Anglo-American Responses to German War Technology in World War II

Figure 1: Knocked-out Tiger being examined by RAAF personnel. ©AWM

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Abstract

Technology was a driving factor in World War II. The importance of technology to both the course and the outcome of the war cannot be overstated. Yet the historiography of military technology tends to focus rather narrowly on technical details pertaining to the development and capabilities of specific pieces of equipment. This thesis, by contrast, attempts to explore military technology in a manner that incorporates the military, social, political, economic, and administrative context in which technology evolves.

To this end, the thesis explores a specific case study, namely, Anglo-American responses to the German Tiger tank. The Tiger was superior to any British or American tank in the second half of World War II. The thesis identifies the underlying reasons why Anglo-American tank technology fell behind that of the Germans. It also explores the varied responses to the Tiger on the part of Allied commanders, troops, weapon designers, politicians, and journalists. The overall goal of the thesis is to contribute to the development of a more holistic approach to the history of military technology.

Thesis declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

I give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library Search and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

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Signed:

Thomas Stephen East 30 March 2020

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Acronyms

AFV: Armoured Fighting Vehicle. A catch-all term to reference any armed and armoured military vehicle.

AP: Armour-piercing.

HE: High-explosive.

KPH: Kilometres per hour.

MP: Member of Parliament.

MPH: Miles per hour.

RAF: Royal Air Force.

RN: Royal Navy.

RTC: Royal Tank Corp.

RTR: Royal Tank Regiment.

sPzAbt: An abbreviation of the German term schwere panzerabteilung, which translates to heavy armoured battalion.

Important terms

Calibre: The calibre of a gun is the measured by the internal diameter of the gun barrel, most often in millimetres (mm) though sometimes in inches (“).

Panzer: In this thesis, Panzer is used as an abbreviation of the German word Panzerkampfwagen, which translates to armoured fighting/battle vehicle.

Tank: In this thesis the term tank refers to any armoured vehicle that runs on continuous track equipped with a fully enclosed turret which rotates 360 degrees.

X-pounder gun: British guns were using the standard ordnance weights and measurements during World War II. This standard used the weight of the projectile as a measure of gun calibre. This standard was established in 1764, and remained unchanged until 1919 when barrel diameter was added as an optional measurement.

Introduction

During World War II, the struggle for dominance on the battlefield was mirrored by a constant battle between Allied and Axis engineers to produce military equipment that was superior to that of their enemies. World War II was a technologically dynamic war, in that battlefield technology changed and evolved rapidly as the war progressed. The technology used by armies at the start of the war was completely different at the end. Great technological strides were made in all areas of warfare on both sides: in the air, on land, and at sea. However, there are some key areas where the Allies, particularly the British and Americans, lagged behind Germany. This thesis examines one of these areas, namely, tank technology. In particular, I look at the Tiger tank as a case study of the German technological advantage. The Tiger was a heavily armed and armoured tank which, at the time of its introduction, outclassed any British or American tank. I study how the technological gap between Allied and German tanks emerged and how the Allies responded. I explore, not just the immediate technological responses of the Allies, but also the reaction of servicemen to the appearance of superior German technology, how the technology gap was reported in the news, and the political debates this generated.

In this introduction, I examine military historiography and the current state of the literature on the topic of military technology. I analyse traditional general military histories, the War and Society school of military history, and the more specialised technical works on military technology. I examine in turn how each strand in the historiography discusses the topic of military technology. I then describe the primary sources on which this thesis is based. First, however, I expand on the question of Anglo-American responses to German war technology.

Allied responses to German technological superiority

The core question in this thesis is why the Allies responded in the way they did to German war technology? This is a very broad question. Millions of words have been written about military technology in World War II. However, the literature that is relevant to our topic is fragmented. There are many publications which concentrate on a particular aspect of technology, without really looking at how it affected others. The technical literature, meanwhile, pays little or no attention to the impact of soldiers' reactions on the development process, nor do they consider the role of government when it came to the development of military equipment. By contrast, literature on the experience of soldiers and civilians discusses how German technology affected them, and their opinions of their own equipment and that of the enemy. Yet this literature tells us almost nothing about how opinions were passed up the chain of command, and whether they were taken into account in the development of Allied technology.

To answer my research question it is therefore necessary to assemble fragments of information that are scattered across the literature. Moreover, to fill in the many gaps left by historians, a close reading of available primary sources is required. Much of what has not been said by historians can be found in the details of the primary sources. However, sifting through the primary sources is complicated as there are so many little details that can, and do, go unnoticed. There were hundreds of pieces of German technology that elicited an allied response. That is why it is useful to take a case-study approach. By concentrating on a piece of exemplary German technology—the Tiger tank—it is easier to explore in detail how technological gaps were opened and how the Allies attempted to catch up.

I have chosen the Tiger tank as my case study because it had a major impact on Allied servicemen, tank designers, and politicians. The Tiger was widely written about,

reported on, and debated. Its reputation overshadowed all other German tanks, to the point that the terms 'Tiger' and 'German tank' became almost synonymous. It was also a piece of technology to which the British and Americans responded particularly poorly. The appearance of the Tiger disrupted British and American tank design philosophy to such an extent that they were not able to build tanks as powerful as the Tiger until the very end of the war. If we wish to study the technological gap between the Germans and the Western Allies in land warfare, the Tiger is an obvious choice as a case study.

The fragmented nature of the secondary literature means that there has not been a holistic examination of Allied reactions to German tank technology that brings together the social, political and military aspects of the Tiger problem. Nor has any historian systematically explored how the encounter with German technology affected the development of new Allied technology. In this thesis, by contrast, I am not just looking at military reactions, but also at what politicians had to say about the Tiger tank, how newspapers reported on the Tiger to the public, and how ordinary soldiers and civilians reacted to Tigers. What factors, be they military, political or social, influenced those responses, and how did these responses impact on the conduct of the war? This is a core question that underpins my thesis.

Though the Tiger was deployed on the Eastern Front as well as in North Africa, Italy, and North-Western Europe, I have elected to focus on the British and American responses to the Tiger. One reason for this decision is the different dynamics on the Eastern and Western Fronts. The tank technology gap between the Western Allies and the Germans was greater than that between the Germans and the Soviets. Moreover, the British and Americans were not as willing as the Soviets to suffer heavy casualties. The Western Allies

relied as much as they could on technology in order to minimise the human cost of war. As a result, they evaluated questions of technology in a different way to the Soviets.

Historiography of the secondary sources

This is a thesis about military history, and in particular about the history of military technology. But I am looking at military technology in a different way, which includes social and political aspects to military technology. In order to understand the novelty of my approach, it is necessary to understand the development of military history as a discipline.

From the beginnings of the discipline in the eighteenth century, through to the middle of the twentieth century, military history was used in military academies as an educational tool. Studying the decisions that were made in battles of the past, and why they were made, was an important part of training officers to conduct the battles of the future. The study of military history was advocated by the Prussian military theorist, Carl von Clausewitz, who believed military history was a fundamental part of military theory and its application to battles of the present.[1] Within this context, military history soon developed certain patterns. Its content was centred on the Decisive Battle, directed by the Great General. It also had a tendency to be nationalistic, Eurocentric, and linked to the ideas of progress and the superiority of western civilisation, which gave it rather racist overtones.[2]

After World War II, military history experienced something of a decline as an academic discipline, but it also began to change in character. There were a number of reasons for this. The first was the emergence of Official Histories. These had been

[1] Azar Gat, *A History of Military Thought: From the Enlightenment to the Cold War.* (Oxford: Oxford University Press, 2001), 190.
[2] Stephen Morillo, *What is Military History?*, (Malden: Polity Press, 2013), 36-37.

commissioned by governments since the nineteenth century but, in the wake of World War II, the scope of the Official History expanded dramatically. Official historians had unprecedented access to declassified documents, and Official Histories of World War II expanded to include topics such as logistics, economics, and medicine, as well as many others. The Official History of the United States Army during World War II had reached a staggering 50 volumes by 1969.[3] These Official Histories were considered so exhaustive that academic historians felt that there was not much that traditional military history could add. Academics who did produce new work on World War II relied heavily on the Official Histories.[4]

Another cause of the change in the nature of military history was the advent of the atomic age. The ability to destroy a city with a single bomb, and the arms race that resulted from this technology, changed the rules of war irrevocably. Technological change has always been a part of military history, but the advance of technology was so great and so rapid that the old ways of fighting wars now seemed to be redundant. As such, the traditional uses of military history as an educational tool in fighting future wars were no longer seen by the military training establishments as particularly relevant for this new age of warfare.[5]

Meanwhile, changing social attitudes to war and warfare led to a decline in the popularity of military history at universities. Anti-war attitudes had developed in society in response, in particular, to the Vietnam War. Writing about military history was perceived as supporting militarism and the military-industrial complex at the expense of civilian values.[6] However, though military history declined as a subject for academic research, it remained a

[3] Ronald Spector, "Public History and Research in Military History: What Difference has it Made?" *The History Teacher* 26:1 (1992), 91.
[4] Spector "Public history and Research in Military History", 92
[5] Jeremy Black, *Rethinking Military* History, (New York: Routledge, 2004), 5.
[6] Morillo, *What is Military History?* 38.

popular subject in the public sphere. Books published for the popular market followed the older traditions of military history, focusing on Decisive Battles and Great Generals, with little in the way of analysis.[7] This led to the publication of a lot of books of questionable quality, which further tarnished the reputation of military history in academic circles. It is arguable that academic attitudes towards the popular market for military history was tinged with a degree of arrogance: 'Real history' was written for other academics, not the masses.[8]

Military historians were also influenced by developments in other fields of history. In the 1960s and 1970s, there was a general shift in the discipline towards the study of social and economic history. Traditional military history was little affected by this, and most military historians continued, as before, to write about Decisive Battles orchestrated by Great Generals. Gradually, however, a new strand began to emerge within military history: the 'War and Society' approach. Historians John Keegan and Victor Davis Hanson were instrumental in introducing this approach, which was based on the premise that each individual society had its own particular 'way of war'.[9] Instead of focusing purely on battles and generals, historians of War and Society investigated the two-way relationship between society and military conflict.[10]

War and Society historians tended to shy away from studying combat operations, preferring to focus instead on the social and economic aspects of warfare. They were generally more interested in the home front than the fighting front. It was not until the mid-1970s that academics returned to war and combat, but using the War and Society approach. John Keegan's seminal work, *The Face of Battle* (1976), launched what became termed Face-

[7] Black, *Rethinking Military History*, 28.
[8] Morillo, *What is Military History?*, 39.
[9] Wayne E. Lee "Mind and Matter-Cultural Analysis in American Military History: A Look at the State of the Field" *The Journal of American* History, 93:4 (March 2007), 1117.
[10] Black, *Rethinking Military* History, 50.

of-Battle studies. Keegan and others studied armies as social and cultural units, and the impact of war on the men and women who fought in it. These studies were part of a new movement call the New Military History. This movement took the lessons learned by the War and Society approach, and applied them to war and warfare directly.[11]

Secondary sources

As a result of these wider trends in military history, the literature on the Tiger tank is fragmented. There is no holistic account of the Tiger and its impact on World War II in terms of technology, military developments, human experiences, politics, and society. In terms of this thesis, there are thus four kinds of literature that are relevant to our theme, all of which have been shaped by the trends that I have discussed. They are: (i) traditional general histories of World War II, or of specific campaigns or battles, which focus mainly on strategy and command decisions, and which mention technology only in passing; (ii) books and articles in the Face-of-Battle tradition that discuss the experiences of soldiers or tank crews who had to fight against the Tiger; (iii) technical studies, which focus almost exclusively on the development of military equipment, with little or no discussion of the human, social, economic, and political context; (iv) War and Society studies, which focus on the home front and the social impacts of warfare.

Despite the fact that World War II was technology driven, the general histories almost never discuss technology in any detail. For example, two of the most widely read general histories of World War II are Antony Beevor's *The Second World War* (2014), and Gerhard Weinberg's *A World at Arms* (2005). Neither author has much to say about the

[11] Morillo, *What is Military* History, 42-43.

impact of technology on the course of the war. Murray and Millet do talk about technology in *A War to be Won: Fighting the Second World War* (2001), but their discussion is restricted to an appendix in which one page is devoted to tanks.[12] In *A World at Arms*, Weinberg makes no mention of the Tiger at all. Antony Beevor, in his blockbuster *The Second World War*, notes that Tigers were able to knock out Sherman tanks from long range, while the Sherman could do nothing in return.[13] This is all that Beevor has to say about the Tiger.

A lack of interest in military technology is typical of the kind of books that authors such as Weinberg and Beevor like to write. The general histories tend to be more concerned with the big battles and command decisions, rather than the wider impacts of a new technology. As a result, they have little or nothing to say about the Tiger. At best, authors sometimes mention that Tigers were present at a particular battle, and some general histories comment briefly on the power differential between the Tiger and British or American tanks. A common comparison is made between the Tiger and the Sherman tank, which was built by the Americans but used in huge numbers by both the British and American armies.

Books about particular campaigns and battles in World War II are more likely than the sweeping histories to mention technology. However, the discussion of technology in such books is generally limited to mentioning what units were equipped with what, and to describing some basic attributes of the technology in question. For instance, Kenneth Macksey's *Crucible of Power: The Fight for Tunisia* (1969) describes in some detail the deployment of Tiger tanks in North Africa at the end of 1942 and the beginning of 1943. He tells us how many Tigers were present at particular engagements, and what happened to

[12] Williamson Murray and Allan Millet, *A War to be Won: Fighting the Second World War*, (Cambridge: Harvard University Press, 2000), 599-600. The information is about a page's worth spread between those two pages.
[13] Antony Beevor, *The Second World War*, (London: Weidenfeld & Nicholson, 2014), 496.

them. But only once in his book, in one paragraph of text, does he pause to explain the wider significance of the Tiger.[14] Macksey does not consider at all the wider implications of new German technology. Bruce Allen Watson treats the Tiger in a similar manner in *Exit Rommel: The Tunisian Campaign* (1999). He makes mention of where Tigers were deployed, but provides only one paragraph on the wider significance on the Tiger.[15]

The literature on soldiers' experiences includes the published diaries and memoirs of the soldiers themselves, though some of these stray into general war history. A typical example is Ken Tout's memoir, *A Fine Night for Tanks: The Road to Falaise* (2002), which discusses the author's experience as a tank crewman during the Battle for Normandy in August 1944. Though Tout's book describes in some depth his experience of tank warfare, it also embeds his personal story in the wider history of the Normandy campaign. In addition to memoir literature of this kind, a number of historians have also discussed the soldiers and their equipment. John Ellis, for instance, in his monograph *The Sharp End: The Fighting Man in World War II* (2011), takes a broad look at the conditions, training and equipment of allied troops and how that affected their ability to fight. Robert Kershaw homes in on the experiences of tank crew from all sides of the conflict in *Tank Men: The Human Side of Tanks at War* (2009). One characteristic of all the published works in this genre—whether written by veterans or by historians—is that they tend to be descriptive. They describe the shortcomings of the equipment that Allied troops had to use, and the superiority of much of the German equipment, but they make no attempt to explain the technology gap.

Historians who discuss the experience of troops often mention that, for Allied soldiers, the Tiger was a major source of concern. They often describe some of the

[14] Kenneth Macksey, *Crucible of Power: The Fight for Tunisia 1942-1943*, (London: Hutchinson, 1969), 146.
[15] Bruce Allan Watson, *Exit Rommel: The Fight for Tunisia 1942*-1943, (Westport: Praeger Publishing , 1999), 148.

innovative methods used by Allied tank men in their efforts to cope with the Tiger. Stephen Ambrose, for example, in *Citizen Soldiers: From the Beaches of Normandy to the Surrender of Germany* (1997), records that the Tigers were largely impervious to the shells of American tanks. Therefore, American tank commanders ordered their gunners to fire smoke shells instead. These would do no harm to the Tiger itself, but they might possibly blind the German crewmen and force them to retreat.[16] However, Face-of-Battle studies are primarily interested in the experiences of soldiers. They never discuss the wider, military and political implications of the Tiger. Nor do they discuss the technological issues that led to the gap that opened up between German and Allied tanks.

The technical literature focuses mainly on the history and evolution of particular pieces of equipment: in this case, tanks. Such works often luxuriate in the technical specifications, for example the dimensions of a particular tank, how fast it could go, what sort of upgrades occurred over its service life, and so forth. However, such books tend to be limited in their approach to the history of these vehicles. They discuss the soldiers' experience only when it is directly relevant to some aspect of the development or performance of the vehicle.

In terms of the Tiger, the technical literature is voluminous. The Tiger is one of the iconic tanks of World War II and many thousands of words have been written about it. However, the technical books tend to get lost in the technical details and the operational history of the tank. They generally pay little attention to issues such as the impact of the Tiger on troops, whether Allied and Axis. Allied responses to the Tiger are only mentioned when they had a direct impact on the development of future variants. Thomas Anderson,

[16] Stephen Ambrose, *Citizen Soldiers*, (London: Simon & Schuster, 1997), 442.

for instance, in his book, *Tiger* (2013), describes some of the tanks that the Soviets developed in response to the Tiger.[17] Hilary Doyle and Tom Jentz, by contrast, in their book *Tiger I Heavy Tank 1942-45* (1993), tell us nothing whatsoever about what the Allies did to counter the Tiger. One of the latest books on the Tiger is *PzKw VI Tiger Tank: The Official Wartime Reports* (2020), edited by Bruce Oliver Newsome.[18] The book is a collection of reports on the Tiger written by the Department of Tank Design and the School of Tank Technology during World War II. It is an excellent resource on technical information about the Tiger. However, it does not seek to tell a wider story. The reports are presented as is, there is no analysis on what impact they had on British tank development.

None of the authors who write technical studies of the Tiger provide any explanation of the deeper reasons why the Germans were able to produce a piece of tank technology that was so superior to anything that the Allies could put into the field. Their works focus very narrowly on the tank itself, its components, and its design history in the narrowest sense. The technical literature takes no interest in the deeper question of why Allied tank technology fell behind that of the Germans. Nor does it adequately place the technology in the context of the military, political, and economic systems which produced them. Little, if any, attention is paid to the complex interplay between the evolution of Allied and German equipment. As in the natural world, the defences of the hunted co-evolved to match the weapons of the hunter, and vice versa. Neither armour nor defence can be understood without reference to the other. Yet the technical literature pays little or no attention to the Darwinian process that drove the evolution of technology and warfare in World War II.

[17] Thomas Anderson, *Tiger*, (Oxford: Osprey, 2013), 143-150.
[18] Bruce Oliver Newsome (ed.), *PzKw VI Tiger Tank: The Official Wartime Reports*, (Coronada: Tank Archives Press, 2020).

The War and Society approach focus on the social impacts of war, which traditional military history tends to gloss over. A broad overview of the social history of World War II has been an important cornerstone for the field. *How We Lived Then: A History of Everyday Life During the Second World War* (1971), by Norman Longmate, is one such example of the British Home Front. One of the first scholarly books on the Home Front in the United States was *War and Society: The United States 1941-1945* (1972) by Richard Polenberg. More recent studies have turned to the effects of the war in individual states and towns. On example is *Committed to Victory: The Kentucky Home Front During World War II* (2015) by Richard Holl. It looks at that the role of Kentucky during the war, and the wartime experiences of Kentuckians. The roles of women in wartime has been a popular topic for study. *Our Mothers' War: American Women at Home and on the Front During World War II* (2004), by Emily Yellin, examines American attitudes to women during the time, societal expectations of women and how they changed and evolved and attitudes toward women considered to be of the 'wrong sort' and their place in war and society. A more recent book on the Home Front is *The Home Front in Britain: Images, Myths and Forgotten Experiences since 1914* (2014), edited by Maggie Andrews and Janis Lomas. The primary focus of the articles in this book is the experience of women in various roles during both World Wars.

Home Front studies provide a wealth of information about the social aspects of the war. However, they only discuss military technology in very specific contexts. Soldiers occasionally wrote to their families about their experiences of technology, but usually they did not, and there is no way to know in advance whether a particular source will contain relevant information. Wartime censorship was one factor that inhibited free discussion of military technology. It is also possible that many soldiers did not want to worry their families by telling them that they were using inferior equipment against a dangerous and skilful

opponent. Katherine Miller, for instance, speculates that either of those reasons is why her father's recounts of battle are brief in his letters home in *War Makes Men of Boys: A Soldier's World War II* (2013).[19] These factors make this kind of source less prominent in my thesis.

The novelty of my approach in this thesis is that I bring these various strands together to provide a holistic analysis of military technology in World War II. The various kinds of literature tend to stay in their own lane and do not investigate how the different aspects of warfare interacted and influenced each other. As a result, we are left with parts of a puzzle that has not been put together. My aim in this thesis is to put together as much of the puzzle as I can, in order to provide a fuller picture. I examine how the military, technical and social aspects influenced each other when the Western Allies encountered superior German technology, using the Tiger as a case study.

Primary sources

The study of primary documents is a key component of this thesis. There are a number of different primary sources that need to be examined to get a holistic view of Allied responses to German war technology. It is necessary to see what people in positions of authority and ordinary soldiers and civilians were writing, talking about, and debating. One of the challenges involved in this area of research is tracking down and sourcing documents. In *The Elusive Enemy: U.S. Naval Intelligence and the Imperial Japanese* Fleet (2011), Douglas Ford mentions the challenges involved in finding relevant documents, as they were not neatly

[19] Katherine Miller, *War Makes Men of Boys: A Soldier's World War II*, (College Station: Texas A&M University Press, 2013), xvi

stored in one, easily accessible place.[20] Rather, where relevant documents still exist they are spread across multiple archives. The kinds of primary sources that are relevant to this thesis can be divided into four broad categories: (i) Military documents produced by the British, American, and German armies; (ii) documents produced by the Allied governments; (iii) civilian and service newspapers; (iv) diaries and memoirs written by servicemen, politicians, and civilians.

Military documents encompass a wide variety of documents produced by numerous agencies that cover a lot of topics. These include reports to, and internal communications within, military departments like the War Office, technical reports on captured equipment, and intelligence reports on new enemy equipment. From these documents it is possible to reconstruct the impact of German technology on Allied military decisions. These decisions include changes in strategy to more effectively combat this new technology and decisions about new technology to counter new technology appearing on the battlefield. Such documents also reveal the debates and disagreements that lay behind into these decisions.

Most of the relevant documents are sourced from various archival repositories, or catalogued within national archives. The *National Archives UK* is a major source for British documents. For American documents, the *National Archives Catalog* is the main repository. Military museums and memorials also contain relevant archival libraries. The Australian War Memorial has a variety of documents from British and American sources which have been useful to this thesis.

Government documents reveal the inner workings of the civilian governments at the time. They overlap with military documents in many places, as they report on the

[20] Douglas Ford, *The Elusive Enemy: U.S. Naval Intelligence and the Imperial Japanese Fleet*, (Annapolis: Naval Institute Press, 2011), 4.

interaction between military and civilian authorities. However, whereas military documents focus exclusively on military considerations, government documents tend to take a broader view of technological questions. Politicians and government officials had to consider not just the military implications of decisions about technology, but also their economic and political consequences. The *National Archives UK* and the *National Archive Catalog* contain many such documents. The WO series of files containing the War Office documents, and the PREM series that hold the War Cabinet documents from the *National Archives UK* have been particularly valuable. The AWM54 series of files in the Australian War Memorial has also been very useful in sourcing technical intelligence documents. Also of value is the *Churchill Archive*, which holds much of Prime Minister Winston Churchill's personal correspondence with ministers, military officials, and parliamentarians. Another important source of information are the records of proceedings in the Houses of Parliament and the United States Congress. Members of Parliament, Members of Congress and Senators asked many questions about military technology, including the Tiger, often because they were concerned by the superiority of German weaponry. Their speeches, and government responses, are recorded in *Hansard* and the *Congressional Record*.

The newspapers of the period are another important source for this thesis. Newspapers show how German technology was reported to the general public and, through letters to the editor, how the general public responded. There are three difference kinds of newspapers that are relevant to this thesis. These are 'quality' newspapers, 'popular' newspapers, and service newspapers. The main difference between them is content and audience. Quality newspapers tend to focus more on news content and have higher standards for editorial content. These kinds of newspapers tended to be read by more educated people. An example of a quality newspaper is *The Times*. Popular newspapers

were not so stringent in editorial content, and contain more articles of public interest. They were aimed more at the lower-middle and working class. *The Daily Mail* is an example of such a popular newspaper. Service newspapers were modelled on popular newspapers. However, they were distributed to soldiers serving in theatre. *The Stars and Stripes* is the prime example of an American service newspaper. Newspapers were reported on German technology several times a month, sometimes even more frequently. This reporting came in a wide variety of forms, from the publication of excerpts from *Hansard* to stories of courage and heroism in the face of the Tiger. Service newspapers also included short articles containing the available technical details of the latest German technology.

Just about every town, region, and theatre of war produced its own local newspaper, so there are many, many newspapers from which to choose. Therefore, I have been particular in my selection. In terms of British newspapers, I have relied above all on *The Times, The Daily Mail, The Press and Journal* and *The Courier and Advertiser.* American newspapers include *The New York Times, The Evening Star*, and *The Wilmington Morning Star.* These are newspapers that were in circulation in major population centres during World War II. As such, they are good examples of what was being reported to the public. I have limited service newspapers to those distributed in the theatres of war that are relevant to my case studies. These include *The Stars and Stripes* and the newspaper of the Canadian armed forces, *The Maple Leaf.* The British newspapers *Union Jack* and the *Eighth Army News* are my main sources for British reporting. The German service newspaper, *Die Wehrmacht*, contains occasional articles on Allied equipment, notably tanks, which has been useful in providing a German perspective on Allied technology.

Diaries and memoirs form a key source for this thesis. To obtain a holistic view of how the Allies responded to German war technology, I have also researched the thoughts

and feelings of the people who were on the receiving end. These sources are almost entirely subjective and prone to inaccuracy. However, factual accuracy is not the main concern when looking at memories. It is the psychological and experiential impact of German technology on these men and women that is most relevant to my research question. The views expressed by Allied troops ranged from admiration of German technology to disgust at their leaders' failure to respond to their complaints about their inferior equipment. I have researched civilians and servicemen from both Allied and German armies to find opinions about the technology they were using themselves and fighting against.

Memoirs by soldiers started appearing not long after the end of World War II. These early memoirs tended to be written by senior commanders and others in positions of command or high politics. Famous examples include General Eisenhower's *Crusade in Europe* (1948),[21] and Field-Marshal Montgomery's *The Memoirs of Field-Marshal The Viscount Montgomery of Alamein* (1958).[22] These kinds of memoirs are generally concerned with strategy, personal rivalries, and politics. Opinions on technology are rarely expressed, though sometimes the occasional insight into the author's perceptions of Allied and German technology sneaks through. For instance, the memoir of General Omar Bradley, *A Soldier's Story of the Allied Campaigns from Tunis to the Elbe* (1951), contains some passages on how German and Allied equipment were perceived by those in command.[23]

Memoirs written by regular soldiers have been published in a small but steady stream since the end of the war. However, the publication of soldiers' memoirs has exploded since the 2000's. Some examples are *Tank Action: An Armoured Troop*

[21] Dwight D. Eisenhower, *Crusade in Europe*, (London: Heinemann, 1948).
[22] Bernard Law Montgomery, *The Memoirs of Field-Marshal the Viscount Montgomery of Alamein*, (London: The Companion Book Club, 1958)
[23] Omar Bradley, *A Soldier's Story of the Allied Campaigns from Tunis to the Elbe*, (London: Eyre & Spottiswoode, 1951), 322-323.

