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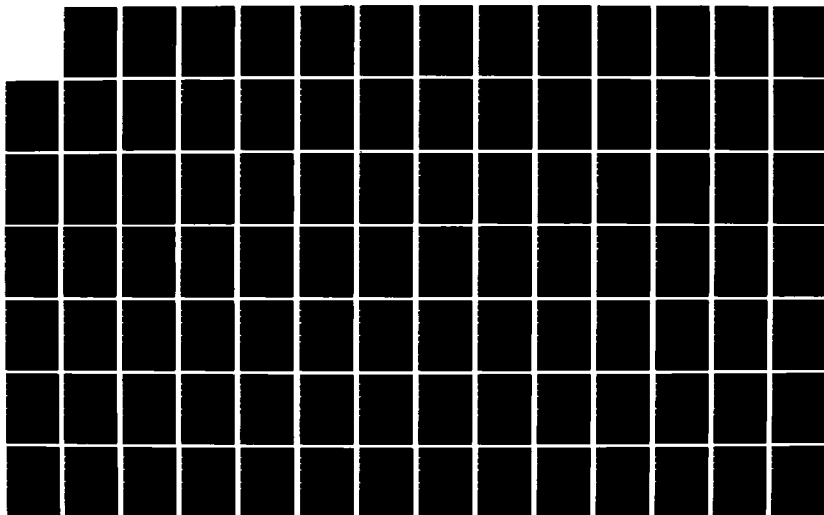
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WEAPONS(U) ARMY COMMAND AND GENERAL STAFF COLL FORT  
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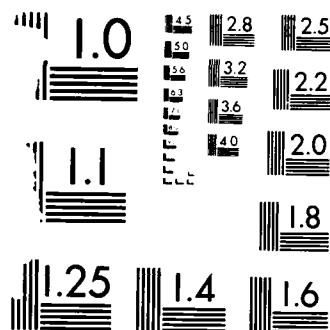
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## ABSTRACT

CONSIDERATIONS FOR THE DISTRIBUTION OF ANTIARMOR WEAPONS, by Major James S. Gavitt, U.S. Army, 130 pages.

Since the appearance of the first tanks during World War I, soldiers have been searching for weapons to combat the armored threat and the most effective organizational structure within which to employ them. Ideally, every soldier could be issued an antiarmor weapon, but for most of the tank's history, effective antiarmor weapons have been too large, complex, or expensive to allow mass distribution. A compromise is necessary between the need for tactical protection against individual and small groups of tanks and the ability to mass antiarmor weapons offensively or defensively at the operational level.

This study reviews the history of U.S. antiarmor weapons, doctrine, and organization since the 1930's and tests the hypothesis that there are certain considerations that have been significant in the successful distribution of antiarmor weapons. Four periods of history are studied. The first of these is the pre-World War II years, 1939-1940. The second is that period, 1940-1944, between introduction of the German "blitzkrieg" and the Allied invasion of Normandy. The third period covers U.S. Army operation in the European Theater of Operations, 1944-1945. The final period is from 1946 until the present.

The author concludes that four considerations have been significant in the successful distribution of antiarmor weapons: perception of the threat, technology, doctrine, and resource constraints. Failure to properly address any one of these has consistently caused a later major reorganization of antiarmor weapons.

The author suggests that these considerations should be carefully examined by force planners developing future antiarmor weapons, doctrine, and organization. Several possible applications to the Army of Excellence are included in the concluding chapter of the study.

CONSIDERATIONS FOR THE DISTRIBUTION OF ANTIARMOR WEAPONS

A Thesis presented to the Faculty of the U. S. Army  
Command and General Staff College in partial  
fulfillment of the requirements for the  
degree

MASTER OF MILITARY ART AND SCIENCE

by

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Fort Leavenworth, Kansas  
1985

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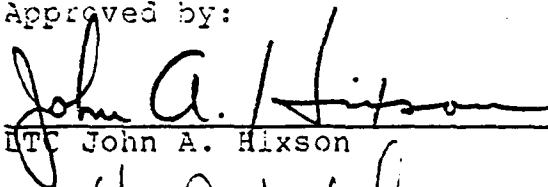
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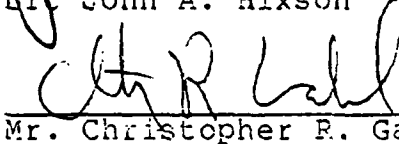
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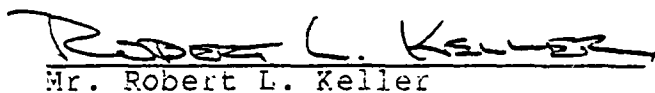
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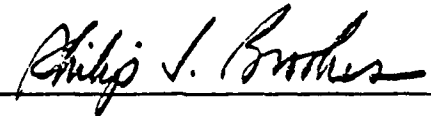
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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

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## CHAPTER ONE

### INTRODUCTION

"Now that we've got it, just what in the hell are we supposed to do with it?"

Anon

#### The Problem of Distribution

When new military weapons are fielded, their integration into the organizational structure of the Army is often hotly debated. Some weapons are distributed throughout the organization, while others are concentrated in specialized units and centrally controlled.

The issue of distribution is critical, for although there never seems to be enough of an asset to go around, the manner of integration of weapons into the force structure will, to a great extent, determine their effect on the combined arms effort and the success of synchronization on the battlefield. A properly integrated weapon not only has its own capabilities optimized, but combines with other elements to create a synergy, increasing the overall combat power of the force disproportionately. Conversely, if the weapon is not properly integrated, no matter how skillfully it is employed, it can only add incrementally to the combat power of the force, and indeed, may hinder other elements and thus detract from combat power.

Although distribution is a (or perhaps the) key factor in fielding a new weapon, there is currently no officially sanctioned list of considerations to assist force developers in this area, although such factors as efficiency, cost, complexity, weapons characteristics,

and enemy threat have been generally recognized as being important.

### Approaching the Problem

It is therefore important to determine if considerations for successful distribution of weapons systems exist and, if they do, to identify them. If we believe that certain factors are generally considered important, three questions evolve:

- What factors have been repeatedly used in the past to distribute weapons?
- What effect or degree of importance did their influence have on the distribution of the weapons?
- Was this influence generally positive or negative in terms of the weapons' effectiveness on the battlefield?

One way of approaching the problem is to study a single type of weapons, say antiarmor systems, over an extended period of time, with the thought that lessons drawn from a single type of weapons are replicated within other types. Organizational successes and failures can be analyzed to determine what (if any) threads of continuity continue to be significant. Although an assumption that considerations which apply to one type of weapon will apply to others is at best questionable, threads of continuity in organization and distribution would seem to be relatively generic, as opposed to threads of continuity in more technical areas such as weapons development. This concept will again be addressed in the concluding chapter; however, the thesis of this paper will be restricted to

developing considerations for the present and future successful distribution of antiarmor weapons within the United States Army. The conclusions arrived at in this paper are admittedly less than scientifically provable beyond a reasonable doubt; however, they can be shown to be logically sound and significant.

