development of the T20 series was the high level of interest displayed by Barnes in every aspect of each project. Numerous entries in the "History of the Medium Tank T20 Series" begin with the phrase, "Activities of General Barnes."³⁸ While his role as Chief of Research and Development of the Ordnance Corps certainly justified an active interest in the T20, Barnes invested considerably more time and effort to tank development than he devoted to any other project. "Activities of General Barnes" appeared far less frequently in the histories of other projects undertaken during the war.³⁹ The most significant characteristic of the T20 project, however, was Barnes' commitment to ever increasing armor protection

³³ *Ibid*, 15 September 1942.

³⁴ *Ibid*, 16 September, 11 December 1942.

³⁵ *Ibid*, 1 October 1942.

³⁶ *Ibid*, 28 October 1942.

³⁷ *Ibid*, 18 February 1943. Ordnance began development of a torsion bar suspension for the T20 series following a request made by Devers on this date; Baily, *Faint Praise*, 36-37.

³⁸ *T20 History*, 15 June, 31 August, 16 September, 21 September, 25 September, 28 September, 2 October 1942. These numerous entries from the first four months of the T20 project quoting the "Activities of General Barnes" are just a sample indicating his level of interest in the series. Entries are even more numerous in 1943 and 1944.

³⁹ Baily, *Faint Praise*, 130.

and gun power.⁴⁰ Barnes quickly became convinced that production of a heavy tank was a necessity to keep pace with German development. His devotion to this idea provided the seed for the controversy that was to follow.

Original designs for the T20 series called for testing an automatic loading 75mm gun, a 3-inch gun such as the one used in the new M10 tank destroyers, and a new 76mm weapon Ordnance developed from the 3-inch gun. The appearance of the Tiger immediately prompted the Ordnance Department to consider even more powerful armament for the series. An engineering study conducted by the Technical Division of the Ordnance Department and released in early October 1942 explored the feasibility of 90mm armament in existing projects.⁴¹ In March 1943, Barnes "instructed the Development Branch to install the 90mm Gun in all future Medium Tanks."⁴² The bigger gun obviously increased the weight of the tank and, more importantly, eventually clashed with the wishes of Army Ground Forces and its commander, General Leslie McNair.

Ever increasing gun power in the development of the T20 series, in addition to adding weight, also resulted in a dimensionally larger tank. Mounting a 90mm gun required a turret diameter much greater than was necessary to mount a 75mm or 76mm gun, adding both length and width to the hull of the vehicle. This fact combined with the ever increasing track widths of new suspension systems to produce a vehicle of even greater width. The 90mm armed T26E3's Barnes introduced in March 1945 were twenty tons heavier, almost two feet wider, and eight and a half feet longer than the standard Sherman with the original narrow tracks and 75mm gun.⁴³

The weight and dimensions of equipment constituted important design considerations, especially for an Army fighting a war far from its own shores. By design, the Sherman conformed to the dimensions and weight limitations of temporary bridging equipment issued to Army engineering units. The Sherman also conformed to the width of flatbed railroad cars needed to haul tanks from American factories to ports

⁴⁰ Barnes, *History of Tank Development by Ordnance in World War II*, 7.

⁴¹ *T20 History*, 1 October 1942.

⁴² *Ibid*, 5 August 1942, 11 March 1943.

⁴³ Chamberlain and Ellis, *British and American Tanks of World War II*, 117, 160.

of embarkation. Once there, twenty Shermans neatly fit, nose-to-tail in two rows, on the 288-foot long tank deck of an LST (Landing Ship, Tank), again, by design.⁴⁴

As developments in the T20 series turned towards new suspension systems featuring wider tracks similar to those of the Tiger and the Soviet tanks at Aberdeen, the width of the tanks began to exceed limitations of both bridges and rail cars. When the Pershing finally reached production status, the wide tracks along with the outer set of road wheels had to be removed to facilitate rail shipment, and the tank deck of an LST proved able to accommodate only fourteen of the larger tanks. Width and load bearing limitations of standard bridging equipment were exceeded by the breadth and weight of the tank. AGF proved reluctant to approve tank designs requiring more shipping space, as fewer vehicles could be conveyed in each shipment. Services of Supply, eventually renamed Army Service Forces (ASF), constantly reminded the Ordnance Department that its designs exceeded *Army Regulation (AR) 850-15*, which set a limitation of 124 inches on vehicle width and 35-tons on gross weight.⁴⁵ Such simple, yet extremely important considerations regarding length, width, and weight emerged as key factors in gaining approval for production of tanks in the T20 series.

An additional concern AGF and McNair harbored regarding heavier armed tanks revolved around doctrine. Failure of the TDs in North Africa seemed to owe much to their lack of gun power. The M-10, with its 3-inch gun, and a new tank destroyer in development designated T70, featuring the new 76mm weapon, seemed to promise the necessary firepower to accomplish the task.⁴⁶ A staunch supporter of the tank destroyer concept, McNair feared that better armament for American tanks simply encouraged tankers to hunt enemy armor instead of engaging in the desired role of exploitation.⁴⁷ While McNair generally opposed production of up-gunned tanks based solely on this premise, he had no opposition to ongoing development.⁴⁸ The jump from development to production, however, proved a difficult hurdle.

⁴⁴ Baily, *Faint Praise*, 82; Gordon L. Rottman, *Landing Ship, Tank: (LST) 1942-2002* (New York: Osprey Publishing, 2005), 12.

⁴⁵ *Ibid*, 82, 95-96, 127.

⁴⁶ Gabel, *Seek, Strike, and Destroy*, 27-28.

⁴⁷ Baily, *Faint Praise*, 94-95.

⁴⁸ *Ibid*, 8-9.

Proponents of the Pershing fought to overcome the considerable restraints of *AR 850-15* and McNair's basic prejudices against its heavier armament to get the tank to the production stage, only to encounter additional interference. Even after the Pershing was standardized, AGF demanded further testing before it would declare the vehicle battle worthy and allow it to be released for overseas service.⁴⁹ Fortunately, General George C. Marshall overrode these objections, or the tank would never have reached frontline units in Europe at all. It was an entirely different story, however, when it came to development and production of tank destroyers. Both the M10, considered an interim design, and the T70, viewed by the Tank Destroyer Force and its commander General Andrew Bruce as the ideal weapon for executing tank destroyer doctrine, faced few of the roadblocks to production encountered by the tanks of the T20 series.⁵⁰ These vehicles were recommended by AGF for standardization with a minimum of testing. In the case of the T70, eventually designated 76mm Gun Motor Carriage M18, and known as the Hellcat, the vehicle was standardized and in production "little more than a year after the decision to go ahead on the design."⁵¹

The same could not be said for vehicles of the T20 series. With its basic design features established by May 1943, had T26 development received the same priority and proceeded from its original conception at the same pace as the M18, it might have been ready for deployment in May 1944.⁵² The T26s, however, presented manufacturing challenges exceeding those of the far simpler tank destroyers. Advances in suspension and track components already developed in other vehicles of the T20 series had to be incorporated, and the turret mounting of the heavy 90mm gun took considerably more time to develop than the open-top, lighter armored counterparts of the tank destroyers. Still, supposed concern over reliability resulted in far more testing for tanks, especially well-armed tanks more suited for tank-to-tank combat with Tigers and Panthers.

⁴⁹ *T-20 History*, 8 December 1944.

⁵⁰ Gabel, *Seek, Strike, and Destroy*, 27-28.

⁵¹ *The Armored Force Command and Center Study No. 27* (Army Ground Forces Historical Section, 1946), 62-66, USAMHI. This AGF document practically gloats over the lack of testing done on the M18.

⁵² *T-20 History*, 5 May 1943.

The last opportunity the western Allies had to recognize the need to produce better tanks came in the summer of 1943. On 12 July, the third day of Operation Husky, Tigers attached to the Hermann Göring Panzer Division took part in a counterattack against the American beachhead near Gela, Sicily. An appropriate combined arms response involving tanks, anti-tank guns, artillery and heavy naval gunfire answered the challenge. Allied cruisers, along with destroyers operating dangerously close to shore, made the difference in the engagement and overwhelmed the German attack with a hail of ordnance. This display of firepower negated the advantages of the Tigers, and ten of the seventeen deployed were knocked out along with more than thirty other German tanks. As the campaign moved inland, the Tigers met with mixed success and, overall, failed to impress. In one engagement with Tigers the American 2nd Armored Division lost an entire platoon of tanks; in another the Sherman's got the drop on six Tigers and destroyed them with well placed rounds into their more vulnerable side armor at close range. By the end of the Sicilian campaign, the majority of Allied tankers were as pleased with the M4 Sherman as they had been following the battles in North Africa.⁵³

When U.S. leadership opted to knuckle under to British Prime Minister Winston Churchill's desire to probe the "soft underbelly" of Southern Europe, rather than directly confront the Wehrmacht in France in 1943, the opportunity for larger, more frequent tank battles with the Panzerwaffe was deferred until the summer of 1944. A landing in France in the summer of 1943 undoubtedly would have exposed the Sherman's flaws and prompted an antidote to the threat posed by the new generation of German armor. Instead, the Mediterranean strategy initiated in North Africa continued.⁵⁴ The rugged terrain comprising most of the Italian boot proved poorly suited to armored operations and few of the new German tanks were encountered in the early stages of the Italian campaign initiated in early September. As preparations began for Operation Overlord, the Sherman appeared thoroughly fit to continue constituting the backbone of the western Allies armored formations.

⁵³ Atkinson, *The Day of Battle: The War in Sicily and Italy, 1943-1944* (New York: Henry Holt and Company, 2007), 100-104; Baily, *Faint Praise*, 52-53.

⁵⁴ Atkinson, *The Day of Battle*, 9-10.

While probably not what Stalin envisioned when he imagined a second front, the invasion of Sicily, nevertheless, influenced events in the Soviet Union. Seeking to reinforce his western defenses, Hitler chose to cut short the titanic clash of armor in Western Russia near the city of Kursk.⁵⁵ Operation Citadel, delayed for months to accumulate the new Panther tanks, seemed to be faltering even before Hitler called it off. Given ample time, the Soviets prepared defenses in depth and made the Germans pay heavily in their attempt to cut off the Kursk bulge. Instead of crippling the Soviets' offensive ability on the Eastern Front as intended, the Battle of Kursk signaled the beginning of an inexorable Red Army advance to Berlin.

Thrust into battle without proper testing, the Panthers proved not worth the wait. Plagued by problems inherent in new vehicles rushed into service, many broke down. Failure of the Panthers weak final drive and engine overheating due to inadequate cooling proved to be the most common problems. These mechanical problems were compounded on the first day of the battle when many of the Panthers that remained operational blundered into minefields and quickly were disabled. Only twenty percent of the Panthers originally committed to Operation Citadel remained operational by the second day of the battle.⁵⁶

Another vehicle with long-range capability, a new, limited production, heavy assault gun fared little better at Kursk than the Panther. Originally designed as a tank by Ferdinand Porsche to compete with Henschel for the Tiger contract, this vehicle featured an electric drive similar to that of the American T23. Mounting a longer, higher velocity 88mm gun than that of the Tiger in a heavily armored superstructure and known as Ferdinand, the assault gun featured the deadliest tank-killing weapon on the battlefield. Unfortunately, the designers failed to provide any secondary armament for the vehicles, which once isolated, as many were at Kursk, were at the mercy of infantrymen with explosive devices.⁵⁷ Still,

⁵⁵ Robin Cross, *Citadel: The Battle of Kursk* (London: Michael O'Mara Books Ltd., 1993), 222-223; Glantz and House, *The Battle of Kursk*, 215.

⁵⁶ Lloyd Clark, *The Battle of the Tanks: Kursk, 1943* (New York: Atlantic Monthly Press, 2011), 183-184, 189-190, 224-225; Cross, *Citadel*, 152; Hughes and Mann, *The Panther Tank*, 54-55.

⁵⁷ Martin Caidin, *The Tigers are Burning* (New York, Pinnacle Books, 1974), 22-23; Clark, *The Battle of the Tanks*, 183, 189-190, 254-255; Grove, *World War II Tanks*, 32-33, 35. Confident of winning the Tiger contract, Porsche produced hulls that served as the base chassis for the 85 Ferdinands used at Kursk. No more were built. Following

along with the Tigers, the Ferdinands and Panthers that continued to run provided a long-range capability for which the Red Army had few immediate answers. Alarmed by the capabilities of the new weapons, the Soviets quickly moved to remedy the situation.

While the western Allies remained oblivious throughout 1943 to the threat posed by the new German vehicles, the Soviets reacted. Prior to the Battle of Kursk, the Soviets fielded a new assault gun based on the KV as a response to the Tiger. Removal of the turret and the addition of a heavily armored superstructure featuring a 152mm gun adapted from a standard artillery piece created a vehicle similar in basic design, but far more powerful than the German StuG III. Few were available at Kursk, but the SU-152, quickly nicknamed Animal Killer by Red Army tankers, proved to be quite capable of dealing effectively with the German cat family.⁵⁸ Continually upgraded, in 1944 the SU-152 was re-designated JSU-152 in honor of Josef Stalin.⁵⁹

The SU-152 marked just the beginning of a series of upgrades to the Red Army's tank fleets. Soon after the Battle of Kursk another assault gun designated SU-85 entered service. Based on the T-34 chassis, and mounting an 85mm anti-aircraft gun converted to the anti-tank role, the SU-85 served as an interim solution until the same gun could be adapted for turret mounting in a significantly upgraded version of the T-34. The resulting T-34/85 featured a new three man turret, alleviating many of the tactical problems inherent in a commander having to double as the tank's gunner. By January 1944, the first of 11,000 T34/85s constructed before war's end rolled off Soviet assembly lines.⁶⁰ With the SU-85s armament now redundant, a superb new 100mm anti-tank gun replaced the 85mm weapon. The resulting SU-100 proved to be, arguably, the best assault gun of the war.⁶¹

The Red Army further addressed the German threat with a new series of heavy tanks developed on the KV chassis. The first of the series, introduced in December 1943 and built in relatively small

retrofitting with a machine gun in the right hull-front the surviving vehicles were renamed Elephant and continued to serve on the Eastern Front and in Italy. The Siemens electric drive required frequent maintenance and greatly contributed to the vehicles extreme weight and short combat range.

⁵⁸ Glantz and House, *The Battle of Kursk*, 19.

⁵⁹ Jim Winchester, *Tanks and Armored Fighting Vehicles of WW II: The World's Greatest Military Vehicles, 1939-1945* (Edison, New Jersey: Chartwell Books, Inc., 2003), 299; Grove, *World War II Tanks*, 119, 121.

⁶⁰ Duffy, *Red Storm on the Reich*, 23-24; Glantz, *Colossus Reborn*, 248.