Commander's War 1944-45 (2016) by David Render, and *Tank Commander: From the Fall of France to the Defeat of Germany: The Memoirs of Bill Close* (2013) by Bill Close. A particular challenge with soldiers' memoirs has been that authors generally do no write about their experiences of German and Allied technology in an explicit manner. There is also considerable variation in the way that veterans discuss technology in their memoirs. David Render takes time to write about German tanks in comparison to Allied ones.[24] By contrast, Bill Close writes in a more narrative style and rarely comments explicitly on matters of technology. Nevertheless, a very close reading of his descriptions does permit us to make certain inferences about his experiences and his views.

The primary source material about the Tiger is abundant. The appearance of the Tiger made the process of tank development much more complicated for the British and Americans. As a result, primary sources that are related to tank design and development frequently refer to the Tiger. For example, the archive of the British War Cabinet includes an entire file on the armament of Allied tanks, in which the threat of the Tiger is regularly mentioned.[25] British tank production was a regular topic of debate in Parliament throughout the war, and Members of Parliament asked difficult questions about why the Tiger was so much more advanced than British tanks. The official record of debates in the Houses of Parliament, *Hansard*, contains over two dozen references to the Tiger. Various technical branches were creating reports on the Tiger tank. The Australian War Memorial holds several of these in their archives, such as the *Middle East Handbook on Enemy Equipment.*[26] While the secondary literature is fragmentary, there are enough primary sources to allow us

[24] David Render and Stuart Tootal, *Tank Action: An Armoured Troop Comander's War 1944-45*. (London: Weidenfeld & Nicholson, 2017), 71.
[25] PREM 3/427/1 TANKS: PRODUCTON (II): Supply and armament policy March 1944-January 1945.
[26] AWM54 320/3/60 *Middle East Handbook on Enemy Equipment*.

to analyse why Anglo-American tank technology lagged so far behind the Germans. It will also allow us to analyse how the British and Americans responded when the appearance of the Tiger made that gap very apparent to them.

Chapter outline

This thesis is divided into three chapters. Chapter one tracks how the conditions before the war and combat experience in North Africa allowed the technology gap to form and how that informed the response to the Tiger. I cover the initial the financial and ideological problems that inhibited the development of tank technology. Chapter two looks at how the Tiger was a problem for the Allies and the technological response of the Allies. I investigate how the appearance of the Tiger exposed deep, systemic flaws in Allied ideas about tanks and how they produced them. Chapter three examines how soldiers responded to the Tiger: what they thought about the tank itself, how it informed opinions on their equipment, and what methods they used to combat it. I then discuss newspaper coverage of the Tiger. I show how this reporting informed opinions on the front line, at home, and in government. Finally, I investigate how the Tiger influenced the debates on tanks and tank effectiveness in Parliament and Congress, and what effect those debates had on tank development.

Chapter 1. Before the Tiger

To understand how the Tiger became such a problem to the Allies, it is necessary to look at the circumstances that surrounded British and American tank development before World War II and early combat in North Africa between 1940 and 1942. Economic crisis and a lack of interest by British industry stifled innovations in tank development in Britain, while in the United States the low priority given to tanks was only overcome by the stunning defeat of France in 1940. However, early victories in North Africa concealed many of the problems with Allied tanks and how they were used. It would take the Western Allies a long time to address these inadequacies properly. In this chapter I will look at the troubled development of inter-war tanks, and how the early victories in North Africa contributed to the complacency of the Allies.

American tank development in the inter-war years

American tank development during the inter-war years was very limited. There was a feeling in some military circles that the tank's heyday was over. It was created to meet a specific set of circumstances on the World War I battlefield, which were unlikely to appear again, so it would no longer be needed.[27] In fact, the American tank corps were disbanded as an independent formation in 1920, and tank design and development was subordinated to the infantry branch.[28] The American Army did not foresee a major role for tanks. The main missions of the Army would be homeland defence and limited deployments to their

[27] J.P. Harris, *Men, Ideas and Tanks: British Military Thought and Armoured Forces 1902-1939*, (Manchester: Manchester University Press, 2015), 197.
[28] Michael Green, *American Tanks & AFVs of World War II*, (Oxford: Osprey, 2014), 12.

overseas possessions. Tanks did not figure heavily in this role, so spending a lot of money on them was not justified.[29] However, there was still some interest in military circles in the ability of tanks to exploit breakthroughs in enemy lines, so some experimentation continued. Most of the developments in American tanks, and their use during the 1920s, followed the lead of British armour experiments.[30]

The American Army had difficulty deciding on what kind of tank they wanted, and because of this the American tank fleet was obsolete when war in Europe broke out in 1939. Many of the tank prototypes in this era, particularly medium tanks, were designed by J. Walter Christie. While Christie's designs would go on to influence Russian and British tanks, the American Army and Christie were never able to completely agree on tank designs. By 1932, the Army had stopped contracting Christie, and started the tank prototyping process all over again.[31] The end result was that the American Army did not get a 'modern' medium tank until 1939. However, this medium tank was based around out-dated concepts of trench warfare, and it was obsolete before it came off the production line.[32] The Americans had fared better with light tanks. The first American light tank went into production in 1935. These light tanks were very similar to the early British cruiser tanks of the period, and were also out-of-date by the time that World War II began. American light tanks had insufficient armour and were under-gunned.[33] When war broke out in Europe in September 1939, the American tank force was small and painfully obsolete.

The stunning and completely unexpected defeat of France in June 1940 caused a radical re-think of what was needed out of a tank. The initial response to the events in

[29] Steven J Zaloga, *M3 Lee/Grant Medium Tank 1941-45*, (Oxford: Osprey, 2004), 4.
[30] Green, *American Tanks*, 10.
[31] Harris, *Men, Ideas and Tanks*, 277; Green, *American Tanks*, 12-13.
[32] Green, *American Tanks*, 21
[33] Green, *American Tanks*, 137.

France was to greatly expand the American fleet of medium tanks. However, it soon became clear that the tanks the Army did have were hopelessly out-of-date. American designers set out to design a completely new tank with thick armour to defend against anti-tank guns, and a 75mm dual-purpose gun mounted in a fully rotating turret. The result of this process was the M4 Sherman. It should be noted that the Sherman, for all its merits, was produced as a reaction to what was happening on the battlefield. The Americans were no better than the British at future-proofing their tank designs to ensure that, if the enemy pulled a nasty surprise, they would be able to respond.

The lack of forward planning for this new tank on the part of the Americans led to numerous bottlenecks, which required ad-hoc design solutions. For example, due to the lack of development of tanks in the preceding years, American industry did not have the capability to make a turret large enough to fit a 75mm main gun. When the Americans realised that a gun of this size was necessary, stop-gap measures had to be taken quickly while the appropriate manufacturing facilities were built.[34] This stop-gap measure evolved into the M3 medium tank. American industry went from building small, thinly armoured and lightly armed tanks in 1939 to heavily armed and armoured tanks that where considered some of the best on the battlefield in 1942. This was proof of the strength of American industry during the inter-war period. This strength also undermined their ability to respond to changing conditions on the battlefield. Once the Americans were satisfied that they had the best tank on the battlefield in the Sherman, they were slow to recognise the need to continually update their tanks to keep ahead of the Germans.

[34] Steven J. Zaloga, *Sherman Medium Tank 1942-45*, (London: Osprey, 1993), 7.

British tank development in the inter-war years

The technological gap between British and German tanks represented by the Tiger was not a sudden and completely unexpected event. The reason this gap existed had deep structural roots. Many of the problems with British tanks are the result of decisions made in the early 1930's. The state of the army in the inter-war period has been covered quite well by historians like J.P. Harris and Peter Beale. However, if we are to understand why the Tiger came to outclass every British and American tank in North Africa and Europe, it is necessary to have a basic understanding of how the relationship between government, industry and the War Office in the inter-war years affected the development of British tanks.

One major problem that plagued British tank development was the failure of the War Office to secure a prominent role for the army in British foreign policy. Successive governments had a definite idea of Britain's strategic needs. They felt that those needs were best served by the Air Ministry, in charge of the Royal Air Force (RAF) and the Admiralty, which commanded the Royal Navy (RN). The War Office, in control of the army, was a distant third in budget priority. The RAF and RN were constructing their budgets around the current trends of British foreign policy. What British politicians wanted was maximum security for Britain and her overseas assets with the minimum force (and thus cost) necessary. British armed forces should not be too small, but they should not be too large either, as that might alarm the other world powers and start another arms race, such as the one that had occurred prior to World War I.[35] The RAF and RN were able to argue strongly that they could strike this balance with their proposed budgets. The War Office was unable to find a way to fit their plans into British foreign policy, and could not argue so strongly for

[35] John Ferris, "Treasury Control, the Ten Year Rule and British Service Policies, 1919-1924," *The Historical Journal* 30:4 (1987), 865.

their budget. This left the army with the smallest share of the defence budget.[36] This inability of the War Office to identify a strategic role for the army that satisfied the foreign policy trends of the post-World War I period is partly responsible for their unpreparedness at the start of World War II.

Despite having the smallest budget of the three services, the War Office was interested in the idea of mechanising the army. In September 1923, the Royal Tank Corps (RTC) was created as a permanent formation within the Army.[37] In 1925, the Chief of Imperial General Staff (CIGS), George Milne, set up the Experimental Mechanised Force to experiment with mechanised formations.[38] Up until 1931, as much freedom as could be afforded was given to the RTC was allowed for experimentation, but the financial crisis of the 1930s interfered with this.[39] Milne's successor, Archibald Montogmery-Massingberd, also had ideas about how to mechanise the Army. He envisioned a balanced all-arms mechanised force. This came into conflict with what the RTC wanted, which was lots of tanks. Despite this disagreement, Montogmery-Massingberd gave Percy Hobart, one the RTC's most outspoken members, command of the first permanent tank brigade.[40] The War Office was very open to the idea of mechanising the army. However, How the British perceived the strategic situation in Europe, financial constraints and disagreements over exactly what form mechanisation should made that a difficult task to achieve.

How British governments viewed their strategic requirements, if war broke out in Europe, was a factor in the slow production of British tanks. The government was concerned

[36] Benjamin Coombes, *British Tank Production and the War Economy, 1934-1945* (London: Bloomsbery Books, 2013), 9.
[37] Harris, *Men, Ideas and Tanks*, 197.
[38] William Suttie, *The Tank Factory – British Military Vehicle Development and the Chobham Establishment* (Gloucestershire: The History Press, 2015), 33.
[39] Harris, *Men, Ideas and Tanks*, 242.
[40] Harris, *Men, Ideas and Tanks*, 243-244.

that a war with Germany would break out eventually, and were constantly monitoring the situation on the continent. One report produced by the Committee for Imperial Defence in October 1936 concluded that Germany should ready to ready to go to war in 1939.[41] The main concern in this report was with German air attack against Britain.[42] Consequently, the RAF was given a higher priority in the defence of the British Isles. There was also the belief that the collapse of the French army was an event so unlikely that it was not worth planning for. As such, a large and costly land force would not need to be sent across the Channel.[43] As a result, the government gave less funding and a lower priority to manufacturing army products.[44] Because air raids were such a concern for the government, the Royal Ordnance factories were told to build more anti-aircraft guns. In this critical period, the army's ability to build tanks was constrained.[45] As a result, Britain produced half the number of tanks that France and Germany did in the same time period. Obsolete, but cheap, light tanks made up the majority of these tanks.[46]

British military spending was also affected by the Great Depression. The MacDonald coalition cut the 1932 War Office budget from £40 million to £36.5 million. It was not until 1935 that the budget returned to the pre-1932 level. Cuts had to be made everywhere, including to the tank budget. This budget was not very big to begin with. The entire budget for tanks was slashed from £357,000 to £301,000.[47] Before the rearmament program was approved in 1936, the only tanks the War Office could afford were limited numbers of

[41] PREM 3/500 Future conduct of war against Germany 1939 appreciation of planners October 1936-September 1942, 3.
[42] PREM 3/500, 18-19.
[43] Harris, *Men, Ideas and Tanks*,291-292.
[44] Coombes, *British Tank Production*, 14.
[45] Harris, *Men, Ideas and Tanks*, 274.
[46] Coombes, *British Tank Production,* 19.
[47] Harris, *Men, Ideas and Tanks*, 237.

Vickers Light Tanks.[48] New, more effective tanks started coming off the production lines in 1937. However, in 1937 the price of one of these new tanks was in the region of £12,000. The only tanks which the War Office could afford to buy in quantity remained the Vickers light tank and the Infantry Tank mark I. These tanks cost £3,250 and £6,000 respectively.[49] Both were obsolete at the time of their introduction.

Figure 2: Vickers Light Tank Mark VI. ©IWM

Figure 3: Infanry Tank Mark I Matilda. ©IWM

A lack of research and development of new tanks was another problem the War Office had in the inter-war years. Before 1937, the War Offices allocated rarely more than £100,000 to research and development of tanks.[50] This was less than 1 percent of the total army budget. In comparison, at the height of the Great Depression in 1929, the RAF was spending £1.5 million on research on development. The RAF had a budget of £17 million at the time, so almost 10 percent of its budget was dedicated to research and development.[51] There was not enough money to entice British manufacturers to work for the War Office,

[48] Coombes, *British Tank Production*, 26-17.
[49] Coombes, *British Tank Production*, 23.
[50] David Fletcher, *The Great Tank Scandal: British Armour in the Second World War Part I*, (London: Her Majesty's Stationary Office, 1989), 4.
[51] Ian Philpott, *The Royal Air Force An Encyclopedia of the Inter-War Years Volume II: Re-Armament 1930 t0 1939* (South Yorkshire: Pen & Sword Books, 2008), 191.

and War Office had barely enough money to keep the firms that were working for them supplied with work orders.[52]

Compounding the research and development problems was the fact that the War Office was not exactly sure what kind of tanks it wanted. During the inter-war period, there were up to six different classes of tank under consideration.[53] The War Office finally decided on what kinds of tank it was going to acquire in 1937. Eventually, three classes of tank were chosen: light tanks, infantry tanks, and cruiser tanks.[54] The uncertainty in tank design caused problems with industry. Manufacturers were not willing to set up a production line if the specifications were constantly changing. It could take up to four years to bring a tank to production, and having to make major changes were costly and wasted time.[55]

The financial problems of the War Office in the inter-war period had flow-on effects on the tanks they did develop. Prototypes of modern tanks were cancelled because they were considered to be too expensive.[56] Tanks designed and built to the lowest price possible were the order of the day. An example of one such tank was the Infantry Tank Mark I. It was very cheap and very well armoured. However, in practice it was useless. Its machine-gun armament was inadequate and it was far too slow.[57] A further cost-saving measure was using commercial truck engines to power future British tanks, instead of developing a purpose-built tank engine. British tanks designed in the 1930's were severely underpowered because British engine manufacturers were not producing high-power truck engines. This was because of size and weight limitations imposed on trucks. Freight transport across the

[52] Harris, *Men, Ideas and Tanks*, 274.
[53]Peter Beale, *Death by Design: British Tank Development in the Second World War*, (Gloucestershire: The History Press, 1998), 42.
[54] Suttie, *The Tank Factory*, 42.
[55] Beale, *Death by Design*, 39.
[56] Harris, *Men, Ideas and Tanks*, 238.
[57] David Fletcher, *Matilda Infantry Tank 1938-45*, (Oxford: Osprey, 1994), 10.

country was dominated by rail, as the government heavily supported British railways. Road vehicles that weighed over two and half tons were subject to large taxes.[58] As it was cheaper to transport freight by rail, there was little demand for heavy vehicles. Consequently, no one was developing truck engines powerful enough to haul big loads that would be suitable to power a tank.[59] The problem with underpowered engines would only be solved when the Rolls Royce Meteor engine was adopted for the Cromwell tank in 1942.[60]

In 1938, the money allocated for tanks was raised to £842,000. This amount continued to rise as the political situation in Europe worsened. By 1940 the tank budget had increased to £200 million. But the damage had already been done in the sense that Britain did not have enough modern tanks in service or development due to the previous financial constraints. The only thing that could be done with this money was to buy up quantities of the old and mostly obsolete designs.[61]

Originally the War Office was directly responsible for designing tanks. However, as the international situation worsened, the Ministry of Supply was created in May 1939. The idea behind this new ministry was that it would simplify the procurement and supply of stores to all the services by utilising business and industry to manage the process. It was assumed that the experience of these firms would increase efficiency.[62] The bill went through several revisions in order to get the support of Parliament. But approved version of the bill did not have to sort of authority that was originally envisioned. Procurement of stores common to all three services and Army equipment came under the Ministry of

[58] Fletcher, *The Great Tank Scandal*, 5.
[59] Fletcher, *The Great Tank Scandal*, 5.
[60] Beale, *Death by Design*, 57-58.
[61] Fletcher, *The Great Tank Scandal*, 4.
[62] Fletcher, *The Great Tank Scandal*, 4.

Supply, while RAF and RN retained control of procuring their own specialist equipment.[63] The War Office now had no direct say in the development of the tanks they were using.

British industry and tanks in the inter-war years

The British economy did not recover as rapidly as that of some other countries after the end of World War I. During the war, the British had been forced to withdraw from markets where they had hitherto been the dominant trading partner. Competition from Japan and America had moved in to fill the void Britain had left.[64] British trade after World War I struggled. In terms of the motor vehicle industry, British cars were more expensive, in part because powerful trade unions ensured that wages were relatively high. In order to encourage economic recovery, tariffs were levied on imported cars and the government encouraged, and even facilitated, a great number of British motor vehicle firms to merge.[65]

As a result of these measures, the British motor vehicle industry found itself insulated from outside influence, and was dominated by a handful of firms. These firms often ended up finding novel ways to stifle competition from smaller companies by engaging in price-fixing schemes and other unfair business practices.[66] The major British manufacturers were happy with the status quo and sought to maintain it. As an example, by 1936 there was little innovation within in the car industry. Manufacturers were content with producing their existing designs.[67] This would become important as the motor vehicle industry quickly became involved in the production of tanks.

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[63] Beale, *Death by Design*, 159.
[64] Barry Eichengreen, "The British Economy Between the Wars," In *The Cambridge Economic History of Modern Britain Volume II: Economic Maturity 1860-1939*, ed. Roderick Floud and Paul Johnson (Cambridge: Cambridge University Press, 2004), 318.
[65] Eichengreen, "The British Economy," 340.
[66] Eichengreen, "The British Economy," 338.
[67] Coombes, *British Tank Production* 13.

The Ford style of mass production was not popular in Britain, which was another factor in the problem of British tank production. Using the motor vehicle industry as an example, the primary customer for cars was the upper-middle class, who were more concerned about quality rather than price.[68] As such, emphasis was placed on craftsmanship, and cars were hand assembled. This 'hand-crafted' style of assembly carried over to tank production, and it affected how quickly British factories were be able to complete tanks. This was not limited to just to cars, the agricultural equipment and locomotive manufacturers that became involved in tanks also worked on similar principles. Spare parts and parts interchangeability were also affected, as the parts did not have the same level of standardisation found in American tanks. Some minor modifications were often necessary in the field to make a new part fit properly.[69]

British industry was very quick to divest itself of military manufacturing at the end of World War I. This abandonment was so complete that, by the time re-armament began, only two places in Britain had any experience in building tanks. These were the Royal Ordnance Factory at the Woolwich Arsenal and the Vickers-Armstrong Elswick works. By contrast, the aviation industry had over a dozen aircraft manufacturers that were involved in the design and production of military aircraft.[70] At Woolwich Arsenal, manufacturing priority was given to RAF orders, so not many tanks were coming out of there. Vickers-Armstrong had the capacity to build lots of tanks, but RAF orders took priority as well. [71] More firms got involved in tank production from 1936, such as Vulcan Foundry and Nuffield

[68] Sue Bowden and David Higgins, "British Industry in the Interwar Years," In *The Cambridge Economic History of Modern Britain Volume II: Economic Maturity 1860-1939*, ed. Roderick Floud and Paul Johnson (Cambridge: Cambridge University Press, 2004), 386-387.
[69] Fletcher, *The Great Tank Scandal*, 5.
[70] Philpott, *The Royal Air Force*, 192.
[71] Coombes, *British Tank Production* 17.

Mechanisation and Aero. However, they were new to the processes of building tanks and were slow to start up.[72]

Industry's lack of interest in tanks was not helped by the War Office's tendency to order tanks in very small numbers. Despite Vickers-Armstong's ability to manufacture more, the War Office only ordered 18 light tanks in 1933. Vickers tank division was kept open by their foreign export sales department. Even during re-armament, War Office orders were initially not sufficient enough to justify the investment required to set up a production line. This was due to the War Office not understanding the industrial process.[73] Without a guarantee of continuing orders to generate a return on investment, companies were not willing to invest in new projects. There was also a 'business as usual' directive of the government that caused problems. Re-armament was not allowed to disrupt regular commercial business. Several large firms had the capability to build tanks and munitions but were not allowed to work on re-armament. The War Office thus could not place all the orders it needed.[74]

There was general lack of interest in British industry in building tanks. It is not hard to see why. For most firms it was not a worthwhile investment. Civilian and export orders had filled up their order books and military contracts were a less favourable option. The taxes levied on heavy trucks favoured the railways, so development of an appropriate engine that could be used to power tanks did not exist. The car industry did not consider investing into tanks an attractive proposition. The War Office ordered very low numbers of tanks, and the lack of a guarantee of continuing orders made working for the War Office very unattractive.

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[72] Beale, *Death by Design*, 151.
[73] Coombes, *British Tank Production* 16.
[74] Coombes, *British Tank Production* 22.

The problems of industry was compounded by the way tanks were designed and produced prior to World War II. The War Office did not involve industry until very late in the design process. When it was only Woolwich Arsenal and Vickers-Armstrong building tanks, there were not a lot of problems. This was because many of the designers originated from those factories and they were already set up to build tanks. However, when the War Office started expanding tank production and tenders were put out to prospective manufacturers, there were significant delays in productions. This was because the original design did not take into account the actual manufacturing capabilities of the firms they were contracting out to. Tank designs would often be modified to facilitate the production processes available to the firms building the tank. A compromise between what the War Office had approved and what could actually be built was often the end result.[75] This situation could have been avoided if the War Office involved the industry at an earlier in the design stage to account for production capability.

Tank production was also in constant competition with the other services for available factory space. The RAF was the primary competitor. Priority production status had been granted to the RAF, which meant that the RAF got resources and orders processed first. Tanks had to wait for factories to finish with RAF orders. Giving tanks priority status was discussed in cabinet after Dunkirk. However, with the Battle of Britain heating up, it was decided that the RAF was the best hope to stave off the threat of invasion. In August 1940 the RAF kept its higher priority status over tanks.[76] This left production of tanks to about 100 per month. In July 1941 cabinet revisited the issue. As long as tanks did not interfere with RAF and RN production, they were allowed priority status. In the second half of 1941, tank

[75] Fletcher, *The Great Tank Scandal*, 5.
[76] PREM 3/426/7 TANKS: PRODUCTION (I): Priority July 1940-August 1940, 29.

production increased to around 100 tanks per week.[77]

With most of Britain's modern tanks left in German-occupied France, there were precious few tanks remaining to defend the British Isles from the expected invasion. Problems with British tanks, such as thin armour and manufacturing defects, had been identified in France. But it was thought there was not enough time to get new tanks into production before the Germans arrived. It was decided to continue producing the old tanks, so that there would be something to fight back with while new, more effective tanks were designed and put into production. At the time this was the best course of action, but it would have long-term ramifications.[78] One of the consequences was that a number of tanks continued production after they stopped being useful. Production reports show that some of these early tanks were produced well into 1943, long after they had been replaced in front-line service.[79] These lines would eventually be stopped and turned over to something more useful, like more modern tanks and locomotives.[80] However, they were in production for far too long and took up production capacity that could have been used more efficiently.

Another consequence of the loss of Britain's tank fleet was the Ministry of Supply's decision to rush development of new tanks to get them into production faster. The Ministry of Supply ordered tanks off the drawing board, without the usual prototyping and testing that would go into the development of a tank. In cases where the tank was based an already existing design, this did not cause many problems. However, brand new designs ordered in this manner ended up having many technical problems. Extensive modifications had to be made to make the tanks functional, which took up valuable factory space. Winston Churchill

[77] PREM 3/425 TANKS: PERIODICAL RETURNS August 1940-March 1945.
[78] Fletcher, *The Great Tank Scandal*, 34.
[79] PREM 3/425 production returns, 57.
[80] PREM 3/426/15 Shortfalls In production August 1942 – November 1942, 7.

was informed in November 1942 that such re-work programs were partly responsible for a shortfall in tank production for the year of 1942.[81] In some cases the development of terrible tanks went on far beyond the point where it should have been cancelled. An example is a tank called the Covenanter. It suffered from several severe design flaws and a lot of time and effort was spent in trying to make it work properly. The Covenanter was never made battle-worthy, and it never saw deployment outside of Britain. British factories still turned out over 1700 of what was a useless tank before production was stopped.[82]

The decision to use readily available truck engines instead of developing purpose-built tank engines also had an effect on tank design. Commercial engines did not produce enough power to properly drive a tank. The British found themselves in a position where their tanks could be fast but poorly armoured or well armoured but very slow. The British solution to this conundrum was to embrace this difference and build two classes of tank with different battlefield roles. These two classes of tank were named infantry tanks and cruiser tanks.[83]

Infantry tanks were slow but heavily armoured tanks intended to support infantry in assaults on enemy strong points. They only needed to go at an infantryman's pace, so they did not need to be fast, going no more than 15 miles per hour (MPH). Infantry tanks sacrificed speed for heavy armour.[84] In the early stages of the war, the infantry tank was impervious to almost every gun the Germans had.[85] However, as the Germans introduced bigger and better guns in their tanks, the armour of the infantry tanks became less effective

[81] PREM 3/426/15 Shortfalls In production, 10-11.
[82] Fletcher, *The Great Tank Scandal*, 62.
[83] Harris, *Men, Ideas and Tanks*, 241.
[84] Fletcher, *The Great Tank Scandal*, 6.
[85] Fletcher, *Matilda Infantry Tank*, 10.

and their slow speed became more of liability.[86] I have already mentioned the Mark I, which was considered a failure. However, the Mark II, more commonly known as the Matilda, was far more successful. It was impervious to almost any gun the Germans had in 1940 and early 1941.[87]

Cruiser tanks were at the opposite end of the spectrum, in that they sacrificed armour protection for speed. This type of tank was supposed to exploit any breakthroughs created by the infantry tanks. They were envisioned to attack behind enemy lines, striking logistics and communications structures and disrupting the enemy army. The first cruiser tank, the Mark I, was very fast, being able achieve speeds of up to 25 MPH on road.[88] However, cruiser tanks were also significantly under-armoured. Their armour could stop rifle and machine-gun fire, but they were vulnerable to the lightest tank and anti-tank guns the Germans had.[89] In contrast, the early German tanks that fought in France and North Africa had the twice the armour protection as the Cruiser Mark I, while travelling at the around same speed.[90]

One final consequence of designing to cost was that British tanks were left with little room for upgrades, if at all. Tanks were built to the very edge of the weight limits the chassis and suspension could bear and what the engine could power. So if there was a significant change required, such as a bigger gun, they would have to design an entirely new tank.[91] An attempt to alleviate the engine problem was made by switching from truck engines to the Nuffield Liberty engine. It was a more powerful aeroplane engine, but it was a dated design

[86] Fletcher, *Matilda Infantry Tank*, 18.
[87] Fletcher, *Matilda Infantry Tank,* 15, 17.
[88] Harris, *Men, Ideas and Tanks*, 298-299.
[89] Harris, *Men, Ideas and Tanks*, 302.
[90] Bryan Perrett, *Panzerkampfwagen III Medium Tank 1936-1944*, (Oxford: Osprey, 1999), 7.
[91] Beale, *Death by Design*, 71.

from World War I and was not very reliable in ground applications. A constant problem the British had was designing a tank for a current threat, only for that tank to be obsolete by the time it reached troops because there were new threats on the battlefield that had superseded the old ones. In such a technologically dynamic war, the failure to adapt to changing threats was serious problem. The British lack of adaptability became evident in Africa, where the Germans could upgrade their tanks in the field with more armour and better guns without a significant loss in performance.