### Structure of the Paper

The paper is structured to trace the evolution of antiarmor weapons and their distribution from the pre-World War II years to the present. Weapons addressed are antitank guns, recoilless rifles and rockets, aircraft, specialized munitions, and the tank itself when used in an antiarmor role. Organizational changes are analyzed to determine why the former scheme of distribution was modified. As the United States Army's last war against a major armored threat was World War II, the main body of the paper addresses this era; however, our increasing ability to simulate the effects of battle, coupled with repeated changes to U.S. force structure based on the perceived lessons from other nations' wars make post-World War II developments equally important. Chapters generally follow this outline:

- Chapter 2 will discuss the pre-World War II (1939) proposed organization of antiarmor weapons in the U.S. Army and the reasons for that organization.

- Chapter 3 will analyze the changes in antiarmor organization between 1940 and 1944. This will include the experience of U.S. forces in World War II up to the Normandy Invasion in June 1943.

- Chapter 4 will first explain U.S. combat experience in the European Theater of Operations and then analyze the success or failure of antiarmor weapons and force structure during World War II.

- Chapter 5 will discuss how the distribution of antiarmor weapons changed from 1946 to the present, and the reasons for those changes.

- Chapter 6 will contain conclusions concerning the validity of those considerations which have consistently been used to distribute antiarmor weapons, and will comment on the applicability of these considerations to the Army of Excellence.

#### Importance of this Project

Discovery of a set of historically significant factors governing the distribution of antiarmor weapons will give force developers precedents which they may accept or reject, but at least should discuss. Additionally, considerations discovered can be a start point for researchers to analyze the distribution of other weapon types and thus confirm their applicability to general force structure.



## CHAPTER TWO

### ANTIARMOR ORGANIZATIONS AND DOCTRINE, 1939-1940

"One principle of our antitank doctrine is that antitank gun fire is the basic and most important means of antitank defense."<sup>1</sup>

#### The Proposed Reorganization - 1939

The U.S. Army of 1939 considered the tank a significant, but not invulnerable, weapon. Besides the normal array of obstacles and antitank mines, the infantry had the trusty .30 and .50 caliber machine guns with armor piercing ammunition. The new towed 37mm antitank gun, replacing its World War I era predecessor, was rated capable of disabling any known tank with a single hit.<sup>2</sup> This new gun, copied from the German PAK 36, was to be the primary tank killer, with the .50 caliber machine gun as backup.<sup>3</sup>

Although the Table of Organization and Equipment (TO&E) for the infantry division, still the backbone of the U.S. Army, was not finalized until 1 June 1941, the extensive field testing of organizational concepts conducted by the 2d Infantry Division in 1937 and 1938 was complete. The purpose of these tests was to produce a smaller, less ponderous division of approximately 13,000 soldiers, more capable of fighting a war of maneuver than the 28,000 man World War I "square" division.<sup>4</sup> The final report of the 2d Infantry Division was prepared under the supervision of its chief of staff, Lesley McNair, who was later to play a key role in Army force structure. The report recommended a division of 10,275 soldiers, a huge decrease in size.

One of the few increases in the division structure recommended by McNair was the addition of a regimental antimechanized company containing 8 of the new 37-mm antitank guns, a total of 24 in the division. Interestingly, the report also recommended deleting all .50 caliber heavy machine guns from the infantry division, leaving the largely ineffective .30 caliber machine gun as the only other divisional direct fire weapon with an antiarmor role.<sup>5</sup> Although some of the recommendations were never adopted, this test was the basis for the "triangular" infantry division which formed the majority of World War II divisions.

Thus, the divisional antiarmor organization recommended to the War Department in 1938 consisted of an antimechanized company of eight 37-mm antitank guns in each of the three infantry regiments. Battalions and companies had only mines, obstacles, and the .30 caliber machine gun. The division had organic artillery and the obstacle capability of the divisional engineer battalion.<sup>6</sup> Concentrations of antiarmor weapons at echelons above the division would only come later, as the structure of those echelons was still in the formative stages, but for now, the backbone of US anti-armor warfare was the 37-mm gun organized in companies of eight weapons each.

#### Reasons for the 1939 Antiarmor Structure

The reasons for the conceptual structure of antiarmor weapons organization in 1939 are many and diverse. The tank was originally developed during World War I as a means of breaching obstacles and

destroying machine guns in order to allow friendly infantry to successfully attack enemy trenches. It was armed with machine guns and sometimes a short cannon.<sup>3</sup> First used by the British on the Somme in September 1916, of 59 tanks allocated for the attack only nine completed their task, but the psychological effect on the German infantry was significant. Despite their initial surprise, the Germans were soon able to produce an armor piercing bullet for their standard rifle, and even though later British and French tanks were more heavily armored, they were never able to achieve a decisive advantage.<sup>9</sup>

Despite the influence of J.F.C. Fuller and B.H. Liddell Hart during the interwar years, economic constraints, antimilitarism, and military conservatism (especially among the horse cavalry), impeded the progress of both the tank and tank doctrine. Fuller sacrificed his military career to ensure formation of the British Armored Force,<sup>10</sup> while the United States, after a brief experiment with its own Tank Corps, abolished it in 1920 and turned responsibility for tank development over to the infantry. Until 1930, the sole U.S. operational tanks consisted of 15 Ford "baby" 3-ton tanks and 10 experimental models.<sup>11</sup> Germany, due to the terms of the Versailles Treaty, was allowed no tanks until Hitler abrogated the treaty in 1935.<sup>12</sup>

Tank doctrine also became disjointed during the interwar years. Despite early imaginative use of their experimental Armored Force, after the disastrous 1934 maneuvers (said to have been contrived to destroy the credibility of the new arm), the leadership of the British Armored Force was gutted and the British tank became either a slow, heavily armored "infantry" tank or a light reconnaissance vehicle. The concept

of a fast, lightly armored "cruiser" tank, used for envelopment and pursuit, was allowed to languish until the eve of World War II.<sup>13</sup>

The French also had a major ongoing doctrinal conflict concerning the role of the tank. One school of thought believed the tank should operate as a separate arm, while the other believed it best suited for infantry support. As in Britain, the latter school of thought prevailed.<sup>14</sup>

At this time, little was known of Soviet doctrine (nor was it considered especially important), while a typical evaluation of the German armored maneuvers of the early 1930's is summarized in the following quote:

"The treaty signed at the close of the Great War does not permit Germany...to build or utilize tanks. Germany, however, simulates tanks by carrying canvas representations on light powerful motor cars. By means of these dummy tanks the German theories as to tank tactics are, from time to time, tested in maneuvers."<sup>15</sup>

From this limited input, it appeared to U.S. Army doctrine writers that the tank, although "a vastly improved weapon compared to its old World War I counterpart,"<sup>16</sup> had "the essential mission to assist the infantry to advance."<sup>17</sup> It would lead the main attack, breach the enemy defensive line, and accompany attacking infantry, providing protection and combat power.<sup>18</sup> The concept of massed armor in reserve, employed at the critical moment to penetrate, counterattack, or exploit, was of secondary importance.<sup>19</sup>

Thus, the perceived armored threat to U.S. forces in 1939 was an improved World War I tank, integrated into infantry formations and used

to assist the foot soldiers in breaking through prepared enemy defenses.