⁶¹ Slayton, *Arms of Destruction*, 192-196.

numbers, was the KV-85. The KV-85s best attribute ended up being its turret and 85mm gun. Minimal modification of the turret proved necessary to adapt it for the aforementioned T-34/85. Of far greater significance were the Josef Stalin series of heavy tanks. The first of these, JS-1, featured a hull with significantly improved ballistic characteristics. When the 85mm gun of JS-1 became redundant with the introduction of the T-34/85, the JS-II quickly replaced it. Featuring a 122mm gun adapted from an artillery piece, JS-II was the most heavily armed tank of the Second World War. Over 2000 of these vehicles, known to the soldiers of the Red Army as the Victory Tank, were produced before the end of the war.⁶²

While the Soviets upgraded, the western Allies dithered. The British finally began producing a decent tank in late 1944 known as the Comet. With a 77mm gun derived from the 17-pounder, the Comet featured good firepower, a low silhouette, and proved far more reliable than most of its predecessors. While a few Comets were delivered to combat units in December 1944, only the British 11th Armored Division ever received a full complement of the tanks for its armored battalions.⁶³ With time quickly running out to introduce a better tank before the invasion of France, the U.S. Ordnance Department was short on options. In spite of Ordnance assertions that a production order for 500 vehicles would pave the way for availability in the summer of 1944, the 90mm armed tanks, the T25 and the T26, simply could not be readied in time.⁶⁴ Barnes and the Ordnance Department instead began to lobby vigorously for the T23. Touting its 76mm armament, low silhouette and the additional speed afforded by its electric drive, Ordnance set out to ramrod the T23 into service.⁶⁵ The T23, however, possessed few advantages over the Sherman and an abundance of flaws, especially with the electric drive. The worst infighting of the war between Ordnance and AGF resulted from efforts to secure production for the T23, T25, and T26. Meanwhile, little changed from 1942; the Sherman soldiered on. Beginning in the summer of 1944, a price for this “sin,” paid for in blood, would be painfully extracted from Allied tankers.

⁶² *Ibid*, 152-156; Bellamy, *Absolute War*, 603; Duffy, *Red Storm on the Reich*, 23-24; Glantz, *Colossus Reborn*, 248.

⁶³ Chamberlain and Ellis, *British and American Tanks of World War II*, 50-51.

⁶⁴ *T20 History*, 13 September 1943.

⁶⁵ *Ibid*, 22 July 1943.

CHAPTER 6

PAYING THE PRICE

From the turret of his Tiger, hidden in a small wood atop Hill 213 on the morning of 13 June 1944, Captain Michael Wittmann of the 501st SS Heavy Tank Battalion detected vehicles of a detachment of the British 7th Armored Division at rest in the French town of Villers-Bocage. Spearheading one arm of a pincer movement intended to envelope the key city of Caen, the lead elements of the 4th County of London Yeomanry had, unfortunately, chosen a bad time and place to halt their advance. Now under the scrutiny of the best tank crew in the Panzerwaffe, the British were oblivious to the mortal danger lurking nearby. Observing through his sight the column of stationary vehicles and the nonchalant milling about of dismounted tankers and armored infantryman, Wittmann's crack gunner, Corporal Balthasar Woll, wryly remarked to his tank commander that "they're acting as if they've won the war already." Extremely experienced, highly decorated, and already famous in Germany as a "tank ace" for the confirmed destruction of over one-hundred tanks and a like number of anti-tank guns on the Eastern Front, Wittmann calmly replied to Woll, "We're going to prove them wrong."¹

Emerging from the wood, Wittmann directed his driver onto a cart path running parallel to the main road into Villers-Bocage. As the Tiger advanced parallel to the line of parked trucks, tanks, and armored personnel carriers, Woll methodically raked the line of British vehicles with devastating 88mm fire administered from point-blank range. Upon reaching the end of the column, Wittmann employed a technique acquired in the east for destroying anti-tank guns. To save ammunition, and avoid the time required to inform the crew of a threat and acquire the target, Wittmann usually directed his driver

¹ Anthony Beevor, *D-Day: The Battle for Normandy* (New York: Viking Penguin, 2009), 191-192; Carlo D'Este, *Decision in Normandy* (New York: Harper Perennial, 1991), 178-180; Max Hastings, *Overlord: D-Day and the Battle for Normandy* (New York: Simon and Schuster, 1984), 131-132; Franz Kurowski, Translated by David Johnston, *Panzer Aces* (New York: Ballantine Books, 1992), 354-356. Wittmann was the most highly decorated tanker in the Panzerwaffe in the summer of 1944. He earned the Knights Cross, Germany's highest military award, for the destruction of 56 Soviet tanks in January 1944, and the Oak Leaves to the Knights Cross later that same month for taking his total to 88. Wittmann received the Swords to the Knights Cross on 22 June for his exploits during the Normandy campaign. Woll also was a Knights Cross holder in honor of his work at the sights of Wittman's Tiger. Such an award was extremely rare for enlisted crewmembers.

towards nearby opposition. The Cromwell tank rammed at the end of the column that day failed to crush, as had Soviet anti-tank guns, but the maneuver, nonetheless, cleared a path for the rampaging Tiger to enter the narrow main street of Villers-Bocage where Woll promptly destroyed three more Cromwell's of the Yeoman's HQ Company.²

Wittmann's crew then survived their closest call of the engagement when one of a handful of Sherman Fireflies attached to the British spearhead managed to score several broadside hits on the Tiger from a side street. Despite a distance of only 200 yards, none of the 17-pounder rounds penetrated the tanks' thick side armor. Alerted to the threat, Woll responded with a shot that, while missing, brought a major portion of a nearby house down on the Sherman. Now low on ammunition, Wittmann's Tiger reversed out of trouble and, after taking the time to destroy one final Cromwell, left Villers-Bocage to refuel and rearm. In a vivid demonstration of the capabilities of the new generation of German tanks, lasting all of five minutes, an elite crew handling a single Tiger had successfully thwarted a threat of strategic proportions. Within Montgomery's grasp, Caen would not be captured for almost another month.³

Wittmann's and his crew's day, however, was not over. The initial engagement at Villers-Bocage left the British spearhead in utter disarray. After quickly replenishing with fuel and ammunition, Wittmann returned in time to join four other Tigers of his company in dispensing further destruction upon survivors of the 4th County of London Yeomanry around Hill 213. In another action in the streets of Villers-Bocage later that day, Wittmann's Tiger was subsequently disabled by far more alert opposition. The Tiger, recovered later that evening and repaired, was ready for action again that same night.⁴

Wittmann's exploits at Villers-Bocage hardly constituted a proper usage of the weapons system at his disposal. Save for the sheer terror incurred by a charging Tiger, ramming vehicles aside and blasting everything in sight, Wittmann negated many of the tactical advantages of his tank by engaging at such

² *Ibid*, 320, 332, 363-364; Beevor, *D-Day*, 192; D'Este, *Decision in Normandy*, 179-181; Hastings, *Overlord*, 132-133.

³ *Ibid*.

⁴ Beevor, *D-Day*, 192-193 ; D'Este, *Decision in Normandy*, 181-183; Hastings, *Overlord*, 132-133; Kurowski, *Panzer Aces*, 364-366.

close range. His crews' survival of their initial entry into the close quarters of the town owed much to luck and the confusion inherent in the close-range engagement. Notably, Wittmann's second foray into Villers-Bocage against a forewarned opponent proved to be a far less successful undertaking. Simply put, the Tiger and Panther were open country tanks and tanks, in general, conceded many advantages to their opposition in the streets of any town or city. While an elite crew, veterans of vicious tank battles around Kharkov, Kursk, and Rostov, commanded by an extremely aggressive commander like Wittmann, could succeed in such an engagement,⁵ a far more effective usage of Tigers and Panthers involved holding them back from the immediate frontline and then committing them in counterattacks against Allied breakthroughs that made good use of their standoff capabilities. The Panzerwaffe excelled in the weeks following D-Day at doing just that. Lieutenant Fritz Langanke, a Panther commander, recalled feeling "like Siegfied, that you can do anything," following an engagement in which his crew rapidly set four Shermans afire.⁶

Tigers and Panthers, for all their perceived mobility and reliability drawbacks, proved ideally suited to the type of defensive fighting of the Normandy campaign. It mattered little in such circumstances that these vehicles were unlikely to complete a long road march without breaking down. While the western Allies were safely ashore in force by the time of the battle in and around Villers-Bocage, German armor, operating close to points of replenishment and repair, initially appeared capable of sustaining indefinitely a containment of the Normandy bridgehead. Eventually, attrition of the Panzer formations and the application of extraordinary measures severely weakened the German defensive capabilities and the front began to crack, but not before the German cat family of tanks etched an indelible mark on the psyche of the tankers of the western Alliance. From Normandy through the end of the war a "tank terror" similar to that experienced by the Germans in 1941, plagued the western Allies. Every Panzer encountered was perceived to be a Tiger and every German gun seemed to be an eighty-eight. The only

⁵ *Ibid*, 310-370; Lloyd Clark, *The Battle of the Tanks*, 1-2, 240-241, 266, 281, 349, 373. Wittmann's and Woll's previous combat experience on the Eastern Front laid the foundations for the sheer audacity on display at Villers-Bocage on 13 June 1944.

⁶ Hastings, *Overlord*, 179-181.

way to tell for sure involved deadly close combat. In 1945 Allied tankers who had been so engaged for seven months vented their frustration.⁷

To further compound the real problems facing Allied tankers, an improved version of the Tiger, long in development, and a powerful new assault gun based on the Panther joined the Panzerwaffe's arsenal in the summer of 1944. The Panzerkampfwagen VI Tiger Ausf B, or Tiger II, weighing almost 70 tons, and featuring an extremely long higher velocity version of the 88mm gun, possessed significantly increased armament and protection. Known to the Germans as the *Königstiger*, and to the western Allies as either the King Tiger, Royal Tiger, or Tiger King, the new tank could easily dispatch a Sherman from well over 3500 yards away, yet proved invulnerable to 75mm AP rounds from all but its rear quarter. While the 17-pounder on the Sherman Fireflies could sometimes penetrate the King Tiger's sloped side armor from very close ranges, the extremely thick, sloped, front glacis plate proved impervious to all shot possessed by the western Allies, even from point blank range. The 90mm guns of later American tanks and tank destroyers proved capable of defeating this frontal protection only at close range. Only Soviet assault guns featuring guns of 100mms or more, and the JS-II heavy tank, due mainly to the kinetic energy of its 52-pound 122mm round, proved able to effectively engage the King Tiger, frontally, from a reasonable distance.⁸

The Jagdpanther assault gun, mounting the same 88mm Pak 43 (L/71) gun as the King Tiger in a far more mobile 46 ton package, featured a well sloped superstructure for the limited traverse main armament.⁹ Comparable to the excellent Soviet SU-100 based on the T-34 chassis, the Jagdpanther,

⁷ Max Hastings, *Armageddon*, 82.

⁸ Grove, *World War II Tanks*, 40-42, 120-121; Slayton, *Arms of Destruction*, 149-157, 189, 192-196; *Notes on Enemy AFVs, Section 21*, Report No. 178866, 1-22, RG 165, E 79, Box 1597, NARA II. The 122mm gun of the JS-II did not have the muzzle velocity of the 88mm gun of the King Tiger, but the sheer weight of its shot compensated to some degree for lack of penetrating power.

⁹ Steven Zaloga, *Armored Thunderbolt: The U.S. Army Sherman in World War II* (Mechanicsburg, Pennsylvania: Stackpole Books, 2008), 99. L/71 refers to the length in calibers of the 88mm gun. Steven Zaloga provides a good explanation of the "L" designation of tank guns: "When comparing barrel length, caliber is the length of the barrel in millimeters divided by the bore diameter." This is why the JS-II's 122mm gun, every bit as long as the 88mm gun on the Tiger, is an L/53, while the Tiger's gun is calibrated to be an L/71. By comparison, the 75mm gun of the original Sherman is an L/32.5, the 17-pounder in the Firefly is an L/55, and the Panther's 75mm gun is an L/70.

emerged as one of the best assault guns of the war.¹⁰ Fortunately for Allied tankers, only 382 Jagdpanthers and 484 King Tigers were built. The original version of the Tiger, similar to the one Wittmann commanded at Villers-Bocage, was renamed Tiger I following the introduction of the King Tiger. A total of 1,355 were produced. All of these vehicles acquired a reputation for destruction far in excess of what their numbers warranted.¹¹

The tank the Allies encountered with the greatest frequency following D-Day, however, was the Panther. Knowledge that the Panther was definitely intended to equip one of the two tank battalions in each Panzer Regiment in the Panzerwaffe was confirmed by the Soviets in the months prior to Overlord and further accelerated efforts already underway for well over a year at Ordnance to introduce better American tanks.¹² Already fully cognizant of the early model Tiger, in late March 1943 General Barnes emphasized to Colonel Colby, now coordinating Ordnance efforts at the Detroit Tank Arsenal, the need to “get the 90mm gun in the T23.” A day later, the “Activities of General Barnes” revealed that 300 T23s needed to be built instead of “handmade jobs” to pave the way for quantity production “so that we will not be behind other nations on our tank designs.” In April 1943, Barnes predicted a year would be required to produce the T20 with a 76mm gun. Later that same month, an official of General Electric complained about a lack of “official authorization” for work on the electric drive for the T23. Excited about the possibilities of the T23, Barnes promised “that he would look into the matter immediately.”¹³

The preliminary order of 300 tanks Barnes believed needed to be built to prepare for eventual quantity production included three tanks of the T20 series. Unofficial approval for the construction of 250 T23s came in a phone call in early April to Barnes from his boss, Major General Levin Campbell Jr. The pilot model of the T23 had already been completed in time for a demonstration on 5 April attended by Campbell, Marshall, McNair, and the commander of AFS, General Brehon B. Somervell. By the end of the month a further order for 50 tanks mounting 90mm guns had also been unofficially approved. Forty of

¹⁰ Grove, *World War II Tanks*, 38-39; Slayton, *Arms of Destruction*, 191-196; *Technical and Tactical Summary of Foreign AFVs and Equipment*, No. 33, 26 May 1944, p. 11, Box 197, Entry 79, RG 165, NARA II. Much of the data in *Technical and Tactical Summary of Foreign AFVs and Equipment*, No. 33 is compiled from “Reports from Russia.”

¹¹ Grove, *World War II Tanks*, 35, 39-40; Hughes and Mann, *The Panther Tank*, 91.

¹² *Technical and Tactical Summary of Foreign AFVs and Equipment*, No. 33, Pg. 36.

¹³ *T20 History*, 29 March, 30 March, 19 April, 23 April 1943 entries.

these, featuring three inch thick frontal armor, would be designated T25. A further ten tanks would be constructed with heavier armor and designated T26. Approval from AFS headquarters for the limited procurement of the 300 tanks was noted in the official record of the Ordnance Committee Meeting of 5 May 1943. Thirteen months prior to Overlord, the effort that should have resulted in new tanks to replace or supplement the Sherman was officially underway. By 11 May, Barnes felt confident T23s would be turning out at the rate of 1000 per month in time for the next summer's campaign.¹⁴

Both during and after the war, Barnes claimed that the T23 could have been produced as a Sherman replacement in time for Overlord and that the Pershing would have been available before the end of 1944 had it not been for the interference of General McNair and AGF.¹⁵ Colby echoed these same sentiments.¹⁶ So, with a pilot model in testing fourteen months prior to D-Day, what happened to the T23, which never saw action, and why did the Pershing arrive so late? These questions may best be answered by a more neutral observer of the T20 series.

As the British Technical Liaison Officer to the Ordnance Department at the Detroit Arsenal from 1942-1945, George MacLeod Ross possessed considerable first-hand knowledge of U.S. tank development in the key period leading up to Operation Overlord. Ross believed that "The Ordnance Development branch seemed to be embroiled in such a host of projects that the impression gained was that no sooner had one model reached pilot stage than another appeared on the stocks."¹⁷ The thoughts of Ross on the T23 hardly mirrored those of Colby and Barnes:

The Prototype which Ordnance R. & D. considered the best choice to supersede the Sherman was the T23-General Electric's contribution-the repudiation of which by a majority opinion R. & D. never forgave. Its all-electric transmission cost an additional 3,800 pounds weight over a normal transmission. Its circuit on one fill of fuel was impracticably low. Its great complication entailed the training of technicians in advanced electrical skills to ensure its maintenance. Its vaunted speed was never required in the field, nor was its ability to 'spin on a dime'. The design abrogated the

¹⁴ *Ibid*, 30 March, 10 April, 29 April, 5 May, 11 May 1943 entries.