Early combat in North Africa

Another underlying structural reason for the technology gap that emerged at the end of 1942 was British armour theory. When the war broke out in 1939, the dominant view in the War Office and British Army was that armoured units should be equipped with lots of tanks, but that there was not much need for supporting elements such as motorised infantry and artillery. The core idea was that an armoured division of roughly 340 cruiser tanks would split into regiments of between 50 and 60 tanks. These regiments would be widely dispersed to find the enemy.[92] When the enemy position was located by one of these sub-units, the rest of the division would converge on the position from multiple directions. The armoured division would thereby keep the enemy confused and unable to coordinate their defence. Although the British doctrine of armoured warfare sounded plausible in theory, it was not properly tested in practice during the campaign in France in 1940 because of the speed of the German victory. Moreover, the war in North Africa began hot on the heels of

[92] Tim Moreman, *Desert Rats British 8th Army in North Africa 1941-43*, (Oxford: Osprey, 2007), 11; Paddy Griffith, *World War II Desert Tactics*, (Oxford: Osprey, 2008), 30.

the defeat of France in June 1940. So there was not enough time to analyse whatever lessons could have been learned in France.[93]

In the event, the swift and almost complete defeat of the Italians in North Africa during February 1941 camouflaged the underlying problems of British armour theory. When Mussolini had declared war on the British in June 1940, the Italian army in North Africa was utterly unprepared. The army was largely un-mechanised, and the few Italian trucks available were unreliable, which was made worse by the fact that none of the necessary modifications for desert use had been made. Italian troops lacked training in desert warfare, and they possessed a very poor communications network. The men in fortified positions on the border of Libya were not even aware that there was a war on until they came under fire from British troops.[94] Their tanks were in a sorry state. The most numerous Italian tank in North Africa, the L3/35, was a tiny light tank armed only with machine-guns, and completely useless against British tanks. The Italians did have some medium tanks, such as the M11/39, but they were few in number and of inferior quality. Though armed with an adequate gun, they were slow and poorly armoured. Moreover, Italian tanks were mechanically unreliable and constantly broke down, a condition made worse by the lack of desert modifications.[95]

Figure 4: L3/33 tankette. ©AWM

Figure 5: M11/39 medium tank captured and put into service by Australian troops. ©AWM

[93] Griffith, *World War II Desert Tactics*, 11.
[94] Beevor, *The Second World War*, 178.
[95] F. Cappellano and P. Battistelli, Italian Medium Tanks 1939-45, (Oxford: Osprey, 2012), 35.

By contrast, the British Army in Egypt had been training for desert warfare for a long time before the outbreak of war. The 7th Armoured Division was the primary armoured unit in Egypt at the time, and they had spent a year between 1938 and 1939 being drilled in tank tactics and desert warfare. The commanding officer who had been entrusted with their training, Major-General Percy Hobart, was something of an expert on tank warfare, and had played a key role in the development of British armour theory in the interwar years.[96] British cruiser tanks were fast, if lightly armoured, and the Matilda infantry tank was impenetrable by any gun the Italians had. The two-pounder gun (40mm calibre) with which all British tanks were armed, was a much more capable gun than those of the Italian tanks. British tanks were also much more mechanically reliable, thanks in part to the addition of essential desert modifications like sand filters for the engines.[97] The key point here is that, on the basis of their experiences of fighting the Italians, there was no apparent reason for the British to think that there was a serious problem with their doctrine of armoured warfare, their tanks, or their tactics.[98]

Figure 6: Cruiser Tank Mark IV. ©AWM

Figure 7: Matilda II infantry tank. ©IWM

[96] Harris, *Men, Ideas and Tanks*, 307.
[97] George Forty, *World War Two Tanks*, (London: Osprey Automotive, 1995), 187.
[98] Griffith, *World War II Desert Tactics*, 11.

The situation in North Africa changed dramatically in February 1941. In order to prevent the total collapse of the Italians in North Africa, Hitler reluctantly decided to send the famous *Afrika Korps*, led by General Erwin Rommel, to support his ally.[99] Now, the British were confronted by a much more serious opponent. The Germans were better organised than the Italians, and many of the German troops were veterans of the Battle of France. The arrival of the *Afrika Korps* presented the British with two principle problems.

The first problem was the underlying doctrine of armoured warfare to which the Germans subscribed. Like the British, the Germans emphasised the importance of concentrating their forces against enemy units. Unlike the British, however, the Germans believed in combined-arms warfare. German armoured formations consisted, not just of tanks, but also of motorised infantry and anti-tank guns. Moreover, unlike the Italians, the Germans had an excellent communications system. Every German tank carried a radio set, which allowed them to communicate and coordinate, not just with other tanks, but also with infantry, artillery, and mobile command units, and the entire division would move together. It was often the case that one of the smaller British regiments would run into an entire German division of roughly 120 tanks, supporting infantry and anti-tank guns and would be destroyed before help could arrive.[100]

[99] Beevor, *The Second World War*, 210-211.
[100] Griffith, *World War II Desert Tactics*, 12, 29.

The second, and greatest, problem posed by the tactics the Germans employed was their use of anti-tank guns. The Italians had not handled their anti-tank guns very well in the Desert War, and they never constituted a major threat to British tanks. However, the Germans effectively integrated anti-tank guns into their battle tactics, using them to cover an advance, to protect their flanks, to prevent encirclement by the enemy, and to provide supporting fire to protect the tanks when they withdrew to refuel and resupply.[101] In the early part of the campaign, the primary anti-tank weapon was a 37mm gun. This gun was not all that impressive, with its effective range against cruiser tanks at just under 1,000 yards.[102] However, the Germans had some far more fearsome anti-tank guns at hand. Replacing the 37mm gun as the primary anti-tank weapon was a 50mm gun. It could destroy cruiser tanks from well over 1,500 yards away, and could even penetrate the Matilda from under 400 yards. But the Germans' most terrifying weapon was the 88mm gun. Strictly speaking, the '88' was not an anti-tank gun at all, but an anti-aircraft gun, officially known as

Figure 8: A heavily camouflaged PaK 38 50mm anti-tank gun. ©IWM

Figure 9: PaK 36 37mm anti-tank gun. ©AWM

[101] Perret, *Panzerkampwagen III*, 19-20.
[102] AWM54 925/7/6 [Tanks - Reports on:] Armoured Fighting Vehicles - Intelligence Information Part I - Tactics in Libya; Part II - Comparison between British and German Armoured Divisions; Part III - The 6 PDR Gun, 1941, Penetration – British and German Weapons Compared.

the *8.8cm Flak 36*. However, the properties that made it a good anti-aircraft gun also made it a supremely effective anti-tank weapon, so it was used in both roles. This gun could destroy any British tank from over 2,000 yards.

Figure 10: Flak 36 88mm anti-tank gun. ©IWM

The threat posed by German anti-tank guns was made even worse by the fact that British tanks did not possess the equipment that was necessary to engage and destroy anti-tank guns. British tanks were only issued with armour-piercing (AP) ammunition. This was because, in pre-war British armour theory, it had been assumed that the primary target for tanks would be enemy tanks.[103] British tanks were therefore equipped with AP rounds, which were designed to punch a hole in an enemy tank and destroy it. However, AP rounds were practically useless for attacking anti-tank guns. What was required instead was an effective high-explosive (HE) shell, which could destroy a soft target such an anti-tank gun, and incapacitate its crew. Due to the close co-operation between German tank crews and their anti-tank guns, and the failings of British tactics, British tanks found themselves having to fight against both. This left the anti-tank guns free to shoot at British tanks, and without a HE round there was little the crew of a British tank could do in return. Tank and crew casualties were high as a result,[104] and the British lost the battlefield dominance that they had enjoyed over the Italians.

[103] Fletcher, *The Great Tank Scandal*, 6.
[104] Moreman, *Desert Rats*, 33.

Another factor was the fact that the Germans had far better tanks than the Italians. British reports on examinations of captured panzers showed that—unlike Italian tanks—they carried desert modifications like sand filters to increase reliability.[105] The Panzer III and Panzer IV were better armoured than the Italian tanks. Both the Panzer III and Panzer IV were armoured similarly to the British cruiser tanks, and could go about as fast. The Panzer III carried a 37mm gun that was slightly worse than the two-pounder on British tanks. The Panzer IV was primarily supposed to fire HE at anti-tank positions, but it did have an AP round that was effective against early cruiser tanks. British and German tanks could destroy each other from around 1,000 yards. They were not the pushovers that the Italians had been.[106] The only real problem for the Germans was the Matilda. The thick armour on the front of this infantry tank was almost impervious to anything smaller than the 88mm. However, the Matilda was very slow, so it was easier to out-manoeuvre it to get to the thinner armour on the side.[107]

Figure 11: Panzer III. ©IWM

Figure 12: Panzer IV. ©IWM

[105] PREM 3/190/2 GERMAN ARMY: German tanks captured in North Africa April 1941 – July 1942, 8.
[106] Moreman, *Desert Rats*, 31.
[107] Fletcher, *Matilda Infantry Tank,* 16.

However, two things happened in quick succession that changed the balance of power. The first was that the Panzer III received a new 50mm gun. This was not quite as powerful as the 50mm anti-tank gun, but it was able to penetrate any British cruiser tank from over 1,500 yards.[108] It was even able to put a round through the Matilda at 200 yards. The gun was first reported to London by Middle East Command in April 1941. However, it does not appear to have been considered important enough by the War Office to mention to interested parties.[109]

The second event was a general up-armouring of German tanks. New model Panzer IIIs coming off production lines in 1941 had thicker armour as standard.[110] Older models had additional armour plate welded onto them to increase their armour protection as an interim measure.[111] Likewise, new Panzer IVs had thicker armour and older models had extra armour added to them.[112] Ideally this was done at the factory when a tank went in for refurbishment. However, additional armour was often improvised in the field.[113] While the new models had some design changes to cope better with the extra weight, the important aspect of this was that the performance of German tanks was not seriously affected by the extra armour.

This left British tanks in a very vulnerable situation. By June 1941, the extra armour carried by panzers reduced the effective range of the two-pounder to under 500 yards.[114]

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[108] AWM 54 320/3/60 PART 7: Middle East Handbook of Enemy Equipment PART 7 [Enemy Equipment - Types:] Middle East Handbook of Enemy Equipment (Includes Horch 4 wheeled Armoured Cars; 6 wheeled Armoured Cars; 8 wheeled Armoured Cars; other Armoured Cars; Mark 1 tanks; Mark 2 tanks; Mark 3 tanks; Mark 4 tanks; Mark 5 tanks) [Part 7 of 11], Section 8: Mark 3 Tank, 10.
[109] PREM 3/284/12 MIDDLE EAST: Armoured and other reinforcements: Enquiry into German tank armament and British tank defects May 1941-July 1942, 3-4.
[110] AWM54 320/3/60 PART 7 Section 8: Mark 3 Tank, 2.
[111] Perret, *Panzerkampfwagen III,* 7-8.
[112] AWM54 320/3/60 PART 7 Section 9: Mark 4 Tank, 7-8
[113] AWM54 320/3/60 PART 7 Section 8: Mark 3 Tank, 10.
[114] Bryan Perret, *Panzerkampfwagen IV Medium Tank 1936-45*, (Oxford: Osprey, 1999), 15.

British tanks were now out-ranged and under-gunned. A new cruiser tank, the Crusader, was rushed out to North Africa in June 1941. However, it did not do much to rectify the situation. It carried almost double the armour of the old cruiser tanks, but this only reduced the range that a Panzer III could destroy it to 1,000 yards. It carried the two-pounder gun, so it still needed to get within 500 yards to do anything to Panzer III. A new infantry tank, the Valentine, also began arriving in June to replace worn-out Matildas.[115] However, it provided

Figure 13: Crusader cruiser tank. ©IWM

Figure 14: Valentine infantry tank. ©IWM

no advancement over the Matilda and suffered from the same problems as the Matilda. Even with their latest tanks, British forces were still out-ranged and under-gunned.

New tanks, new guns

During 1942, British forces in North Africa received new tanks that would begin to swing the balance back in their favour. These were the American M3 medium and M4 Sherman, and the British Crusader III and Churchill III. Along with a change in tactics, these tanks gave the Allies superiority in quality tanks, not just quantity. General Alexander, Commander in Chief

[115] Bruce Oliver Newsome, *Valentine Infantry Tank 1938-1945*, (Oxford: Osprey, 2016), 15.

Middle East, commented in his memoirs that the Sherman in particular gave the British the technological superiority they had lacked. [116]

The first of these tanks was the American M3 medium tank. This tank began to arrive in Egypt in November 1941, but its first combat occurred in May 1942.[117] From the perspective of the British, the M3 medium appeared to provide a solution to the problem posed by both the panzers and the German anti-tank guns. It was a highly effective tank for its time.[118] It had a 75mm gun that was 'dual-purpose', in that it gave excellent AP performance against German tanks and also allowed tank crews to engage anti-tank gun emplacements with an effective HE shell. However, it was not as effective as it could have been, as the British used it in the same manner as their other tanks, meaning they were often outnumbered and without sufficient infantry and artillery support.[119]

Figure 15: M3 Medium tank. ©IWM

The M3 medium did have some serious design drawbacks due to the fact that it was rushed into production as an interim vehicle.[120] The chief flaw of the M3 medium was the placement of the main gun, which was mounted in the hull of the tank, rather than in the turret. This limited the traverse of the gun to the left and the right. Unless the enemy was directly ahead, the entire tank needed to be moved to aim the gun. The placement of the gun in the hull also meant that, in order to fire, a lot of the tank had to be exposed. A turreted tank can go into what is known as a 'hull down' position, where as

[116] Field Marshal Earl Alexander of Tunis, *The Alexander Memoirs 1940-1945*, (London: Cassel, 1962), 20.
[117] Jim Mesko, *M3 Lee/Grant in action*, (Carrollton: Squadron Signal, 1995), 40.
[118] Zaloga, *M3 Lee/Grant Medium Tank*, 15.
[119] Ken Ford, *Gazala 1942: Rommel's greatest victory*, (Oxford: Osprey, 2008) 21.
[120] Zaloga, *M3 Lee/Grant Medium Tank*, 7.

much of the tank is hidden behind terrain as possible, leaving only the turret exposed. Going 'hull down' could not be done easily in the M3 medium, which, as a result, presented a prominent target for the enemy.[121]

Despite this, the M3 medium was well liked by its crews. The gun was better than the two pounder. The Germans reported that the 75mm was able to destroy any panzer from roughly two kilometres away.[122] It was more effectively armoured than its British contemporaries, and could take a lot of punishment as a result.[123] German after-action reports of the Battle of El-Alamein state that panzers had to get to within 500 metres to destroy one M3 medium. Only the 88mm threatened the M3 medium at long range.[124]

The M4 Sherman was the most modern American tank on the battlefield. It first went into combat at the Second Battle of El-Alamein.[125] The Sherman was supposed to replace the M3 medium entirely, but Sherman production was not able to keep up with demand and so it ended up serving alongside the M3 medium up until the end of the campaign in Tunisia. The Sherman took all the good things about the M3 medium and put them in an even more effective package. It also carried a dual-purpose 75mm gun, but this time it was mounted in a fully rotating turret instead of in the hull. This gave it more tactical flexibility,

Figure 16: M4 Sherman. ©IWM

[121] Zaloga, *M3 Lee/Grant Medium Tank*, 16.
[122] AWM54 423/4/103 PART 93 21st Panzer Division report on the Battle of Alamein and the Retreat to Marsa El Brega, 23rd October – 20 November 1942, 19.
[123] AWM54 925/7/6, *Confidence in Grant.*
[124] AWM54 423/4/103 PART 93, 18.
[125] Zaloga, *Sherman Medium Tank*, 20.

as it did not have to turn the entire tank to engage a target. It also allowed the Sherman to take advantage of the hull-down position. The armour of the Sherman tank was of similar thickness to the M3 medium, but it was constructed in a far more effective manner. German instructional pamphlets informed gunners that the Sherman could survive a hit from the deadly 88mm from ranges over 800 metres.[126]

The British-built Crusader III tank began arriving in North Africa in late 1942 and first saw at the Second Battle of El-Alamein in October.[127] The two-pounder was replaced with a new gun. This was the six-pounder (57mm). It was far more effective against German armour than the two-pounder. It gave the British the ability to once again destroy panzers from over 1,000 yards away.[128] However, it did not carry much in the way of extra armour, so the Germans could destroy it from a similar distance. The six-pounder also lacked a HE shell, so it was not so useful against anti-tank guns. The Crusader III brought back the status quo of early 1941.

Figure 17: Churchill III infantry tank. ©IWM

Figure 18: Crusader III cruiser tank. ©IWM

[126] Anderson, *Tiger*, 118.
[127] David Fletcher, *Crusader Cruiser Tank 1939-1945*, (Oxford: Osprey, 1995), 22-23.
[128] AWM54 925/7/6 Penetration – British and German Weapons Compared.

The final new tank that appeared in the desert at this time was the Churchill III. The Churchills did not arrive in numbers until 1943, one unit was sent for evaluation in late 1942 and saw action at El-Alamein.[129] This was a heavy infantry tank intended to replace the Valentine and the Matilda. It was exceptionally heavily armoured. It was immune to anything less than the 88mm. It also carried the new six-pounder gun. It was, like all British infantry tanks, very slow, with a top speed of 15 MPH on road.[130]

Conclusion

The Second Battle of El-Alamein proved Allied tank superiority over Rommel's *Afrika Korps*. There was no apparent urgent need to replace the current tanks and guns with anything better, as the Allies had the best tanks on the battlefield. The only real change the War Office argued for was that the six-pounder should be replaced with the 75mm due to its HE shell. The complacency of the Allies was brutally exposed in December 1942 by the arrival of the Tiger.[131]

The Tiger opened up a massive technological gap between the Germans and the Western Allies. This gap occurred, not because of some unforeseeable accident, but as a result of several underlying factors. The first was the reactive nature of American and British tank development, born in the interwar period out of a lack of funding and a failure to develop a coherent theory of armoured warfare. The general inadequacy of Italian tanks gave the British a false sense of security about their tanks. The arrival of the *Afrika Korps* gave the British a rude shock. With the frequent upgrades in guns and armour, it was clear

[129] Bryan Perret, *Churchill Infantry Tank 1941-1951*, (Oxford: Osprey, 1993), 17.
[130] Perret, *Churchill Infantry Tank*, 28.
[131] Tom Jentz and Hilary Doyle, *Tiger I Heavy Tank 1942-1945*, (Oxford: Osprey. 1993), 20-21.

that German tank development was not static. It should not have been a great leap of imagination to realise that the Germans were probably working on even more heavily armed and armoured tanks. This was a lesson the Allies should have taken more seriously.

For a short time, the Americans were ahead of the game with the introduction of the Sherman. The Churchill and Crusader were also more advanced than previous British models. As a result of the introduction of new models in 1942, the Western Allies once again lapsed into complacency. The British were always just good enough against German tanks and, with the arrival of superior American tanks, the Allies did not feel the need to develop more powerful tanks quickly. However, by the time the Sherman was brought into action in October 1942, the Germans were already taking the next step with the Tiger. The Americans and British were thus constantly playing catch-up with German developments. Allied armour theory, British ideas in particular, also played a role in the opening of the technological gap. The theory informed what kind of tanks were to be built, and poor theory led to problems in the tanks they did build. These underlying structural problems that caused this technological gap has not been seriously explored in the current literature, if at all. This is surprising, given how much the Tiger caused concern among the Allies.

Chapter 2. Allied responses to the Tiger

Figure 19: Tiger I. ©IWM

The appearance of the Tiger tank in December 1942 in North Africa came as a shock, both to Allied tank crews and Allied commanders. It was unlike anything they had fought up to that point, and they struggled to find an effective way of countering it. The purpose of this chapter is to describe the problems that the Tiger caused for the Allies, and how they attempted to respond. I start the chapter by giving a brief history of the Tiger's service in Africa, followed by a history of the development of the Tiger. I explain why the appearance of the Tiger was so problematic for the Allies. I then look at the ways the Allies attempted to respond to the Tiger through their guns, upgrades to their existing tanks, and the development of new tanks. I examine the ways in which troops engaged the Tiger using the equipment they already had. Finally, I return to the question of why the Allies were so unprepared for a tank like the Tiger.

Enter the Tiger

Tigers first saw combat during the Siege of Leningrad in August 1942, but the British and Americans first encountered them in Tunisia in late 1942. One battalion of Tigers, the *Schwere Panzer Abteilung* 501 (*sPzAbt* 501), was sent to help stabilise the deteriorating German and Italian situation in North Africa. They began to arrive in late November 1942, and the entire battalion was deployed in Tunisia by the end of January 1943.[132] Tigers were put into action as they arrived, and they made an immediate impact. The main battle tanks that were available to the British and Americans at that time could not penetrate the Tiger, even from extremely close ranges. Meanwhile, the anti-tank guns that were available to Allied forces were unable even to slow down the Tigers, let alone penetrate them. Hits to the road wheel and tracks would normally disable other tanks. In the case of the Tiger, by contrast, they resulted in only minor damage.[133] The biggest threat to the Tiger came not from British or American guns, but from the rough terrain, which worked the Tigers hard. By the end of January 1943, only one Tiger remained fully operational, and all the others required extensive servicing.[134] From 19 January to 14 February 1943, the Tigers engaged in offensive operations, and they destroyed an impressive number of Allied tanks and vehicles.[135]

The Tigers of *sPzAbt* 501 launched their final offensive in North Africa on 26 February 1943, but failed to achieve their objectives. With 14 Tigers at their disposal, the battalion was tasked with capturing a road junction at a town called Beja. During the operation, the Allies managed to knock out seven Tigers through a combination of fire from tanks, anti-

[132] Anderson, *Tiger*, 115
[133] Anderson, *Tiger*, 127.
[134] Anderson, *Tiger*, 131.
[135] Bryan Perret, *The Tiger Tanks*, (London: Osprey, 1981), 26.

tank guns, artillery, and air support.[136] The German operation was a failure, and during the following months the Tigers were deployed in defensive rather than offensive operations. Even on the defensive, however, the Tiger tank was a formidable opponent. On the night of 24 March 1943, for example, a dozen Tigers stalled an American offensive and destroyed no fewer than 44 American tanks. The Tigers were unable to revive the fortunes of the Germans in North Africa, who by this point were fighting a hopeless struggle. The German army in Tunisia, including *sPzAbt* 501, surrendered to Allied forces on 12 May 1943.[137]

That the Tiger represented a huge stride forwards in terms of tank technology was painfully clear to the Allies. Surprisingly, however, historians have shown very little interest in the reasons why this technological gap opened up at the end of 1942. As we have seen, historians who write about the war as a whole say little or nothing about the Tiger. Historians of specific battles often describe the role played the Tiger in that engagement, but they do not comment on the Tiger's wider significance. Historians who write specifically about the Tiger focus exclusively on technical minutiae. But what is interesting to consider are the deeper, structural factors that caused Allied tank technology to fall behind so dramatically. These factors were (i) the nature of the process by which the Allies developed their tanks, (ii) problems with the British concept of armoured warfare, and (iii) the Allies' experience of fighting the Desert War in the period 1940 to 1942.

Allied responses were reactive

Generally speaking, it took a minimum of two years for a new tank to go from the initial design on the drawing board to full production. The Crusader project began in 1939 and it

[136] Perret, *The Tiger Tanks*, 26.
[137] Perret, *The Tiger Tanks*, 27.

reached troops in time for a major operation in June 1941. The Sherman's design specifications were laid down in late 1940, and they began rolling off the production lines in February 1942. There were some cases of tanks that were designed and produced more quickly. However, trying to rush the production process was very risky. The Churchill, for example, went from design to production in a record nine months, with the first production tanks appearing in May 1941. However, the shortcuts that were taken resulted in tanks that did not work properly, and it took almost a year rectify the problems.[138]

Given the time needed to bring a tank into production and the dynamic nature of tank technology, tank designers had to be forward thinking. They not only had to take into account existing threats, but also to consider future threats. They needed to produce tanks that were not only—at the very least—as good as those of the enemy, but which also had room for upgrades so that improvements in enemy technology could be countered. This is an aspect of British tank design that failed spectacularly. The British designed and produced tanks in response to the circumstances that they encountered on the battlefield, but they designed their tanks with little in the way of upgrade potential. As a result, British tank design tended to lag behind that of the Germans. The British approach to designing tanks was essentially reactive, rather than proactive.

All tank development is reactive to some extent. Factories take time to set up and get running, so it is not possible simply to replace an old tank with a new one. More often than not, upgrades need to be made to the existing fleet to keep them combat viable while production of new tanks ramps up and they start getting delivered to units. This was

[138] Fletcher, *The Great Tank Scandal*, 59-60.

something the British found difficult to do, and something the Americans did not do once they felt they had produced the best tank in the world: the Sherman.