The M-3 37-mm antitank gun was almost an exact copy of the German 37-mm PAK 36, which had proven successful against the relatively lightly armored tanks of the Spanish Civil War. It was a light (912 lbs), towed, high velocity (2600 fps) single shot rifled gun<sup>20</sup> which, although considered "capable of disabling any modern tank with one hit"<sup>21</sup> in 1939, was inadequate by 1940.<sup>22</sup> However, its perceived lethality, low profile, and simplicity made it seem an ideal infantry weapon, and it was distributed to regiments until it was proven inadequate in North Africa.

Besides aiming for the tank's vision slits with rifle and machine gun fire, antitank mines, and obstacles, there were two alternative weapons which could be pressed into service to destroy tanks - field artillery and other tanks. In the proposed infantry division TO&E prepared by the 2d Infantry Division in 1938, the divisional artillery regiment contained three battalions of 75-mm guns and one battalion of 155-mm howitzers.<sup>23</sup> The 75-mm gun and 155-mm howitzer could, in 1939, destroy a tank if they hit it; however, they were primarily designed for indirect fire support rather than tank killing. Although both were to provide excellent antitank defenses in isolated instances, a combination of low velocity, unsuitable rounds, high silhouette, and slow handling due to weight placed these weapons at great risk when used in a direct fire role, as well as diverting them from their primary fire support mission. As artillery was most effective when providing massed indirect fire, these weapons were seldom integrated into infantry formations.

Using a tank in the antitank defense role was generally discouraged. The tank was an instrument for the attack, not for the

defense, and was designed and armed with that in mind.<sup>24</sup> Additionally, it was expensive, difficult to conceal, and by doctrine would only be used against other tanks when all other means failed.<sup>25</sup> The proposed triangular infantry division of 1938 contained no tanks.<sup>26</sup>

Due to the limited nature of tank doctrine in the interwar years it was logical to expect that antiarmor doctrine would also be underemphasized. Some military theorists believed that in future warfare the tank would be used in massed formations supported by the other arms, demanding the massing of antiarmor weapons or other tanks in the defense;<sup>27</sup> however, most of the U.S. Army's hierarchy believed that any future enemy would mirror its own image of the tank as primarily an infantry support weapon. Given this perception and the lack of alternative antiarmor weapons, it was perfectly logical to distribute the 37-mm antitank gun to the infantry regiments where, by doctrine, it was used as follows:

- Offensive Operations. Normally used in general support of the regiment.
- Defensive Operations. Normally decentralized to subordinate battalions.
- Retrograde Operations. Normally decentralized to subordinate battalions.
- Pursuit. Attached to the pursuing force.<sup>28</sup>

The antitank gun, combined with mines, obstacles, and other forms of firepower, was organized to destroy the enemy tank threat in front of the defensive line or as a part of an infantry attack. No special provisions for antiarmor defense of the rear areas was deemed necessary. The tank itself would be massed and used as an antitank

weapon only in emergencies, as when enemy tanks penetrated a portion of the defensive line.<sup>30</sup>

Distributing the 37-mm antitank gun to regimental level left the organization of antiarmor weapons relatively inflexible. The regimental antimechanized company could be split and used to support subordinate battalions as antimechanized platoons, but there was no such organizational mechanism for the massing and control of antitank guns at division level. As General McNair was later to remark, "massed guns can be dispersed either partly or wholly if desired, but guns dispersed organically cannot be massed."<sup>31</sup>

The 75-mm gun, of which there were three battalions in the divisional artillery regiment, could be used as the divisional antitank weapon, but due to its major capability shortfalls and role as an artillery weapon it was not normally emplaced within direct fire distance of the front lines. As with other unarmored towed systems, it was unable to quickly maneuver under fire and could not counterattack.<sup>32</sup> As can be seen from this discussion, the ability to rapidly mass antitank guns was not an overriding consideration in antiarmor weapons distribution in 1939.

Distributing the 37-mm antitank gun equally to all regiments, while guaranteeing a degree of antiarmor protection to every unit on the line, was also wasteful. The regiment defending a primary armor avenue of approach had the same number of antitank guns as the regiment in restrictive terrain, and the difficulty of transferring these weapons between units made it a virtual certainty that many, if not most, antitank guns would never see a tank.<sup>33</sup> The large number of weapons necessary to fill every infantry regiment could not be quickly produced

or procured, and as late as 1942 (when the 37-mm antitank gun was long obsolete) many units did not have them in sufficient numbers even for training.<sup>34</sup>

The 37-mm antitank gun did add a separate company to the regimental structure of the infantry division; however, the weapon itself merely replaced the old M1916 37-mm field gun which had resided in the regimental cannon company since World War I.<sup>35</sup> There was no real increase in the complexity of command and control, training, or logistics, especially when considered in context with the greatly simplified structure of the triangular infantry division over its predecessor. The 37-mm antitank gun and its prime mover had a minimal effect on the deployability of an infantry formation during this era of almost exclusive shipboard movement. In any case, the chances of the United States participating in another European war with ground forces was seen as slight during most of the interwar years.<sup>36</sup>

### Summary

On the eve of World War II the basic U.S. Army antitank defense means was the 37-mm antitank gun, organized into regimental antitank companies. The following were primary considerations in this scheme of distribution:

- a. There was a perception that the armored threat would remain a relatively slow, lightly armored, infantry support weapon.
- b. The belief existed that the 37-mm antitank gun would be able to destroy both contemporary and near term future armored vehicles.



c. There was the realization that antiarmor defense would rely on the 37-mm antitank gun. Other weapons would either be ineffective or else their use in an antiarmor role detracted from their primary mission.

d. U.S. Army had an antiarmor doctrine which was designed to counter an enemy armored threat deployed across a broad linear front rather than massed against a small portion of the sector. This doctrine favored a "grass roots" distribution of antiarmor weapons.

e. The 37-mm antitank gun was a relatively inexpensive weapon (especially when compared to later developments) and even in times of constrained military spending, the Army could eventually afford enough for the proposed organization.