¹⁵ Barnes, *History of Tank Development by Ordnance in World War II*, 13.

¹⁶ Mayo, *The Ordnance Department: On Beachhead and Battlefield*, 329, 338; Baily, *Faint Praise*, 1-2.

¹⁷ Ross, *The Business of Tanks*, 266.

basic principle of corporate tank design by giving too great a preponderance to power plant and transmission, to the detriment of a balance of the several other characteristics which were essential to a well-proportioned fighting vehicle.¹⁸

The T23, the only tank design in the T20 series that might have been available in time for Operation Overlord was finally rejected because of its electric drive. Unable to advance at a steady speed below ten miles per hour without damaging the traction motors of the electric drive, the vehicle quickly outpaced accompanying infantry. This undesirable trait ultimately kept the tank from entering quantity production and the 250 vehicles constructed spent the remainder of the war in training units.¹⁹

The most significant of the “several other characteristics” Ross thought lacking in U.S. armored development lay in the area of gun power. According to Ross, “The sum and substance was, a basic principle of tank design had been ignored because the answer to the riddle which comes first, the gun or the tank? is always the gun and neither 75, nor 76, nor 90 mm U.S. gun qualified at the bar of battle.”²⁰ Most postwar analysts wholeheartedly agree with this assessment of the shortcomings of American anti-tank weaponry.²¹ One allied tanker’s comment on the Sherman that “it would have yet been a tank had it mounted a gun,” succinctly summed up the problem.²²

Ross held that the greatest failure of Ordnance lay in its numerous attempts “to provide the ‘best’ while ignoring the good.”²³ His assessment of the T20 series, that “the modification of the good, the M4 Sherman, was side-tracked and ignored, while design resources were squandered on a series of tanks which made no contribution to victory,”²⁴ reflected Barnes’ desire to see his favorite project reach fruition. Failure to upgrade the Sherman lay solely with the Ordnance Department, especially in the realm of gun power. The only concerted effort made by Ordnance to upgrade the Sherman’s firepower proved to be

¹⁸ *Ibid*, 268. The “spin on a dime” comment refers to being able to turn a tank’s tracks in opposite directions, allowing the vehicle to rotate in place. While the Germans achieved this mechanically with a negative steer system, the only American tank capable of doing so was the T23 with its electric transmission.

¹⁹ Baily, *Faint Praise*, 79-81.

²⁰ Ross, *The Business of Tanks*, 293.

²¹ Baily, *Faint Praise*, 144-145; Mayo, *The Ordnance Department: On Beachhead and Battlefield*, 328-331, 338.

²² *White Report*, 51.

²³ Ross, *The Business of Tanks*, 268.

²⁴ *Ibid*, 275.

the development of a turret enabling installation of the 76mm gun in the tank. It is important to note on behalf of the T20 series that this was best achieved by adapting the 76mm armed turret of the T23 to the M4.²⁵

That Barnes wished to avoid interference in introducing the Pershing as the first 90mm armed U.S. tank is evident in his opposition to the same gun installation in the Sherman. He responded to a request from the Armored Board in September 1943 to mount “1,000 90mm guns on the M4A3 chassis” by claiming that “it is too much of an unbalanced design,” and that “it is too heavy, and some authorities do not think we need a larger gun than the 76mm.”²⁶ The reference to “some authorities” is an obvious nod to McNair, who, in addition to his opposition to 90mm gunned tanks, had recently reported that he “did not go along with the 90mm on the M10” tank destroyer.²⁷ While Barnes may have concluded that difficulties with McNair in providing more firepower for his favored tank destroyers in the form of the 90mm gun did not bode well for getting the same gun into the Sherman, it is far more likely that he feared such a move would jeopardize standardization of the T26. Subsequent successful adaptation of the T26 turret to the Sherman proved Barnes’ fears of an overweight “unbalanced” design unfounded. By the time this was accomplished by Chrysler in the summer of 1944, however, work on the T26 had advanced to a stage where it would have taken longer to facilitate the modification on existing Sherman production lines than to just proceed with the Pershing.²⁸ Had Barnes and Ordnance wished to significantly upgrade the Sherman, this development certainly would have been explored long before the request arrived from Fort Knox. Ross’s assertion that Ordnance cared little about upgrading the Sherman seems an appropriate criticism.

McNair’s opposition to the 90mm version of the M10, designated T71 in its prototype form, is indicative of the premium he and AGF placed on the mobility of American armor. Bigger guns equated to more weight, a resulting decrease in mobility, and thus were of questionable value to AGF and its

²⁵ Baily, *Faint Praise*, 82-83.

²⁶ *T20 History*, 13 September and 7 October 1943 entries.

²⁷ *Ibid*, 29 September 1943 entry.

²⁸ Baily, *Faint Praise*, 87-88; Zaloga, *Armored Thunderbolt*, 128-129.

commander. This constitutes further evidence of the “other characteristics” besides gun power that Ross referred to in his criticism of American armored development. Of greater importance to Allied tankers was the fact that even after Ordnance overcame the objections of McNair and AGF to heavier armament, the guns failed to measure up to the penetrating power of German weapons.²⁹

The appointment of General Jacob Devers to command the European Theater of Operations (ETO) in mid-May 1943 really brought the debate over heavily armed and armored tanks to a boil. Devers’ request, in a cable to the War Department on 13 November 1943, that 250 T26s be produced with the highest priority for his command, drew an immediate response from McNair. Having finally and reluctantly approved the T71 tank destroyer in early November and assented to the development of a towed 90mm anti-tank gun, McNair believed the issue of heavier German tanks had already been adequately addressed. In a memo to General Marshall on 30 November 1943, McNair complained that Devers request represented a “British view” and noted that “there has been no call from any theater for a 90-mm tank gun.” McNair also voiced doctrinal concerns in stating, “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.”³⁰

McNair’s charge that Devers’ request for the T26 represented a British view undoubtedly has merit. An exceptionally long entry in the T20 History on 9 October 1943, beginning with the phrase “Activities of General Barnes,” clearly indicates the views of General John F. Evetts, Assistant Chief of the Imperial General Staff. Evetts believed that “the 90mm is a must on the battlefield on the Continent and we are going to be in a very bad way if it isn’t used.” That Ordnance agreed wholeheartedly with Evetts was evident in continued programs mounting the 90mm in tanks. The same 9 October entry noted that the first pilot model of the T25 was expected at Aberdeen for testing in November, and that the first T26 pilot should arrive the following month. In January 1944, the pilot was still not ready.³¹

²⁹ Baily, *Faint Praise*, 91.

³⁰ *Ibid*, 94-95; Johnson, *Fast Tanks and Heavy Bombers*, 192-193; *Military Historical Files*, Folder: *Critical Policy Papers*, Anti-tank file, Box A 799, Entry 646A, RG 156, NARA II.

³¹ *T20 History*, 9 October 1943 and 10 January 1944 entries.

With the program for a 90mm-gunned tank underway and the T23 pilot in trials, Barnes set about trying to establish a need for their standardization. By the summer of 1943, the time for decision was at hand, and Barnes pushed hard for production of the T23. On 22 July he stated that, "if the T23 is to be made available to troops in any quantity by the middle of 1944, orders will have to be placed to start production, and we recommend that orders be placed now for the manufacture of 500." Even though actual development of the 90mm gunned tanks was months behind that of the T23, Barnes continued to lobby for their eventual production. On 31 July 1943 he stated, "there will be a demand for them soon." Yet, following Devers' request for the T26 in November, Ordnance was still uncertain of what type of drive to use in the tank. On 10 August a decision to drop the electric drive transmission for the T25 and T26 because of weight concerns cleared the way for the use of a torquematic drive. This decision led to the vehicles being re-designated T25E1 and T26E1. In September, Barnes recommended orders for 500 of each on the same day he rejected the idea of up-gunning the Sherman with the 90mm gun.³²

Fortunately, as the invasion of the European continent approached, concerns voiced to the War Department by theater commanders in Europe over the lack of firepower of American tanks carried more weight than arguments between AGF and Ordnance. Unfortunately, by fall 1943, time had run out for getting either the T25 or T26 in production for use in Overlord. Even though General Marshall had overridden McNair and approved Devers' original request for 250 T26s, neither they nor the T25 would be ready for the invasion. The first pilot model of the T25, originally slated for completion in November, was not finished until 3 January 1943, and General Dwight D. Eisenhower's appointment as head of ETO and Devers' subsequent transfer to North African Theater of Operations (NATO) as deputy commander further muddied the waters at the end of December on the T26 order. ASF delayed a final decision on production until Marshall clarified that the new ETO commander also wanted the T26. On 7 January 1944, when ASF finally advised General Campbell that the order for ten T26s had been increased to 260, the pilot model of the tank had yet to be completed. The decision to drop the electric drive meant the first pilot of the T26E1

³² *Ibid*, 22 July, 31 July, 10 August, 23 August, 13 September 1943 entries. The torquematic drive featured an automatic transmission and a torque converter.

would not be ready until February.³³ Ordnance assertions aside, disputes with ASF, AGF, and McNair, while certainly responsible for delaying many official decisions, did little to hinder the arrival of actual 90mm-gunned tanks with production potential.

Time also expired on the T20E3. A pilot model of this vehicle was completed on 1 July 1943, but its Hydra-matic transmission and torque converter became sources of constant problems. By November Barnes was so frustrated that he commented that “we may as well send it to Aberdeen for historical purposes.” In May, the T20 was cancelled.³⁴ With the T20 a failure, the T22 teetering on the brink of the same fate,³⁵ the T23 unwanted because of continuing problems with its electric-drive, and the T25 and T26 still in development, Ordnance had only numerous prototypes to show for all their efforts since approval to develop the M4X in May 1942. Standardized in June as the M36, the T71 tank destroyer with 90mm armament would not arrive in Europe until after D-Day.³⁶ Some Shermans mounting 76mm guns would be ready in time, but were not issued to units participating in the initial stages of the invasion. Designated for use with independent tank battalions slated to deploy to France in the build-up phase of Overlord, the 76mm armed M4A1s sat unused in England on 6 June 1944.³⁷ Only thinly armored M10 tank destroyers with 3-inch guns and British Sherman Fireflies with 17-pounders represented an upgrade in firepower for the armored formations of the western Allies. Limited numbers of these vehicles would provide support for thousands of Shermans, no different in basic armor and armament, and little changed in protection from the M4s used by the British Eighth Army at El Alamein in November 1942.

Fortunately for the Americans, Montgomery’s task to seize Caen as a gateway to good tank country to the east attracted the vast majority of German armor on the Normandy front. Operating in the formidable hedgerows of the Norman bocage, U.S. forces were easily checked by small German infantry units supported by artillery, anti-tank guns, and assault guns. While frequent tank-to-tank clashes involving sizable armored units raged between the British and Germans in the northern portion of the

³³ *Ibid*, 7 January, 8 January 1944 entries; Baily, *Faint Praise*, 96-97; Chamberlain and Ellis, *British and American Tanks of World War II*, 158-161.

³⁴ *T20 History*, 10 May 1944 entry.

³⁵ Chamberlain and Ellis, *British and American Tanks of World War II*, 150.

³⁶ *Ibid*, 142.

³⁷ Baily, *Faint Praise*, 101; Zaloga, *Armored Thunderbolt*, 119, 129-130, 167.

Normandy lodgment, the Americans struggled to devise small unit tactics for overcoming the nightmare of the hedgerows.

Conquering the hedgerows required a combination of tactical and technical innovation. While the bocage proved entirely unsuitable for deployment of large armored formations, tank support for the infantry divisions tasked with advancing through the difficult terrain proved crucial. Fortunately, the U.S. Army possessed a number of independent tank and tank destroyer battalions in the summer of 1944, that were quickly tasked to provide direct fire support for the infantry. Combat teams of infantry supported by artillery, tanks, and tank destroyers improvised tactics not found in the manual for tank-infantry cooperation to overcome the difficulties of the hedgerows. A key technical innovation, known as the hedgerow cutter, also aided greatly in sustaining the advance. Forced initially to expose the soft underbellies of their tanks to climb over hedgerows, Allied tankers sought a safer way of dealing with the troublesome bocage. The eventual attachment of steel cutting devices, made from dismantled German beach obstacles, to the lower hulls of a Shermans allowed the tanks to push directly through the hedgerows. Although it was still slow going, the advance steadily continued.³⁸

By 24 July 1944, General Leslie J. McNair was on hand in France to witness the opening phase of Operation Cobra, an offensive designed to release American soldiers from the “Hedgerow Hell” of the bocage. Seizure of St. Lo, on the edge of the hedgerow country, by American forces under General Omar Bradley after weeks of bitter and bloody fighting presented an opportunity to break the Normandy stalemate. McNair was actually in Europe to take command of General George S. Patton’s phantom First U.S. Army Group (FUSAG). Part of an elaborate ruse to convince the Germans that the main Allied invasion would strike at the Pas de Calais, the sham headquarters McNair was to command would soon be shut down with the activation of the Third Army under Patton. McNair, creator of the U.S. Army sent to fight World War II, seemed poised to become the new commander of the ETO following the activation of

³⁸ *Ibid*, 146-155; Baily, *Faint Praise*, 103; Hastings, *Overlord*, 251-252. Many units and individuals experimented with ways to defeat the bocage, but Sergeant Curtis G. Culin of the 2nd Armored Division usually gets credit for the idea of the hedgerow-cutter equipped Shermans, which appeared in a variety of forms and were known as “Rhinos.”

Supreme Headquarters Allied Expeditionary Force (SHAEF) on the continent under Eisenhower.³⁹ Disputes with Ordnance over tank design likely were far from McNair's mind as the vast air armada slated to pave the way to a breakthrough beyond St. Lo approached on the morning of 24 July.

Difficulties between AGF and Ordnance had not died easily. After reluctantly acquiescing in January 1944 to the 250 T26s requested by Devers, McNair continued to oppose full production of it and the T25, well into the spring. As usual, tank destroyer doctrine and the role of tanks as weapons of exploitation figured prominently in his objections. This final phase of opposition illustrates well the behind the scenes maneuvering inherent in the squabbles between AGF and Ordnance.

General Campbell, commander of Ordnance, retained great enthusiasm for the 90mm armed tanks. When a call to Barnes at the end of March 1944 elicited the normal response that the tanks were definitely ready to be ordered in great quantity, Campbell recommended to ASF commander General Brehon Somervell that at least 2,000 be produced. Somervell presented the question to his subordinate, General Lucius Clay, who, predictably, deferred to the wishes of AGF. Having previously contacted the Armored Board at Ft. Knox about the T25 and T26, AGF now seemed quite ready to see a new tank enter production, but harbored completely different thoughts on armament. An AGF communiqué to the War Department G-4 on 12 April 1944, influenced by a recommendation from Colonel Frank R. Williams of the Armored Board, recommended an even larger order of nearly 6,000 T-25s armed with 75mm and 76mm guns in place of the 90mm, and entirely rejected the T26 claiming lack of need.⁴⁰ This stance continued to reflect AGFs position that an armored doctrine focused on exploitation did not require 90mm guns, which, of course, only encouraged tank-to-tank fighting.

Fortunately, AGF qualified its recommendation for the lightly armed T26s by suggesting that the ETO commander should have final say on armament requirements and that the recommendation could be adjusted according to theater needs. General Russell L. Maxwell, the War Department G-4, immediately became involved in an effort to sort out AGF opinion from actual theater requirements. On 17

³⁹ Beevor, *D-Day*, 346-347; D'Este, *Decision in Normandy*, 401; Perret, *Winged Victory*, 311.