However, the Germans were not so complacent about upgrading their tanks to keep them competitive with those of their rivals. The campaigns in Poland and France in 1939, and above all the invasion of the Soviet Union in June 1941, had exposed deficiencies in German tank guns and armour. In particular, the experience against Russian T-34 medium tanks and KV-1 heavy tanks had demonstrated that German tanks were weakly armoured and under-gunned. To their cost, German tank crews discovered that the T-34 could only be destroyed at close ranges, whilst the KV-1 was immune to anything less than the 88mm.[139]

Figure 20: KV-1 heavy tank. ©IWM

Figure 21: T-34 medium tank. ©AWM

In response, the Germans progressively increased the armour and installed more powerful guns on their tanks. This was something the Allies could, and eventually did, do, but the Germans were able to do this more quickly and efficiently. Nonetheless, by the end of 1941, the Panzer III had reached the limits of its upgrade potential. It could not fit a bigger gun and its engine was not powerful enough to carry heavier armour. The Germans turned to the Panzer IV, which could take a bigger gun. A powerful long-barrelled 75mm dual-purpose gun was fitted to the Panzer IV. British troops called this version the Panzer IV

[139] Steven Zaloga and Jim Kinnear, *KV-1 & 2 Heavy Tanks 1939-45*, (Oxford: Osprey, 2003). 20-21.

special. With this new 75mm gun, the Panzer IV special could effectively engage the T-34 and the KV-1 from long ranges, but it was still vulnerable to Soviet guns. The Panzer IV special was also sent to Africa, where it first went into action in Rommel's May 1942

Figure 22: Panzer IV special. ©IWM

offensive. It was better than the M3 medium and able to fight the Sherman on equal footing, but it was still vulnerable to the American 75mm gun from long range. The Panzer IV special posed the most serious threat to Allied tanks at this stage of the war, but there were never enough of them to challenge Allied superiority in tanks, both technologically and numerically. As a result, the Allies continued to assume that their force of tanks were fit for purpose.

The Germans, however, were not just content with upgrading their existing tanks. They were also anticipating future threats. Recognising that tank and gun development would not remain static, the Germans were already developing new tanks to replace their current fleet before the war began. This point is worth emphasising. Whereas the British

and Americans responded to challenges as they cropped up on the battlefield, the Germans were planning two or three years ahead before the war had even broken out.

One such program was a new heavily armoured tank to replace the Panzer IV, which was initiated immediately after the Panzer IV went into service in 1937.[140] Combat experience with French heavy tanks during the campaign of 1940 only confirmed the Germans' desire to produce an even bigger and better tank than the Panzer IV.[141] This was the origin of the Tiger, though the project would go through many iterations before it would evolve into the iconic tank.

It is notable that the Tiger did not appear to be a response to any particular threat that the Germans were encountering. German tank historians Jentz and Doyle, note that the set of design specifications that became the then unnamed Tiger were laid out on 26 May 1941.[142] The date is significant. This was long after the French had been defeated, but before battle experience with the Soviets exposed the deficiencies of the existing German tanks. It was also a year before the Germans encountered the Sherman or even the M3 medium. At the time when the specifications were established, German tanks were more than adequate for all the demands that were being placed upon them at that time. In other words, the Germans were thinking ahead.

The development of the Tiger was accelerated at the personal request of Hitler. He was annoyed at the *Wehrmacht* for being reluctant to design tanks as big he wanted, so he asked Dr Ferdinand Porsche to develop a heavy tank. Porsche collaborated with the armaments firm, Krupp, to develop a new 88mm tank gun based on the already proven *88mm Flak 36*. The two companies also collaborated to produce a new turret that would be

[140] Anderson, *Tiger*, 13.
[141] Perret, *The Tiger Tanks*, 4.
[142] Jentz and Doyle, *Tiger I Heavy Tank*, 5.

large enough to accommodate such a massive gun.[143] In September 1941, the manufacturing firm Henschel was brought into the project when they were ordered to adapt one of their prototypes to take the turret and gun of the Porsche tank. In March 1942, by which time the project had received the name Tiger, both Porsche and Henschel were ordered to have their Tiger prototypes ready to demonstrate for Hitler on his birthday on 20 April. Despite the fact that neither prototype was ready for demonstration, both firms managed to get functional examples completed by the deadline. The two versions of the Tiger were demonstrated before Hitler, but the prototypes barely squeaked through the demonstration. They were constantly threatening to break down or catch fire and embarrass their designers. However, as a result of that demonstration, and a more thorough shakedown at other testing areas, the Henschel Tiger was selected over the Porsche Tiger, and it went into production as the *Panzerkampfwagen* VI Tiger. [144] Between June 1942 and August 1944, a total of 1,346 Tigers rolled off the production lines.[145] By the standards of the time, this was a limited production run, yet the Tigers went on to make an enormous impression on those who had to fight against them.

In 1943 the two best tanks in North Africa faced off against each other: the Sherman and the Tiger. However, the difference between the two could not be greater. This was a result of their development history. The Sherman was designed in response to a well-defined threat: the stunning German victory in France. That event forced the Americans to realise that their existing tank force was completely obsolete. They designed a tank that would defeat the German tanks that they already knew about. When it came into service, it did prove capable of defeating the tanks it was designed to defeat. But the Sherman was not

[143] Jentz & Doyle, *Tiger I Heavy Tank*, 4.
[144] PREM 3 190/3 GERMAN ARMY: Various September 1941-June 1945, 20-21.
[145] Jentz & Doyle*, Tiger I Heavy Tank*, 12.

designed with any regard to the fact that the Germans were also designing new and better tanks. The Tiger, on the other hand, began its development process with no particular threat in mind. The Germans recognised that tank and anti-tank weapons development would not be static. They were designing tanks to anticipate future threats. Just as the Tiger began as a replacement for the Panzer IV immediately after it went into service in 1937, as soon as the Tiger went into production the Germans began designing a replacement, with even heavier armour and a more powerful gun. This would be the Royal Tiger.

The Allies problem with the Tiger

The Tiger tank posed the Allies with a three-fold problem. First, it had heavy armour that resisted almost every Allied tank gun fired at it. Second, it had a gun that simply punched right through the armour of most Allied tanks at quite long ranges. Third, it was a highly mobile for a tank that was so large and heavy. The Allies were caught completely off-guard by this tank. To understand how the Tiger completely outclassed anything available to the Allies in Africa, it is necessary to look at some of the technical details of the armour and guns that German and Allied tanks carried. The British produced very detailed technical reports on the Tiger, and much of the data introduced here comes from the *Middle East Handbook of Enemy Equipment*, which was published some time in 1944.[146] The War Office series WO/185, found in the The National Archives (TNA) in Kew, contains a lot of information about the Tiger, including detailed assessments of its capabilities. The Cabinet papers from the PREM 3 series of microfilm published by Adam Matthews contains valuable

[146] AWM54 320/3/60 Middle East Handbook of Enemy Equipment. This document is a very large and disorganised collection split into parts and spread over several folders. I was unable to find a discrete publication date aside from circa 1944.

files pertaining to the three-way debate unleashed by the Tiger between the British cabinet, the War Office, and the army.[147]

From the perspective of the Allies, the principle problem of the Tiger was the thickness of its armour, which rendered it largely impervious to Allied guns. Up until this point, the maximum thickness of armour that the Panzer III and Panzer IV carried was 50mm.[148] The front of the Tiger had armour up to 102mm thick. The sides, which are usually thinner than the front, were 82mm thick.[149] The armour of the Tiger was thus double the thickness of any tank that the Western Allies had previously faced, which was a problem for every Anglo-American tank or anti-tank gun then in the field.

The ability to engage a tank at long range was an important factor in tank combat in North Africa, where the terrain was open. The Tiger's thick armour posed a serious problem for all the Allied guns then in service, as the Tiger had to be engaged at significantly shorter ranges. There were still large numbers of older tanks still in service in the Allied armies that were equipped with two-pounder guns. By late 1942, these guns were obsolete, and struggled to penetrate even the normal German tanks. The two-pounder was almost entirely irrelevant when it came to the Tiger tank. The only possible threat to the Tiger that the Germans considered from these guns was the possibility that a freak lucky shot might wedge itself between the Tiger's hull and its turret, thereby impeding or perhaps stopping movement of the turret.[150] If any other part of the Tiger was hit, it would bounce off without doing any damage at all.

[147] Principally WO 185/6, WO 185/7, WO 185/226, and PREM 3/427.
[148] WO 194/1115 German Pz Kw Tiger tank 1943, foreword.
[149] WO 194/1115 German Pz Kw Tiger tank 1943, 3.
[150] Anderson, *Tiger*, 127.

The latest Allied tank guns, the six-pounder and 75mm, also struggled to penetrate the Tiger's armour. These guns could knock out a Panzer III or Panzer IV with relative ease at long ranges. However, this was not the case with the Tiger. British reports to Winston Churchill noted that a tank equipped with a six-pounder could only destroy a Tiger if it could attack it from the sides or from the rear, and even then it would have to get dangerously close. It was possible for the six-pounder gun to penetrate the frontal armour of the Tiger, but only under ideal conditions and at almost point-blank range.[151] The 75mm also fared badly against the Tiger's thick armour. The 75mm could not penetrate the front of a Tiger at all. In theory, the 75mm was able to penetrate the Tiger's side armour at very close ranges,[152] but, like the six-pounder, it had to be in an ideal position to pull off a penetrating shot. In practice, Allied crews found it difficult to penetrate the side of a Tiger. American tank crews first engaged Tigers with M3 mediums on December 1942. The M3 medium was unable to penetrate the side armour of the Tiger from ranges under 100 metres.[153] However, it could be done. In Sicily in July 1943, Sherman crews managed to knock out three Tigers with side shots.[154] But there was little room for error. If the Allied tank attacked at the wrong angle, the Tiger was impenetrable.

The Tiger was equipped with a powerful gun that could knock out any Allied tank with ease. The Tiger's gun was derived from an 88mm anti-tank gun that the Allies already knew and feared. British tests of this gun revealed that, like its anti-tank counterpart, the

[151] PREM 3/427/1, 117. In this report it is stated in the text that the six-pounder could penetrate the Tiger from 1000 and 500 yards from the side and front respectively. However, the author of the report provided a handy chart at p.120 which contradicts this statement. The chart indicates approximately 800 yards for the side, well under 200 yards for the front.
[152] PREM 3/427/1, 41.
[153] Anderson, *Tiger*, 117.
[154] Zaloga, *Sherman Medium Tank*, 23

Tiger's 88mm could penetrate almost any allied tank at ranges over 2,000 yards.[155] Even the tough M3 Medium was not immune to the Tiger's gun.[156]

Only the Sherman and the Churchill could withstand the 88mm from shorter ranges. The Sherman's armour was constructed at angles, which effectively made it thicker and increased the chance that a shot will bounce off. The toughness of the Sherman was noted in the *Tigerfibel*, the Tiger's user manual. Tiger crews were advised that, in a head-on engagement, the Sherman was only vulnerable from a range of 800 metres.[157] However, the sides of the Sherman were very thin, so it was still vulnerable from flanking fire at long range. One Tiger in Tunisia is recorded as knocking out a Sherman at a range of 2,700 metres.[158] The Churchill mark III was the most heavily armoured tank the Allies had at their disposal, and arguably the best British tank at that stage of the war. Churchills were actually armoured to a similar level as the Tiger. However, unlike the Sherman, this armour was flat and slab-sided, which made it easier for the Tiger's 88mm to penetrate. The *Tigerfibel* advises that the Churchill could be engaged from 1,500 metres when fighting head-on.[159] Another disadvantage of the Churchill was its six-pounder gun. The Churchill's crew had to give up whatever armour advantage they had in order to get into a range where the six-pounder could be effective. An additional problem was that the Churchill was very slow. As an infantry tank, it was not expected to have to go faster than walking pace for long periods. At best it could manage 24 kilometres per hour (KPH) when travelling on roads, but only 12 KPH off-road.[160]

[155] AWM54 360/3/60 PART 7, Section 11: Mark 6 Tanks, Appendix A, 2.
[156] Tigerfibel, deckeltasche Lee.
[157] Tigerfibel, deckeltasche Sherman.
[158] Perret, *The Tiger Tanks*, 26.
[159] Tigerfibel, deckeltasche Churchill.
[160] Perret, *Churchill Infantry Tank*, 28.

This brings us to the final reason why the Allies were so shocked by the Tiger tank; it was surprisingly mobile for a tank of its size. The Tiger tank weighed in at 56 tons, yet it was capable of a maximum road speed of 40KPH, and up to 20 KPH off road. The road speed of the Tiger was comparable to that of the Sherman, which only weighed 30 tons. That the Tiger could move so quickly, despite its massive weight, was due to its powerful engine. However, the lighter mass of the Sherman did give it better off-road speeds than the Tiger (up to 32KPH, compared to the Tiger's 20KPH). The weight of the Tiger did cause problems when it came to terrain. Allied intelligence reports noted that the Germans had to perform extensive reconnaissance to make sure the terrain was not too soft and that bridges could handle the Tiger's weight.[161] On other hand, the design of the suspension and wide tracks of the Tiger more efficiently distributed the weight of the tank. This allowed the Tiger to navigate obstacles like sand, mud and snow that normally would not be considered possible in such a heavy tank. German after-action reports from Russia in early 1943 noted that, despite the bad terrain conditions, the Tiger was surprisingly mobile.[162]

The Allied response to the Tiger: Guns

After the end of the Tunisian campaign, the only time Tigers were encountered in 1943 was during the invasion of Sicily, which began on 19 July and ended on 17 August.[163] There were 17 Tigers stationed on the island. Some of them attempted to attack the Allied bridgehead on 11 July, but were driven off by supporting fire from American warships.[164] Most of the

[161] *Tactical and Technical Trends,* No.30, 29 July, 1943, (Washington D.C.: Military Intelligence Service, War Department, 1943), 8.
[162] Anderson, *Tiger*, 60.
[163] Beevor, *The Second World War*, 591; 603.
[164] Beevor, *The Second World War*, 595.

Tigers were destroyed by their crews to prevent capture.[165] The Allies would not encounter Tigers again until January 1944, when *sPzAbt* 508 was sent to Italy to oppose the Allied landings at Anzio.[166] This lack of Tigers was fortunate for the Allies. Any battle with a Tiger during this period would need to have been conducted with the tanks that they had on hand, which had already proven inadequate. It would not be until early 1944 that any tanks able to effectively engage the Tiger would be available. In the meantime, the Allies were running tests to determine what was necessary to combat the Tiger. Firing trials were conducted against a captured Tiger hull in Tunisia. This was to record the performance of current Allied AP shells and what kind of shells they should make in the future.[167] What was

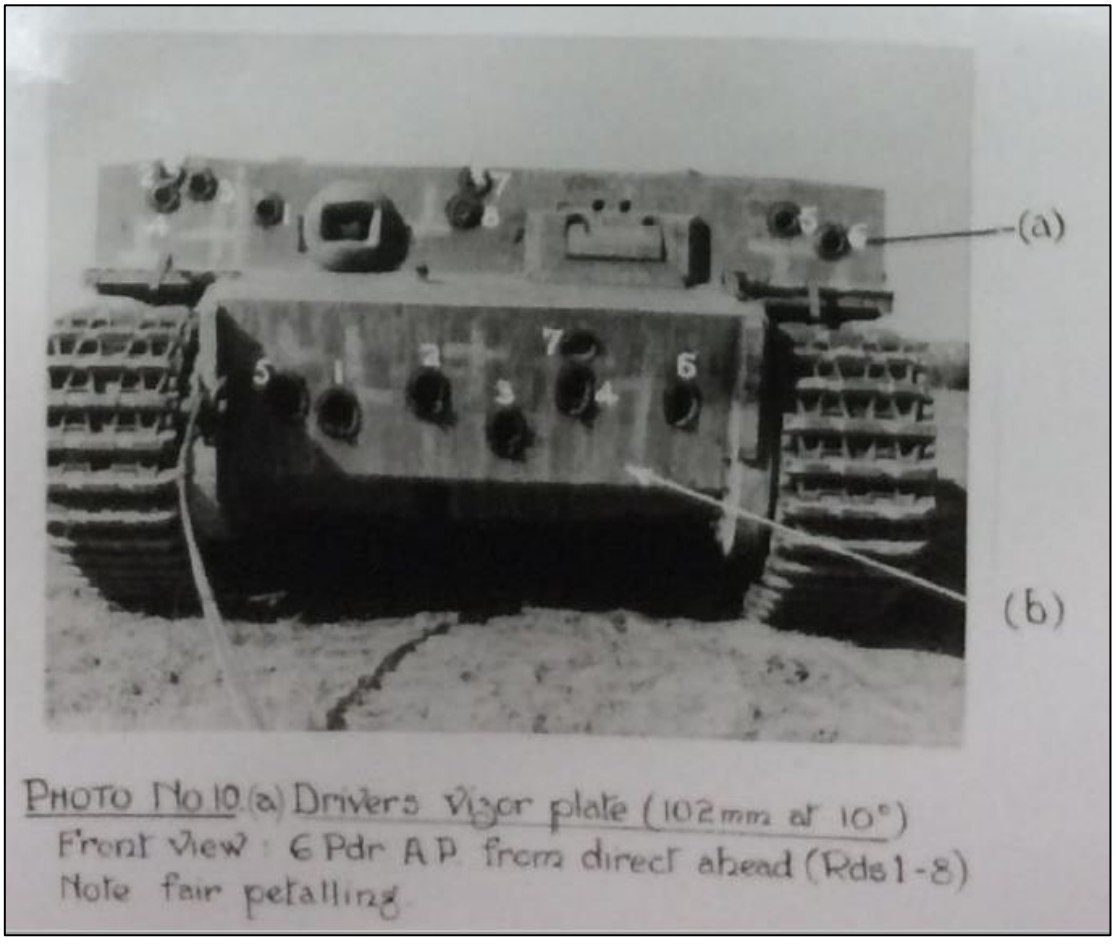

Figure 23: Aftermath of a firing trial against a Tiger hull in Tunisia.

[165] Jentz & Doyle, *Tiger I Heavy Tank*, 24.
[166] Jentz & Doyle, *Tiger I Heavy Tank*, 33.
[167] WO 194/744 Firing trial in Tunisia against the hull of German Pz Kw VI Tiger tank 1943, 10 October 1943, 1.

really needed was a complete Tiger to run comprehensive tests in order to inform future tank design. In July 1943 the AFV Liaison Committee asked the Eighth Army to make sending a Tiger back to England a priority.[168] By November a comprehensive technical report had been compiled on the Tiger.[169] For the remainder of 1943, the Tiger continued to inform Allied decisions on the next generation of tanks.

The fact that the Allies failed adequately to future-proof their tanks was highlighted by the debate about the armament of the next generation of Allied tanks. The politicians and military officials in charge of tank production were uncertain about which gun to mount in their latest tank, and the appearance of the Tiger on the battlefield further confused the argument. The Allies' problem was caused by the conflicting needs of AP and HE performance. The prevalence of German anti-tank guns made it necessary to have a good HE shell. On the other hand, the thick armour of the Tiger made it more important to upgrade the AP capability of the next generation of Allied tanks. Moreover, although the Allies had access to some good anti-tank guns, they were slow to install them on tanks. When these guns finally appeared on tanks, they were already obsolete because of further developments in German tanks. From the end of 1942, the tanks of the Western Allies were outclassed by the Germans and for the rest of the war they were unable to catch up. This cost the Allies dearly both in lives lost and tanks destroyed.

In May 1941, a number of 3-inch anti-aircraft guns were made available to experiment with mounting them on tanks. This was done with the knowledge that the Germans were experimenting with heavily armoured tanks.[170] The 3-inch anti-aircraft gun

[168] WO 187/7 Armoured fighting vehicles – minutes of liaison committee 1942-1944, Minutes of the 30th A.F.V. Liaison Meeting held on Tuesday, 6th July, 1943
[169] WO 194/1115 German Pz Kw Tiger tank 1943.
[170] PREM 3/426/2, 37.

was reported as being able to punch through 100mm of armour at 500 yards.[171] Little came out of this project, and one factor in its failure was that very few people appeared to be thinking ahead. A note of future tank development, dated 10 July 1941, addressed the issue of a 3-inch gun. It stated that, despite knowing that experiments with heavy tanks were taking place, that the Germans showed no signs of using heavily armoured vehicles, and that the six-pounder would probably be suitable for all British anti-tank needs.[172] This focus on the here-and-now showed a stunning lack of foresight, which flew in the face of the intelligence that was being received. This would have repercussions later in the war.

While the British failed to adapt existing guns to an anti-tank role, they did successfully design a new anti-tank gun: The 17-pounder. Development of the 17-pounder began in 1941, driven by the same information about heavy tanks that was behind the 3-inch gun project.[173] It was able to fire AP shells were more powerful than either the 75mm or the six-pounder. It was also capable of firing a HE shell. The 17-pounder was capable of punching a hole through the front of a Tiger from almost 1,500 yards. By the end of 1942, the gun itself was in production but the carriage needed to carry the gun was not quite ready. When the Tiger appeared at the very end of 1942, the British rushed the still unfinished 17-pounder to North Africa. As an

Figure 24: 17-pounder anti-tank gun. ©IWM

[171] PREM 3/426/2, 40
[172] WO 232/36 Armoured Fighting Vehicles General Staff policy and requirements; technical developments; design and equipment Jan 42- Jul 48, Note on development of future types of tanks, 10 July 1941, 1-2.
[173] PREM 3/426/2, 38.

emergency measure, the gun had to be mounted on artillery gun carriages designed for another weapon. This solution was far from ideal, and is another example of how lack of foresight and proper planning meant that the Allies had to find ad-hoc responses to cope with German innovations.[174]

The threat posed by German anti-tank guns meant that British tanks required access to a good HE shell. General Montgomery, Commander of the British Eighth Army in North Africa, reported that roughly half the ammunition used by the Eighth Army was HE ammunition, so it was imperative that every tank be able to fire a good HE shell.[175] In September of 1942 the War Office had made the ability to fire a good HE shell a high priority in their requirements for new tanks.[176] After-action reports from El-Alamein, dated 7 December 1942, stated that the 75mm was a more suitable gun than the six-pounder.[177] Because of the success of the M3 Medium and the Sherman, the War Office, emphasised the need for future British tanks to have a dual-purpose gun like the American 75mm. Official tank policy documents from April 1943 record that in February 1943, Sir James Grigg, the Secretary of State for War, approved the decision to adopt a 75mm dual-purpose main gun in the majority of British tanks.[178] While most British tanks would have the 75mm, about one third of British tanks would be armed with the six-pounder for specialised anti-tank duties.[179] A British built version of the American 75mm gun was expected to be installed in new tanks rolling off production line by August.[180]

[174] Watson, *Exit Rommel*, 106.
[175] PREM 3/427/1, 75.
[176] WO 232/36, General Staff Policy on Tanks, Appendix I, 10 September 1942, paragraph 1(c).
[177] WO 185/7 A.F.V. Technical Report No.11, Part I: Operational, 7 December 1942, paragraph 9.
[178] PREM 3/427/1, 69.
[179] PREM 3/427/1, 70.
[180] WO 187/7 Minutes of the 10th liaison Meeting held on Tuesday, 23rd February, 1943.

As reports of the Tiger began filtering back to Britain, questions were raised about the wisdom of this decision. In March 1943, Duncan Sandys, Secretary for the Ministry of Supply, circulated a report to Government Ministers suggesting that the 75mm gun was not, in fact, all that superior to the six-pounder. The failure of the 75mm to penetrate the Tiger was brought up as a reason to keep the six-pounder.[181] By the end of April, Winston Churchill was sending memos questioning whether or not the 75mm was the right gun as well.[182] The appearance of the Tiger and the dismal performance of the 75mm against it seemed to strengthen the argument to retain the six-pounder. However, official tank policy documents show that the War Office still preferred the 75mm because of its dual-purpose nature.[183]

At a meeting of the War Cabinet on 3 May 1943, three arguments were raised in favour of keeping the six-pounder. The first argument was made by Oliver Lyttelton, the Minister of Production. According to Lyttelton, the British had to prepare for the possibility that Tigers might appear on the battlefield in greater numbers. To this end, it was important that future British tanks be equipped with a gun that was capable of penetrating the Tiger. Although Lyttelton did not entirely reject the 75mm, he preferred that there be more six-pounder tanks than 75mm tanks.[184] Sandys agreed with this argument, but he thought that the British should drop the 75mm altogether. Sandys did not believe that the larger HE shell of the 75mm was worth the compromise in anti-tank capability. He believed that a tank which was expected to fight other tanks should be equipped with the best gun for that role. At that time, the six-pounder was the most suitable gun available.[185]

[181] PREM 3/427/1, 117-118.
[182] PREM 3/427/1, 85.
[183] PREM 3/427/1, 72.
[184] PREM 3/427/1, 61.
[185] PREM 3/427/1, 60.

The second argument was that new ammunition was now being produced for the six-pounder that would significantly improve its performance. Major General E.M.C. Clarke, the Director General of Artillery, noted that new AP ammunition was coming into service that increased the range at which a six-pounder could penetrate a Tiger to 1,000 yards.[186] Lyttelton also brought up the fact that a HE shell was now being issued for the six-pounder. This would give the six-pounder the ability to destroy anti-tank guns that it previously lacked.[187]

The third argument, though only lightly touched on at the meeting, was the terrain that British tanks would encounter in northern France. The War Cabinet were looking ahead to the Normandy invasion, which was due to be launched in the early summer of 1944. The terrain in northern France in general, and in Normandy in particular, was much less open than in North Africa. The presence on the battlefield of woods, hedges, embankments, and buildings meant that tanks would have to engage at a much closer range than in North Africa.[188] This was expected to negate the range problems caused by the Tiger's thick armour. Shorter combat ranges could with help to improve the 75mm's hitherto lacklustre performance against the Tiger. However, the fact remained that a successful shot on a Tiger would need to be taken at the side or rear from under 100 yards, and even that was not completely reliable. With the new AP ammunition, Major General Clarke was anticipating that the six-pounder would penetrate a Tiger from any angle at all expected fighting ranges in France. There was also a prevailing opinion in Britain that the lessons learned in Africa only really applied to Africa. Things would be so different in Europe that the African lessons

[186] PREM 3/427/1, 59.
[187] PREM 3/427/1, 58.
[188] PREM 3/427/1, 121

would not apply to the new terrain.[189] This combination of superior anti-tank capability, improved ammunition, terrain and engagement ranges, coupled with the opinion that combat in Europe would be completely different from Africa, made the six-pounder the preferred tank gun.

These arguments between the War Cabinet and the War Office over the six-pounder and the 75mm had been sent to the Eighth Army in North Africa for comment in April 1943. The Eighth Army sided with the War Office. Tank crews liked the 75mm, and there were doubts about whether the new six-pounder HE shell would meet the required standard. A report of early April 1943 noted that the new six-pounder ammunition had only recently reached troops in North Africa, so they did not have much time to form a proper opinion on it.[190] Shortly afterwards, on 16 April, Commander in Chief Middle East, General Alexander, telegrammed London with the Eighth Army's verdict on the new six-pounder HE shell: they were not impressed by it, and still preferred the 75mm HE shell. Alexander also reiterated that he preferred the 75mm as an anti-tank weapon. He held this opinion with the expectation that development work on 75mm dual-purpose weapons was going to keep pace with the increases in German armour.[191] Moreover, Alexander emphasised the point that flexibility was vital in tank operations.[192] Experience had shown that tanks needed to be able to engage both enemy tanks and anti-tank positions as the situation required.