In summary, U.S. Army antiarmor organization was based on a World War I threat perception, relied on an inexpensive marginal weapon which had no replacement under development, and had a doctrine which distributed antitank weapons with uniform thinness throughout the battlefield. The U.S. was incapable of quickly massing to face a major armor threat. This was soon to change.

## ENDNOTES

<sup>1</sup> Tactics and Techniques of Infantry - Advanced, 9th ed. (Harrisburg, PA: The Military Service Publishing Co., 1939), pp. 352-353.

<sup>2</sup> Tactics and Techniques of Infantry - Advanced, 9th ed., pp. 356-357.

<sup>3</sup> John Weeks, Men Against Tanks (New York: Mason/Charter, 1975), pp 33-34.

<sup>4</sup> L. Van L. Maisawald, The U.S. Infantry Division Changing Concepts In Organization 1900-1939 (Chevy Chase, MD: Operations Research Office, The John Hopkins University, 1952), pp. 39-40.

<sup>5</sup> "Field Service Test of the Proposed Infantry Division, Appendix C" (unpublished recommended changes to the tables of organization and equipment of the infantry division, submitted by the 2d Infantry Division, 1937), TO&E 7-11 R and 7-13 R.

<sup>6</sup> "Field Service Test of the Proposed Infantry Division, Appendix C," TO&E 7-11 R and 7-13 R.

<sup>7</sup> U.S. War Department, Tentative Field Service Regulations - Operations, Field Manual 100-5 (Washington, D. C.: U.S. Government Printing Office, 1939), p. 2.

<sup>8</sup> John Weldon, Machine Age Armies (London: Abelard -Schuman, 1968), p. 140.

<sup>9</sup> Weeks, pp 21-26.

<sup>10</sup> Wheldon, pp. 42-44.

<sup>11</sup> Mildred Gillie, Forging the Thunderbolt (Harrisburg, PA: The Military Service Publishing Co., 1947), pp. 17-18.

<sup>12</sup> Gillie, p. 19.

<sup>13</sup> Wheldon, pp. 51-55.

<sup>14</sup> Ralph E. Jones, The Fighting Tanks Since 1916 (Washington, D.C.: The National Service Publishing Co., 1933), pp. 273-275.

<sup>15</sup> Jones, p. 275.

<sup>16</sup> Tactics and Techniques of Infantry - Advanced, 9th ed., p. 351.

<sup>17</sup> Tactics and Techniques of Infantry - Advanced, 9th ed., p. 316.

- 18 FM 100-5, 1939 ed., pp 6-7.
- 19 Jones, pp. 273-282.
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CHAPTER THREE  
TRANSITION TO WAR AND EARLY COMBAT  
EXPERIENCE 1940-1944

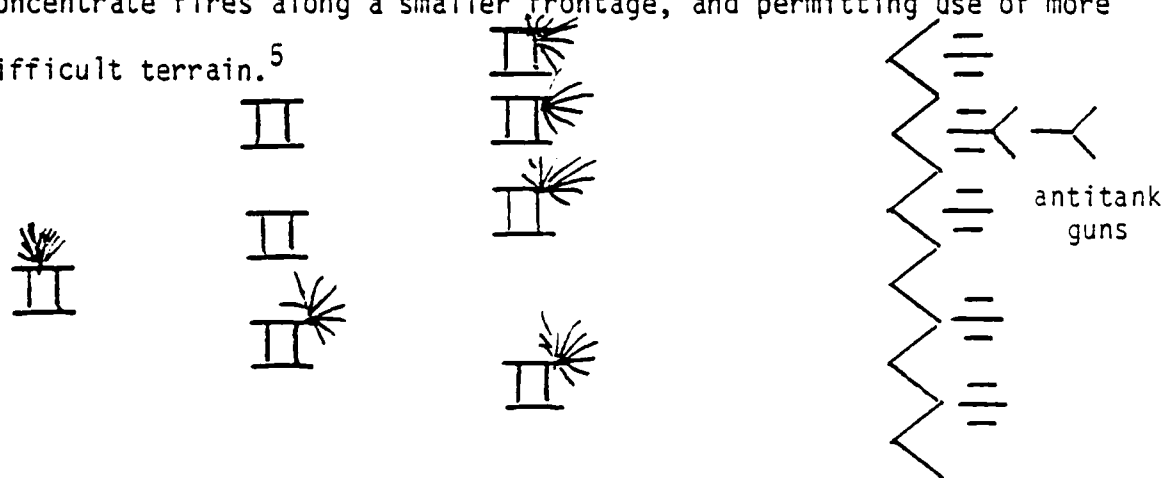
The rout of French and British forces in May and June 1940, leading to the rapid defeat of France, were to remold perceptions of armored warfare in the U.S. Army. The combined French/British force, able to hold the German threat for four years during World War I, was crushed in six weeks. Previous German operations in Spain and Poland should have been a warning, but the results of these campaigns were either misunderstood, ignored, or rejected.<sup>1</sup> Reasons for the 1940 debacle were hazy. Some blamed low French morale and training. There was a common, although incorrect, perception of German superiority in quality and quantity of weapons. However, most observers agreed that the German tank, used in mass formations, had been the decisive factor weapon.<sup>2</sup>

The German Threat - "Blitzkrieg"

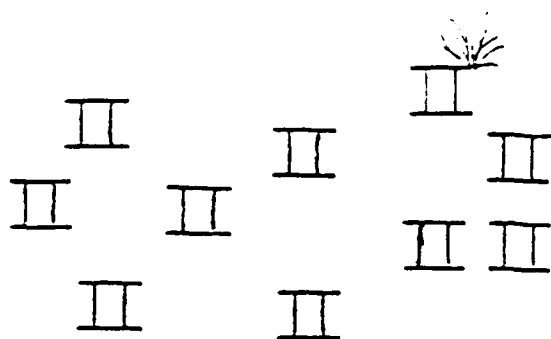
The first German Tiger tank was not fielded until 1942 and the first Panther tank until 1943, so the battles of 1940 were fought by the Pz I, II, III and IV.<sup>3</sup> The Pz I was a machine gun carrier suitable only for training by 1940. The Pz II was a light tank for reconnaissance, capable of a speed of 35 mph but with only a 20mm gun. The Pz IV weighed 18 tons, had a top speed of 25 mph, and a short 75-mm gun for armament. It had the primary mission of direct

support. The Pz III mounted a 37-mm antitank gun and was designed as a tank killer. None of these German tanks could withstand a direct hit from field artillery or from the 37-mm antitank gun in almost universal service at the time. Furthermore, the main guns of the Pz I, II, and IV could not penetrate the armor of the heavy French and British tanks.<sup>4</sup> These facts were available to U.S. planners in the years 1940-1944, so there is no reason for them to have accepted the popular notion of German tank superiority in 1940. The critical question was how good the next generation of German tanks would be and how many of them would the enemy produce?