⁴⁰ *T20 History*, 4 April, 14 April 1944 entries; Baily, *Faint Praise*, 121-122, 124-125.

April, Maxwell ordered Somervell to produce 1,800 T26s with 90mm guns, but McNair withheld final AGF approval until ETO tendered its official answer on the matter.⁴¹ Not only did ETO want the T26, it also clearly indicated what was not needed in concluding that “No 75mm or 76mm weapons are desired” in future medium tanks.⁴² Subsequent confirmation of Maxwell’s decision on the T26 by ETO on 18 May finally brought McNair’s opposition to the T26 to an end.⁴³

By the time McNair arrived in France to observe Operation Cobra, the debate over armor and armament of American tanks had been settled by the stark realities of war. Battle in the close quarters of the bocage meant that American forces initially had little contact with the tanks of the Panzerwaffe. The first known American encounter with the Panther in Normandy came on 11 July 1944 in the form of an unsuccessful local counterattack by the Panzer Lehr Division intended to stem the attack of the U.S. 9th Infantry Division on St. Lo.⁴⁴ General Fritz Bayerlein, commander of Panzer Lehr, found the Panther to be too wide for effective operation on the narrow sunken roads on which his armor was forced to operate.⁴⁵ Well hidden 57mm anti-tank guns and M10 tank destroyers firing into the Germans flanks at close ranges knocked out a number of the Panthers employed and eleven fell into American hands.⁴⁶ In spite of this success, concern at the highest levels of command over the lack of firepower of American weapons against German armor had already surfaced.

Field testing of the British 6 and 17-pounder guns against German tanks captured in June fighting on the Caen front triggered concerns. During a visit to Montgomery’s 21st Army Group Headquarters following his arrival in France on 1 July, Eisenhower learned of the ineffectiveness of the 76mm gun in tests against these same tanks and expressed extreme frustration over the situation to General Omar Bradley:

⁴¹ *Ibid*, 122, 124-125.

⁴² *Dwight D. Eisenhower Pre-Presidential Papers, Supreme Headquarters Allied Expeditionary Force, Office of Secretary General Staff: Records, Box 84, folder “470.8 Vol. I, Tanks,” p. 947, 969, Dwight D. Eisenhower Presidential Library, Abilene, Kansas. The SHAEF folder on tanks contains documents from a variety of sources pertaining to theater concerns involving armor. [Hereafter referred to as SHAEF Tank Folder along with page number and any pertinent document information.]*

⁴³ Baily, *Faint Praise*, 124-125.

⁴⁴ Zaloga, *Armored Thunderbolt*, 152, 155.

⁴⁵ *Ibid*, 177-178.

⁴⁶ *SHAEF Tank Folder*, 896, 898-899;

You mean our 76 won't knock these Panthers out? Why, 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.⁴⁷

A 2 July dispatch sent by Eisenhower from Bradley's First Army Headquarters stated that "actual tests against captured enemy tanks show that 76 millimeter will not penetrate Tiger in front or flanks and will not penetrate Panther except on flanks."⁴⁸ Subsequent evaluation of the damage inflicted on several of the eleven captured Panthers by M10s of the 899th Tank Destroyer Battalion revealed that none of the 3-inch rounds had succeeded in penetrating the front glacis of any of the tanks.⁴⁹

In response to the shocking news he was receiving, Eisenhower quickly dispatched to Washington Brigadier General Joseph A. Holly, Chief of the Armored Fighting Vehicle and Weapons Section of SHAEF, to examine resources and options for rectifying the situation. In a 5 July communiqué to Marshall, Eisenhower highlighted his level of concern and the immediate need for tanks and tank destroyers with 90mm guns as well as better armored piercing rounds for existing guns:

I have just returned from a visit to the First Army where I found them deeply concerned over the inability of our present tank guns and anti-tank weapons to cope successfully with German Panther and Tiger Tanks....Outside of the possibilities of improving ammunition, it appears that the 90 mm. gun on SPW, M-36, and 90 mm. gun Tank T-26 would materially improve our anti-tank defenses, as well as our capabilities in attack. In the absence of early improvement of ammunition, the delivery of these weapons must be expedited in every way practicable to this theater to replace less efficient guns....The urgency of this matter is such that I am sending Brigadier General Joseph A. Holly to you by air in order to amplify this urgent request and give to you the benefit not only of information from the battle-field but his own personal experience in tank design and

⁴⁷ Omar N. Bradley, *A Soldier's Story* (New York: Rand McNally & Company, 1951), 321-323.

⁴⁸ *SHAEF Tank Folder*, 922. This was a priority message from Eisenhower at First Army HQ to Lieutenant General W. Bedell Smith at SHAEF.

⁴⁹ *Ibid*, 895-896, 898-899. In tests conducted on 13 July (p. 899) against the front plate of a Panther using the Sherman's 75mm gun firing "M3-HEAT (Special)" armor piercing rounds, no penetrations were achieved from a range of just 250 yards.

development....I cannot emphasize too strongly that what we must have now is effective ammunition at the earliest practicable date. We cannot wait for further experimentation.⁵⁰

Finally the capabilities of the Tiger and Panther were well known to people with the clout to demand meaningful change. Alleviating the problem in a timely fashion, however, was already crippled by the design curve of armored development. The first M36s would finally arrive in August 1944, but the T26 would take much longer. The problem of better ammunition never was adequately solved, and what was available always seemed to be in short supply.

Extraordinary measures finally solved the dilemma posed by German defensive prowess on the Normandy front. Field Marshall Montgomery had first attempted carpet-bombing using heavy bombers in an attempt to breakthrough on the Caen front on 7 July. The bombardment enabled the British to occupy the outskirts of Caen, but huge craters and rubble impeded further gains. Montgomery tried the same tactic again on 18 July. This time, upon spotting the approaching air armada, the Germans thwarted a potential breakthrough by immediately executing a planned counterattack. By closing with the awaiting British spearheads, many German units avoided the worst of the aerial bombardment.⁵¹

Despite Montgomery's mixed success with the strategy, General Bradley adopted the method of clearing a path with heavy bombers for Operation Cobra. Originally scheduled for 24 July, Cobra was delayed one day by heavy rain. Unfortunately, not all of the bombers were recalled in time, and while attempting to bomb through cloud cover some of the ordnance fell short, killing and wounding 155 soldiers of the 30th Infantry Division. The rescheduled attempt on 25 July proved even more disastrous for the 30th. This time, 101 men were killed and 463 wounded. Among the dead was Lieutenant General Lesley J. McNair, the highest ranking American officer to be killed in action during the Second World War.⁵²

Friendly fire deaths notwithstanding, the carpet-bombing preceding Operation Cobra proved to be far more successful than previous attempts. Panzer Lehr, caught in the maelstrom, was utterly

⁵⁰ *Ibid*, 920.

⁵¹ Perret, *Winged Victory*, 309-310.

⁵² *Ibid*, 310-311; Beevor, *D-Day*, 342-347. This was not McNair's first unlucky trip to the front. In 1942, he sustained wounds while in North Africa as part of an AGF fact-finding contingent.

devastated, and the way to Avranches, the gateway to Brittany, lay wide open.⁵³ On 1 August, Patton's Third Army Headquarters was activated and American armor began racing into a void of undefended territory.⁵⁴ The greatest moment of the war for the M4 Sherman was now at hand.

The Germans quickly organized a counterattack aimed at seizing Mortain as part of an attempt to close the breach of the front at Avranches, but the advance failed miserably in the face of devastating artillery concentrations and fighter-bomber attacks.⁵⁵ Sustaining heavy losses, American towed anti-tank guns destroyed fifteen German tanks.⁵⁶ As Patton's armor began to advance in every direction of the compass, a dangerous pocket containing tens of thousands of Germans began to form west of the town of Falaise. The majority of the German forces in Normandy now faced encirclement and annihilation. Fortunately for the Germans, the Allies, especially Montgomery's forces, were slow to close the pincers.

On the morning of 8 August, the British launched yet another massive bombing raid to crush German resistance along the Falaise road and clear the way to close the Falaise Gap. When pathfinder aircraft began dropping marker flares for the incoming bombers, the Germans closed with the enemy as they had done outside of Caen. One of the tanks involved in the spur-of-the-moment advance was the Tiger commanded by Michael Wittmann. On this day, the luck of Wittmann and his veteran crew ran out. British sources indicate that they became involved in a close-range engagement near Cintheaux, with up to seven Shermans, at least one of which was a Firefly. As would be the case with many of their contemporaries, Wittmann, Woll, and the rest of the crack Tiger crew were unable to withstand the overwhelming firepower inherent in superior numbers.⁵⁷

While the western Allies struggled to break the stalemate of the Normandy front, the Soviets launched their summer offensive. On 22 June 1944, the Red Army executed the opening phases of Operation Bagration in western Byelorussia. The date of the attack, three years to the day after the initiation of Operation Barbarossa, was no accident. Spearheaded by powerful tank armies consisting of

⁵³ *Ibid*, 348-351; D'Este, *Decision in Normandy*, 400-404.

⁵⁴ Colonel Robert S. Allen, *Lucky Forward* (New York: Manor Books, Inc., 1977), 75.

⁵⁵ Beevor, *D-Day*, 409-415; Perret, *Winged Victory*, 314-315.

⁵⁶ Baily, *Faint Praise*, 104-105.

⁵⁷ Beevor, *D-Day*, 426-428; D'Este, *Decision in Normandy*, 459; Hastings, *Overlord*, 298-299; Kurowski, *Panzer Aces*, 367-369.

large numbers of T-34/85s supported by JS-Is and a variety of assault guns, Operation Bagration resulted in the worst German defeat of the Second World War. By 27 July, having destroyed German Army Group Center, the Soviets stood on the banks of the Vistula River in Poland near Warsaw. Seventeen Wehrmacht divisions ceased to exist and at least fifty more were decimated, divisions in name only.⁵⁸ Two days before Bagration, on 20 July, Hitler had barely survived an attempt on his life.⁵⁹ With the Normandy front at its breaking point, the Eastern Front blown wide open, and Hitler's own officer corps trying to kill him, the days of the "Thousand Year Reich" seemed numbered. Then the dam broke in the west.

Surviving German armor held the Falaise Gap open long enough for fifty thousand Germans and thousands of vehicles to escape the impending trap in Normandy and cross the Seine.⁶⁰ The Germans, however, were now in full retreat from France. The American advance progressed at breakneck pace as tank columns, accompanied dawn to dusk by formations of Republic P-47 Thunderbolt fighter-bombers, raced after the retreating Germans. A surprising number of pilots in General Elwood R. "Pete" Quesada's IX Tactical Air Force volunteered to ride in tanks and coordinate the efforts of their airborne squadron mates. While providing reconnaissance ahead of the armored spearheads, the Thunderbolts eliminated any visible opposition. When ground units met resistance, the P-47s usually proved effective in renewing forward momentum. Meanwhile, British armored thrusts, supported in like fashion by "cab ranks" of Hawker Typhoon fighter-bombers, struck northeast along the channel coast with distant objectives in Holland and Belgium. Constant daylight support from fighter-bombers added a new layer of lethality to the western Allies version of Blitzkrieg. Called "Jabos," and loathed by the Germans, the Thunderbolts and Typhoons greatly facilitated the headlong thrust of the western armies.⁶¹

⁵⁸ Bellamy, *Absolute War*, 608-610, 613-616; Duffy, *Red Storm on the Reich*, 11-12; Hastings, *Armageddon*, 7-8; Steven Zaloga, *Bagration 1944: The Destruction of Army Group Center* (London: Osprey Books, 1997), 7, 81-82; Earl F. Ziemke, *Stalingrad to Berlin: The German Defeat in the East* (New York: Military Heritage Press, 1985), 319-320, 325, 329-330, 339.

⁵⁹ Beevor, *D-Day*, 324; D'Este, *Decision in Normandy*, 399; Hastings, *Overlord*, 278-280.

⁶⁰ Perret, *Winged Victory*, 314.

⁶¹ Beevor, *D-Day*, 352; Hastings, *Overlord*, 271; Perret, *Winged Victory*, 305, 307-309. The term "cab rank" was a common reference for lines of English taxis awaiting customers.

The general advance, in which the Sherman demonstrated its best qualities, continued into the fall and eventually carried the Allied armies to the German border. There, forward momentum finally halted due to the tyranny of logistics and stiffening resistance from a resilient Wehrmacht. In the autumn mud and the snow of winter 1944-1945, American tankers faced their most difficult moments of the war as every weakness of the Sherman became fully exposed in ongoing battles with Tigers and Panthers. Told their weapons were the "best in the world," when forced into decidedly unequal engagements with clearly superior German armor, American tankers complained bitterly as generals scrambled to gloss over the failures of American armored development.

CHAPTER 7

THE TANK CONTROVERSY

By winter 1944, the seemingly unstoppable advance across France had ground to a halt along the German border, setting the stage for especially trying times for Allied tankers. In the mud, snow, and ice of fall and winter, even the Shermans' vaunted mobility came into question. The new M4A1 (76mm) Shermans, first used in Operation Cobra, began to see more widespread service, but its added firepower proved only an incremental improvement over the 75mm gun. Only the 90mm armed M36, having been accepted with reluctance by the Tank Destroyer Command, proved effective in countering heavy German armor, but it too had limitations. The only other 90mm-gunned vehicle to be used in northwest Europe, the Pershing, was just beginning its production run.¹

Lacking firepower, Allied tankers increasingly turned to added protection to give themselves a chance to get close enough to effectively engage Tigers and Panthers. A factory-built, up-armored version of the Sherman, officially designated M4A3E2 but called "Jumbo" by Allied tankers, was highly desired, but only available in limited numbers.² Regular Shermans, both 75mm and 76mm versions, routinely received improvised protection. The most common method involved adding sandbags to the hull front, sides, and turret. Everything from improvised welded metal frameworks to chicken wire was used to secure the sandbags on the tank. Tank destroyer units also turned to sandbag armor. In Hodges' First Army, written policy pertaining to the employment of tank destroyers urged units to "protect your light armor by sandbags." First Army recommended that "The front of the M-10 should be sandbagged heavily"

¹ Chamberlain and Ellis, *British and American Tanks of World War II*, 116-117, 142, 158; Baily, *Faint Praise*, 101-102, 109-110, 117.

² *Ibid*, 120-121; Chamberlain and Ellis, *British and American Tanks of World War II*, 118-119; Zaloga, *Armored Thunderbolt*, 83, 126-127. The Jumbo passed muster with McNair and AGF by being procured as an assault weapon for independent battalions to be used in supporting attacks on the German Siegfried Line. Instead, most of the Jumbos ended up in armored divisions where they were frequently used to lead advancing tank columns.

and noted that sandbags “strapped to the turret, gun shield, side armor, and rear deck” also improved protection. Apparently sandbags now trumped mobility as a form of protection for tank destroyers.³

While the level of actual protection against high-velocity guns was questionable, sandbag armor did prove useful in decreasing the effectiveness of the deadly anti-tank weapons available in increasing abundance to German infantry. These weapons accounted for a significant proportion of Allied tank losses in the last eight months of the war. The panzerschreck, a larger, more effective copy of the American bazooka, and the panzerfaust, a throw away launch-tube topped by a rocket-propelled warhead, both used the directed energy of a hollow charge warhead to project a deadly jet of molten material through even the thickest armor.⁴ Detonation of a hollow charge projectile against either the sandbags or the structures that held them in place sometimes activated the jet prematurely and lessened its penetrative effect upon the tanks’ main armor. Some Allied tank units preferred to supplement protection by welding on additional armor plate salvaged from a variety of sources, including abandoned German tanks, in lieu of sandbags. In some units, both extra plate and sandbags were used. Some tankers even applied concrete to improve protection.⁵

With three tons or more of additional weight sometimes applied to the tank, it speaks well for the Shermans’ automotive reliability that little breakage of engines and drive components resulted. Weighty, up-armored Shermans, however, proved slower and more prone to get stuck in soft ground, a problem further exacerbated by the tanks’ narrow tracks. If tankers had really been concerned about mobility, however, they would not have slung tons of additional weight on their Shermans. Instead, they preferred a chance for survival and packed on extra protection. Mobility, however, had varying definitions. While the Sherman excelled at road movement, its off-road performance left much to be desired. When laden with tons of sandbags or other forms of improvised protection, mobility suffered even further.