Alexander's telegram was brought up in the 3 May meeting in defence of the 75mm. Grigg pointed out the dissatisfaction of the six-pounder HE shell in response to Lyttelton.[193] Brigadier J.A.M. Bond, from the War Office, emphasised the need for flexibility. Tanks

[189] PREM 3/427/1, 75
[190] PREM 3/427/1, 98 .
[191] PREM 3/427/1, 75.
[192] PREM 3/427/1, 76.
[193] PREM 3/427/1, 59.

needed to fight in self-supporting units, as the way they were tactically deployed did not always allow for specialised vehicles. A dual-purpose weapon was therefore vital for tanks.[194] General Sir Allan Brooke, Chief of the Imperial General Staff and head of the War Office, reminded the meeting that there were many situations in Africa that were going to be repeated in Europe. The 75mm gun had proved itself to be adequate for most armoured encounters. If tank troops did run into the occasional Tiger, there would be some six-pounder tanks available to call upon if necessary.[195] With these arguments and counter-arguments in mind, Winston Churchill held off making a decision.

By the end of June 1943, it seemed that the Eighth Army and the War Office had won the debate with the War Cabinet about the future of British tank guns. By this point in time, it was taken as given that a 75mm dual-purpose gun, and not the six-pounder, was going to be mounted on a majority of British tanks. The clinching argument was that it was necessary to have a gun that would be able to cope with any situation it came against. While the prospect of more Tigers was considered, it was still thought that it was unlikely that there would be large numbers of them.[196] The AP performance of the 75mm was considered adequate for the German tanks they were expected to fight, and the inferior HE

Figure 25: Cromwell cruiser tank. ©IWM

[194] PREM 3/427/1, 61.
[195] PREM 3/427/1, 60.
[196] PREM 3/427/1, 22

shell of the six-pounder was not considered to be up to the task of dealing with German anti-tank guns.[197]

There were two other factors that made the 75mm easier to accept. The first involved developments in British tank design. Alterations to the construction of the new Cromwell tank would mean that, by 1944, it could accommodate both the 75 mm and the six-pounder. This would allow some degree of flexibility when it came to planning operations. The proportions of dual-purpose and anti-armour tanks could be changed as the situation required.[198] The second was that both the War Cabinet and the War Office were expecting that the 75mm gun was going to be replaced by a new, more powerful dual-purpose gun then in development.[199]

The new gun was known as the 75mm high velocity (HV) gun. The HV gun was expected to be able to penetrate a Tiger at a little under 500 yards.[200] While not as good as the six-pounder, it was a definite improvement over the standard 75mm. More importantly, it had a HE round projected to be as good as that of the 75mm.[201] On 2 March 1943, a meeting of the AFV Liaison committee was informed that it was possible to fit this gun into the turret of a Cromwell.[202] Prototypes were approved for construction during April 1943.[203]

The War Cabinet appear to have been impressed by the promising performance of the 75mm HV gun. By June 1943, Winston Churchill had noted that it was agreed by everyone in the War Cabinet that the HV gun would replace the six-pounder and the 75mm

[197] PREM 3/427/1, 60.
[198] PREM 3/427/1 19-20.
[199] David Fletcher and Richard Harley, *Cromwell Cruiser Tank 1942-1950*, (Oxford: Osprey 2006), 13-14.
[200] PREM 3/427/1, 41.
[201] WO 185/226 Tank Policy 1943-1946, The installation of 76mm. U.S.A. gun or 75mm British gun in A.34 Cromwell, 12 August, 1943, paragraph 1 (b).
[202] WO 185/7 Minutes of the 17th A.F.V Liaison Meeting held on Tuesday, 2nd March 1943, 2.
[203] PREM 3/427/1, 70.

in British service.[204] In AFV Liaison committee meetings in July, it was reported that by the end of 1944, a high proportion of Cromwells were expected to be armed with this gun.[205] There was even a proposal to fit it into the Churchill.[206] However, there was one rather serious problem with this plan. In May 1943 it was discovered that the 75mm HV gun did not actually fit in any turret of a British tank![207] There was still an expectation that the HV gun would be mounted in Cromwells up to October 1943. However, when discussing production schedules for British tanks, Oliver Lyttelton and Andrew Duncan, the Ministers of Production and Supply respectively, were no longer talking about equipping Cromwells with the HV gun after October.[208]

Despite this unanticipated setback, work on the HV gun continued. To simplify manufacturing and design, the gun was reworked to fire the projectile used by the 17-pounder.[209] As the 17-pounder projectile was larger than the original 75mm one, the gun was renamed to the 77mm HV gun.[210] The new name also helped distinguish 77mm HV ammunition from 17-pounder ammunition. Even though the two guns shared the same projectile, the shell casings were different which meant the ammunition was not interchangeable.[211] However, this gun was not destined for the Cromwell. Ministry of Production documents on future tank policy show that the HV gun was to be mounted in the Cromwell's successor, the Comet.[212] The Cromwell would go into France with the 75mm

[204] PREM 3/427/1, 23.
[205] WO 185/226 Note on meeting held in Room 627, Adelphi, on Thursday, 22nd of July, 1943, 1.
[206] WO 185/226, Notes for discussion on tank development policy, 27 August 1943.
[207] Fletcher and Harley, *Cromwell Cruiser Tank*, 14.
[208] WO 185/226, Note of a meeting held in the Minister of Production's Room, 13 October 1943, 2.
[209] WO 185/6 Tank Board Proceedings 1940-1945, Armament of A.34, October 1943.
[210] Fletcher and Harley, *Cromwell Cruiser Tank*, 39.
[211] WO 185/226 War Cabinet Defence Committee (Supply) Part X. Development, 19 November 1943, 1.
[212] WO 185/226, Tank Policy, draft paper by the Minister of Production, 16 December 1943, 1-2.

gun, and for some reason no six-pounder Cromwell would be sent into Europe.[213] I have not found an explanation why this decision was taken.

Though it was claimed that the Cromwell could not fit the HV gun, it is debateable if that was actually the case. In *Death by Design*, Peter Beale notes that there should have been no engineering problem with mounting the HV gun into the Cromwell.[214] The standard of crew comfort that the War Office was willing to accept may have played a part in the failure to install the 75mm HV gun in the Cromwell. H.H. Burness, the Secretary of the Tank Board, wrote a report on German and British tank design principles in which he noted that the turrets of German tanks were of a similar size to those of British tanks. The Germans were able to fit bigger guns in their tanks by sacrificing crew comfort and creating some complications in turret design.[215] Burness did not think that a bigger gun was worth the sacrifice in crew comfort.[216] However, it suggests that it was entirely possible to install bigger guns in British tanks. This is one factor that may have influenced the decision over the HV gun.

The failure to mount the HV gun in existing tanks meant that most British tanks had to make do with the standard 75mm gun for the rest of the war. The significance of the HV gun failure goes without comment in the existing literature. It is an example of the underlying structural problems with the British process of tank design and production. The failure to fit what was considered to be the future standard British tank gun into British tanks should come under greater scrutiny.

[213] Fletcher and Harley, *Cromwell Cruiser Tank*, 14.
[214] Beale, *Death by Design*, 108.
[215] WO 185/6, German and British Tank Armament Policy, 28 January 1944, 1.
[216] WO 185/6, German and British Tank Armament Policy, 28 January 1944, 3.

Like the British, the Americans were also pondering how to respond to the Tiger. As it turned out, US Army Ordnance already had a new, more powerful gun with a calibre of 76mm in development. Work on this gun began in 1942, and Ordnance proposed to mount it on the Sherman.[217] The 76mm gun had an armour-penetrating performance very similar to that of the British HV gun. However, the Americans had to make compromises with the HE shell to achieve this result. HE shells for these superior anti-tank guns needed a more robust construction to withstand the extra forces applied to the shell, otherwise the shell would break apart in flight. However, this meant that there was less room for explosives in the shell itself. The 76mm HE round carried roughly half the explosive charge as the 75mm.[218]

Having a good HE shell was paramount, so the Army was not keen to mount a gun with a less effective HE shell than the 75mm on the Sherman.[219] However, discussions with British colleagues in December 1942 convinced General Jacob Devers, the chief of the Armoured Force, that at least some Shermans needed to have this 76mm gun for anti-tank purposes. So development of a 76mm armed Sherman continued. Devers came into conflict with his superior, General Leslie McNair, the chief of the Army Ground Forces, over the issue of the 76mm gun. McNair did not want the 76mm gun in Shermans. After repeated clashes with McNair, Devers was promoted out of the argument in May 1943, when he was sent to take over command of the American army in Europe. He was replaced by General Alvan Gillem, who was more amenable to McNair's position on the matter. An order for 1,000

[217] Steven Zaloga, *M4 (76mm) Sherman Medium Tank 1943-65*, (Oxford: Osprey, 2003), 4.
[218] WO 185/226 The installation of 76mm. U.S.A. gun or 75mm British gun in A.34 Cromwell, 12 August, 1943, paragraph 1 (b).
[219] Zaloga, *M4 (76mm) Sherman*, 7.

76mm Shermans was eventually placed, but a general adoption 76mm gun in the Sherman stalled.[220]

McNair's opposition to the 76mm gun stemmed from his belief that the Sherman did not need such a gun. McNair saw tanks like the Sherman as a 'deep exploitation' weapon, the main purpose of which was to break through enemy lines and rampage behind them, destroying communications and logistics centres. A good HE shell was vital for that. Engaging German tanks was not the Sherman's primary mission, so the AP capability of the Sherman's gun was not as important as its HE shell. Fighting German tanks was ideally to be left to specialised vehicles called 'tank destroyers'.[221] However, in 1942 the AP performance of the Sherman's 75mm gun was more than adequate for any German tank they had faced. After the Battle of Kassarine Pass, which ended on 24 February 1943, Brigadier-General T.J. Camp was sent to conduct interviews with American tank crews. Though the Americans won the battle, it was still a bit of a disaster for American armoured forces. Camp was compiling lessons from that battle for trainees back home. The Sherman received very good reports from the interviewed soldiers. According to Sergeant Becker from the 1st Armoured Regiment told Camp: 'I like the M4. I look at the German tank and thank God I am in an M4'.[222] British officers were praising the Sherman, so there was no pressing need to consider upgrading the vehicle.[223]

[220] Zaloga, *M4 (76mm) Sherman*, 7.
[221] Green, *American Tanks*, 77-78.
[222] T.J.Camp, *Tankers in Tunisia*, (Honolulu: University Press of the Pacific, 2004), 32.
[223] PREM 3/284/7 MIDDLE EAST: Armoured and other reinforcements: Sherman Tanks June-October 1942, 23.

The 76mm Sherman eventually went into production in January 1944 and the first units reached Britain in April. Due to concerns about the poor performance of its HE shells, none of the 76mm Shermans were deployed to France in June 1944. Combat experience in the Normandy bocage in June and July revealed the vulnerability of the 75mm Sherman. After the realisation that the 75mm was no longer adequate, there were not enough upgraded Shermans to satisfy the demand for them.[224]

Figure 26: M4 (76mm) Sherman. This is a late war example that went on to serve in Korea. ©AWM

Veteran Allied tank crews were well aware of the deficiencies of their weapons. Peter Roach recounts a training session he attended in the lead-up to D-Day:

> I will always remember a vehicle recognition class taken by our OC in which we questioned him about thickness of armour, weight of projectile and muzzle velocity of the respective tanks, ours and the Germans. He was an honest man and when he had finished there was silence. Each sat quietly brooding. Again we were to be hopelessly outgunned, and, after out brief period of equality, this was a bitter blow.[225]

New tanks crews were not always aware of the deficiency until they had seen it for themselves. Prior to the Normandy landings, James Carson, a fresh Lieutenant in the Welsh

[224] Zaloga, *M4 (76mm) Sherman*, 16.
[225] Peter Roach, *The 8.15 to War: Memoirs of a Desert Rat: El Alamein, Wadi Halfa, Tunis, Salerno, Garigliano, Normandy and Holland*, (London: Leo Cooper in association with Martin Secker & Warburg, 1982), 129.

Guards, commented on the Tiger's 88mm: 'It's only 13mm greater than the 75mm Sherman – so what?'[226] The same was true in the US Army. Ted Hartman was a tank driver in the 11th Armoured Division, and before he experienced combat he was unaware of the inadequacy of the Sherman's 75mm gun.[227] In his interviews with tank crew veterans, Robert Kershaw found that the experienced men did not bother to tell new crewmen the truth, as it would unnerve them and they were going to find out soon enough anyway.[228]

The British, however, did have one trick up their sleeves: The 17-pounder anti-tank gun. Before the 17-pounder had finished development, British designers were thinking about how it might be possible to mount it in a tank. A few designs were proposed, but these kept running into delays and engineering problems.[229] In August 1943, some unofficial experiments to modify the American-built Sherman so that it could accommodate the British-built 17-pounder caught the attention of the War Office. With no other 17-pounder tank forthcoming, the War Office requested this development continue. In January 1944, the design for this hybrid tank, the 'Sherman Firefly', was accepted for production. By the time of the Normandy landings, over 300 had been delivered. By the end of the war, over 2,000 Sherman Fireflies had been produced.[230]

Figure 27: Sherman Firefly. ©IWM

[226] Robert Kershaw, *Tank Men: The Human Side of Tanks at War*, (London: Hodder & Stoughton, 2009), 304.
[227] J. Ted Hartman, *Tank Driver with the 11th Armoured from the Battle of the Bulge to VE Day*, (Bloomington: Indiana University Press, 2003), 42.
[228] Kershaw, *Tank Men*, 298.
[229] WO 185/7 A.F.V Liaison Meeting 6 June 1943, paragraph 8.
[230] Stephen A. Hart, *Sherman Firefly vs Tiger: Normandy 1944*, (Oxford: Osprey, 2007), 24.

The Firefly was one of the best tanks the British put into the field during the war. It had the ability to engage the Tiger on equal terms, and the Germans quickly learned to fear the Firefly. Even so, the fact that the Firefly was an ad-hoc conversion did create some problems. First, even though it had an excellent gun, the hull of the tank was the same as that of the regular Sherman. By that late stage of the war, the armour of the Sherman was on the thin side. Even though the Sherman Firefly could penetrate a Tiger's frontal armour from a long range, the generally short engagement ranges in France negated this advantage. Second, there were never enough Sherman Fireflies to equip entire tank squadrons. Only certain types of Sherman could be converted, and supplies of the appropriate hulls were limited due to demand for them.[231] It was therefore necessary to keep the older Sherman tanks in service. Third, like the six-pounder, the 17-pounder had an inferior HE round.[232] The Firefly is yet another example of how the Allies had to scramble to keep up with the Germans tank technology.

The appearance of the Tiger exposed the laxity in the Allies' tank development programs. Despite having good guns on hand, they allowed confidence in their existing weaponry and incompetence to prevent them from being mounted in tanks. The realisation that the Tiger was not going away left the British with the choice between two guns, the 75mm and the six-pounder, neither of which was adequate. When the Allies did get new guns in their tanks, they were either nearly obsolete or hurriedly mounted on tanks not designed for it, a fact which created additional problems. Fortunately for the British, the Firefly was overall a good tank despite its drawbacks.

[231] WO 185/6, Tank Board, 10 August 1944, paragraph (f).
[232] WO 185/6, 21 Army Group Memorandum on British Armour, 21 February 1945, 2.

Upgrading old tanks and building news ones

Efforts were also being made to upgrade the armour of Allied tanks to levels that were similar or superior to that of the Tiger. There were two ways in which this would happen. The first was upgrading the armour of existing tanks. The second was to build a new tank with heavier armour from the outset.

One of these first efforts to upgrade existing tanks was to increase the armour of the Cromwell. A small program was started to equip 'applique armour' to approximately 100 Cromwells.[233] Applique armour is extra plates welded onto the tank to make the armour thicker. In August 1943, the first pilot models rolled off the production lines, with 101mm of armour on the front. However, only 123 of these up-armoured Cromwells were produced.[234] I have not found a definite reason why so few of these more heavily armoured Cromwells were made. However, a Defence Committee Tank Policy paper produced in the autumn of 1943 suggests that this was an interim measure until the Cromwell's successor, the Comet, entered production. This was expected to start in mid-1944, which is when the applique-armoured Cromwell programme was scheduled to end.[235]

A more successful effort was the latest model of the Churchill, the Mark VII. As early as April 1943 consideration was given to up-grading the armour of the Churchill.[236] The new version of the Churchill had 152mm of armour on the front, and 95mm on the side.[237] This was significantly more protection than that of the previous versions of the Churchill. It gave far better protection against the 88mm. This did come at a cost of a lower top speed of 19

[233] WO 185/226, War Cabinet Defence Committee (Supply) Tank Policy, 2. No date is provided on this paper, however a second draft of this paper is dated October 1943.
[234] Fletcher and Harley, *Cromwell Cruiser Tank,* 19.
[235] WO 185/226, War Cabinet Defence Committee (Supply) Tank Policy, 2.
[236] WO 185/226, War Cabinet Defence Committee (Operations) Tank Supply Policy, 9 April 1943, paragraph 18.
[237] WO 185/226, War Cabinet Defence Committee (Supply) Tank Supply Policy, 9 April 1943, paragraph 10. No date is on this document, but an attached list of edits to be made is dated January 1944.

kilometres per hour.[238] The Churchill VII was in production in early 1944 and by the end of 1944 the Churchill VII had replaced all other Churchills on the production line.[239]

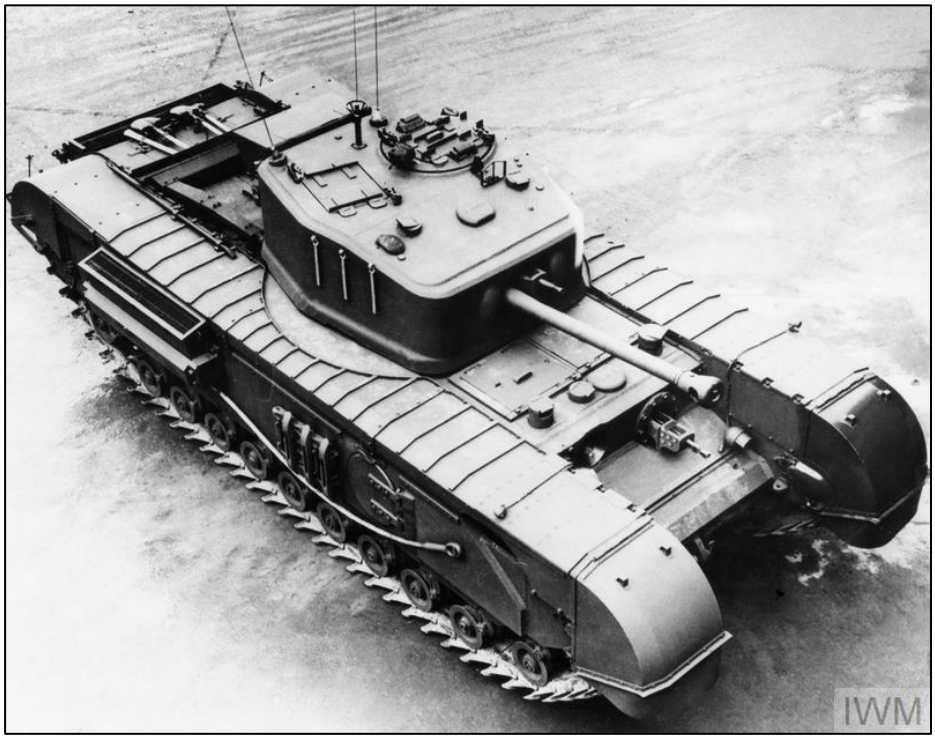

Figure 28: Churchill VII infantry tank. ©IWM

However, there were still plenty of the older Churchills in service. To bring them up to the same standard as the Churchill VII, a program to develop an applique armour package for the Churchill III was begun in June 1943. The AFV Liaison Committee stressed that this armour package had to be able to be fitted in the field, to avoid a costly re-work program.[240] This was due to the experience of a Churchill rework program in 1942. The rushed development of the Churchill resulted in a lot of flaws. As these flaws were sorted out, Churchills were sent back to the factory to be upgraded with the latest parts. This had the unfortunate side effect of clogging up factories with old Churchills waiting to be reworked,

[238] Perret, *Churchill Infantry Tank*, 7.
[239] WO 185/226 Draft reply to the Prime Minister's Personal Minute M.111/4, 18 February 1944, paragraph 8; PREM 3 427/9 TANKS: Production (II): Various April 1943 – January 1945, 5.
[240] WO 185/7 Minutes of the 28th A.F.V Liaison Meeting held on Wednesday, 16th June 1943, paragraph 2 (iii).

and there was a drop in output of new Churchills.[241] A repeat of that situation was to be avoided. However, by the end of 1944, older Churchills were upgraded to Churchill VII standard as part of their regular factory overhaul.[242]

The Americans made one attempt to up-armour the Sherman, which was known as the M4A3E2 Sherman Jumbo. This was a regular Sherman that was given a new turret with thicker armour and had applique armour welded onto the hull. The thickness of the armour was increased to 101mm on the front and 76mm on the side. Going into service in the autumn of 1944, the Sherman Jumbo was immune to the 88mm except at the closest of ranges. Sherman Jumbos were placed in the lead position in armoured columns, where they would take hits from anti-tank guns and alert the rest of the column to the danger.[243] The extra armour did lower the speed of the Sherman Jumbo, but this was an acceptable trade-off in the eyes of troops and the Sherman Jumbos were very popular. However, the decision to go ahead with the production of America's latest tank, the T26 Pershing, put an end to Sherman Jumbo production. In total, only 254 Sherman Jumbos were built.[244]

American tank crews were otherwise left to their own devices when it came to increasing the protection of their tanks. Crews would drape spare track links over the hull and pile sandbags on the front as additional armour. However, those methods were aimed more at portable anti-tank rockets than the big anti-tank guns. Some armoured units, notably the 4th Armoured Division, salvaged armour plate from knocked-out German tanks and welded it onto the front of their Shermans. How effective this extra armour was debateable, but it certainly made the crews feel safer and boosted morale.[245]

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[241] PREM 3 426/15 Shortfalls in production, 10-11.
[242] WO 185/6 Churchill Programme 11 July 1944.
[243] Bruce Culver, *Sherman in Action*, (Carrollton: Squadron Signal, 1977), 39.
[244] Zaloga, *Sherman Medium Tank*, 17.
[245] Zaloga, *Sherman Medium Tank*, 18.

During 1943, the Americans had been working on a replacement for the Sherman, known as the T20 series of tanks.[246] These tanks were designed to have a lower profile than that of the Sherman, and carried the 76mm gun. However, combat with the Tiger in Tunisia caused a rethink of the design. The new tank, the T26 Pershing, carried 100mm of armour on the front and was armed with a 90mm gun, while maintaining similar speeds and mobility as the Sherman.[247] General Devers, commander of the US Army in Europe at the time, recognised the danger the Tiger presented after encounters with it in Tunisia and Sicily during 1943. He pressed for the Pershing to be put into production as soon as possible.[248] However, he came up against General McNair again. McNair, who saw no need for the Pershing, stated that: 'Apparently, the M4 is an ideal combination of mobility, dependability, speed, protection and firepower' and that there did not appear to be any fear of the Tiger at all.[249] American tank crews did not share in McNair's opinion that the Tiger was not a threat, as I shall explain in the next chapter.

Devers continued to press for the Pershing, and McNair continued to fight it, but in December 1943 Devers won an order from the War Department for 250 Pershing tanks to be delivered by April 1945.[250] Continued opposition to the Pershing caused delays in production, but 20 of the new tanks were ready to send to Europe at the beginning of 1945.[251] The Pershings were split between the 3rd and 9th Armoured Divisions, and saw combat on 26 February 1945 while fighting over the Roer River in Germany. The Pershing was well received by American tank crews. However, only 310 Pershings had been delivered

[246] Steven Zaloga, *M26-M46 Pershing Tank 1945-1954*, (Oxford: Osprey, 2000), 6.
[247] Zaloga, *M26-M46 Pershing Tank*, 28; Zaloga, *Sherman Medium Tank*, 28.
[248] Zaloga, *M26-M46 Pershing Tank*, 9.
[249] Zaloga, *M26-M46 Pershing Tank*, 9.
[250] Green, *American Tanks*, 184.
[251] Green, *American Tanks*, 192.

by the end of the war. It arrived too late to make any real impact.[252] The Americans' overconfidence in the Sherman was a direct cause of their complacency in getting new and more effective tanks to counter heavily armoured tanks like the Tiger.

Figure 29: Comet cruiser tank. ©IWM

Figure 30: T26 Pershing. ©AWM

The British ended up putting three new tanks into production, but only one saw service during the war. This tank was the Comet, the successor to the Cromwell. The Comet was an extension of the basic Cromwell design, with armour up to 100mm. It was also armed with the HV gun that was originally supposed to be mounted in the Cromwell.[253] Production was supposed to begin in mid-1944, but the program suffered a number of delays during the design phase. These delays ranged from specification changes that required significant alterations, a lack of qualified draughtsmen and a two-month flu epidemic that affected workers at the factory the prototypes were being constructed.[254]

[252] Green, *American Tanks*, 195.
[253] WO 185/227 Tank Policy – conclusions of the Tank Board 1943-1946, Specification of A.34, 20 December 1943.
[254] WO 185/226, Notes of a meeting in Room 121D Shell-Mex House, Ministry of Supply, on 23rd December 1943, A.34.

Comets began arriving at front line units in February 1945, where it was well received by troops. The HV gun was still somewhat underpowered. However, the tank was considered a general improvement over the Sherman and the Cromwell.[255] Like the Pershing, the late introduction of the Comet meant it did made little impact on the course of the war.

Tactical responses to the Tiger

Despite the widespread concern about the Tiger, there does not appear to have been an officially sanctioned tactic for dealing with it on the battlefield. However, some Army publications did make suggestions about the best ways to attack a Tiger. In the 29 July 1943 issue of *Tactical and Technical Trends*, an American monthly intelligence magazine circulated among troops, there was an account of how British anti-tank gunners dealt with Tigers in Tunisia. The article noted a couple of lessons that could be drawn from this engagement:

(a) "The British Gunners did not open until the enemy tank was well within effective range.

(b) "In addition to opening fire with the primary weapon—the 57-mm—the AT unit also opened with intense light machine-gun fire which forced the tank to button up and in effect blinded him. His vision apparently became confused and he was actually traversing his gun away from the AT guns when he was knocked out for good. [256]

[255] Patrick Delaforce, *The Black Bull: From Normandy to the Baltic with the 11th Armoured Division*, (Mechanicsburg: Stackpole Books, 2011), 190-191.
[256] 'Attack Against German Heavy Tank – PZKW 6', *Tactical and Technical Trends*, No. 30, 29 July, 1943, 7.

The second point, having the supporting infantry fire upon the tank with small arms to keep the crew locked inside their tank, was the main conclusion of the article. If the tank cannot see the anti-tank guns, then the anti-tank guns could go about their business unobstructed. The 16 December issue of *Tactical and Technical Trends* published a Russian pamphlet on how to attack Tigers.[257] However, this contained a lot of information that was already known to American and British tank crews, such as shooting at the tracks and vision devices. The most important piece of new information was the identification of a small area of the lower hull not covered by the suspension that was thin enough for 75mm guns to penetrate at range.[258] This area was so small that reliably hitting it was extraordinarily difficult.