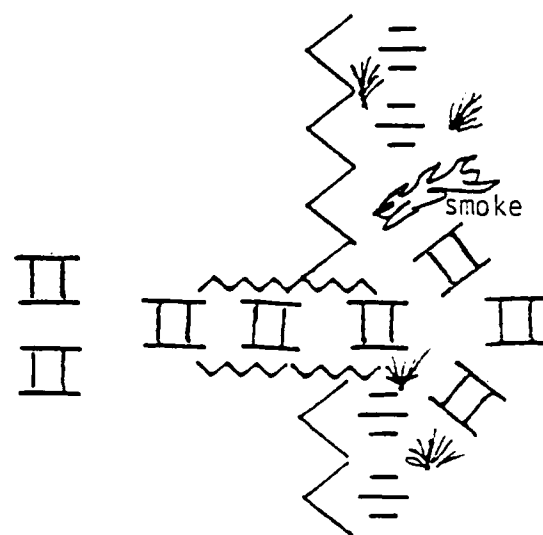
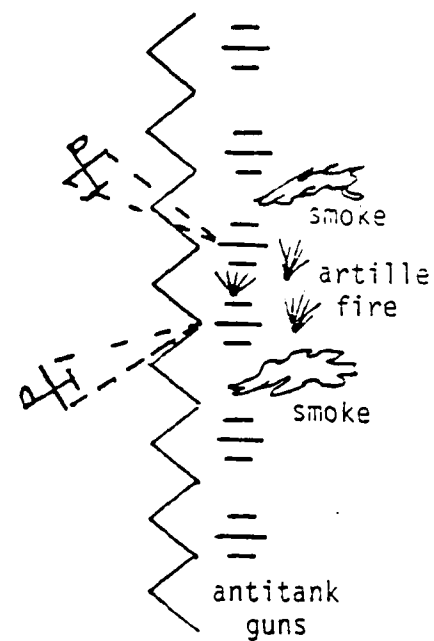
Survivors of the 1940 battles were able to disseminate their impressions of German mechanized tactics, which they called "blitzkrieg". One of the best descriptions was by Ferdinand Miksche, a Czech officer who had experienced this new type of warfare from the losing side. He wrote that German tanks were employed along narrow fronts in massed groups, allowing them to overcome the linearly deployed antitank guns opposing them, enabling their supporting arms to concentrate fires along a smaller frontage, and permitting use of more difficult terrain.<sup>5</sup>



Conventional Linear Armored Tactics - Broad Frontage exposure of Armor to Anti-Armor Systems



Preparation Phase



Breakthrough Phase

Concentration of armor reduces armor exposure to antiarmor systems

"Blitzkrieg" Tactics

Thus, by 1941, the American perception of the German tank threat was of a relatively thin-skinned, fast, moderately armed tank, first employed in massed formations to overwhelm a narrow portion of the defensive sector, then to drive deep to destroy and disrupt. Later experience fighting Germans in Africa and Italy pitted U.S. forces against limited numbers of the new German Tiger and Panther tanks, the former with 10-15 cm of armor and an 88 mm gun, and the latter with 8 cm of armor and a long 75-mm gun.<sup>6</sup> Both were superior in armament and armor to U.S. tanks. Although U.S. forces seldom faced massed German armor in the North African or Italian campaigns, as late as 1944 planners believed the German Army would retain sufficient tank reserves to again use massed armor in northern Europe,<sup>7</sup> which they did in December 1944.

#### Countering the Threat - Divisional Weapons

The battles of 1940 also forced the U.S. Army to put a high priority on the development of antiarmor weapons. By 1944, ground means devoted to destruction of enemy tanks (besides obstacles and mines) included antitank rockets and both towed and self propelled antitank guns. Field artillery and other tanks could also be used in the antitank role, but these were secondary missions for them.

The 2.36 inch rocket, better known as the "bazooka", was invented in the Spring of 1942 by a Colonel Skinner of Aberdeen Proving Grounds. COL Skinner attached a homemade rocket to an M-10 antitank (shaped charge) grenade and fired it from a home made launcher. It was an immediate success due to its simplicity and



effectiveness at short range, but as the war continued and improved German tanks appeared on the battlefield, the bazooka's short range and small warhead made it increasingly less effective.<sup>8</sup> The Ordnance Department developed an upgraded 3.5" version of the bazooka but for unknown reasons "shelved it" until after the war.<sup>9</sup>

The 37-mm antitank gun, formerly the standard antiarmor weapon at infantry battalion and regimental levels, was obsolete before Pearl Harbor, and no replacement was then under development. The Ordnance Department copied another foreign gun, the British 6-pounder, and immediately began its production as the 57-mm antitank gun. This gun had a maximum effective range of 800 yards, but was unable to penetrate the frontal armor of the newer German tanks.<sup>10</sup> Many divisions left them behind in France in 1944, considering them useless.<sup>11</sup>

### The Tank Destroyer

The tank destroyer emerged doctrinally as the U.S. Army's primary means of countering the German armored threat. General Lesley McNair, first Chief of Staff of General Headquarters (GHQ) then Commander, Army Ground Forces (AGF), championed the tank destroyer concept. He believed there was a need for a large number of towed tank destroyer units to protect the infantry from massed armor, and a few self propelled units for either a theater reserve or to support armored and other mobile forces when needed. Tank destroyers developed during World War II were:

a. The M-6 towed 3" antitank gun had a muzzle velocity of 2,600 ft/sec and could penetrate the frontal armor of the Panther tank at 1500 yards, but the frontal armor of the Tiger I only at point blank range. It was ineffective against the Tiger II. No other towed antitank gun was mass produced and issued to tank destroyer battalions during World War II.<sup>12</sup>

b. The M-3 (75-mm gun) and M-6 (37-mm gun) were both self propelled antitank guns produced early in the war. Both were ineffective against the newer German tanks and were soon replaced by the M-10.<sup>13</sup>

c. The M-10 (3") and M-18 (76-mm) were the two self propelled antitank guns available for the invasion of Europe. Their guns had identical armor defeating capabilities, but the M-18 was a great deal faster and more maneuverable (although more lightly armored) than the M10, capable of 60 mph road speed. As with the M-6 towed antitank gun, they were marginally effective against the Panther, but at a great disadvantage when facing a Tiger I or II.<sup>14</sup>

d. The M-36 (90-mm gun) arrived in Europe in September and October 1944, but as late as December there were only 236 of them in the theater.<sup>15</sup> The big antitank gun could defeat the frontal armor of the Panther and the Tiger I up to 1,000 yards, but had to get a flanking or rear shot on the Tiger II.<sup>16</sup>

None of the self propelled antitank guns were armored to withstand the impact of a German tank gun round.