³ *First United States Army Artillery Information Service, Section II, Tank Destroyer Notes*, p. 54, 56, 58, Box A 773, Entry 646A, RG156, NARA II; Zaloga, *Armored Thunderbolt*, 279-284.

⁴ Slayton, *Arms of Destruction*, 75-78.

⁵ Zaloga, *Armored Thunderbolt*, 279-284.

Learning that the Shermans mobility paled in comparison to the far heavier Tigers and Panthers in mud, snow, and on ice proved especially disconcerting. In the dash across France, the narrow rubber clad tracks of the M4 provided excellent mobility in dry conditions on good roads. Operations off-road, in deep mud, however, frequently resulted in Shermans mired up to their belly pans and thoroughly immobilized. Deep snow presented a similar problem. In the face of opposing armor or anti-tank guns such a predicament usually proved fatal. Oddly, for vehicles weighing from 25 tons to 70 tons, the problem was referred to as “flotation.” Wider tracks and suspensions allowed for dispersion of weight and enabled even the heaviest of tanks to “float” above the muck. With 32-inch wide tracks and large overlapping road wheels, the King Tiger, in spite of its weight of nearly 70 tons, was able to traverse ground that would bog down a 25-ton Sherman equipped with the original nine-inch wide tracks. On ice, the Shermans’ narrow track, clad in rubber, provided far less braking surface and traction than the wide steel tracks of Tigers and Panthers.⁶

On 16 December 1944, the opening artillery bombardment of Operation Autumn Mist fell on unsuspecting American forces in the Ardennes. This offensive, known as the Battle of the Bulge, which aimed at seizing Antwerp and splitting the Allied forces in Europe, severely tested the mettle of American tankers.⁷ With Allied airpower grounded by bad weather during much of the German offensive, American armored units, already stretched thin,⁸ frequently were forced to go toe-to-toe with Tigers and Panthers in vicious tank-to-tank fighting. Before the offensive ended, the unvarnished truth about the shortcomings of the Sherman, already well known in military circles, became public knowledge.

The various units of the German military thrown into the Ardennes offensive in 1944 bore little resemblance to the Blitzkrieg juggernaut of May 1940. New drafts of inexperienced soldiers manned many of the tanks and filled out the ranks of infantry units. Some of these men came from disbanded

⁶ Johnson, *Fast Tanks and Heavy Bombers*, 195; *White Report*, 14-15, 20-22, 24,29, 31-33, 35, 37-44, 46-47, 53-56, 60, 62-63.

⁷ Trevor N Dupuy, *Hitler’s Last Gamble: The Battle of the Bulge, December 1944-January 1945* (New York: HarperCollins Publishers, Inc., 1994), 13-18; Stanley Weintraub, *11 Days in December: Christmas at the Bulge, 1944* (New York: Free Press, 2006), 14-15.

⁸ *SHAEF Tank Folder*, 799, 810-811. ETO already had an acute tank shortage prior to the Battle of the Bulge and was attempting to divert 76mm-gunned tanks from Italy on 18 December. By 26 December ETO reported further heavy tank losses and a shortage of 500 medium tanks.

Luftwaffe units, a fact that spoke volumes about the condition in late 1944 of that once powerful component of Blitzkrieg.⁹ The Germans hoped for bad weather to negate Allied air superiority and counted on the skill and élan of elite armored formations deployed in mass to carry the day.

The strongest units in the Panzerwaffe now belonged to the Waffen SS, not the Wehrmacht. Only three divisions and a reinforced regiment of Waffen SS existed in 1940 for deployment in the campaign against France. By 1942 there were six Waffen SS divisions. Initially they were motorized infantry divisions, but by the end of 1943, eight of the twelve Waffen SS divisions were full-fledged armored units. At Kursk in the summer of 1943, II SS Panzer Corps, comprised of three elite SS Panzer divisions, each with an attached Tiger battalion, proved to be the most powerful armored formation on the battlefield. As at Kursk in 1943, the Waffen SS possessed the strongest armored units committed to the Battle of the Bulge in December 1944. Heinrich Himmler's political capital with Adolf Hitler guaranteed the Waffen SS always garnered the cream of recruitment and the best equipment.¹⁰ Thus, well equipped with the latest version of the Panther and reinforced by King Tigers, units of SS General Sepp Dietrich's Sixth SS Panzer Army intended to spearhead a drive west to the Meuse River before turning north towards Antwerp. In addition to denying the Allies a crucial supply point, seizure of Antwerp would isolate Montgomery's 21st Army Group. Hitler believed such a catastrophe would trigger a political crisis and create a rift between the western Allies.¹¹

Tactically, the Germans achieved total surprise and, aided by bad weather that grounded the Jabos, managed to advance to the Meuse. In striking American forces in the lightly defended Ardennes Forest, the Germans took advantage of the same attitude displayed in 1940, the assumption that the area was unsuitable for armored operations. In the opening days of the battle, the Germans used surprise and bad weather to their advantage and penetrated American defenses. Unlike the French and British in spring 1940, in winter 1944 the Allies possessed an abundance of armored units, in concentrated form,

⁹ Hastings, *Armageddon*, 198-199.

¹⁰ *Ibid*, 199; Clark, *The Battle of the Tanks*, 188-189; Robert C. Stern, *SS Armor: A Pictorial History of the Armored Formations of the Waffen-SS* (Carrollton, Texas: Squadron/Signal Publications, Inc., 1978), 4-5, 22-25, 35-36, 70.

¹¹ Hastings, *Armageddon*, 197, 225,228; Dupuy, *Hitler's Last Gamble*, 9-12.

and superb infantry reserves in the U.S. 82nd and 101st Airborne Divisions with which to respond to the breakthrough.

The Allies now also knew the value of combined arms operations. With airpower negated by bad weather during the opening phase of the battle American artillery, already the most impressive branch of Allied ground forces, made up the difference. American armor faced its most difficult test of the campaign in Northwest Europe, in the Ardennes, backed throughout by overwhelming firepower. Artillery concentrations of unprecedented destructive force supported American infantry bolstered by armored divisions and the tanks and tank destroyers of independent battalions. Defenses along the northern shoulder of the German thrust stood fast against the main effort of the offensive. In toe-to-toe combat with the best the Waffen SS could muster in late 1944, the Allies blunted every attempt by Sixth SS Panzer Army to advance to the Meuse and turn north towards Antwerp.¹²

As the SS units seemed stymied, Wehrmacht forces of General Hasso von Manteuffel's Twelfth Army to the south shattered the inexperienced U.S. 106th Infantry Division and dashed to the west. The advance eventually surrounded remnants of retreating American units along with the reinforcing 101st Airborne at the vital road junction of Bastogne and threatened the Meuse at Dinant in a deep western penetration that gave the Battle of the Bulge its name. Rampant fuel shortages, however, proved to be a fatal limiting factor in the German offensive. The German spearheads approaching the river, fuel tanks near empty, soon faced Allied counterattacks from British armored units of General Brian Horrocks' XXX Corps and the tank-heavy U.S. 2nd and 3rd Armored Divisions.¹³

Chance also aided in the Ardennes battle when, at the lowest point of Allied fortunes, the skies cleared allowing crucial supplies to be air-dropped to the besieged defenders at Bastogne. This same reprieve in the weather enabled the Jabos to execute their role in the combined arms equation. As Christmas approached, counterattacking armored units of Patton's Third Army pierced the southern flank of the German penetration and drove towards Bastogne while Thunderbolts and Typhoons savaged

¹² Dupuy, *Hitler's Last Gamble*, 368; Hastings, *Armageddon*, 80, 220; Zaloga, *Armored Thunderbolt*, 243.

¹³ Dupuy, *Hitler's Last Gamble*, 230-249; Weintraub, *11 Days in December*, 153-154.

supply columns and armored spearheads. On the cutting edge of Patton's spearheads, M4A3E2 Sherman Jumbos of the 4th Armored Division blazed the path north. As darkness fell on the evening of 26 December a column of Shermans of Lieutenant Colonel Creighton Abrams' 37th Tank Battalion, led by the Jumbo of First Lieutenant Charles Boggess, made contact with a unit of the 101st Airborne to break the siege of Bastogne.¹⁴

To the west of Bastogne, largely without fuel, the lead spearheads of the 2nd Panzer Division near Celles struggled to fend off repeated attacks by their American counterparts in the 2nd Armored Division. In a series of tank battles beginning on Christmas Day, the last German hope of reaching the Meuse at Dinant faded. By 27 December the destruction of 2nd Panzer was complete and the western-most German penetration neutralized. With all efforts on the Meuse rebuffed and strong armored units of Patton's Third Army striking its southern flanks, the German offensive lost forward momentum.¹⁵

Still intent on pressuring the western Allies, Hitler initiated Operation Nordwind (Northwind) on New Year's Day to draw reinforcements away from the bulge by launching units of the German First Army against General Alexander Patch's U.S. Seventh Army in Alsace.¹⁶ That same morning, one thousand German fighter aircraft, carefully husbanded for a large operation intended to inflict a crippling blow against the Allied strategic bombing campaign, were committed instead to Operation Bodenplatte. In low level attacks against Allied airfields in France and the Low Countries, the Luftwaffe lost 300 irreplaceable pilots.¹⁷ Operation Nordwind briefly threatened Strasbourg, but had been contained by the end of the first week in January.¹⁸ With Autumn Mist a failure, Nordwind snuffed, and Bodenplatte a disaster, many precious German resources, badly needed elsewhere, had been needlessly expended.

The "elsewhere" in need of these resources lay to the east. On 12 January the Red Army initiated the Vistula-Oder Operation. This offensive, moved up eight days to aid the western Allies, finally brought

¹⁴ Dupuy, *Hitler's Last Gamble*, 228-229.

¹⁵ Hastings, *Armageddon*, 335.

¹⁶ Perret, *There's a War to be Won*, 430-432.

¹⁷ Donald L. Caldwell, *JG 26: The Top Guns of the Luftwaffe* (New York: Ivy Books, 1991), 307-324; Adolf Galland, *The First and The Last* (New York: Bantam Books, 1978), 259-262; John Weal, *Jagdgeschwader 2 'Richthofen'* (Elms Court, England: Osprey Publishing, 2000), 114-115.

¹⁸ Perret, *There's a War to be Won*, 432.

a halt to German armored operations in the Ardennes.¹⁹ Sixth SS Panzer Army, however, would arrive in the east far too late to stem the Soviet tide. By the first days of February, powerful Soviet bridgeheads had been established over the Oder River less than 65 miles from Berlin.²⁰ As Nazi Germany seemed to teeter on the brink of annihilation, an unexpected crisis arose for American leadership.

On Wednesday 3 January 1945, as fighting continued in Belgium, the *New York Times* ran the first of three articles by Hanson Baldwin, its military expert, examining the Ardennes battle. The first article criticized Allied leadership for being surprised by “Wily moves by (the) Germans.”²¹ The next day, *The German Blow-II* took Allied leadership to task for the manner in which armored assets had been employed so far in the war on the continent:

Not yet, in this war, have we used armor and self-propelled guns with the vision and in the mass that the Germans and Russians have employed. It looks very much as if our ground tactics were still hampered by the dead hand of tradition....The Germans bunched their armor for one pile-driving sweep....Our armored divisions have been dispersed along the whole length of the front from the Belfort Gap to the flooded Netherlands.

Baldwin ended the second article by winding-up for the big punch he intended to throw the next day. He concluded, “there are other questions relating to the quality of some of our material, which General Eisenhower cannot answer, and for the answers to which the War department bears the responsibility.”²²

On 5 January the sub-headline *The German Blow-III, New German Tanks Prove Superior To Ours-Inquiry by Congress Urged*, summed up the problem. Baldwin then went on to clearly spell out an ugly truth:

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 gunned German monsters know the truth. It is high time that

¹⁹ Glantz and House, *When Titans Clashed*, 233.

²⁰ Bellamy, *Absolute War*, 634-635, 640, 642-645.

²¹ Hansen W. Baldwin, *New York Times*, *The German Blow-I*, 3 January 1945, p. 6, USMHI. Baldwin was a well-respected and well-connected long-time reporter on issues of national defense for the *New York Times*.

²² Hansen W. Baldwin, *New York Times*, *The German Blow-II*, 4 January 1945, p. 5, USMHI.

Congress got at the bottom of a situation that does no credit to the War Department....This doesn't mean our tanks are bad. They are not: they are good. They are the best in the world-next to the Germans'.

Baldwin was obviously aware of American efforts to produce better tanks, as the pending arrival of the Pershing had been well publicized. The role doctrine played in defining the Sherman as a weapon of exploitation and in discouraging tank-to-tank fighting seemed clear to Baldwin, and he also recognized that the superiority ceded to German tanks was not a recent development. Cynical references to "apologists" for the Sherman abounded:

This deficiency and others almost comparable to it are not the faults of our designers and technicians. Far better tanks than any we have in the field undoubtedly exist on the drawing boards or even in the factories in this country and may soon be in action. But the point is, the Germans always-save for a brief period in North Africa when the enemy sent the first of their Tigers to Russia-have been ahead of us on the battlefield. And it is battlefield service that counts....Our apologists have repeatedly said that we prefer a lighter tank with 'more maneuverability,' but the Germans have demonstrated time and again the maneuverability of forty-five to seventy-two ton tanks, and bridges and rivers have been no obstacle to them....apologists have said that tactically we don't believe in fighting tanks with tanks. To which the only possible answer is an expletive. Every campaign of this war has sooner or later involved tank battles; practice, not theory, is the best guide to tank construction....apologists say that we can knock out the best of the German tanks. Of course we can; no tank can be built that cannot be knocked out....but too often we have to do it the hard way; two or three guns against one German tank; several bazooka teams, or two or three of our M-4 (against) one German monster to get in a side shot....²³

In calling for an investigation into the matter, Baldwin noted that "links in the chain of procurement are many and some are clearly weak." Knowledge that a blame game was already underway was reflected in his statement that "The Ordnance Department lays the blame on Army Ground force, Army Service Forces or Armored Center; the Armored Center blames Ordnance, etc., ad nauseam." Baldwin

²³ Hansen W. Baldwin, *New York Times*, *The German Blow-III*, 5 January 1945, p. 4, USMHI.

questioned why the Germans were ahead in other weapons technologies as well, but deficiencies in tank design clearly constituted the focus of what he thought needed to be thoroughly investigated. Stating that “There is far too much time lag between design and battlefield use,” Baldwin urged that “Congress should determine why.”²⁴

Baldwin’s articles triggered a publicity campaign, lasting well into March 1945, which touted the advantages of the Sherman while also trumpeting the impending arrival of the Pershing. In a 3 February article in the *New York Times*, Sidney Shalett of the United Press (UP) reported assertions by Chief of Ordnance Major General Levin H. Campbell that U.S. tanks were entirely satisfactory and that heavier tanks were not needed. Having just returned from Europe, armed with statements and letters, Campbell went on the offensive. He released a letter he had received from Eisenhower on 18 January 1945 praising American equipment and stressing the mobility advantages of American armor in the exploitation role. According to Campbell, “General Patton when he heard that our tanks are being unfavorably compared with the heavier German models, let out a string of expletives and declared: ‘We’ve got the finest tanks in the World! We just love to see the German Royal Tiger come up on the field.’” Disclosing that “American forces so far have encountered only twenty Royal Tigers,” Campbell derided the “seventy-three-ton bulk” of the tank and deemed it “mechanically inefficient.”²⁵

Two days after Shalett’s article, Baldwin fired back in the first installment of a two-part series. He began by stating that “The sweeping advance of the Russians on the Eastern Front again emphasized last week the importance of the tank in modern war.” Baldwin believed that “Russian progress was made possible primarily by the tank and the gun” and noted that “the Joseph Stalin, with a 122-mm. gun,” had spearheaded the offensive. Excepting reports of a “heavier than the standard” Sherman already in action, only “predictions” of a “powerful new tank” promised to alleviate the suffering of American tankers. In

²⁴ *Ibid.*

²⁵ Sidney Shalett, *New York Times*, *Ordnance Head Backs U.S. Tank; Calls Heavier Types Not Wanted*, 3 February 1945, p. 3, USMHI.