In practice, it was left up to individual regiments to figure out their own ways of attacking Tigers when they came across them. The problem seemed insurmountable. When asked how to deal with Tigers in a Churchill, one tank commander replied that one needed to get within 200 yards and put a round through the driver's vision port. He did not know if anyone had ever managed to pull off this feat.[259] Nonetheless, it was not impossible to neutralise the Tiger as a threat, even if most Allied tanks could not destroy it outright. One method was to try and knock the tracks off the Tiger in order to immobilise it. That was still a difficult task, but the Tiger's tracks and running gears remained a relatively vulnerable

[257] 'Vulnerability of Tiger Tanks', *Tactical and Technical Trends,* No.40, 16 December, 1943, (Washington D.C.: Military Intelligence Service, War Department, 1943), 2-4.
[258] *Tactical and Technical Trends* No. 8, 24 September, 1942, (Washington D.C.: Military Intelligence Service, War Department, 1942) and *Tactical and Technical Trends* No. 11, 5 November, 1942 (Washington D.C.: Military Intelligence Service, War Department, 1942) have articles on the vulnerability of German tanks. They predate the Tiger, but they contains a lot of the same advice on how to deal with the Tiger presented in the Russian pamphlet.
[259] John Ellis, *World War II: The Sharp End*, (London: Windrow & Greene, 1990), 129.

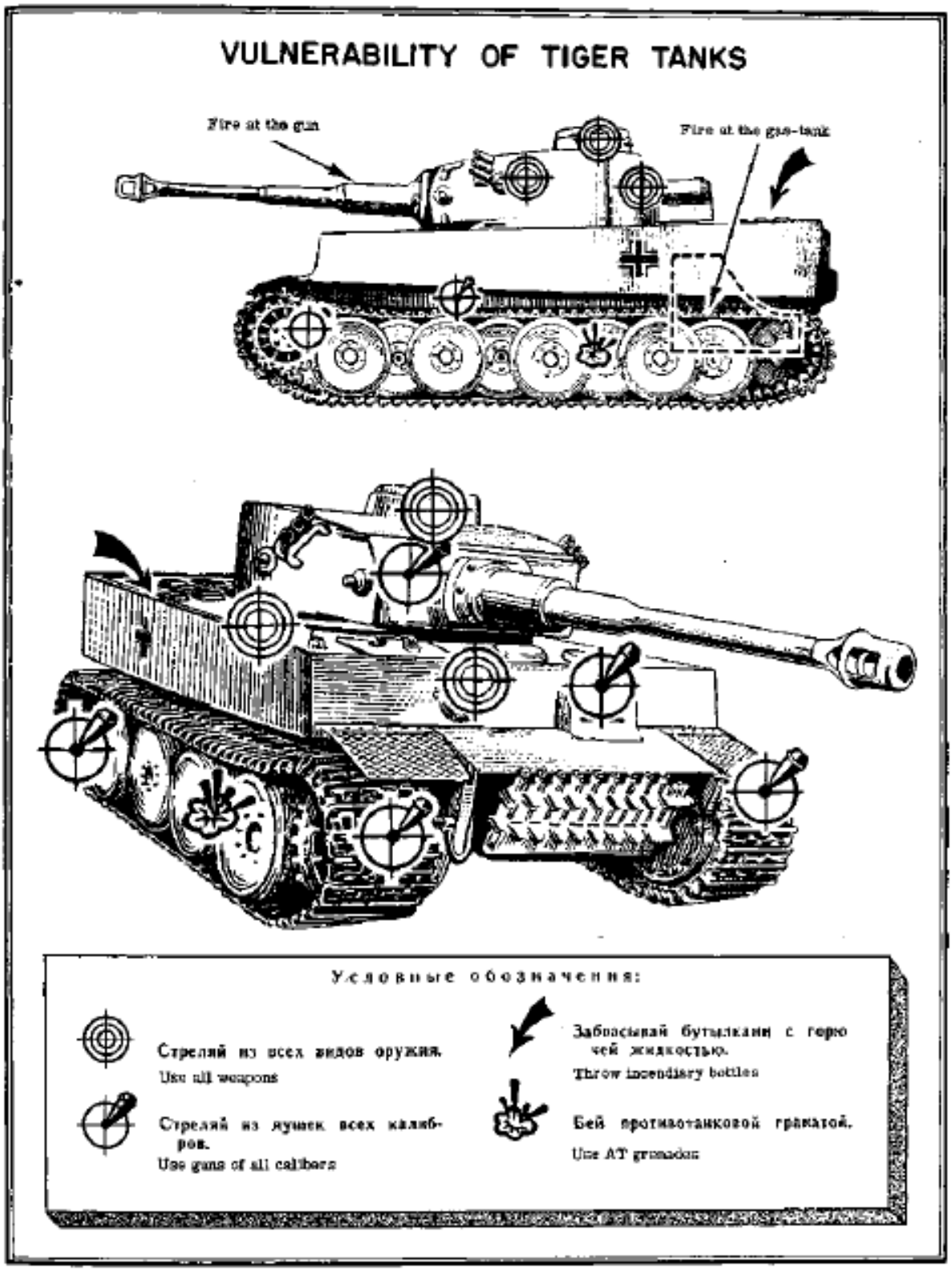

Figure 31: Sketch demonstrating where to attack the Tiger from Tactical and Technical Trend no. 40. The highlighted gas-tank had an area that was lightly protected, but it required a precision shot between the tracks and heavily armoured hull. It was a very difficult target to hit.

spot. The records of the Panzer *Lehr* division criticised British gunnery for shooting short of the target, but Lieutenant Michael Trasenster, a tank commander in 4th/7th Royal Dragoon Guards, defended British gunners. 'We were going for the sprockets and tracks with the 75mm, otherwise their tanks were immune'.[260] Once the Tiger had been immobilised, Allied tanks or anti-tank guns could be brought to a close-range firing position from which they could finish it off. Alternatively, the Tiger's crew might decide to abandon their vehicle once it had been immobilised, precisely because it was now a large sitting duck.[261]

An American method was to use a couple of tanks to engage the Tiger head-on, as bait to keep the Tiger occupied. Meanwhile, other tanks or anti-tank guns would try to sneak around the Tiger's flanks, from where they could penetrate the thinner side armour.[262] This would often cost the unit a couple of Shermans and, in all likelihood, the lives of their crews. General Bradley noted that 'we could defeat the enemy's panzers but only by expending more tanks than we cared to lose'.[263] A more inventive, less costly, method was to fire a white phosphorous smoke shell at the Tiger. Shermans carried some of these types of shell to be able to create clouds of smoke to conceal movement. In *Citizen Soldiers* (1997), Stephen Ambrose records an incident that took place on 31 March 1945 at the Paderborn tank school in Germany, where a Sherman from the 3rd Armoured Division hit two Tigers with white phosphorous shells. The resulting cloud of smoke, and accompanying smell and sparks from the phosphorous, convinced the crews of the Tigers that their tank was on fire, and they abandoned the tank.[264] However, this incident took place during an attack on a tank training centre, so the inexperience of the Tiger crews was likely a major

[260] Kershaw, *Tank Men*, 323.
[261] Kershaw. *Tank Men*, 182-183.
[262] Zaloga, *Sherman Medium Tank*, 37.
[263] Bradley, *A Soldier's Story, 322.*
[264] Ambrose, *Citizen Soldiers*, 442.

factor in their decision to abandon their tank. Whether this trick would have worked on a more experienced crew earlier in the war is debateable. However, the smoke would have certainly have forced the crew to close their hatches. Any accompanying infantry would have run away from the tank as well. White phosphorous causes terrible burns if it comes in contact with skin and is very difficult to put out.[265]

An innovative solution to the Tiger problem was attempted by Captain John Semken of the Sherwood Rangers Yeomanry. His plan was to use the Sherman's superior rate of fire to his advantage. Semken calculated that a good Sherman crew could fire three or four rounds before the Tiger loaded its much heavier 88mm ammunition. His plan was not to destroy the Tiger outright, but to fire so many shells at it that there would be a reasonable chance, not just of damaging its tracks, but of smashing up its periscopes and view ports.[266] This would render the Tiger blind, and would force the crew to withdraw or abandon their vehicle. Semken's method proved its worth in an engagement with a Tiger in the village of Fontenay on 25 June 1944. His Sherman engaged a Tiger that was moving into the village. In the space of one minute, his tank fired six rounds at the Tiger, and Semken only stopped firing when the crew of the Tiger was seen to bail out of the tank. This was the first Tiger captured intact during the Normandy campaign.[267]

Conclusion

The Allied response to the Tiger tank was fractured and uncertain, but it exposes a number of patterns of behaviour that show some deep-seated structural problems in the

[265] Ambrose, *Citizen Soldiers*, 68
[266] Render, *Tank Action*, 91.
[267] Render, *Tank Action*, 116-118.

organisations that designed and built tanks. The current literature does not touch upon these structural problems that plagued the Allied response to the Tiger tank. There are many factors that went into creating these problems.

One problem was the complacency of some senior officers, who clung to the pre-war armour theory even as it got shot to pieces in Africa. Giffard Martel, one of the key figures in British inter-war tank development, believed that British tank strategy had been proved sound in the battles of North Africa. He completely dismissed the concerns over the six-pounder gun and why troops wanted the 75mm gun in his memoirs.[268] We see this reflected in the tank gun debate, where the War Cabinet was arguing to keep the status quo.

There were also problems within the institutions that developed tanks and guns. The responsibility for developing tanks and tank guns fell under two different authorities, the tank board under the Director General of Tanks and Transport and the Director of Artillery respectively. These departments do not appear to have had any sort of official inter-departmental communication system, and the Director of Artillery did not have a seat at the War Office, so it would seem to be the case that one department was unaware of what the other was doing.

The artillery department was the most forward thinking of the two departments. British intelligence services were reporting that the Germans were experimenting with tanks with up to 90mm of frontal armour as early as April 1941.[269] The artillery department appears to have taken these warnings seriously. They were putting into development first class anti-tank guns like the 17-pounder and tank versions of these guns long before there

[268] Giffard Martel, *An Outspoken Soldier: His Views and Memoirs*, (London: Sifton Praed, 1949), 204.
[269] PREM 3 190/1 GERMAN ARMY: War Office Intelligence Summaries July 1940-October 1941, 41.

was a clear need for them, while the tank board ignored their current assets and designed tanks to fight yesterday's threats.[270] Britain had the guns, but not the tanks to put them in.

There was also the sense in the War Cabinet that conditions in France were going to be so different from that of North Africa that the lessons learnt in the desert were only really applicable for desert warfare. This included the question of tanks and tank armament. No one perceived the need to change the standard armament of British tanks because the shorter ranges will make the six-pounder the better gun for anti-tank purposes, and with its new HE shell there was the belief that it will be adequate for the job. This is despite the fact that the six-pounder was only just adequate to deal with the Tiger even at close range, while the Tiger could engage any British tank from well beyond the six-pounders' effective range.

Finally, there was one aspect of the Tiger that had the effect of camouflaging the inadequacies of Allied tanks against it: the small numbers in which it was deployed. There were never more than 20 Tigers active in Tunisia, and normally fewer at any given time due to breakdowns.[271] In Sicily, Tigers were also encountered in small numbers.[272] By far the greater number of tanks were the more lightly armoured panzers. Even in France the Tiger was only active in small numbers. However, this created the impression that such heavily armoured tanks were only ever going to be used in small numbers. While this is true of the Tiger, newer, just as heavily armoured tanks were being brought into service in ever larger numbers, ultimately with the goal of replacing the Panzer III and IV entirely. This was discovered by the Allies too late to for them to do much other than quick improvisations to

[270] Beale, *Death by Design*, 107.
[271] Anderson, *Tiger*, 131.
[272] Zaloga, *M4 (76mm) Sherman*, 13.

get better guns into service.[273] When the Allies did get new, more effective tanks into service, it was far too late for them to have a lasting impact.

[273] Zaloga, *M4 (76mm) Sherman*, 14.

Chapter three: Responses to the Tiger of servicemen and civilians

In the previous chapter, I explored why the Tiger was a technological challenge to the British and Americans. However, the impact of the Tiger went beyond technology. During the tank battles in Tunisia in early 1943, the Tiger forged a fearsome reputation which followed it into France. In this chapter, I examine in turn the attitudes towards the Tiger of British and American servicemen, journalists, and politicians.

To date, there has been very little historical research on the impact of the Tiger on public and political opinion. In a sample of ten standard monographs on the north-western European campaign in 1944,[274] there is little discussion of the Tiger and its influence. Tigers are mentioned, but only in terms of their presence at a particular battle, or very basic descriptions of their superiority over Allied tanks. One exception is Robin Neillands' *The Battle of Normandy, 1944* (2002). Neillands includes many first-hand accounts from veteran tank crews, in which the fear of the Tiger and frustration with their own equipment is palpable. However, he makes no attempt to analyse these responses to the Tiger. Nor does Neillands consider the wider significance of the Tiger in the Normandy campaign, nor the

[274] William Stuart Nance, *Sabers through the Rich: World War II corps cavalry from Normandy to the Elbe*, (Lexington: The University Press of Kentucky, 2017); Charles Dick, *From Victory to Stalemate: World War II in the West, summer 1944*, (Lawrence: University Press of Kansas, 2016); John Keegan, *Six Armies in Normandy: From D-Day to the Liberation of Paris, June 6th-August 25th, 1944*, (London: Cape, 1982); Olivier Wieviorka, *Normandy: The Landings to the Liberation of Paris*, (Cambridge: Belknap Press of Harvard University Press, 2008); Mary Louise Roberts, *D-Day through French Eyes: Normandy 1944*, (Chicago: The University of Chicago Press, 2014); Alan J. Levine, *From the Beaches of Normandy to the Baltic Sea: The Northwest Europe Campaign 1944-1945*, (Westport: Praeger, 2000); Joachim Ludewig, *Rückzug: The German Retreat from France, 1944*, (Lexington: The University Press of Kentucky, 2012); W. G. F. Jackson, *'Overlord': Normandy 1944*, (London: Davis-Poynter, 1978); Robin Neillands, *The Battle of Normandy, 1944*, (London: Cassell, 2002); Stephen Badsey, *Normandy 1944: Allied landings and breakout*, (London: Osprey, 1990).

structural causes of the technological gap. This failure to explore a problem that was of great concern to people at the time is characteristic of the literature. The superiority of German equipment, exemplified by the Tiger, is noted by historians. Their observations, however, are usually cursory and always superficial. In fact, the Tiger had a much greater effect on Allied troops than the literature currently portrays. While the effect on soldiers is clear to see, the how the Tiger affected the attitudes of journalists and politicians is not so easy to discern. Taken at face value, the press and politicians publically discounted the Tiger as a danger to Allied troops. However, a close reading of what was written about the Tiger reveals a number of contradictions that imply that it was more of a concern than reporters and politicians were prepared to admit.

The Reputation of the Tiger

On account of its heavy armour and powerful gun, the Tiger earned a reputation as a very formidable tank in the battles for Tunisia during the first months of 1943. The failure of the Allies to provide adequate weapons for their tanks ensured that the Tiger's notoriety remained intact when the Allies invaded France in 1944. Even though Tigers made up only a small proportion of the German tank force in France, Allied tanks crews expected one to turn up at every corner. The Tiger is a tank that frequently gets referenced in memoirs and diaries. Even soldiers who do not write much about technology pick out the Tiger for special mention. There is thus a striking discrepancy between the primary and the secondary sources. While the Tiger and its impact appears frequently in the former, it rarely gets discussed in the latter. The Tiger had a direct effect on the attitudes of Allied troops toward all German tanks. Because of the Tiger, all German tanks were viewed as more heavily

armed and armoured than they actually were, even German tanks that Allied tanks were perfectly capable of defeating.

There is evidence that attributes of the Tiger were transferred to other panzers in the minds of Allied tank crew and commanders. As a result, less impressive tanks appeared more intimidating than was actually warranted. For example, when General Omar Bradley first discussed the qualities of American and German tanks in his memoirs, he wrote: 'In their first engagement, the American tankers learned that tank for tank their General Grants and Shermans were no match for the more heavily armoured and better-gunned German panzers.'[275] He follows this observation with more specific information on the Tiger, and later in the book he talks more about the fact that Tigers out-gunned the American tanks in North Africa.[276] However, his first statement is revealing because it is not consistent with the facts. As I explained in the previous chapter, the only German tank before the Tiger that could engage the Sherman on an equal footing was the Panzer IV Special. But there were never enough Panzer IV Specials in Tunisia to have a significant impact. The first major tank engagement between American and German tanks was at the Battle for Kasserine Pass, which took place between 14 and 24 February 1943, with the main push on the pass starting on 19 February.[277] The Americans were ultimately able to recapture and hold the Kasserine Pass against a strong German attack, but they took significant losses in men and machines. It is true that there were a handful of Tigers present during the early stages of the battle,[278] but they were sent to other parts of the front on 17 February, prior to the main German assault.[279] This means that the Germans fought at Kasserine using Panzer IIIs and regular

[275] Bradley, *A Soldier's Story*, 41.
[276] Bradley, *A Soldier's Story*, 322
[277] Gordon Rottman, *M3 Medium Tank vs Panzer III: Kasserine Pass 1943*, (Oxford: Osprey, 2008), 7.
[278] Rottman, *M3 Medium Tank vs Panzer III*, 61.
[279] Watson, *Exit Rommel*, 78.

Panzer IVs. In terms of technology, the Americans were on a far more equal footing than Bradley's statement suggests. However, the Americans received a harsh beating, which was the result more of poor leadership and lack of combat experience than the presence on the battlefield of Tigers.[280]

Another example of this sort of attribute transference comes from the diaries of Trevor Greenwood, who was the commander of a Churchill tank in 9 Royal Tank Regiment (RTR) in France in 1944. Several times in his diaries, Greenwood tells the reader that the German Panther tank was equipped with the same 88mm gun as the Tiger. In fact, the Panther was equipped with a 75mm gun. Greenwood first identifies the 88mm on Panthers in his entry for 9 July 1944,[281] and again on 3 August 1944.[282] I do not think this is a case of Greenwood misidentifying Panthers for Tigers. In his entry for 10 July 1944 he wrote: 'Jerry has a habit of concealing Tigers and Panthers in the woods. They usually open fire when we are too close to take evasive action—and *one* hit from an 88 at 400 yards…!'[283] In this case, it appears that Greenwood was under the impression that these tanks had the same gun. It is a minor technical detail, but Greenwood should have been aware of the difference, as details of the Panther had been available to British tank crews for some time. British newspapers were printing articles about the Panther as early as August 1943.[284]

Of all the tanks and anti-tank weapons that the Germans could throw at the Allies in Normandy, the Tiger was what Allied tank crew feared the most.[285] As I demonstrated in the chapter two, this reputation was not undeserved. Tigers had destroyed over 100 Allied tanks

[280] Gerhard Weingberg, *A World At Arms: A Global History of World War II*, 9New York: Cambridge University Press, 2005), 443-444.
[281] Trevor Greenwood, *D-Day to Victory: The Diaries of a British Tank Commander*, (London: Simon & Schuster, 2012), 79.
[282] Greenwood, *D-Day to Victory*, 116.
[283] Greenwood, *D-Day to Victory*, 82.
[284] "Nazi Panther Tank." *Citizen* [Gloucester, England] 28 August 1943, 1.
[285] Ken Tout, *A Fine Night for Tanks: The Road to Falaise* (Phoenix Mill: Sutton Publishing, 2002), 156.

in Tunisia, and British and American tanks went into action in France with the same weapons that they had been using in North Africa. With the exception of the Sherman Firefly, Allied tanks were still poorly equipped to engage the Tiger. A handful of well-positioned Tigers could wreak havoc on an Allied advance, and there was little that Allied tank crews could do in response.

A well-known engagement in which Tigers caused major problems in the Normandy campaign took place during the opening stages of Operation Epsom, which was launched on 26 June 1944. Epsom was intended to encircle the city of Caen and force the Germans to abandon their positions. Bill Close, a squadron commander in 3 RTR, recalled that, after crossing the Oden river, several dug-in Tigers and anti-tank guns held up the advance of two entire British regiments of about 59 tanks each.[286] The allied tanks were able to destroy several of the anti-tank guns, but were unable to shift the Tigers.[287] This skirmish turned into the Battle for Hill 112, which stalled the entire Allied operation. Epsom was called off on 30 June 1944, having failed to encircle Caen.[288] The inability of Allied tanks to knock out the Tiger played a significant role in this setback.

Individual incidents served to heighten the fearsome reputation of the Tiger. One of the most notable was a particular action involving *Obersturmführer* Michael Wittmann, commander of the 2nd company of *Schwere SS-Panzerabteilung* 101, and a column of 20 British tanks and vehicles from the 4th City of London Yeomanry. This column was part of the 7th Armoured Division, which was advancing through the town of Villers-Bocage. Wittmann was a 'tank ace' who had served on the Eastern Front, where he had claimed 130 Russian

[286] Hart, *Sherman Firefly vs Tiger*, 44.
[287] Bill Close, *Tank Commander: From the Fall of France to the Defeat of Germany: The Memoirs of Bill Close*, (Barnsley: Pen & Sword, 2013), 109-110.
[288] Delaforce, *The Black Bull*, 40.

tanks.[289] On 13 June 1944, the 4th City of London Yeomanry was under pressure from their superiors to advance. As a result, they had not performed proper reconnaissance and were unaware of the presence of Tigers in the area.[290] Wittman surprised the column by destroying the first and last tanks in the formation. Because of the high embankments on either side of the road, the British column was trapped. Wittmann was then able to destroy the entire column one by one. As most of the tanks in the column were armed with the British 75mm gun, there was little they could do to stop the destruction. Their rounds simply bounced off the armour of Wittmann's Tiger, even though the range was only 30 metres.[291]

This was one incident in a larger battle between the 7th Armoured Division and the German panzer division, *Panzer-Lehr*. Although the battle involved thousands of men and hundreds of tanks, it was the story of Wittmann's exploit that became well known to troops on both sides. As the story spread, it was embellished. Peter Roach, a tank crewman of 1 RTR who was not involved in the incident, heard the story a little later and recounted this little detail:

> We believed the tale of the leading regiment of our brigade who were ambushed in a cutting beyond Villers-Bocage. A Tiger tank had come over the top of the cutting and knocked out the first and last vehicles. The commander had then appeared from his turret, taken off his hat and bowed to the remainder. Such was the feeling of immunity given by this great gun and weight of armour.[292]

[289] Render and Tootal, *Tank Action*, 89.
[290] Render and Tootal, *Tank Action*, 88.
[291] Kershaw, *Tank Men*, 331-332.
[292] Roach, *The 8.15 to War*, 141.

The detail about the commander is not present in first-hand accounts. It most likely did not happen. It must have been added in shortly after. Not only does this detail show what Allied tank crews thought of the Tiger, but also of German tanks crews. It would be extremely unusual for any member of a tank crew to get out of his tank in the middle of a battle without good reason, but to get out just to taunt the enemy would suggest that the British thought the Germans had supreme confidence in their equipment and themselves. According to David Render, the incident served to strengthen the belief that the Tiger was invincible and that they were everywhere. The story continued to evolve, thereby further inflating the impact of Wittmann on the battle that was being fought around him. Wittmann himself did not take further part in the battle after 13 June, but to this day he is often credited (incorrectly) with having single-handedly stopped the advance of the entire 7th Armoured Division.[293]

Allied tank crews were sure that there were Tigers everywhere. Lieutenant Steele Brownlie of the 2nd Fife and Forfarshire commented to Delaforce in *The Black Bull* on a run-in with three German tanks: 'Tigers? Everything looked like a Tiger in those days'.[294] Tigers were mentioned so widely in battle reports from all sections of the front that they appeared to be everywhere. However, senior Allied commanders knew that this could not be so. In an intelligence report compiled for 30 Corps headquarters on probable German tank losses between 6 June and 26 June 1944, it was noted that British tank crews had reported the destruction of nearly twice as many Tigers as Panzer IVs. Yet the report also notes that the author, a senior officer, knew that there were far more Panzer IVs in the area than Tigers.[295]

[293] Render and Tootal, *Tank Action*, 89.
[294] Delaforce, *The Black Bull*, 38.
[295] The officer who authored this report did not print his name, only signed it. The signature is illegible, only his rank (Brigadier) is clear.

One possible explanation comes from a comment on that intelligence report. It was noted that the Germans had been camouflaging their Panzer IVs to look like Tigers, thereby inflating the number of Tigers in the area.[296] I have not come across this particular practice in my research before, but the report may be highlighting a source of misidentification.

The Germans were not camouflaging Panzer IVs deliberately, but the later models of Panzer IV had additional armour plates mounted on frames on the sides of the hull and turret, known as *Schürzen* (Aprons). These were mounted as a defence against new, more advanced types of anti-tank projectiles.[297] The addition of *Schürzen* had the visual effect of masking the distinctive profile of the Panzer IV turret and make it look similar to that of the Tiger. The use of *Schürzen* was known to Allied forces prior to the Normandy landings. An article on *Schürzen* was published in the 16 December 1943 issues of *Tactical and Technical Trends*, an American intelligence magazine issued to troops. It was noted that the use of these additional armour plates 'would make the identification of a tank more difficult, except at short ranges'.[298] Allied tank crews were already primed to see a Tiger around every corner thanks to its reputation. Under the stress of battle, it is possible that Allied tank crews were mistaking the smaller panzers equipped with *Schürzen* for Tigers.

The Tiger was the tank that Allied tank crews least wanted to see on the battlefield, and for very good reason. The Tiger could still out-range most Allied tanks and guns. Allied tank crews were sure that they were everywhere. Allied troops were misidentifying all manner of German tanks as Tigers, perhaps as a result of the application of *Schürzen*, and giving attributes of the Tiger to other German tanks. This demonstrates that the Tiger made a very strong and lasting impression on Allied troops. The Tiger changed the way that Allied

[296] 30 CORPS INTELLIGENCE SUMMARY No.430, Based on Information received op to 262359B (D plus 20), 4.
[297] Perret, *Panzerkapmofwagen IV*, 8.
[298] "Armour Skirting on German Tanks", *Tactical and Technical Trends*, 16 December, 1943, 11.

troops looked at all German tanks, to the point that every German tank was potentially viewed as a Tiger.

Panzer IV special without Schürzen

Panzer IV special with Schürzen installed

Tiger

Figure 32: Comparison between Panzer IVs with and without Schürzen and the Tiger. Author's collection.

The Tiger in media and politics

The impact of the Tiger on the Allies was not limited to the battlefield. Troops and civilians read about the Tiger in their newspapers. The Tiger was also discussed in public by politicians. The newspaper media was not entirely sure on how to approach the Tiger. Newspapers tended to play down the threat posed by the Tiger to Allied tanks. Yet newspapers also presented the Tiger as the new standard for Allied equipment to beat, and contributed to the already pervasive idea that Tigers were everywhere. The Tiger was a hot topic in Parliament, but in Congress is was largely dismissed until the technological disparity between American tanks and the Tiger was too great to ignore.