So by June 1944, the U.S. Army had an individual antitank weapon, the bazooka, capable of disabling a German tank from the flank

or rear at close range, a battalion and regimental (towed) antitank gun which could not penetrate the armor of the newer German tanks except from the flank or rear from close range, and one towed and two self propelled nondivisional antitank guns which also needed flank or rear shots to penetrate the armor of Panther and Tiger tanks at all but the closest ranges. A third self propelled antitank gun, the M-36, was deployed after Normandy, but even its 90-mm gun could not penetrate the frontal armor of the Tiger II. The tank destroyers' lack of armor meant that once discovered, they could be destroyed by long range fire from German tanks, themselves safe from the return fire.

#### Multipurpose Weapons

Specialized antiarmor weapons were necessary because few other weapons could destroy tanks. True, "no tank of the Second World War was proof against a direct hit by a 'medium' artillery shell (90 pounds from a 155-mm howitzer....)"<sup>17</sup> and the 105-mm howitzer used in the direct fire role could also destroy tanks, but as has been previously discussed, tank killing is a secondary mission for artillery, detracting from its primary direct support mission. Additionally, artillery in the direct fire role is at a disadvantage due to its high silhouette, low muzzle velocity and lack of proper ammunition, protection, and mobility.

Using the tank as an antitank weapon posed several problems. First, the M-4 Sherman medium tank, mainstay of the armored divisions

and separate tank battalions, mounted either the 75-mm or 76-mm gun. The former was never designed to be an antitank gun, while the latter was only marginally acceptable. Second, Army doctrine in 1944 said:

"The armored division (or battalion) is organized primarily to perform missions that require great mobility and fire power. It is given decisive missions. It is capable of engaging in most forms of combat but its primary role is in offensive operations against hostile rear areas."<sup>18</sup>

The tank was regarded as an offensive weapon for making deep penetration and exploitations, not as an antitank weapon. It was February 1944 before the Ordnance Department finally persuaded the Army Ground Forces (AGF) under General McNair to permit it to begin replacing the low velocity 75-mm gun on the Sherman tank with the high velocity 76-mm gun, primarily due to McNair's feeling that the upgrading was unnecessary; that the proper antitank weapon was the tank destroyer.<sup>19</sup>

#### U.S. Antiarmor Doctrine

The infantry division, with its organic bazookas and 57-mm antitank guns, was believed capable of defeating all but massed armored attacks, and had neither organic tanks or tank destroyers. When the enemy did mass his armor on a narrow front, the infantry division was, by doctrine, engage these formations of massed tanks with organic weapons, while separate tank destroyer battalions

(sometimes combined into groups or brigades) used their high mobility to move into positions previously prepared in depth along likely armor avenues of approach to destroy the enemy penetration.<sup>20</sup> Tank destroyers, like tanks, were intended to be employed in mass, and although attachment to infantry divisions and supplementing indirect fires were missions acknowledged by doctrine, both were considered nontypical.<sup>21</sup>

Employed in accordance with doctrine, tank destroyer battalions theoretically had great flexibility. Their organization - a headquarters with necessary supply, maintenance, and support, a reconnaissance company, and three antitank companies - enabled them to reconnoiter, prepare, and defend positions in depth without external support.<sup>22</sup> Because their positions normally began at the depth of the regimental reserve, detailed coordination did not have to be made with deployed forces. Coordination with forces in the area was conducted primarily as a means of protecting the tank destroyers, which had no means of countering dismounted infantry.<sup>23</sup> Normal doctrinal employment called for separate battalions under a corps or army command. This was the basis for tank destroyer organization and training.<sup>24</sup> If a serious enemy armored threat required a coordinated effort by several tank destroyer battalions, tank destroyer group and brigade headquarters, attached to armies and corps, assumed operational command of the massed antiarmor units, and maneuvered them to destroy the enemy armored threat.<sup>25</sup> Lack of combined arms training in their secondary mission of infantry support was seen as a serious deficiency by most tank destroyer commanders, but priority went to their primary, tank-killing mission.<sup>26</sup>

The Army Ground Forces (AGF) Reduction Board -  
Streamlining and Pooling

General McNair considered the antitank gun itself a fiscally sound concept stating, "it is poor economy to use a \$35,000 medium tank to destroy another tank when the job can be done by a gun costing a fraction as much."<sup>27</sup> McNair's major concern was not strictly monetary, but was part of what he referred to as "economy of force." Slashed funding, a manpower shortage (the causes of which are beyond the scope of this thesis), and shortages of overseas shipping made it vitally important that maximum combat power be gained from every unit formed. McNair was concerned that units were becoming too large in their attempt to be self-sufficient, and on 7 November 1942, he formed the AGF Reduction Board. Its charter was to review all TO&E's of ground force units and "streamline" them, removing all personnel and equipment not needed in offensive operations against normal enemy resistance. Some of the personnel and equipment so removed were then "pooled" at higher echelons of command, from where they could either be used in support of the command as a whole or to reinforce specific subordinate units when needed.<sup>28</sup>

On 21 November 1942, General McNair stated

"We must economize in both personnel and material. We must weigh carefully what will be included in cargoes going overseas, and what will be omitted. All must be eliminated that does not pay its way in fighting power."<sup>29</sup>

The organization of antiarmor weapons was a direct result of

the streamlining and pooling concept. The short range, inexpensive bazooka provided emergency protection to small units. With an effective range of 800 yards, the three 57-mm antitank guns of the battalion antitank platoon and the nine of the regimental antitank company could cover their unit frontage (800-1600 yards and 2000-3000 yards respectively)<sup>30</sup> and provide what was believed to be an adequate defense against all but massed tanks. Since an infantry unit would not be expected to confront massed armor continually, other antiarmor weapons were concentrated into the separate tank destroyer battalions, which could be used by the corps or army commander to block and destroy massed enemy armored formations, or could reinforce those units under heavy armored attack. In this manner, the expensive (in dollars, industrial capacity, manpower, and shipping) heavy antiarmor weapons were organized in what was thought to be the most efficient manner.