Baldwin's estimation, "The development of such a new tank is obvious proof of its need; if the Shermans had been adequate in armor and gun power no new tank would have been necessary."²⁶

Alarming evidence of the mismatches American tankers in Shermans often faced accompanied Baldwin's article. Sergeant Robert C. Jones of the 743rd Tank Battalion "asserted that his own gunner hit a German Royal Tiger tank fourteen times with 75 mm. shells before disabling it by breaking its track." The military establishment's own trade journals served to vividly belie the preferred official perceptions of American tanks as the "best in the world." Baldwin included an account from a 1 January edition of *Armored News* that quoted Sergeant Michael Fritzman, a gunner with the 2nd Armored Division, who "knocked out four Mark IV's and one self-propelled gun, but couldn't chalk up a single Tiger or Panther although he bounced shells off half a dozen." Baldwin also included a 16 December 1944 *Army and Navy Journal* article that cited an unidentified "Lieut. Col." in France who identified seven features of the Panther and Tiger that needed to be incorporated into American armor and stated the anonymous officer's belief "that superior numbers, not superior armor, drove the Germans back (in Normandy and France)." Baldwin closed his 5 February commentary by quoting an 8 January 1945 editorial in *Armored News*: "We salute our gallant tankers who are beating the enemy even though they know that, tank for tank, they are licked."²⁷

The next day Baldwin questioned the value of other American weapons. He deemed German ammunition, light machine guns, pistols, and machine pistols to be superior to American counterparts. Baldwin also believed the Germans were well ahead of American efforts in the realm of advanced weaponry such as "rockets, robot bombs, jet-propelled planes and hollow-charge projectiles."²⁸ Tanks, however, continued to be the focus of media reports critical of American weapons. In a UP article in the *New York Times* on 7 March, Sergeant Robert M. Earley of the U.S. 3rd Armored Division implored

²⁶ Hanson W. Baldwin, *New York Times, Tanks and Weapons-I*, 5 February 1945, p. 6, USMHI. The "heavier than the standard" Sherman referred to was the Jumbo. The "powerful new tank" was the Pershing.

²⁷ Ibid.

²⁸ Hanson W. Baldwin, *New York Times, Tanks and Weapons-II*, 6 February 1945, p. 6, USMHI.

reporters to "Tell them at home about our tanks....Tell them our tanks are not worth a drop of water on a hot stove. Tell them we want tanks to fight with, not just to drive over the countryside in."²⁹

A 14 March story by UP war correspondent Virgil Pinkley recorded many of his personal observations from both Italy and Europe. After noting that "Published photographs from the Western Front still show American tanks heavily sandbagged and buttressed with logs by their crews to make up for lack of armor and deficiency of firepower," Pinkley claimed that "All during the war the Germans have held the upper hand in armor over American tanks and most of the time over the British." Pinkley believed "The Shermans, pound for pound, probably are the finest in the world. But they are middleweights carrying small shooting rods and mount only 75 or 76-millimeter guns." In addition to lack of firepower and protection, Pinkley recognized the flotation problem of the M4 in noting "Tigers, weighing between 67 and 72 tons with treads twice as wide as Shermans can move on ground where the 27 and 30-ton Shermans bog down."³⁰ The Shermans' flaws were now exposed in a glaring spotlight.

In spite of numerous inquiries from reporters about the quality of American weapons, Eisenhower did not become fully aware of media criticism until early March. A 6 March letter from Chief of Staff General George C. Marshall spelled out the problem:

We are under attack of course for the inadequacy of our winter clothing and now for the charge that 75% of our material is inferior to that of the Germans. They grant that the jeep and the Garand rifle are all right but everything else is all wrong. Making war in a democracy is not a bed of roses.³¹

In a letter to Marshall on 12 March, Eisenhower answered the accusations about the inferiority of American equipment, and tanks in particular, while placing great hope in the capabilities of the T26E3s newly arrived in ETO:

It is pure bosh to say that 75% of our equipment is inferior to the German material. Speaking generally the reverse is true although, of course if you take the present Sherman and the Panther

²⁹ U.P. Report, *New York Times*, *U.S. Tanks Inferior, Men in Them Say*, 6 March 1945, p. 3, "Press Releases," Box 799, Entry 646A, RG 156, NARA II.

³⁰ Virgil Pinkley, *New York Times*, *Newest U.S. Tanks Still Lack Tiger's Firepower*, 14 March 1945, "Press Releases," Box A746, Entry 646A, RG 156, NARA II.

³¹ *Dwight D. Eisenhower Pre-Presidential Papers, Supreme Headquarters Allied Expeditionary Force, SHAEF Correspondence*, Folder: George C. Marshall, 6 March 1945, p. 1, Dwight D. Eisenhower Presidential Library, Abilene, Kansas. [Hereafter referred to as *SHAEF Correspondence* followed by person contacted and date.]

and put them in a slugging match the latter will win. One trouble is that many of our professionals do not understand that a compromise in tank characteristics is necessary if we are to meet our own complex requirements in this type of equipment. It is my opinion that when we have the new T-26 in sufficient numbers, and especially when we get the even newer model that has the souped-up 90 mm gun, our tank force will be superior in slugging power as well as in maneuverability and in numbers.³²

Following further queries from Marshall,³³ the Supreme Commander turned to Generals Maurice Rose of the 3rd Armored Division and Isaac D. White of 2nd Armored to provide a clearer picture of the relative value of German equipment, especially tanks, in comparison to American issue. On 18 March, Eisenhower wrote both commanders identical letters requesting their “own personal convictions about the quality of our tank equipment as compared to the German, and having in mind the necessity of our shipping our material over long distances to get it to the battle field.” Eisenhower also wanted feedback on the ability of the T26 to “meet the Panther on equal terms” and “A digest of the opinions of your tank commanders, drivers, gunners, and so on, on these general subjects.”³⁴ Eisenhower’s choice of 2nd and 3rd Armored was not random, as both units had fought many tank battles, and the latter had the T26 while the former did not.

In his thoughts to White and Rose, Eisenhower sought opinions to rebut what he suspected were exaggerated accusations about the inferiority of American tanks in combating the Panther:

From time to time I find short stories where some reporter is purportedly quoting non-commissioned officers in our tank formations to the effect that our men, in general, consider our tanks very inferior in quality to those of the Germans. I realize that these sometimes spring from the human tendency to make startling statements in the hope that out of them will come a bit of publicity and self-notoriety. Possibly, also, certain reporters sometimes support their own views on such matters as those by quoting only those statements that uphold such views....Our men, in general, realize that

³² *SHAEP Correspondence*, Folder: George C. Marshall, 12 March 1945, p. 2.

³³ *Ibid*, 18 March 1945, p. 1-2. Eisenhower noted to Marshall in this letter that “A sergeant’s statement seems to mean more to the average person than does one from a higher officer.” The “souped-up gun” comment referred to a long-barreled 90mm gunned T26 in development.

³⁴ *Ibid*, Folder: Isaac D. White, 18 March 1945, p. 1; *Ibid*, Folder: Maurice Rose, 18 March 1945, p. 1.

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.³⁵

As Rose and White recorded their own opinions and sought out those of their subordinates, the twenty T26E3s introduced by Zebra Mission were already in the ETO and committed to action. Having left the United States in late January, the vehicles arrived in Antwerp where Ordnance officers and civilian technicians close to the project oversaw their offloading on 11 February 1945. With the tanks too wide to be transported by rail, modified trailers were required to convey the vehicles to Aachen where crash crew training courses would be conducted. A meeting between Barnes and Eisenhower the second week in February determined that all of the tanks should go to Bradley's 12th Army Group. On 14 February Barnes met with Bradley, who decided to split the T26s evenly between the 3rd and 9th Armored Divisions.³⁶ Ten crews of Rose's 3rd Armored, hurriedly given gunnery training and drilled on basic maintenance, took the tanks into action before the end of February. By 7 March the T26s assigned to 9th Armored Division also were in action and played a key role in the seizure of the first crossing of the Rhine at Remagen. Unfortunately, the width and weight of the Pershings prevented them from traversing the heavily damaged Ludendorff Bridge. The tanks finally crossed the Rhine aboard makeshift ferries on 12 March.³⁷

If Eisenhower hoped to elicit praise for the Sherman and derision for Panthers and Tigers from 2nd and 3rd Armored, he had to be disappointed with the responses from Rose, White, and their tankers. Lack of gun power emerged as the overriding concern of every tanker from drivers and gunners to their commanding officers. Surprisingly, protection took a backseat to mobility concerns and numerous details

³⁵ *Ibid.*

³⁶ *Report of Heavy Tank Mission*, p. 1, 6 March 1945, Box 772, Entry 646A, RG 156, NARA II.

³⁷ R. P. Hunnicutt, *Pershing: A History of the Medium Tank T20 Series* (Berkeley, California: Feist Publications, 1971), 9-12.

related to destructive capabilities. Maybe the tankers trusted that enough sandbags, concrete, and additional steel plate would suffice to supplement the protection of thin factory armor. Regardless of their feelings for their own vehicles, the tankers comments on the capabilities of heavy German armor mirrored those already related in the American media.

Both Rose and White were extremely prompt in replying to Eisenhower's queries. Rose answered the Supreme Commander in an eight-page letter just three days later on 21 March. In addition to his own views, Rose included for Eisenhower the thoughts of eight of his tankers, which represented "a good cross-section of the opinions that you have requested." Two battalion commanders and six enlisted men were among the eight 3rd Armored Division tankers interviewed.³⁸ Rose wasted no time and did not mince words. In his opening comments comparing the Sherman to the Panther he frankly stated, "It is my personal conviction that the present M4 and M4A3 tank is inferior to the German Mark V." His only explanation for the success of the division against German armor was "that we compensate for our inferior equipment by the efficient use of artillery, air support, and maneuver." Rose had "personally observed on a number of occasions, the projectiles fired by our 75 and 76mm guns bouncing off the front plate of Mark V tanks at ranges of about 600 yards."³⁹

Rose's officers also offered bad news. Lieutenant Colonel E. W. Blanchard, a tank battalion commander since the Normandy invasion reported, "The only Panthers I have seen, not knocked out by our artillery or our air, were either abandoned or destroyed by their crews or had been hit by our tanks at very close ranges. Personally I have only seen one Mark V knocked out by our 75mm." Lieutenant Colonel Matthew W. Kane, commander of the 1st Tank Battalion of the 32nd Armored Regiment believed that "In a tank versus tank action, our M4 tank is woefully lacking in armor and armament when pitted against the super velocity 75mm or 88mm gun of the German tank." Kane related that "Crews recognized

³⁸ *SHAEF Correspondence*, Folder: Maurice Rose, 21 March 1945, p. 1. [Hereafter referred to as *Rose Letter*]

³⁹ *Rose Letter*, p. 1.

the deficiencies” of American tanks and that success was “attributable to our superiority in numbers of tanks, and resolve to sustain heavy casualties in men and tanks in order to gain objectives.”⁴⁰

The enlisted tank commanders echoed the sentiments of Rose, Kane, and Blanchard. Sergeant Harry W. Wiggins failed to achieve any penetrations with six rounds fired at the front plate of a Panther from only 150 yards. Sergeant William G. Wilson, while somewhat luckier in piercing a Panther, still thought “it took a lot of nerve to stand there and pump out many rounds before getting a definite penetration.” Sergeant Robert M. Earley, who had already weighed in on the value of the Sherman to UP reporters in March, heaped more abuse on the tank by saying “I haven’t any confidence in the M4. Jerry armament will knock out an M4 as far as they can see it.”⁴¹

Gunners also expressed little confidence in the Sherman. Corporal Albert W. Wilkinson concluded, “We can’t compare to the Jerry tank. We haven’t got the armor nor gun....When you have firepower you can fight no matter if you don’t have the armor, but when you have neither, you sweat it out.” Private John A. Danforth thought “we don’t have enough gun” and had “seen a Jerry tank fire through two buildings, penetrate an M4 tank, and go through another building.” All of the officers and enlisted men appreciated the ten T26E3s the division had received, but some wanted more armor to go with the 90mm gun.⁴²

White had replied to Eisenhower a day before Rose with a much larger collection of vignettes from officers and men of every rank. Besides White, thirty-three officers from junior ranks to colonels and a brigadier general responded. Of the 125 enlisted personnel interviewed, sixty-five were sergeants, the majority of them tank commanders. While some armored infantrymen were interviewed, the vast majority of the respondents were tankers. The seventy-six page document, classified until 1958, presented damning evidence of the truth of media reports.⁴³

⁴⁰ *Ibid*, p. 2, 5-6.

⁴¹ *Ibid*, p. 2-4.

⁴² *Ibid*, p. 3-5.

⁴³ *White Report*, 9-61.