In considering the impact of the Tiger on the press, it is important to remember that there were censorship laws in place that the press had to navigate, though both British and American journalists largely complied with the censors. In Britain, the government operated a voluntary censorship regime. But the government reserved powers to shut down newspapers that violated what it considered to be acceptable. These powers were rarely used, as the mainstream press generally complied with the censorship regulations. However, the British press were not afraid to criticise the government for any misstep and the continually pushed the line of what was acceptable.[299] American journalists also tended toward self-censorship, which was influenced by two main factors. The first was that many journalists believed in the justness of the war against Nazi Germany. Many journalists were also embedded with troops, and developed a deep comradery with the soldiers about whom they were writing. Journalists were proud to report on American accomplishments. The second was more practical in nature. Many journalists opted to cooperate because

[299] Aaron Goldman, "Press Freedom in Britian During World War II", *Journalism History* 22:4 (1997), 154.

were heavily dependent on the military for access to transport, communication and, above all, troops to interview.[300] This tendency to cooperate with the military did not mean that everything the journalists sent back home was all good news. If things were not going well or there was a serious problem, American journalists did not hesitate to write about it.[301]

However, this tendency to self-censor does make it difficult to determine the true views of the journalists concerned. Did they downplay the peril of the Tiger because they really did not believe it to be dangerous? Perhaps they were not even thinking about the Tiger and simply reporting on what troops told them. However, there are a number of contradictions in the portrayal of the Tiger in the press that suggest that there were underlying concerns. For a tank that was not supposed to be all that dangerous, it is odd that it is the standard against which new Allied equipment is measured. The number of times that the Tiger is singled out simply for its existence on a battlefield is remarkable. No other German tank was treated in this way, which contradicts the assertion of the journalists that it was just another tank.

The number of Allied newspaper articles that mention Tigers is striking. The mere rumour of a Tiger on the battlefield was enough to note that Tigers were present in battlefield reports. This may have implied that there were more Tigers in the area than there actually were. Stories including Tigers appeared more frequently in the main American service newspaper, *Stars and Stripes*, than its British and Commonwealth equivalents. The first appearance of the Tiger in *Stars and Stripes* occurred on 6 February 1943, when it was reported that British anti-tank guns had knocked out a Tiger.[302] In my research, I have found

[300] Steven Casey, *The War Beat, Europe: The American Media at War Against Nazi Germany*, (New York: Oxford University Press, 2017), 348-349.
[301] Casey, *The War Beat, Europe*, 349.
[302] 'British Six-Pounders Knock Out 52-Tonner', *The Stars and Stripes*, 6 February 1943, 4.

no British service newspaper articles that referred to the Tiger at such an early date. Between September 1943 and March 1945, *Stars and Stripes* ran no fewer than 23 articles in which Tigers were discussed in the context of battle reports. During the same period, the British newspapers *Union Jack* and *Eighth Army News*, and the Canadian newspaper, *The Maple Leaf*, published a combined total of only 19 articles that included Tigers. The earliest reports from *Stars and Stripes* contained a description of the dimensions of the Tiger, some of which were based on incomplete information. For example, an article of 14 February 1943 claimed that the Tiger's frontal armour was 10 inches thick, when the actual figure was four inches.[303] However, by the end of February the reported dimensions were correct.[304] Allied soldiers could visualise the size of the Tiger early on, even if they had never seen one. The destruction of Tigers was a common theme in these early *Stars and Stripes*' reports. On 3 March 1943, the *Stars and Stripes* made a point of mentioning that, during an engagement in Tunisia, a Tiger was among the 24 German tanks that had been knocked out by the Allies.[305] A similar report was published on 6 May.[306]

There was a lull in combat between the end of the Tunisian campaign in May and the invasion of Sicily in July, so there is a corresponding lack of Tiger reports in that period. Tiger sightings resumed when Allied forces landed in Sicily. On 14 July 1943, *Stars and Stripes* reported that a large number of enemy tanks had been destroyed, and some of them might have been Tigers.[307]

During the campaigns in Southern Italy, one *Stars and Stripes* article stated that, between the end of July and the beginning of September 1943, 500 Tigers had reportedly

[303] 'Nazis Hurling New Weapons Into Battle to Hold Tunisia', *The Stars and Stripes*, 15 February, 1943, 1.
[304] 'Mark Six Is 55 Tons, Shell Three Feet Long', *The Star and Stripes*, 25 February, 1943, 4.
[305] 'Allies Take Offensive on Tunisian Fronts; Rommel Is Repulsed', *The Stars and Stripes*, 3 March 1943, 1.
[306] 'Axis Defense Seems Shattered; Ferryville Menaced', *The Stars and Stripes*, 6 May 1943, 1.
[307] 'Landings Reported Near Catania', *The Stars and Stripes*, 14 July 1943, 1.

been shipped to Italy.[308] The research of German tank specialists Jentz and Doyle shows that only 164 Tigers were produced during this time period. In total, only 500 Tigers had been produced by this stage of the war.[309] Taking into account combat losses and the fact that Tigers were also being sent to the Eastern Front, the number of Tigers sent to Italy would certainly have been much smaller than 500. It is likely that *Stars and Stripes* was in fact reporting on the number of tanks of all kinds that had been shipped to Italy. The journalist does not say where he got that information from, so I cannot ascertain how he came to the conclusion that the 500 tanks were Tigers. However, this is an example of another phenomena I will look at later—the conflation by Allied observers of 'German tanks' and 'Tigers'.

British service newspapers were more conservative, and more accurate, in their reporting of Tiger numbers. German tanks like the Panzer IV were more frequently referred to than the Tiger, as they were more common. A report on American actions in Cherbourg in the 18 June 1944 issue of *Eighth Army News* only mentions Panzer IV's and Panthers.[310] A similar article in the *Maple Leaf* of 15 June 1944 notes that the Germans were 'using mainly Mark IV tanks, supported by a number of Tigers'.[311] The *Union Jack*, meanwhile, reported on 1 August 1944 that, in the fighting around Florence, a company of New Zealand troops came across one Tiger and four Panzer IVs.[312] British newspapers make it clear that the Tigers were few in number and that the bulk of the German tanks was made up of other vehicles. Indeed, there were occasions when British service papers explicitly pointed out that not every German tank was a Tiger. On 21 December 1943, the *Eighth Army News* stressed that:

[308] '5th Army Hurls Back Nazi Lines In Bitter Fight', *The Stars and Stripes* 14 September 1943, 4.
[309] Jentz & Doyle, Tiger I, p.13
[310] 'Cherbourg Cut Off', *Eighth Army News*, 19 June, 1944, 1.
[311] 'Brigade Earns Special Praise', *The Maple Leaf (Italy Edition)*, 15 June, 1944, 4.
[312] Bill Taylor, 'A Bulldozer joined in', *Union Jack (Central Italy Edition)*, 1 August, 1944, 3.

> Since the start of the Sangro battle forty-three German tanks have been destroyed, thirty of these being Mark IV's—the heaviest in use by the enemy in Italy. The Mark IV tanks should not be confused with the German Panther and Tiger tanks.[313]

This statement is true. The first of the Tiger battalions sent to Italy was *sPzAbt.* 508, which was deployed to Italy in January 1944 to counter the Allied landings at Anzio.[314] This report implies that other tanks were being mistaken for Tigers long before the Normandy landings, and that it was a cause for concern.

Like the *Eighth Army News*, the *Maple Leaf* also reported on the absence of Tigers. In an article about a Canadian action in Northern Italy on 5 January 1945, it was noted that Tigers were reported in the area, but none had been encountered.[315] The 3 July 1944 edition of *The Maple Leaf* related an incident where Lieutenant Nigel Taylor 'found his Sherman confronted by what he at first took to be a Tiger'.[316] The article does not mention what kind of tank it turned out to be. But because the encounter ended with both tanks knocked out, it was most likely to be a Panzer IV, rather than a Tiger. There appears to have been an awareness among British correspondents that there was a problem with calling every German tank a Tiger. However, British journalists never openly comment on troop anxieties over the Tiger and the effect of seeing Tigers 'everywhere' that this anxiety created. The reason why journalists did not use their platform to make this important point has not been recorded.

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[313] 'Our Tanks Force Germans Back', *Eighth Army News*, 21 December, 1943, 1.
[314] Jentz & Doyle, Tiger I, p.33.
[315] Howard Rutsey, 'Armor Points Way To Gain', *The Maple Leaf (Italy Edition)*, 5 January, 1945, 1.
[316] H.J. Daly, 'BCD's Impressive In Front Line Debut', *The Maple Leaf (Italy Edition)*, 3 July, 1944, 2.

Despite their efforts to stop the myth that Tigers were everywhere, both British and Commonwealth papers, as well as *Stars and* Stripes, often mixed up the identity of other tanks with the Tiger. In other words, correspondents and editors were doing exactly what they were warning Allied servicemen not to do. One common mistake was to identify

Out For Duration

CANADIAN soldiers inspect a Tiger whose teeth have been permanently pulled. This German heavy is one of the enemy tanks put out of action in the battles on the Adriatic front.

Figure : Panzer IV identified as a Tiger from The Maple Leaf, 3 March 1944.

U.S. infantry in top picture use tanks as cover in attack at Periers. In lower picure, First Army troops go in for the kill after knocking out a German Tiger (Mark VI) tank.

Figure : Panther identified as a Tiger from Stars and Stripes, 26 July 1944.

But it is the enemy's tanks that are getting the worst of it. This German Tiger Tank on the right, for instance, was taking cover beside a house when our artillery fire found it and destroyed it.

●

Through it all the work of mercy goes on. Below an Italian village priest brings in refugees from areas at present occupied by German troops near Faenza.

Figure : Panzer IV identified as a Tiger from Union Jack, 13 January 1945.

photographs of any sort of knocked-out panzer as a Tiger. An example of this comes from the 3 March 1944 issue of *The Maple Leaf*. The front page spread includes a photo of a knocked out German tank, which it claims is a Tiger.[317] However, the tank in question is a Panzer IV. The 13 January 1945 issue of *Union Jack* also has a similar photograph, in which a knocked out Panzer IV is labelled as a Tiger tank.[318] The Tiger and the Panzer IV do share a similar design aesthetics. It is reasonable to assume that an editor behind the lines, who is not familiar with tanks, could mistake the two. However, the profiles of the Panther and the Tiger were very different. Mistaking a Panther for a Tiger should be more difficult, but it did happen. For example, the 26 July 1944 issue of *Stars and Stripes* contained a photo of a knocked-out panzer that is very clearly a Panther, but the text identifies it as a Mark VI Tiger.[319]

One particularly interesting piece of misreporting is what appears to be the creation of a fictional Tiger tank that was separate from the real Tiger. The 5 July 1944 issue of *The Maple Leaf* contained this closing paragraph on Allied actions around the Musone River on the Italian Adriatic coast: 'An Indian Army correspondent reports that because Tiger tanks have failed to stop the Allied advance in Italy, the Germans have brought in the 504th Tank Battalion from France, equipped with Mark VI's, to oppose Fifth Army troops.'[320] The report must be referring to *sPzAbt.* 504, which was transferred to Italy in June.[321] In this case, the 'Tiger' tank was not good enough for the task at hand. However, the Mark VI was simply an alternative designation of the Tiger tank. There is possibly more misidentification in this passage. Maybe the correspondent was referring to Panthers or Panzer IVs. However, that

[317] 'Out For Duration', *The Maple Leaf*, 3 March, 1944, 1.
[318] Untitled photograph, *Union Jack (Italy/Western Italy Edition)*, 13 January, 1945, 2.
[319] 'Yanks, Allies Renew Attacks', *The Stars and Stripes*, 26 July, 1944, 4.
[320] 'Germans Shift Italy Defences', *The Maple Leaf*, 5 July, 1944, 4.
[321] Jentz & Doyle, Tiger I, p.24.

would indicate that the term 'Tiger' had become almost synonymous with 'panzer' as a term for a German tank, until positively identified.

The press had a problem with identifying too many Tigers on the battlefield. This happened in three main ways. The first was reporting every instance of a Tiger taking part in a battle. The second was taking the rumour of a Tiger being in the area and writing it into the story. The final way was to identify other tanks as Tigers. This had the effect of creating the impression that there were far more Tigers present than there actually were.

Newspapers and official sources: playing down the threat

While Allied newspapers were inflating Tiger numbers, they were also telling the troops that it was not a big threat to Allied tanks. As early as February 1943, *Stars and Stripes* was already reporting that the Tiger, while a formidable machine, was not particularly revolutionary. In fact, the Allies were already producing counters for the Tiger.[322] It was therefore not a particular problem for the Army.[323] The *Eighth Army News* ran an article on 18 April 1944 that claimed that the Tiger 'has not been, in our experience, any real improvement over the old original Mark III and IV'.[324] By equating the Tiger with older models of German tank, Allied tanks crews were being told that they had the right tools to destroy the Tiger. However, experience fighting the Tiger meant that Allied tank crews were aware that what the newspapers were claiming was not true.

Civilian Newspapers, like their service counterparts, soon began to run articles that downplayed the threat posed by the Tiger. *The Evening Star* carried a story on 5 February

[322] Edward Kennedy, 'Two Effective Weapons Joined in Mark Sixes', *The Stars and Stripes*, 26 February, 1943, 4.
[323] Frank Carey 'US Weapons Top the Axis' Best', *The Stars and Stripes*, 29 June, 1943, 2.
[324] Alexander Clifford, 'Hitler's Secret Weapons Have Been Flops', *Eighth Army News*, 18 April, 1944, 2.

1943 about how British 6-pounders had knocked out a Tiger.[325] On the same day, an article in the *New York Times* reported that experts did not think much of the Tiger, which—they claimed—was really a defensive weapon.[326] The *Wilmington Morning Star* of North Carolina ran an article on 12 April 1943 which asserted that the British had known all about the Tiger 18 months beforehand, and that measures were already in place to defeat it.[327] In fact, the British did not know about the Tiger that far in advance. According to F.H. Hinsley, author of *British Intelligence in the Second World War,* the first time the British became aware of the existence of the Tiger was in September 1942, just two months before the Allies encountered it on the battlefield.[328] Moreover, all that the British knew in advance about the Tiger was that it was too big for the port facilities in North Africa to handle. The British had received no advance warning of the Tiger's capabilities.

American civilian newspapers also frequently reported on the Tigers' appearance in Tunisia, but they claimed that, the Tiger—despite its size—was not a serious threat. The first substantial articles on the Tiger appeared in the press on 1 February 1943. The *New York Times* and *The Evening Star* of Washington D.C. ran stories on the 'new monster tanks called Tigers' that the Germans were reported to have shipped to Tunisia.[329] They announced some incorrect details regarding the tank's armour. *The Evening Star* added that German prisoners were told that the tank was invincible and could not be knocked out by Allied guns. Both newspapers also stated that Tigers were not a menace. A number of stories described how the crews of tanks had faced off against multiple Tiger tanks and come out

[325] Lewis Hawkins, '52-Ton German Tank Pierced by 4 Shells In Tunisian Fighting', *The Evening Star*, 5 February, 1943, 16.
[326] 'Experts Discount Nazi Mark VI Tank', *The New York Times*, 5 February,1943, 3.
[327] George Tucker, 'British Experts Beat Nazis With Espionage', *Wilmington Morning Star*, 12 April, 1943, 3.
[328] F.H. Hinsley, *British Intelligence in the Second World War: Its Influence on Strategy and Operations Volume Two*, (London: Her Majesty's Stationary Office, 1981), 715.
[329] 'Germans In Tunisia Get Monster Tanks', *The New York Times*, 1 February, 1943, 4; Ross Munro, 'Nazis Displaying 62-Ton Tanks To Bolster morale in Tunisia', *The Evening Star*, 1 February, 1943, 2.

on top. For the newspapers at home, Shermans were the best tank in the world. Debate on the Sherman tank and its effectiveness against heavy tanks like the Tiger did not happen until very late in the war.

British civilian newspapers regularly discussed the Tiger during the Tunisian campaign. The *Courier and Advertiser* from Dundee, Scotland, described the first clashes of the invincible Tiger tanks and British forces on 2 February 1943. The article made a point of noting, however, that two of the Tigers had been knocked out by British fire.[330] On 9 March 1943, the *Daily Mail* reported on a German attack by Tigers on a British position in Tunisia. According to the article, British artillery was so good at smashing up Tigers that British tanks were not even needed.[331] Articles in British papers do not represent the Tiger as the menace that British soldiers considered it to be. Details of the Tiger were sparse as well. At most, the size of the gun was reported. On 16 February, the *Gloucestershire Echo* reported on a question in Parliament, where we learn the Tiger has an 88mm gun.[332] The Tiger does not appear very often in British newspapers after the conclusion of the Tunisian campaign. Where it does crop up, it is usually in the context—as we shall see below—of reports on debates in the House of Commons. This will be examined later in the chapter.

The overall superiority of American tanks over their German counterparts was a topic that was regularly mentioned in the United States Congress. For most of the war the opinion of Congress was that American tanks were the best in the world. In early February, Henry Lodge, Republican Senator for Massachusetts, told the Senate that American tanks were superior to those of all other countries.[333] In a speech of 19 June 1943, Democrat Joe

[330] "British Halt Arnim's 'tiger' Tanks." *Courier and advertiser* [Dundee, Scotland] 2 February 1943, 2.
[331] "British Gunners Smashed Rommel's Tiger Tanks." *Daily Mail* [Hull, England] 9 Marc 1943, 1.
[332] "British Tanks in Tunisia." *Gloucestershire echo* [Gloucester, England] 16 February 1943, 6.
[333] Congressional Record Volume 89 Part 1 (January 6, 1943 to March 1, 1943), 606.

Starnes of Alabama stated in the House of Representatives that the M4 was superior in firepower to its contemporaries.[334] On 9 June 1944, Democratic Senator Robert Reynolds of North Carolina read a letter from General Jacob Devers, who was in command of the American army in Italy at the time. Devers praised American tanks and how much better they are than those of the Germans.[335] This would appear to be at odds with Devers' efforts to get the 76mm Sherman and the Pershing into service that was discussed in the chapter two. This does not necessarily mean that he thought that everything was fine. Devers ascribed much of the Allies' success to other arms of service, such as the artillery and the Air Force. That the letter could be read in Congress and accepted at face value shows that the disagreements within the army about tanks were very much behind closed doors. The public was not privy to the arguments over American tanks, and the Army would appear to have wanted to keep it that way. This letter was more of a public relations exercise, to reassure the politicians at home that they were winning the war, while arguing for better equipment in the background.

The Tiger was rarely brought up in debate in Congress. I have found a handful of references published as extended remarks in the *Appendix to the Congressional Record*. On 18 November 1943, Republican Senator Alexander Wiley of Wisconsin published an address he made to the National Founders Association the previous day. He said that the Germans were producing weapons that were, in some cases, better than American weapons. The Tiger was one of them.[336] On 1 December 1943, Republican Senator James Davis of Pennsylvania entered a speech given by the Governor of Pennsylvania at the Washington and Jefferson College on 20 November. In the Governor's speech, he mentioned that the

[334] Congressional Record Volume 89 Part 5 (June 15, 1943 to July 6, 1943), 6159.
[335] Congressional Record Volume 90 Part 4 (May 12, 1944 to June 12, 1944), 5592.
[336] Appendix to the Congressional Record Volume 89 Part 12 (October 15, 1943 to December 21, 1943), 4995.

Germans were still producing large quantities of new weapons such as the Tiger.[337] Neither of these references are critical of American tanks or the process that designed them. The mention of the Tiger in these references was more of a rhetorical device, to underscore that the war was not yet over and America needed to keep producing to win.

Downplaying the threat the Tiger posed to Allied tanks was one method that was used to reassure troops and civilians alike. The press regularly presented the Tiger as no real improvement over the Panzer III and Panzer IV, and portrayed the current range of Allied weaponry as being perfectly adequate to deal with the Tiger. Congress took it for granted that American tanks were superior to any tank the Germans could field. This view would not be challenged until very late in the war.

Newspapers and official sources: playing up Allied technology and courage

The Tiger was also used as means to demonstrate the superiority of new Allied equipment coming into service. Each new Allied tank or anti-tank gun was presented as an answer to the Tiger. In October 1943, for example, official information about the British 17-pounder anti-tank gun was released. Both the *Eighth Army News* and *Union Jack* released articles that described the 17-pounder as 'the complete answer to the Tiger'.[338] British Civilian newspapers also reported on this press release. The wording was very much the same as the service newspapers, with emphasis on how easily the 17-pounder could defeat the Tiger. The *Western Daily Press and Bristol Mirror* ran the headline 'the complete answer to the "Tiger" tank', and the *Press and Journal* from Aberdeen, Scotland, described the 17-

[337] Appendix to the Congressional Record Volume 89 Part 12 (October 15, 1943 to December 21, 1943), 5220.
[338] 'Autumn Fashions For Death', *Eighth Army News*, 21 October, 1943, 3; 'And Now The 17-Pdr!', *Union Jack* , 12 October, 1943, 1. This line is used verbatim in both *Eighth Army News* and *Union Jack* articles.

pounder as being able to 'knock out the German "Tiger" tank with ease'.[339] The release of information about the Sherman Firefly on 18 July 1944 prompted favourable comparisons to the Tiger. The articles in the *Courier and Advertiser* and *Press and Journal* both described the Firefly as more manoeuvrable than the Tiger and the 17-pounder as a match for the 88mm.[340] This is in contradiction to the stories in which existing Allied tanks, guns and artillery were perfectly adequate for destroying Tigers. By using the Tiger as the measure for new Allied equipment, the newspapers were implying that the Tiger was, in fact, a real threat.

The 2 March 1943 issue of *Stars and Stripes* ran a story on a new vehicle coming into service, the M10. The M10 was reported to be able to 'trade blows on an even basis with the much discussed 88mm weapons found on the most recent German tanks in North Africa' (in other words, the Tiger).[341] In November, the same vehicle was reputed to be able to put a round through 'any German tank, including the 40-ton Mark VI, from stem to stern'.[342] None of these statements was true. The M10 carried less armour than the Sherman, so in no way could it trade blows with a Tiger.[343] It was armed with a 3-inch gun that had properties very similar to the 76mm gun discussed in the chapter two.

After the Tunisian campaign, many of the references to the Tiger were embedded in tales of derring-do. They showed off the courage of American soldiers under fire. *The Wilmington Morning Star* ran a short article on 10 July 1944 about a reconnaissance patrol in Italy that had run into a Tiger. Instead of withdrawing, the patrol had been able to blow

[339] "17-pounder Proves a Killer!" *Western Daily Press and Bristol Mirror* [Yeovil, England] 11 October 1943, 1.
[340] "'Firefly' Can Beat the 'Tiger." *Courier and advertiser* [Dundee, Scotland] 18 July 1944, 3.
[341] 'Tank Destroyer Matches Nazi 88'. *The Stars and Stripes*, 2 March, 1943, 1.
[342] 'Hell on Treads', *The Stars and Stripes*, 11 November, 1943, 6.
[343] Steven Zaloga, *M10 andM36 Tank Destroyers 1942-1953*, (Oxford: Osprey, 2002), 23

up the Tiger up with a bazooka.[344] On 10 March 1944, *The Evening Star* reported an incident at Anzio where the crew of a bogged-down American M10 had decided to fight it out against advancing Tiger tanks.[345] The Americans allegedly took out two Tigers before they had to abandon the tank, and only then because the explosion one of the Tigers had injured one of the American crewmen. This is another example in which the threat posed by the Tiger is played down. The implicit message is that existing American tanks and weapons were more than adequate to deal with the new German tank. However, the encouraging effect this messaging was supposed to have on troops did not work, as I shall discuss later.

These sort of articles on Allied courage in the face of the Tiger also appeared in British civilian newspapers. The *Press and Journal* ran a story on 19 June 1944 about a British tank troop which had stalked and destroyed a pair of Tigers in Villers-Bocage. One of the Tigers tried to break out of the town, but in the attempt a 75mm shell 'cracked' it, and a second shot set it alight. The article does describe the event as a very tense and harrowing battle, but existing British equipment is presented as adequate against the Tiger.[346] The *Citizen* published a story on 12 August 1944 about an American Sherman which rammed a Tiger, then blew it apart from point blank range with its 75mm gun.[347] *The Evening Telegraph and Post* from Dundee, Scotland, ran a report on 22 July 1944 about a British Sherman ramming a Tiger and knocking it on its side.[348]

It is questionable if the German tanks in these stories were actually Tigers. The last story sounds particularly ridiculous. A 30-ton Sherman simply did not have the capability to bowl over a 56-ton Tiger. Assuming the event did take place, the tank was more than likely

[344] Kenneth L. Dixon 'Pickups From The Front Lines', *Wilmington Morning Star*, 10 July , 1944, 6.
[345] 'Hux and Owens Members of Tank Destroyer Battalion', *Roanoke Rapids Herald*, 18 January, 1945, 6.
[346] Tom Treanor, "Tiger Tanks Stalked and Smashed." *Press and journal* [Aberdeen, Scotland] 19 June 1944, 3.
[347] Robert Reuben, "Rammed Tiger Tank Head On." *Citizen* [Gloucester, England] 12 August 1944, 5.
[348] "The Tiger Toppled Over." *Evening Telegraph and Post* [Dundee, Scotland] 22 July 1944, 1.

to be a Panzer IV misidentified as a Tiger. However, whether or not they were Tigers is immaterial. Tigers were reported as no big threat, and these stories served to reinforce that perception to reassure both readers at home and the troops that the Allied armies had what they needed to defeat the Tiger.

Newspapers and official sources: Silence and stonewalling

Playing down the threat of the Tiger and talking up Allied equipment and courage did not have the desired effect of downplaying the Tiger as a threat. Allied tank crews were still critical of the tanks they were using when they were coming up against the Tiger. British papers tended to omit such criticism, but the *Stars and Stripes* did not. Frustrations over the disparity in tank performance boiled over in early 1945, and the troops' anger caught the attention of the press. On 5 January 1945, the *New York Times* published the last of a three-part series titled 'The German Blow', which analysed the recent fighting in the Ardennes forest.[349] These articles were written by Hansen W. Baldwin, the *New York Times*' resident military affairs editor and a respected war correspondent. In his article, Baldwin explained that the initial German success had in part been due to the superiority of their tanks. According to Baldwin, the latest German tanks possessed better armour, better guns, and were far more mobile that their detractors claimed. He noted that, while troops at the front knew about this all too well, it was taken for granted at home that American troops were supplied with the best equipment in the world. Baldwin urged that Congress should investigate how this technological gap had occurred, so it could be prevented in the future.

[349] Hanson W. Baldwin, 'The German Blow – III', *The New York Times*, 5 January, 1945, 4.

This article did produce discussion on American tanks, though much of it was critical of the accusation of German superiority. The 5 February 1945 issue of the *Evening Star* carried an article that claimed there was nothing inferior about American tanks, the combat records of which showed that they were superior to German tanks.[350] The Florida *Key West Citizen* considered the entire debate to be nonsensical: 'The American tank is as good as any'.[351] For the authors of these articles, the fact that the Allies were winning was proof enough of the effectiveness of Allied tanks. It should also be noted that the main sources of information for these articles were statements made by generals, rather than interviews with the troops themselves, which is where Baldwin was sourcing his information.