The need for streamlining and pooling and its importance to deployability cannot be overemphasized. Early in 1942, planners realized that a shortage of shipping would be a major deterrent to the early invasion of Europe.<sup>31</sup> When, in September 1942, it became apparent that it would be impossible to launch a 1943 cross channel invasion, the war Department directed the deployment of one million Army Air Force (AAF) personnel to England by the end of 1943 for the air offensive against Germany. With the AAF receiving top priority for shipping, the Army Ground Forces had to make due with what was left. On 25 October 1942 the War Department wrote Headquarters, Army Ground Forces:

"...shipping considerations may dictate a considerable change in our strategic concept with a consequent change in the basic structure of our Army. Since from the shipping capabilities...it appears that early employment of a mass Army, which must be transported by water, is not practicable, it follows that the trend must be toward light, easily transportable units..."<sup>32</sup>

Transporting lend-lease supplies to England and the Soviet Union, hauling vital imports necessary for the survival of the British industry and people, and the ongoing war in the Pacific placed even a greater burden on U.S. shipping.<sup>33</sup> As a result, only seven U.S. divisions deployed to the European and Mediterranean theaters prior to September 1943.<sup>34</sup> In addition to the need for economy in antitank weapons, there was the controversy concerning whether they should be towed or self propelled. As the infantry soldier moved afoot, his organic weapon, the 57-mm antitank gun, was quite logically towed. The problem centered on the tank destroyer battalions which were doctrinally to mass, then maneuver quickly to counter enemy armored breakthroughs. The M-6 towed antitank gun (3") weighed 5,850 pounds, while the M-10 and M-18, mounting the same or a similar gun, weighed 66,000 and 40,000 pounds respectively, a tremendous difference even when considering that the towed gun needed a vehicle for all but short movements.<sup>35</sup> These differences, combined with the greater support requirements of the self propelled gun and the unsatisfactory results from limited use of the 75 mm self propelled tank destroyer in Africa, caused the 1943 decision to arm all but a few U.S. tank destroyer battalions with towed antitank guns. It was not until November 1943, when the snipping crisis had eased somewhat, that the War Department decided to arm half the tank destroyer battalions with self propelled



guns.<sup>36</sup> And so deployability, hardly considered before the war, became a critical factor in the organization of antiarmor weapons.

### Simplifying Command, Control, and Training

General McNair's organizational concept stressed simplicity. Men and equipment were first organized into standard units, governed by a table of organization and equipment (TO&E), such as tank destroyer battalions, infantry divisions, and maintenance companies. Specialized and specially organized units were deleted when possible. Standard units formed "building blocks," each with known capabilities, which could be task organized for specific missions by corps or armies.<sup>37</sup>

Training in new and complex weapons systems was also simplified by consolidating them. In the case of antiarmor weapons, proponentcy for doctrine and training was assigned to the Tank Destroyer Center at Camp Hood, Texas. All newly organized tank destroyer battalions received antiarmor training here, and although training equipment and facilities were often in short supply, skills required to operate and properly employ antitank guns certainly received greater emphasis in the 2-3 months allowed for unit training than they would have otherwise.<sup>38</sup> Concentrating all unit training at a single location had the advantages of pooling scarce equipment and expert instructors, improved supervision by branch headquarters, and the ability to profit from the experiences of other units of the same type.<sup>39</sup> Training

was conducted in graduated steps. Individual training was followed by unit training (at the Tank Destroyer School), followed by training in combined arms operations and large scale maneuvers.<sup>40</sup>

Finally, keeping units as streamlined as possible simplified command and control. Burdening the commander with unneeded units only complicated and slowed his actions. When his unit was streamlined the commander had fewer concerns and the unit itself became more manageable. Additional antiarmor assets could be requested from corps when needed, or so it was thought.

### Summary

The U.S. Army's organization of antiarmor weapons changed greatly after the Germany Army's rapid conquest of France in 1940. The regimental antitank company of the triangular infantry division remained, although it was now armed with the 57-mm antitank gun and 2.75-in rocket launcher. An antitank platoon, organized with these same weapons, had been added to the infantry battalions of the division as well. However, the primary antiarmor weapon in the U.S. Army's inventory was the tank destroyer - a large, specialized, high velocity antitank gun, developed in both towed and self propelled versions. These were centralized, or "pooled" as separate, nondivisional battalions, meant to be employed by corps, army, or army group commanders against major enemy armored threats.

Changes to the concept of operation and organization of antiarmor forces were the result of a number of factors, all interrelated.

a. The German Army had molded an armored force, using the tank as a base, and used it in massed, mobile formations to penetrate, then exploit, the linear defenses of their opponents. McNair and his supporters realized that antiarmor weapons must be capable of rapidly massing on the battlefield and in depth to destroy major armored penetrations rather than being deployed linearly.

b. The newer model German tanks were better armed and armored than their predecessors, requiring larger, more specialized guns or specialized ammunition such as the 2.75-in rocket launcher to destroy them.

c. The large U.S. tank destroyers were believed to be too expensive (in shipping, manpower, industrial capacity, and training facilities) to be fielded in the numbers necessary for distribution to all divisions. Additionally, it was generally thought that the 57-mm antitank gun and 2.75-in rocket launcher, organic to infantry divisions, would be sufficient protection against all but massed armor. Thus, the most efficient means of using the tank destroyer was under centralized control.

d. No weapon other than the antitank gun (in some forms called the tank destroyer) was believed sufficient to counter the armored threat. Thus, specialized antitank guns were developed rather than attempting to expand the role of an existing system. Even the tank was only to be used in the antitank role when absolutely necessary.

e. The U.S. Army was mobilizing, with all the problems of expansion. McNair felt it necessary to simplify command and

control and training by keeping units as streamlined as possible and centralizing the training on specialized, complex weapons.

In short, a change in the Army's perception of the nature of the German armored threat caused a reactive change in antiarmor weapons technology and doctrine. Army planners saw a need to confront massed enemy armor with massed, powerful antitank guns called tank destroyers. They determined that as manpower, industrial capacity, and overseas shipping were limited, the needs of the Army could best be served by forming "pools" of tank destroyers at field army level, where they could be employed most efficiently, rather than by distributing them to lower levels. Training efficiency and simplicity of command and control were considered added benefits. But although changes in tank capabilities and tactics, improvements in antiarmor weapons and doctrine, and shortages of manpower, equipment, and shipping all had an impact; the focus of antiarmor and indeed of all organizational change in the Army Ground Forces from 1940-1944, was General McNair. There was a lack of consensus in the Army and many senior officers who viewed the same situation and came up with divergent solutions; but it was General McNair, Chief of Staff of the 2d Infantry Division in the late 1930's, later commander GHQ, U.S. Army at the beginning of the war, then Commander of the Army Ground Forces, whose thoughts on organization came closest to total acceptance. The organization with which American ground forces entered combat in World War II was to a large extent the product of his mind.

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## CHAPTER FOUR

### ANTITANK STRUCTURE IN THE EUROPEAN THEATER OF OPERATIONS 1944-1945

The best way...to completely immobilize troops in a small area is to put an armored outfit there too....The resulting confusion made it extremely difficult for either the infantry or the armor to get any real effort started, and time which should have been spent by commanders working out their own problems had to be spent in arguing with each other about who would do what, where and when, or why not, etc."