White began his personal observations on a positive note by lauding the performance of the newest version of the Sherman. Designated M4A3E8, but called the “Easy Eight” by the tankers, this incarnation of the M4 featured a 76mm gun, equipped for the first time with a muzzle brake, and a new suspension with a 23-inch wide track. White noted that the division had received only a handful of the Easy Eights, and wrote “that many criticisms made by tank crews would not appear had we been equipped with a larger proportion.” White quickly got to the heart of the matter, however, in noting that “The main armament of our tanks, including sights, is not comparable to that of the Germans.” White was also eager to see more of a new type of ammunition known as HVAP (Hyper-Velocity Armor Piercing), which obviously was not available in adequate quantities. After offering opinions on a variety of equipment besides tanks, White closed his own comments by noting that “The most important point, and upon which there is universal agreement is our lack of a tank gun and anti-tank gun with which we can effectively engage enemy armor at the required range.”⁴⁴

White’s higher-ranking officers agreed with his comments. The commander of Combat Command A (CCA) of 3rd Armored, Brigadier General J. H. Collier, listed a number of qualities of German tanks including “Superior flotation” resulting in greater mobility, tank and anti-tank weapons with “a much higher muzzle velocity and no tell-tale flash,” superior sights, and “better sloped armor and a better silhouette.” Since the division had not received any, Collier had no thoughts on the T26, but really liked the new M24 Chaffee light tank. The disingenuous response by military authorities touting the Sherman as a war-winner obviously served only to further anger Allied tankers already embittered by the gross inadequacy of the vehicle in comparison to German armor. Collier addressed this and acknowledged the tankers long awareness of the threat posed by the Tiger in ending his commentary:

The fact that our equipment must be shipped over long distances does not, in the opinion of our tankers, justify our inferiority. The M4 has proven inferior to the German Mark VI in Africa before the invasion of Sicily, 10 July 1943. It is my opinion that press reports of statements by high ranking

⁴⁴ *Ibid*, 9-10. The wider suspension and track system of the M4A3E8 Easy Eight resulted from developments of the T20 series. The muzzle brake was a response to the extreme blast effects of the earlier models of the Sherman with the 76mm gun which tended to obscure the results of the tanks shot.

officers to the effect that we have the best equipment in the world do much to discourage the soldier who is using equipment that he knows to be inferior to that of the enemy.⁴⁵

Colonel S. R. Hinds, the commander of CCB, related that "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." The commander of the 67th Armored Regiment, Colonel Paul A. Disney, believed "the necessity for equipping troops with tanks capable of engaging enemy tanks on an equal basis outweighs all other considerations. Being close to the using personnel I am acutely aware of the morale factor involved in equipping troops with present tank equipment." Lieutenant Colonel Wilson M Hawkins, commander of the 3rd Tank Battalion of the 67th Armored Regiment, also believed "We have been out-gunned since Tunisia when the Germans brought out their Mk IV Special with the long-barreled 75 mm gun." Referring to the Panther, Hawkins rejected claims "that our tank is the more maneuverable. In recent tests we put a captured German Mk V against all models of our own. The German tank was faster, both across country and on the highway and would make sharper turns. It also was the better hill climber."⁴⁶ Every tank officer under the rank of colonel in White's report was as cognizant as their superiors of the basic disadvantages in flotation, ammunition, sights, gun-power, and protection that the Sherman ceded to a well-crewed and properly running Panther or Tiger.

Enlisted tankers were also fully aware of every disadvantage of the M4. All had experienced the frustration of rounds bouncing off of German tanks and envied the destructive power of their enemy's weapons. Corporal Francis E. Vierling, a Sherman commander, dramatically summed up the situation:

I believe the American M4 medium tank, a basically good implement of war, is beset by overwhelming disadvantages....The greatest deficiency lies in its firepower, which is most conspicuous by its absence. Lack of a principal gun with sufficient penetrating ability to knock out the German opponent has cost us more tanks and skilled men to man tanks than any failure of the crews, not to mention the heart break and sense of defeat I and other men have felt. To see twenty-five or even more of our rounds fired and ricochet off the enemy attackers. To be finally hit,

⁴⁵ *Ibid*, 14.

⁴⁶ *Ibid*, 15, 20-21.

once, and we climb from and leave a burning, blackened and now a useless pile of scrap iron. It would have yet been a tank had it mounted a gun.⁴⁷

Gunner William J. Marcheski gave proof of the questionable protection offered by sandbags. A Panther encountered at close range put a round, which exploded inside Marcheski's Sherman, through two layers of sandbags before easily defeating a single layer of sandbags to penetrate the armor plate of another M4. Sergeant Albert B. Jones thought "Our best weapon and the boy that has saved us so many times is the P-47" Thunderbolt fighter-bomber. Corporal Sheldon Wiener "hit a Mark V eight straight times, broadside, and it still kept going without any damage. It later turned around and knocked out several of our own tanks at a much greater range than we fired at them." Sergeant Chester J. Marczak judged the Sherman "a good tank-for parades and training purposes-but for combat they are just potential coffins"⁴⁸

The American tankers envied the German tank's flotation qualities almost as much as their armor and armament. First Lieutenant Harold A. Shields was surprised to discover the Panther left a far shallower impression than his M4 did in soft ground. Sergeant Alvin G. Olsen observed a Panther and a Tiger "scarcely dig into the plowed field while the tracks of our own M4 Tanks were deep enough in the same field to show the marks of the tank's belly dragging." Sergeant Milburn C. Irwin remembered losing "several tanks because of the mud. They got stuck. During the engagement I didn't see a single German tank stopped."⁴⁹

Convinced that difficulties with German tanks were being blown out of proportion in media reports, Eisenhower had sought clarification of the actual depth of the problem. The reports he received from the 2nd and 3rd Armored Divisions revealed the situation to be even worse than media depictions. After reviewing Rose's letter and White's report, Eisenhower forwarded the documents to General Marshall on 26 March 1945 along with the following comments:

⁴⁷ *Ibid*, 51.

⁴⁸ *Ibid*, 34, 57, 61.

⁴⁹ *Ibid*, 29, 33, 37.

You will note that Rose, one of our finest Division Commanders, as well as junior officers and enlisted men serving within his Division, are all dissatisfied with the performance of the present Sherman tank. Their criticisms, of course, relate primarily to direct duel between the Sherman and the Panther or Tiger. We have always known that the Sherman, particularly with the 75 mm gun, was very badly handicapped in this specific set of circumstances....There is general agreement that the new T-26, particularly when it gets the newest high-velocity gun, will be a match for the Tiger and the Panther even in single combat. Nevertheless you will note that one or two of the tank commanders would like to have even more armor, particularly in front. The fact is that when a man is actually on the front line engaging a gun or a tank, he could not have, in his own estimation, a big enough gun or enough armor. While this would result in nothing but a steel pill box, it is clear that the Ordnance Department should do everything it can to speed up production of the T-26 with the very high-velocity gun.⁵⁰

The seizure of the Ludendorff Bridge at Remagen on 12 March was closely followed by a Third Army crossing of the Rhine on 22 March. Montgomery had forces over the river the next day.⁵¹ By the time Eisenhower sent the Rose letter and the White report to Marshall, German resistance had virtually collapsed in the west. The western Allied armies began to advance at a rapid pace, which again showcased the strong points of the Sherman. Within a month the tank controversy vanished as the Third Reich crumbled. Newspapers no longer had room to run stories on the inferiority of the Sherman because of the need to report spectacular advances.

What resistance the Allies encountered, unfortunately, could frequently be fatal. As dusk fell on 29 March, following a day in which his 3rd Armored Division had advanced nearly a hundred miles, General Maurice Rose attempted to reach the lead units of one of his spearheads near Paderborn, Germany. In the fading light, the driver of Rose's Jeep barely avoided rear-ending a King Tiger that had inadvertently blundered into the column of American vehicles. Trapped between the tank and a tree, Rose, his driver, and his aide raised their hands in surrender to the commander of the Tiger, who was

⁵⁰ *SHAEF Correspondence*, Folder: George C. Marshall, 26 March 1945, p. 1.

⁵¹ Hastings, *Armageddon*, 368.

described as quite agitated and obviously nervous. Probably thinking that the wildly gesturing German wanted him to remove his sidearm, Rose dropped his arms to his side and was killed by a burst from the Tiger commander's machine pistol. Rose was the only division commander in the ETO to be killed in action during the war in Europe.⁵²

⁵² Cooper, *Deathtraps*, 274-275.

CHAPTER 8

CONCLUSION

On 20 March 1945, shortly after Major General Gladeon M. Barnes' return from Zebra Mission, his superior, Lieutenant General Levin H. Campbell, recommended him for the Legion of Merit Award for his efforts in getting the Pershing tank to Europe. Noting that the Pershing "played an important role in the final break-through into Germany," Campbell indicated that Barnes' efforts "in anticipating, determining and introducing into combat new weapons" were deserving of commendation.¹ A story in the *Washington Post* two days after Campbell's recommendation helps explain why Barnes never received the award and sums up the mood in the media and at the front regarding the Pershing's late arrival:

A Bronx Cheer comes out of Germany to greet the news that the Pershing tank has gone into mass production. It is the opinion of the men at the front, apparently, that they will get the new tank in numbers when it is no longer needed, i.e. when the war is over...an investigation is thoroughly in order. It should take up the reasons for the long delay in getting the Pershing in production. It should likewise find out why our tanks are inferior to the enemy's.²

Fortunately for the U.S. Army, the media clamor for an investigation into why the Pershing arrived so late died as quickly and quietly as Barnes' recommendation for an award for finally getting the tank into combat. While the immediate crisis in 1945 was quickly forgotten in the euphoria of victory, American tank development and armored doctrine during the Second World War continued to be a topic of debate.

It is easy to conclude that American armored development moved at too slow a pace. General George S. Patton never uttered a disparaging word against American weapons in public. Privately, however, he expressed far different opinions. Patton told an Ordnance officer visiting Third Army shortly after the Battle of the Bulge, "Ordnance takes too God Damn long seeking perfection at the expense of

¹ *Records of the Office of the Chief of Ordnance*, Folder: "Commendations," 20 March 1945 letter from Lieutenant General Levin H. Campbell to Adjutant General of the War Department, Box A772, Entry 646A, RG 156, NARA II.

² *Washington Post*, 22 March 1945, p. 2. Cited by Constance McLaughlin Green, *The Ordnance Department: Planning Munitions for War* (Washington, D.C.: OCMH, 1955), 176.

the fighting men, and you can tell that to anyone at Ordnance.”³ This slow pace, however, had a positive side in the reliability that resulted from the rigorous testing that consumed much of the time American weapons spent in development. In stark contrast to the Panther’s disastrous debut at Kursk in the summer of 1943 when most of the 200 tanks hastily committed to action experienced mechanical problems, American combat units using the Pershing during the final two months of the war in Europe reported few difficulties.⁴

George MacLeod Ross, the British Technical Liaison Officer assigned to the Detroit Arsenal from 1942 to 1945, echoed Patton’s opinion on the tendency of Ordnance to seek perfection.⁵ Further assertions by Ross that the possibilities of the Sherman were ignored to focus on perfection in the T20 series were borne out by the M4s subsequent combat service with better armament. As late as the Arab-Israeli Wars of 1967 and 1973, derivatives of the Sherman up-gunned with high-velocity weapons provided by the French proved effective in combat with the Israeli Defense Force against T-34s as well as Soviet built tanks of the postwar T-54/T-55 series.⁶ Half-hearted and belated efforts to maximize the potential of the Sherman constituted the greatest failure of the Ordnance Department. The Sherman M4A3E8 Easy Eight, with its improved suspension, constituted the only significant upgrade of the original design, besides the mediocre 76mm gun.

Ross and other observers viewed the inability to effectively up-gun the Sherman as the worst offense committed by the Ordnance Department.⁷ Attempts to up-gun the Sherman proved either ineffective or too late due to lack of effort. The 76mm gun used in the Sherman and the M18 Hellcat did not possess the muzzle velocity of German weapons of comparable size. This was due both to the design of the weapon and the failure to produce ammunition as effective as that used by the Germans. The 3-inch gun of the M-10 tank destroyers, from which the 76mm gun was derived, was no more effective. Lacking penetrating power, the Ordnance Department turned to the possibilities afforded by larger guns.

³ Mayo, *The Ordnance Department: On Beachhead and Battlefront*, 337.

⁴ Hunnicutt, *Pershing*, 22, 38.

⁵ Ross, *The Business of Tanks*, 266, 268, 275.

⁶ Zaloga, *Armored Thunderbolt*, 234-235.

⁷ Baily, *Faint Praise*, 144-145; Mayo, *The Ordnance Department: On Beachhead and Battlefront*, 328-338; Ross, *The Business of Tanks*, 275, 283-284, 292-293, 297-301.

Engineering studies by the Ordnance Department Technical Division determined mounting of a 90mm gun to be “practicable” in fall 1942.⁸ Barnes finally “instructed the Development Branch to install the 90mm gun in all future Medium Tanks” five months later.⁹ This belated move towards 90mm armament was a direct response to the Tiger and, significantly, only “future Medium Tanks” such as the Pershings were equipped with the weapon. Ordnance efforts to up-gun existing Shermans with this weapon were half-hearted at best and reflected a general lack of desire to improve a tank viewed as obsolete and therefore unworthy of further development.

Gun-power proved to be the one area most lacking in American armor for the balance of the war, a weakness the testimony of American tankers clearly highlighted. Recognition of the advantageous characteristics of Soviet armor in late 1942 put American design efforts a year behind the Germans in the development curve. The appearance of the Tiger and Panther put American development even further behind in the tank arms race. The Pershing, developed with a 90mm gun to counter the Tiger I, appeared far too late to address the problems faced by American tankers. Most Ordnance efforts constituted reactions to developments of Allies and enemies, and displayed a thorough lack of farsightedness.

Setting aside its delayed arrival, did the T26E3, standardized as the Heavy Tank M26 Pershing in late March 1945, finally redress the inequities of American armor in tank-to-tank contests with their German counterparts? The simple answer is no. Even with the 90mm gun, the Pershing was still out-gunned in terms of muzzle velocity, the key to armor penetration. Only a single American tank appeared on the European battlefield with a gun of comparable muzzle velocity to its German antagonists. This one tank, a developmental version of the Pershing, designated T26E4 and dubbed the “Super Pershing,” featured an improved T15E2 90mm gun and saw a few weeks of combat with the U.S. Third Armored Division prior to VE Day.¹⁰ The Super Pershing aside, a considerably more important question is: was the standard Pershing better than the standard Sherman? The simple answer this time is yes, its wider tracks and torsion bar suspension were far superior, and the 90mm armament obviously constituted an upgrade

⁸ *T20 History*, 1 October 1942 entry.

⁹ *Ibid*, 11 March 1943 entry.

¹⁰ Cooper, *Deathtraps*, 250-251; Hunnicutt, *Pershing*, 28-31.

in firepower. While it still lacked in armor and penetrating power when directly compared with German tanks, its protection was much improved in comparison to the M4. However, only 310 Pershing's would be shipped to Europe, with just 200 reaching units for use in combat operations. Most saw a month or less in action before the war in Europe ended.¹¹

While the United States constructed vehicles that matched and eventually exceeded the capabilities of the German Mk. III and Mk. IV tanks of 1941, the Germans accelerated the tank arms race to new heights with the Tiger and Panther. Developments in the T20 series of American tanks incorporated many of the best features of Soviet armor, but failed to anticipate a German response to the T-34 and KV featuring greatly increased levels of firepower and protection. Unfortunately, it took time to implement the features of the T-34 and KV in American armor. The Pershing and M24 Chaffee light tanks both used torsion bar suspensions systems with wider tracks and large road wheels to achieve mobility, including flotation, on a par with Soviet and German armor. It was early 1945, however before either tank reached the battlefield. The time from when Ordnance observers, like Jarrett and Colby, first witnessed the mobility of the Soviet tanks at Aberdeen in late 1942 until the appearance of the Pershing and the Chaffee took more than two years. This time-frame was not really out of line with the development time of contemporary German tanks like the Panther, and both the M24 and M26 proved to be far more reliable weapons. An earlier start, based on solid assumptions of what the Germans might do to counter the T-34 and KV, might have altered the time-frame of development, but only by a few months. Complacency, fueled by the perceived success of the Sherman, resulted in a complete lack of urgency to develop more powerful vehicles even after the appearance of the Tiger.

Flaws in doctrine combined with a failure to properly dispense intelligence to create the problems encountered by Allied tankers in combating German armor in 1944-1945. Under-gunned for tank-to-tank fighting because of its role within the armored division as a weapon of exploitation, the 75mm equipped Shermans were often easy prey for Tigers and Panthers. The Mk. IV, armed by 1944 with a slightly longer version of the 75mm gun examined by Jarrett in the spring of 1942, also maintained a firepower

¹¹ *Ibid*, 38.

advantage over this version of the Sherman, as did all German assault guns. This firepower advantage, courtesy of German experience on the Eastern Front, meant most Shermans were outgunned in almost any fight with German armor. The inadequacy of the 3-inch gun of the M10 tank destroyer and its derivative 76mm gun in both the Sherman and the M18 Hellcat tank destroyer meant that all American armor faced a gun-power deficit against the vehicles of the Panzerwaffe.