Baldwin's article caused enough of a fuss that even the *Stars and Stripes*, printed by the Army for their troops, reported on the controversy. On 8 January, an article was published that paraphrased Baldwin's criticisms, such as their superior guns and heavier armour.[352] Baldwin was referenced again in *Stars and Stripes* on 7 February, where a number of interviews with soldiers were quoted in which they stated that the Germans had better tanks.[353]

Letters to the editor also appeared around this time. A letter from Sergeant 'Any Tanker' was published on 23 February. It quite explicitly stated that the Tiger was much better than the Sherman, and that tank crews would prefer something with more armour and a 90mm gun.[354] Tank crews were telling journalists of their criticisms in the hope that something would be done about it. Ann Stringer, a correspondent with the United Press, wrote about an interview she conducted with some soldiers on 7 March 1945:

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[350] 'American Weapons', *The Evening Star*, 5 February, 1945, 6.
[351] 'Nonsense About Tanks', *The Key West Citizen*, 23 March, 1945, 2.
[352] Carl Larsen, 'U.S. Tanks Inferior, Hanson Baldwin Charges', *The Stars and Stripes*, 8 January, 1945, 2.
[353] 'Says Nazi Tanks Better, U.S. Beats By Numbers', *The Stars and Stripes*, 7 February, 1945, 3.
[354] 'Our Tanks', *The Stars and Stripes*, 23 February, 1945, 2.

> American tank crews who have pounded their way from the Roer to the Rhine are proud of their units and proud of their record advances. But when they talk about their tanks it is different.
>
> "Tell them at home about our tanks," said S/Sgt. Robert Earley, of Minnesota, who commanded the first tank to enter Cologne. "Tell them our tanks are not worth a drop of water on a hot stove. Tell them we want tanks to fight with, and not just to drive over the countryside."[355]

This episode provided a unique opportunity for *Stars and Stripes* which, prior to Hansen's article, did not publish open criticism of American tanks. Clearly, troops felt that their anxieties over the Tiger were being ignored, and here was a chance to air troop concerns in public. This spotlight on American tanks did draw an official response. But it was not the response for which the troops were hoping.

On 19 March 1945, General George Patton, commander of the U.S. 3rd Army, wrote a letter to Lieutenant General Thomas Handy, Deputy Chief of Staff of the Army, which blasted critics of American tanks. The letter was released to the public on 27 March. Citing the difference in tanks lost (2,287 German to 1,136 American), Patton strongly rejected the assertion that American tanks were inferior to those of the Germans. He did admit that, in a tank-on-tank duel, the Tiger was better. He then countered that by stating that tanks crews who got themselves into a head-to-head duel with Tigers were not adopting the correct tactics. American tanks were supposed to flank around and attack from the rear.[356] Patton

[355] Ann Stringer, 'Tankers Want Better Tanks Than Jerry's', *The Stars and Stripes,* 8 March, 1945.
[356] 'U.S. Tanks Best On West Front, Patton Declares'. *The Stars and Stripes*, 28 March, 1945, 2.

ignored the fact that the Tiger outranged the Sherman by a huge margin, so even getting around to the rear was a problem. This letter appears to have been the last official word on the subject. After Patton's letter was released to the public, no further criticism of American tanks was published in *Stars and Stripes.* It is unlikely that critics of American tanks changed their opinion because of the letter. Further criticism of American tanks did not appear in the civilian newspapers after the release of Patton's letter either. The authority that the letter gave to supporters of American tanks is best summed up by the closing paragraph of *The Wilmington Morning Star's* 31 March article:

> Since General Patton has devoted much of his military career to tank operations and probably knows their capacity to "take it" as well if not better than any Allied commander, certainly better than any untrained observer, we may safely conclude that American tanks are all that he claims for them. Certainly they are doing their part in the present battle.[357]

The discontent surrounding American tanks that surfaced in the newspapers also created some concern within Congress. Republican Clare Luce of Connecticut gave her report on a House Military Affairs Committee tour of Europe on 18 January 1945. She stated that the Army lacked a heavy tank to counter the Tiger. However, this was not considered a serious problem.[358] On 25 January, Democrat Overton Brooks of Louisiana also gave a report to the House on the committee trip. He was asked by Republican John Robsion of Kentucky specifically about the lack of an American heavy tank. Brooks' reply was that the American

[357] 'Our Tanks Best', *The Wilmington Morning Star*, 31 March, 1945, 4.
[358] Congressional Record Volume 91 Part 1 (January 3, 1945 to February 23, 1945), 350.

tanks were fine, but that the Army was in the process of producing a heavy tank to match the Tiger.[359] This answer appears to have satisfied Robsion. Shortages of artillery ammunition were a bigger cause for concern in these reports.

Stars and Stripes reported on 8 March 1945 that Republican Senators Harold Burton of Ohio and Homer Ferguson of Michigan were pressing for an investigation into the quality of American tanks.[360] However, I have found no evidence in the *Congressional Record* that this effort got anywhere. Patton's letter appears to have quashed further debate on the topic, as it did for the newspapers. In a Senate debate on 27 March 1945, Robsion stated that: 'There are those who claim that German tanks are superior to ours; but General Patton, the great tank fighter in this war, says the American tank is superior to any tank he has met with or seen in any country in Europe.'[361] The authority of Patton was called on to end the debate, and it was this authority that appears to have been used as an answer to all further enquiries. There was one final enquiry into the state of American tanks make on 17 April 1945 by J. Buell Snyder, Democratic Congressman of Pennsylvania. He wrote to the War Department with a query about American tanks. In return, he was sent a copy of General Patton's letter.[362] This was reason enough for him to pursue the matter no further.

British civilian newspapers did not have much to say about the Tiger, but not because of the Tiger itself. During 1941, British civilian newspapers had often run stories about British tanks. For example, on 10 January 1941 *The Times* published an article about

[359] Congressional Record Volume 91 Part 1 (January 3, 1945 to February 23, 1945), 507.
[360] 'Senate May Investigate', *The Stars and Stripes*, 8 March, 1945, 1.
[361] Congressional Record, Volume 91 Part 3 (March 27, 1945 to May 4, 1945), 2841.
[362] Congressional Record, Volume 91 Part 3 (March 27, 1945 to May 4, 1945), 3465.

how British tanks were superior to German tanks.[363] On 1 December 1941, the *Courier and Advertiser* ran an article with the title 'Stalin likes our tanks, wants more'.[364]

In the second half of 1942, Government sourced tanks stories disappeared from the British press, and this is likely because of the response to the Battle of Gazala. In June 1942 British forces in North Africa suffered a catastrophic defeat in the Battle of Gazala. A massive tank battle took place on 12 and 13 June, in which the British suffered heavy losses and were forced to withdraw deep into Egypt.[365] On 21 June the strategically important port city of Tobruk, along with its 33,000 strong garrison, surrendered to the Germans.[366] In the wake of this disaster, serious questions about the quality of British tanks were raised in Parliament and published in newspapers. *The Times* of London published much of this kind of correspondence. In June and July 1942, a flurry of letters and editorials appeared which attempted to identify the problem with British tanks and give possible solutions. On 27 June 1942, for instance, *The Times* published an editorial which blamed the defeat on a lack of imagination and the failure to innovate.[367] According to the editorial, the British Army was set up to fight old wars, so when the enemy brought something new to the table it always came as a surprise. A couple of letters published on the same day supported this theory. Sydney Clive, Marshall of the Diplomatic Corps, wrote that the press had been writing great things about the 6-pounder gun since 1941, yet no tank appeared to be designed to mount it.[368] T.C.L Westbrook, who worked for the War Office,[369] wrote that he had arranged for a

[363] OUR MILITARY CORRESPONDENT, "The Tank In Modern Warfare." *Times* [London, England] 10 January 1941, 2.
[364] "Stalin Likes Our Tanks, Wants More." *Courier and advertiser* [Dundee, Scotland] 1 December 1941.
[365] Ken Ford, *Gazala 1942*, 73.
[366] Ken Ford, *Gazala 1942*, 73.
[367] "The Road To Victory." *Times* [London, England] 27 June 1942, 5.
[368] G. SIDNEY CLIVE, "Tanks And Guns." *Times* [London, England] 27 June 1942, 5.
[369] 'Ministry of Aircraft Production', Hansard, House of Commons debate 8 July 1942, vol 381 column 749.

mock-up of a self-propelled 6-pounder to be built in 1941, yet nothing had been done to develop the idea.[370] This criticism was correct. The example of the 3-inch anti-aircraft gun and the half-hearted methods to mount that on a tank described in chapter two was similar. However, this 6-pounder project never got past the design phase. Both men identified excessive red tape and indecision as key problems within the War Office and the Ministry of Supply.

Influential people were noticing problems in the design and development of British tanks, yet the Government's response was to stop talking about the problem in public. When a question about the Tiger tank was tabled in Parliament on 13 April 1943, the Government responded by stating: 'It is not in the public interest to disclose the date on which information about the German Tiger Tanks was first received by the War Office.'[371]

However, this silence did not prevent the circulation of stories about the superiority of German equipment. This can be seen later in the war in an editorial published in the Aberdeen *Press and Journal* on 1 January 1945. A few questions are posed in this article about the superiority of German technology. The article states that these were topics about which the public were talking, yet the Government was completely silent about them.[372] The Government's decision not to release public information did not stop the questions and criticisms coming.

The Battle of Gazala and the loss of Tobruk brought the quality of British tanks into Parliamentary debate. Sir John Wardlaw-Milne, Conservative MP for Kidderminster, pointed out that British tanks were well behind German ones, and were not as well-armed as the

[370] T. C. L. WESTBROOK, "Sir,-Just lately many confusing and con-." *Times* [London, England] 27 June 1942, 5.
[371] "Nazi Tiger Tanks." *Citizen* [Gloucester, England] 13 April 1943, 4.
[372] 'The London Letter', *Press and journal* [Aberdeen, Scotland] 4 January 1945, 2.

tanks that were used in World War I.[373] On 14 July, Ellis Smith, Labour MP for Stoke, replied to a statement given by Oliver Lyttelton, the Minister for Production. In this reply Smith stated that evidently no lessons were learned from defeat in France, as the Germans have the better tanks and anti-tank guns.[374]

During these early debates, the Government did attempt to stand up for British tanks. Part of Churchill's defence of British performance in June 1942 during the sitting on 2 July 1942 was that it took up to six months for equipment to reach troops in Africa from Britain. While that made it impossible for the very latest in developments to have been in the hands of troops, it reflected poorly on the ability for the British to future-proof their tanks at that stage.[375] Captain John Profumo, Conservative MP for Kettering and a serving officer in the Army, also defended British tanks in that debate by stating that all the German and British tanks had been designed before the war, and that British tanks had since been upgraded.[376] However, he failed to mention that German tanks were also receiving upgrades which were making them more effective than British tanks.

Sometime after the July debates, there appears to have been a change in the way that Government ministers answered questions about tanks. Instead of trying to defend British tanks, ministers either dodged the question or gave the bare minimum amount of information requested. This is most evident when the question involved the Tiger. MPs were asking the Government questions about the Tiger as soon as it appeared in Africa.

The Government's preferred answer was that it was 'not in the public interest' to discuss the question of tanks. This answer does seem to have some basis in a genuine

[373] 'Central Direction of the War', Hansard, House of Commons debate 1 July 1942, vol.381 columns 233-235.
[374] 'Production', Hansard, House of Commons debate 14 July 1942, vol. 381, column 1126.
[375] 'Central Direction of the War', Hansard, House of Commons debate 2 July 1942, vol. 381 column 600.
[376] 'Central Direction of the War', Hansard, House of Commons debate 2 July 1942, vol. 381 column 570.

concern that the Germans were getting information from public statements. On 7 July 1942, Sir Edward Keeling, Conservative MP for Twickenham, asked James Grigg, the Secretary of State for War, if the announcement of the six-pounder on 12 February had given the Germans enough warning to upgrade the armour of their tanks. While the German intelligence gathering efforts are beyond the scope of this thesis, it was unlikely that the Germans were responding to British developments. By this stage of the war, German tank development was primarily driven by events on the Eastern Front, as described in the previous chapter. However, refusing to release information because of the fear of giving away information to the enemy was a useful way to avoid answering awkward questions about British tanks.

This attitude extended to the way in which the Government released information about tanks to the public. In 1941, Government officials and Army officers were giving the speeches about British tanks that the press were printing in the newspapers. After the Gazala debacle, the Government appears to have decided that it was not in the public interest to comment on tanks at all, and tank stories disappear from British newspapers. Given the propensity of the British press to criticise the government, it is an understandable position. However, it was an utterly ineffective way to avoid the topic. This silence did not stop people from discussing the rumours about German tank superiority, as the *Press and Journal* editorial of 1 January 1945 shows. Nor did this stop MPs from pressing the Government on British tanks and its responses to German tanks. Questions about tanks continued to be asked in Parliament, and the Tiger became a focus for lack of response from the Government on the issue.

There were two main issues that arose pertaining to the Tiger. The first related to the existence of British tanks that were the equal of the Tiger. The second issue was getting permission for MPs to inspect one of the captured examples of a Tiger.

Questions about the British response to the Tiger began as soon as its existence became public knowledge. On 10 February 1943, Richard Stokes, Labour MP for Ipswich, asked the Minister of Supply, Andrew Duncan, if the British had a tank that was equal to the Tiger. Duncan dodged the question by stating it was not in the public interest to release that information.[377] On 7 March 1944, Stokes asked Grigg to what extent a lack of a British equivalent to the Tiger hindered the fighting in Anzio Bridgehead. Grigg again trotted out the line that it would not be in the public interest to release that information.[378]

The issue of access to captured Tigers arose in early 1944. The crux of the issue revolved around the fact that captured German tanks had been paraded publicly before. In the debate on 25 April 1944, Hammersley asked Grigg why he was refused permission to inspect the Tiger. Grigg replied that the answer the Prime Minister gave Stokes the previous week covered the question.[379] Stokes had asked the same question, and the Prime Minister gave a very evasive answer: 'after this year's campaign has reached a suitable phase it might be possible'.[380] Returning to Hammersley's question, Keeling entered the debate by stating that in the past Parliament had the opportunity to inspect tanks, even ones that were still secret.[381] One such exhibition was advertised in the Aberdeen *Press and Journal* on 3 October 1942. Not only were the latest Panzer III and IV tanks being shown off, a bevy of

[377] 'Tanks', Hansard, House of Commons debate 10 February 1943, vol. 386 columns 1318-1319.
[378] 'Tanks', Hansard, House of Commons debate 7 March 1944, vol. 397 column 1862.
[379] 'Tanks', Hansard, House of Commons debate 25 April 1944, vol. 399, column 610.
[380] 'Tanks', Hansard, House of Commons debate 18 April 1944, col 399, columns 23-24.
[381] 'Tanks', Hansard, House of Commons debate 25 April 1944, vol. 399, column 611.

British tanks were accompanying them as well.[382] In late 1943, a captured Tiger had gone around Britain on a war effort fundraising tour, so the refusal to let MPs inspect the Tiger appears pointless and petty.[383] Grigg abruptly ended the debate on this question by stating that this was the Prime Minister's decision, and he could not change it.

It is unclear what the Government was trying to hide with its stonewalling. The dimensions of the Tiger was already public information. In fact, Grigg had announced some of them in Parliament on 8 June 1943 at the request of Rear-Admiral Tufton Beamish, Conservative MP for Lewes.[384] As I have already shown, photographs of the Tiger were available in newspapers and the Tiger had already been on public display. On 13 February 1945, Hammersley asked Grigg exactly what use denying the public this information served and Grigg dodged the question by replying that the Government will not release information potentially useful to the enemy.[385] People knew enough about the Tiger to realise when they were having the wool pulled over their eyes. An example of this is a photography trick used in a War Office press release on the Churchill. Stokes brought up the photograph in the debate on 13 March 1945.[386] In the pamphlet, a long-range photograph of the Tiger was used make it look much smaller than it really was compared to the Churchill. I believe that if MPs got to thoroughly inspect the Tiger, the gap in capability would be more evident than just knowing how big it was. The problem of inadequate British tanks may have become something the government could no longer avoid under parliamentary pressure. It is unlikely that any of the new tanks designed in response to the Tiger would have made it into

[382] "Captured Tanks Now on Tour in Scotland." *Press and journal* [Aberdeen, Scotland] 3 October 1942, 3.
[383] Newsome (ed.), *PzKw VI Tiger Tank*, 6.
[384] 'German Mark VI Tiger Tanks', Hansard, House of Commons debate 8 June 1943,vol. 390, column 525.
[385] 'Captured German Tank (Inspection), Hansard, House of Commons debate 13 February 1945, vol. 408, column 23.
[386] 'Demobilisation and Re-employment' Hansard, House of Commons debate 13 March 1945, vol 409 column 171.

service before the end of the war. However, greater scrutiny and resources may have been given to the projects that were in an advanced stage of development. For example, the Comet could have come into service earlier if the project had the amount of engineers that had been requested. The Prime Minister eventually relented and promised to allow inspection. However, this permission was granted in response to a question from Stoke on 31 May 1945, after the war in Europe was over and the need to inspect the Tiger had passed.[387]

Conclusion

The Tiger made an impression in most of the military and civilian arenas in which it was publicly discussed. The impact of the Tiger on soldiers and the battlefield is clear to see. Of all the tanks, it was the one that seared itself into the minds of Allied soldiers – to the point that they were seeing Tigers everywhere. Even when Tigers were not present or present in small numbers, Allied troops misidentified all manner of German tanks for Tigers or transferred attributes of Tigers to other tanks.

The impact of the Tiger on the press and politicians is not so clear. Publically, the press and politicians made light of the danger posed by the Tiger. However, if we read between the lines, there do appear to be real concerns. These anxieties sometimes show themselves in the text, for example the frequency with which the Tiger is picked out for special mention, and the misidentification of other tanks as Tigers. Such reports likely contributed to the troops' perception that Tigers were everywhere, which is exactly the

[387] 'Tanks (inspection by Members")' Hansard, House of Commons debate 31 May 1945, vol. 411, columns 352-353.

opposite of what many of the journalists wanted to achieve. The need to use the Tiger as the standard against which new allied equipment was measured is noteworthy, particularly as Allied equipment was simultaneously reported as being perfectly capable of defeating the Tiger. Moreover, the coyness of the British and American governments regarding the Tiger suggests an underlying sensitivity.

When criticism of Allied tanks did surface in the newspapers, debate was eventually quashed. In America, the Army kept their arguments about the Tiger away from politicians and the public. This was mostly successful, as Congress remained unconcerned (at least in public) about the Tiger. When apprehensions about the Tiger were raised in public, the debate was suppressed by an authoritative letter from General Patton and the matter was not brought up again. In Britain, the government tried hard to say as little about the Tiger as possible. Numerous questions were asked in Parliament about how the government planned to respond to the Tiger, but ministers either refused to respond or gave vague and non-committal answers. While this evidence is suggestive of real unease about the superiority of the Tiger, it is not conclusive. Studies dedicated to the press and politics and their relationship to the Tiger would need to be conducted to produce a more definitive answer.

The social responses to the Tiger has not been analysed, despite the far reaching impact of the Tiger. The Tiger is one example of the ways society responded to military technology. In examining the way the press wrote about the Tiger and how it was debated in the British parliament, we can see that the Tiger was not just a military problem that required only a military solution. Military technology should be analysed and discussed within the wider societal systems that created it and in which it existed.

Conclusion

The Tiger opened up a gap between German tank technology and that of the Western Allies. Once it had opened, the British and Americans were unable to close it for the rest of the war. They either resorted to ad-hoc solutions that came with their own set of problems, or their answers to the Tiger problem arrived too late in the war to make a difference. The reasons that the military response to the Tiger was so lacklustre are rooted in systemic problems that hindered the development of more powerful new tanks. Some of these difficulties stemmed from the financial constraints imposed on military spending in the early 1930s. Further complications were caused by the Anglo-American approach to tank development and their philosophy of armoured warfare. The key point is that neither the Americans nor the British were forward-thinking. They designed tanks for known and existing threats, with little regard for potential and future threats. The German approach, by contrast, was proactive. The Germans put tanks into the field – not just the Tiger but also the Panther and the King Tiger – that outclassed the equipment available to the British and Americans, and that forced them to scramble to design tanks to combat the Tiger.

The Tiger not only provoked a technological response on the part of the Western Allies, it also had an impact in terms of the lived experiences of British and American servicemen. Allied Soldiers were afraid of the Tiger, and with reason. They knew that they were ill-equipped to deal with the Tiger, and that the consequences of German technological superiority could be lethal. When given the opportunity, Allied servicemen aired their frustrations in public, as they did in early 1945. But Allied tank crews felt that their criticisms were ignored, and to some extent they were right.

Newspapers reported on the Tiger frequently, though their coverage was uncertain and ambiguous. In some stories the Tiger was portrayed as just another tank, the appearance of which on the battlefield was of no great significance. In other stories, by contrast, the Tiger was acknowledged as the standard that new Allied tanks and guns had to beat. Allied newspapers, particularly American ones, often inflated the numbers of Tigers in the field. Sometimes they did this by reporting that Tigers were present at a battle, even though they probably were not. On other occasions, journalists misidentified other German tanks as Tigers. Both responses suggest that the threat of the Tiger was more present in their minds than they cared to admit, perhaps even to themselves.

Political responses to the Tiger in Britain and the US were equally uncomfortable. When MPs asked difficult questions about the Tiger in the House of Commons, government ministers were deliberately evasive. In the US, by contrast, Congress remained blissfully unaware of the Tiger's superiority until Hansen Baldwin's *New York Times* article of January 1945. While the article caused some concern among politicians, a letter from General Patton praising American tanks settled the debate in March, and no further action was taken.

Despite their clear advantage in tank technology, the Germans still lost the war. The main reason for this was the overwhelming material superiority of the Allies. During World War II, the Germans only manufactured 1,346 Tigers, about 6,000 Panthers, and 492 Royal Tigers.[388] Formidable as these weapons were, they had to be distributed across all the theatres in which the Germans were fighting. The British and Americans, on the other hand, produced between them 50,000 Shermans, over 5,600 Churchills, more than 2,000 Sherman

[388] Stephen Hart, *Panther Medium Tank 1942-45*, (Oxford: Osprey, 2003), 35; Thomas Jentz and Hilary Doyle, *Germany's Tiger Tanks VK45.02 to Tiger II Design Production & Modifications*, (West Chester: Schiffer Military History, 1997), 62

Fireflies, and 2,400 Cromwells.[389] Moreover, at any one time the bulk of the German army was fighting on the Eastern Front, so the numerical advantage of the Western Allies was even more decisive than these figures suggest. The superiority of German tank technology thus made very little difference to the final outcome of the campaigns in North Africa, Italy, and France. But it did make the task of the British and Americans more difficult, more time-consuming, and more bloody. This is one of the reasons why the technological gap that the Tiger created deserves more attention than it has been given in the literature.

Another reason for studying the case study of the Tiger is that it sheds light on a much bigger issue in military history. World War II was a technologically dynamic war in the sense that the technology of warfare evolved significantly during the course of the war itself. Moreover, the ability of belligerent powers to upgrade their technology whilst also fighting a war was a major factor in its outcome. Technologically dynamic wars, however, cannot be understood purely in terms of the technology and its military applications. Equally important are the political, economic and social contexts within which technology evolves. Behind the scenes, there are systems and ideologies in place that either promote or hinder the effective development of new technology. For this reason, systems analysis is important to the study of technologically dynamic warfare. The way a piece of technology interacts with the society that produced it, or has to figure out how to deal with it, is just as important as its immediate effects on the battlefield.

World War II was thus a war, not just of people and of weapons, but of systems and of ideologies. If we were to look solely at the example of the Tiger, we might conclude that German systems and ideology were better adapted to fighting mechanised war than those

[389] Green. *American AFVs*, 94; Perret, *Churchill Infantry Tank*, 9; Fletcher and Harley, *Cromwell Cruiser Tank*, 14.

of the Western Allies. Interestingly, however, the superiority of the Germans in terms of tank technology was not replicated across the board. Throughout the war, the Western Allies were able to produce aircraft that were at the very least equal to, and often better than, the majority of the aircraft that were available to the *Luftwaffe*. In some technological fields, for example radar, decryption technology, and the development of nuclear weapons, the Western Allies had a decisive advantage over the Germans. To understand why the Germans outclassed the Anglo-Americans in some fields, and fell behind them in others, would require a comparative systems analysis across all the relevant technologies. Yet examining the systems behind the technology is something that current literature does not do, or does only very partially.

In this thesis, I have tried to approach the history of military technology in a more holistic way, using the Tiger as my case study. There are three obvious ways in which my study could be extended in order to shed further light on the factors that promote and inhibit innovation in technologically dynamic wars.

Firstly, there is still much more to find out about the evolution and the impact of the Tiger. In this thesis, I have concentrated on the Western Allies. However, the approach that I have adopted could be used to analyse the response of the Soviets. How did the Soviet media report the Tiger? What sort of questions were asked and what debates took place in military and political circles about the best way to respond to the Tiger? Similarly, the example of the Tiger could be used to analyse comparatively the evolution of military technology in democratic (British and American) and authoritarian (Nazi and Soviet) systems. One striking difference suggested by this thesis is that democratic systems appear to have a supervisory effect. The fact that the Germans had a superior weapon was not

suppressed, and to an extent it was openly discussed in newspapers, in Parliament, and in Congress.

Secondly, a more holistic approach could also be used to study other new technologies that emerged during World War II. Developments in aircraft and anti-aircraft technologies, as well as submarine and anti-submarine technologies, would be obvious examples. It would be interesting to examine how these topics were presented in the press, debated in Parliament and Congress, and discussed by troops and civilians. The evolution of aircraft and submarines, no less than that of tanks, was shaped by the interaction of social, political, economic and factors.

Thirdly, the approach that I have taken in this thesis could in theory be applied to the study of other fields of military history, and especially to conflicts that were technologically dynamic. Analysing tank and aircraft development and application during World War I would be a prime example. Looking at how French and English naval technology advanced during the eighteenth and nineteenth centuries would be another interesting topic. A more holistic view of technology can give us a greater understanding of how technology has been developed and applied throughout history.

In conclusion, a close study of Anglo-American responses to the Tiger tank demonstrates the importance of synthesising social history, military history, and the history of technology. As this thesis shows, there were wider social and political responses to the Tiger during World War II that went beyond the purely military responses and applications. In the mainstream military historiography and in the technical and 'Face-of-Battle' literature, the Tiger is discussed only in military contexts. Little attempt is made to analyse systematically the wider impact of the Tiger on the conduct of the war, and little is said about the relationship to new technology with all the people who were affected by it.

In short, the relationship between technology and society during World War II is more complicated than is currently portrayed. There were systems that were working the background that influenced the production of technology, and in turn new technology influenced those systems. Therefore, in order to understand the technology, we have to relate it to the systems that produced it. Historians of military technology tend to discuss their subject matter only in terms of battlefield application. Historians of the War and Society school analyse the wider social and political systems, but they do not make the link between these systems and technology. A holistic analysis of all the systems that influence technology is required to fully understand the development and applications of military technology.

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