Intelligence assessments pertaining to the up-gunning of German armor was readily available. The Ordnance Department had officers like Colby and Jarrett in the field constantly gathering data and enemy equipment for evaluation. AGF also conducted numerous fact-finding missions to assess the effectiveness of American weapons, tactics, and training. McNair was wounded in 1943 during one such mission. Curiously, the efforts of the two organizations resulted in dramatically contrasting opinions on tanks and armored doctrine. Ordnance saw an upgraded weapon in the Mk. IV or examined the Tiger and identified a need for heavier tanks with more armor and more powerful guns. Responsible for training men and acquiring equipment to carry out the missions of the Armored Force and Tank Destroyer Command as laid out in official doctrine, AGF tended to seek justification that the training and doctrine remained sound.

The creation of a separate command charged with the mission of stopping massed German armor proved a questionable decision and resulted in an unnecessary doctrine that was never executed as conceived. By the time the U.S. Army went to war, the Germans were on the strategic defensive and massed German armor was encountered on few occasions. The largest accumulation of German armor to be thrown at the western Allies during the war in Europe came in the Battle of the Bulge. A combined arms response featuring every weapon in the Allied arsenal and inadequate supplies of gasoline, not massed TDs, halted the German offensive. While the tank destroyer was never employed as envisioned, it nonetheless contributed to the final victory. With enough independent TD battalions available, every American infantry division and many armored divisions benefitted from the additional support of attached tank destroyers. In most cases, TD units established a good working relationship with the infantry and

armored units by being permanently attached to the host formation. In spite of the additional firepower they provided, the last tank destroyer battalion was deactivated by the end of 1946.¹²

The greatest impact of tank destroyer doctrine was the gun-power deficit their existence conferred on the armored divisions. The proliferation of Shermans equipped with low-velocity 75 mm guns poorly suited for combating German armor was a by-product of both tank destroyer doctrine and the role of the Sherman as a weapon of exploitation. The most important lesson learned was the folly of creating such mission-specific weapons. The concept of the main battle tank, equally suited for doing battle with both soft targets and enemy armor, arose from the experience in Northwest Europe. Confirmation that a well-armed tank was the best weapon to oppose other tanks would never again come into question.

Long-term, there was a silver lining in the failures of Ordnance as developments undertaken during the war years established the fundamental characteristics of American armor for the next three decades. The basic box-hull and rear drive developed for the T20 series remained key features of American tanks until the appearance in 1980 of the M1 Abrams. The M47 and M48 Patton tanks derived directly from the M26 Pershing. These tanks led in turn to the M60, also known as the Patton. M60s with box-hulls saw action with U.S. Marine Corps units as late as the Gulf War of 1991.¹³

The bad press of the tank controversy of 1945 prompted wartime changes as well, and some were quite surprising. As the Battle of the Bulge was coming to an end, AGF underwent a remarkable reversal in its previous disinterest in heavy tanks. In a memorandum of 30 January 1945 to the commander of ASF, considerable interest in details of the latest tanks in development was on display. Stating that "The fact that German heavy tank material has out-floated our tank material has been repeatedly brought to the attention of this headquarters," AGF expressed concerns that the proposed track designs for the 64-ton T29 mounting a 105mm gun and the 67-ton T30 with a 155mm weapon would not be wide enough for optimum flotation. The three-page memo further recommended that

¹² Gabel, *Seek, Strike, and Destroy*, 65.

¹³ Baily, *Faint Praise*, 142.

development of the T29 “be continued under a high priority.” Neither the T29 nor the T30 ever went into production, but their development led directly to the postwar M103 heavy tank.¹⁴

Another positive by-product of the failure to assess enemy weapons properly appeared in late 1944 in the form of the Weekly Battle Performance Report. These reports compiled by Ordnance assessed the performance of both American and enemy weapons. “Extracted from all available sources” from all fronts, the reports were condensed and dispensed to keep top leaders apprised of both positive and negative aspects of weapons performance. Examples included a report on 23 April concentrating on the performance of the M36 tank destroyer and another relating that a Pershing had “disabled a Mark IV, with the use of HVAP at 4500 yards.”¹⁵ Such information would have been invaluable in 1943. Reports on the performance of the Panzerwaffe at Sidi-bou-Zid from officers like Hightower and Alger might have initiated earlier interest at higher levels of command towards answers for the Tiger I and up-gunned Mk. IVs.

The time and resources consumed in constructing Tigers and Panthers, however, inevitably led to greater problems for the Germans. Production of these vehicles never met need. The Mk. IV, eventually armed with an even better 75mm gun than the tanks Jarrett examined in spring 1942, equipped the majority of the units of the Panzerwaffe until the end of the war. Even during the Battle of the Bulge, the offensive most associated with the Tiger and Panther, the Mk. IV and assault guns like the Stug III constituted the vast majority of the German armor employed.¹⁶ Requiring considerable construction time, Tigers and Panthers were never produced in the numbers necessary to stem the tide of the Allied armies. Just 1355 Tiger Is, 484 King Tigers, and 5508 Panthers were built from late 1942 until war’s end. These

¹⁴ *Records of the Office of the Chief of Ordnance, “Military Historical Files,”* 30 January 1945 memo from AGF HQ to Commanding General, AFS, p. 1-3, Box A772, Entry 646A, RG 156, NARA II; Chamberlain and Ellis, *British and American Tanks of World War II*, 164-165.

¹⁵ *Records of the Office of the Chief of Ordnance, Weekly Battle Performance Reports*, Report #20, 23 April 1945, p. 1-3 and Report #30, 2 July 1945, p. 1, Box A773, Entry 646A, RG 156, NARA II. Some reports, like #30, contain post VE-Day accounts of battlefield performance.

¹⁶ Zaloga, *Armored Thunderbolt*, 258.

7347 tanks and slightly over 6100 Mk. IVs built during the same time period vainly attempted to halt Allied armies far more generously equipped.¹⁷

The strategic bombing campaign conducted by the western Allies staged frequent and devastating raids against centers of tank production to further reduce the numbers of tanks available to depleted armored formations. Shortly after the Soviets suffered heavy losses to Tigers and operable Panthers at the Battle of Kursk, the U.S. Eighth Air Force seriously disrupted Panther production in a series of raids in August 1943. Sustained combat with Tigers and Panthers in Normandy triggered another series of raids in the summer of 1944. Allied bombing continued to be a problem for the remainder of the war.¹⁸ While bombing raids hampered the German tank industry over 40,000 Shermans and at least that many T-34s were produced with no interference to counter the weapons of the Panzerwaffe.¹⁹ Simple math guaranteed Allied victory.

Ironically, German tank development was hampered most by its greatest benefactor. Adolf Hitler displayed an intense interest in tank design. The thick front plate of the Tiger and Panther, for example, were the result of his direct intervention.²⁰ While this decision greatly affected the reliability of both tanks, the thick armor proved to be the bane of Allied tankers. Other projects encouraged by Hitler, however, constituted a colossal waste of vital resources and manpower. Six prototypes of a monstrosity called the "Maus" (Mouse) were initiated and two partially completed vehicles assigned to defend the Eastern Front headquarters at Zossen were captured by the Soviets in April 1945. The production turret of the Maus would have weighed more than a Panther and carried a main armament of 128mm alongside a co-axially mounted 75mm gun. This ridiculous vehicle was waterproofed to enable the use of a snorkel device that allowed the tank to wade to a depth of 26 feet. With a weight of over 180-tons, such a detail might have proved useful as few bridges in Europe could accommodate the Maus.

¹⁷ Grove, *World War II Tanks*, 18, 35, 39, 40.

¹⁸ Hughes and Mann, *The Panther Tank*, 46-47; Zaloga, *Armored Thunderbolt*, 181-182.

¹⁹ Grove, *World War II Tanks*, 113.

²⁰ Guderian, *Panzer Leader*, 276-278.

The Maus was only one example of the unbelievable extravagance afforded tank designers in the Third Reich. In a postwar mission to Europe, Jarrett examined the hull of a 120-ton tank that would have mounted a 170mm gun. In addition to this tank, known as the E 100, Jarrett also examined the Maus.²¹ One project on paper envisioned a 1500-ton land-battleship that would have been powered by four U-boat diesels and featured an 800mm main gun and two auxiliary 150mm weapons.²² With much time and effort being devoted to such flights of fancy, it is little wonder the Germans struggled to provide the Panzerwaffe with an adequate supply of tanks. The concerns of American officers like Eisenhower and McNair about heavy tanks that amounted to little more than mobile pillboxes apparently never occurred to the Germans.

A vivid example of the desire American tankers harbored to be able to face Tigers and Panthers on an equal basis is well illustrated by the actions of 3rd Armored Division upon receiving the lone Super Pershing. Immediately tasked with the chore of up-arming the tank, Captain Belton Cooper, the Ordnance liaison officer of Combat Command B, used sections of steel plate salvaged from a German factory and a Panther to significantly upgrade the T26E4s level of protection. Mounting an extremely long L-73 90mm T15 gun and equipped with a good supply of HVAP ammunition capable of generating a muzzle velocity of 3,850 feet per second, the up-armored Super Pershing promptly set out to find a King Tiger. Apparently McNair was correct all along in his assumption that providing the tankers with heavily armed and armored tanks to match heavy German armor would only encourage tank-to-tank combat. Unfortunately, the seven-tons of weight added in up-arming put a far heavier load on the tanks engine and caused problems with overheating. In the end, however, the crew did manage to get a King Tiger.²³

For tankers like Belton Cooper, “one of the greatest tragedies of World War II was that our armored troops had to fight the Germans with a grossly inferior tank compared to the heavy German panzer units.” Equipped with 232 M4s upon its arrival in Normandy, 3rd Armored Division “had some 648

²¹ Jarrett, *Ordnance: The Theme Song of Military History*, 196-198.

²² Chris Ellis, Peter Chamberlain and John Batchelor, *German Tanks 1939-45* (London: Phoebus Publishing Co., 1975), 60-63.

²³ Cooper, *Deathtraps*, 250-255, 270; Hunnicutt, *Pershing*, 27-31; Zaloga, *Armored Thunderbolt*, 290.

Sherman tanks completely destroyed” and “another 700 knocked out, repaired and put back into operation” over the course of the campaign in Europe. Cooper calculated that the division suffered “a loss rate of 580 percent.”²⁴ Known as “The Spearhead Division” for good reason, 3rd Armored saw more action than most Allied armored formations, but no unit was unfamiliar with high tank loss rates. The human cost has never been accurately tallied and goes far beyond simple calculations of dead and wounded. Survivors carry mental as well as physical scars, the latter frequently inflicted in armored infernos.²⁵ For the majority of Allied tankers memories of Ronsons, Zippos, Brew-Ups, and Tommy-Cookers as armored coffins and deathtraps far outnumber those of the Sherman as a war winner.

The tank controversy of January-April 1945, in a conflict all but over, constituted a “tempest in a teapot” for the top leadership of the U.S. Army. Allied combined arms proved so effective that the final outcome of the war in Europe was never really in question. For the men on the cutting edge of the armored formations of the western Allies, however, the final outcome of individual engagements with German armor all too often depended on a level of luck and nerve that bordered on the edge of insanity. To knock-out heavy German armor, Allied tankers attempted to offset their lack of firepower by maneuvering to extremely close ranges or by maintaining the nerve to remain in an ambush position.²⁶ Tankers not issued Sherman Jumbos packed on improvised protection to supplement thin factory armor. Eisenhower’s assumptions that tankers learned to cope with Tigers and Panthers proved correct, as do assertions that the Sherman excelled in the role of exploitation and “won” the war. Heavy tanks also took up more space aboard ocean-going vessels and strained the limits of overland transport and temporary bridging equipment. None of this mattered when the crews of under-gunned, under-armored Shermans hampered by poor flotation struggled to combat German armor that could “knock out an M4 as far as they can see it.”²⁷

²⁴ Cooper, *Deathtraps*, xii.

²⁵ Monahan and Neidel-Greenlee, *And If I Perish*, 419. Many of the tankers wounded during the Battle of the Bulge received severe burns “from the waist up.”

²⁶ Michael Doubler, *Closing with the Enemy: How GIs Fought the War in Europe, 1944-1945* (Lawrence Kansas: University Press of Kansas, 1994), 209-210.

²⁷ *Rose Letter*, p. 4.

A clear understanding of the plight of Allied tankers and the myriad of inputs resulting in the Pershings late arrival seems to be the very least history owes to those who manned the M4 in so many unequal engagements in the last eleven months of the war in Europe. Writing in 1998, Belton Cooper believed that “most military historians have failed completely to understand the enormous impact on American armored troops of having to fight superior German tanks”²⁸ and he wondered why the Pershing was not “delivered in time for the invasion.”²⁹ Failures of intelligence combined with the reactive nature of Ordnance development and left the United States far behind in the tank arms race. Backed by the War Department and free of the interference of McNair and AGF, Ordnance might still have failed to come up with a producible tank at an earlier date, but such an outcome should never have been a result of ignorance of the threat by the proper authorities.

Barnes ended his Army career after thirty-six years of service a year after the tank controversy and spent much of his retirement defending Ordnance Department tank development efforts during the war. Gladeon Barnes died on 15 November 1961 at the age of 74. It is unfortunate that the official histories of the Ordnance Department bought into Barnes deflection of blame onto Leslie McNair for the failure to introduce better tanks prior to Overlord. Unable to defend himself postwar following his untimely death in late July 1944, McNair, the architect of the wartime U.S. Army deserved better. He and AGF never stifled any developmental effort at Ordnance and were correct in their decision not to produce the flawed T23. While McNair and AGF may have been guilty of being too doctrine bound, neither the General nor the organization he led added a single day to the time required to place the Pershing in service.³⁰ The late arrival of the Pershing and the paucity of significant upgrades for the Sherman were inexcusable anomalies for a nation which produced cutting-edge Essex Class aircraft carriers and Iowa Class battleships for its Navy and state-of-the-art aircraft like the P-51 Mustang and the B-29 Superfortress for its aerial armadas. The Sherman *could* and *should* have been replaced or

²⁸ Cooper, *Deathtraps*, xi.

²⁹ *Ibid.*, 27.

³⁰ Baily, *Faint Praise*, 140-141.

supplemented with a tank like the Pershing prior to the Normandy invasion. The tragic results of failing to do so constituted one of the greatest blunders of Allied arms during the Second World War.

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BIOGRAPHICAL INFORMATION

John Muller received a B.A. in history in 1981 and a teaching certification in 1991 from the University of Texas at Arlington. Before beginning fulltime pursuit of an M.A. in history in 2010, Mr. Muller taught Texas History in the Texas public schools. Influenced by his early childhood years as an Air Force brat of a World War II veteran, and with many of his friend's fathers having also served in the war, Mr. Muller became interested in military history. Research for this thesis conducted at the National Archives, the United States Army Military History Institute, and the Dwight D. Eisenhower Presidential Library has firmly cemented Mr. Muller's desire to continue his study of the military arts. Specific areas of interest include the World Wars and the Cold War spawned by the two conflicts. Mr. Muller's future plans include further writing projects on General Maurice Rose of the U.S. 3rd Armored Division and a study of the contributions of the North American P-51 Mustang and the Boeing B-29 Superfortress to Allied victory in World War II that revolves around two of the men who flew the aircraft, his father and his next-door neighbor. Mr. Muller lives in Mansfield, Texas with his wife of thirty years, Michele, and daughters Jocelyn and Claire.