Anon U.S. Officer<sup>1</sup>

#### Concept vs Reality

Doctrinally, the tank destroyer was the primary antiarmor weapon of the U.S. ground forces during World War II.

Trevor Dupuy, a noted military analyst, writes that a radical new weapon (such as the tank or tank destroyer), when first adopted, is not normally used to its fullest advantage, but is rather used hesitantly and inflexibly and proves vulnerable to enemy countermeasures.<sup>2</sup> Dupuy's criteria for assimilation (that is, ability to use it to full potential) of a weapon in combat are:

- "a. confident employment...in accordance with a doctrine that assures its coordination with other weapons in a manner compatible with the characteristics of each.
- b. Consistently effective, flexible use of the weapon in offensive warfare, permitting full employment of the advantages of superior leadership and/or superior resources.
- c. Capability of dealing effectively with anticipated



and unanticipated countermeasures.

d. Sharp decline in casualties for those employing the weapon, often combined with a capability for inflicting disproportionately heavy losses on the enemy."<sup>3</sup>

The German Army was certainly able to meet these criteria with its armored force in the battles of 1939 and 1940. This chapter will trace changes in the organization of U.S. antiarmor weapons in combat, emphasizing the role of the tank destroyer in the European Theater of Operations (ETO), then will analyze the reasons for and problems associated with these changes in order to make a judgement on the success of the pre-Normandy antiarmor force structure.

#### Combat Reorganization

General Lesley McNair was killed by a misdirected U.S. air strike on 25 July 1944, immediately prior to assuming command of U.S. ground forces in the European Theater of Operations (ETO).<sup>4</sup> As champion of both the tank destroyer and of "streamlining and pooling," his untimely death, combined with the demands of General Eisenhower and other senior commanders to increase the organic combat power of the infantry division, was certain to have an effect on the future organization of ground antiarmor weapons.<sup>5</sup>

Even prior to McNair's death, the total number of authorized tank destroyer battalions was reduced, primarily because of a perceived lessening of the German armored threat. The troop basis approved 24 November 1942 authorized formation of 144 tank destroyer battalions (McNair had recommended 222), but by 15 January 1944, this

figure had been reduced to 78,<sup>6</sup> of which 58 were earmarked for the ETO.<sup>7</sup>

The next change was in the tank destroyer itself. Rather than the inexpensive, light, towed gun originally envisioned by McNair, by the end of the European campaign almost all towed guns had been replaced by self propelled antitank guns which were rapidly approaching the weight and cost of a tank.<sup>8</sup> Meanwhile, the low velocity 75-mm gun, originally standard on the M-4 Sherman, was phased out of production in February 1944, and all new Shermans were armed with the same 76-mm antitank gun as the M-18 tank destroyer,<sup>9</sup> the newest available for the Normandy landings. The M-36 tank destroyer, sent to Europe beginning September 1944, was armed with the even more powerful 90-mm gun; however, the Sherman's replacement, the M-26 Pershing, was available in small numbers by 1945 and also mounted the 90-mm gun as standard equipment.<sup>10</sup> But great as these physical changes were, doctrinal changes were even greater.

Contrary to doctrine, tank destroyers were seldom employed as battalions. Tank destroyer brigades and groups, designed to control massed battalions, became administrative rather than tactical headquarters, and those sent to the ETO were employed primarily as special staff sections.<sup>11</sup> The tank destroyer battalions themselves were normally attached one per division, with their companies sub-attached to regiments, and often their platoons to maneuver battalions.<sup>12</sup> It was soon found that this method was most effective when the attachment was long term, and the association between the tank destroyer units and their infantry or armor counterparts was

generally made as permanent as possible.<sup>13</sup> With each division in the ETO (47 by May 1945),<sup>14</sup> having one or more of the available 52 tank destroyer battalions<sup>15</sup> attached, the "pool" of antiarmor weapons at Army level was nonexistent. As early as 24 July 1944, First Army had allocated all 19 of its tank destroyer battalions to subordinate corps,<sup>16</sup> from where most were attached to divisions.<sup>17</sup>

Once attached, tank destroyers provided a great deal more than antiarmor defense. Although primarily designed as an antitank weapon, the tank destroyer had the secondary missions of: "reinforcing artillery, roving battery,...supporting infantry by direct fire,...assault of fortified positions."<sup>18</sup> Reports from the field indicated that employment in these secondary missions was actually the norm. Between June 1944 and April 1945, the 14 tank destroyer battalions attached to Patton's Third Army at the end of the war had destroyed 601 German tanks (a somewhat suspect figure considering the number of tanks the Germans actually had facing U.S. forces); however, their normal employment was attached to infantry divisions, supporting the front line units with direct fire against pill boxes, entrenchments, and artillery. Their second most common role, in which by far the most rounds were fired, was reinforcing divisional artillery with indirect fire.<sup>19</sup>

In summary:

- The overall number of tank destroyer battalions was reduced.
- The towed antitank gun disappeared in favor of a self propelled weapon which evolved into a lightly armored tank (or assault gun).

- The tank achieved parity in armament with the tank destroyer.
- Tank destroyer battalions were normally attached to divisions, and their companies and platoons were often sub-attached, resulting in loss of tactical control by the tank destroyer battalion commander.
- Corps and army commanders lost the ability to mass tank destroyer battalions under operational control of tank destroyer group and brigade headquarters.
- The tank destroyer was primarily used as an infantry support weapon (direct fire) and reinforcement for divisional artillery (indirect fire) rather than as a tank killer.

#### The Unexpected Armored Threat

In June 1944, the German Western Command had 99 obsolete Pz III, 587 Pz IV, 290 Pz V (Panther) and only 63 Pz VI (Tiger) tanks available.<sup>20</sup> The Pz IV had by now been rearmed with a high velocity 75-mm gun and its frontal armored protection had been increased to 80-mm. The Pz V (Panther) was also armed with the high velocity 75-mm gun and protected by 120-mm of sloped frontal armor. The Tiger I was armed with an 88-mm gun and had 110-mm of frontal armor. The Tiger II, which the U.S. Army was not to see in significant numbers until December 1944, had an improved 88-mm gun and 150-mm of frontal armor.<sup>21</sup> Luckily for the United States Army, less than half of the available German tanks were the newer Panthers and Tigers, either of which could destroy the Sherman tank and any tank destroyer at 2,000

yards.<sup>22</sup> Despite the technical superiority of their newer tanks, the Germans seldom employed them in large numbers against U.S. forces. Only at Mortain and the Ardennes did the feared Panzer divisions mass and attack.<sup>23</sup> By early September 1944, the Germans had only 100 tanks available on the entire Western Front opposing over 2,000 allied tanks.<sup>24</sup> The combination of the retreat from Normandy, the abortive German counteroffensive at Mortain, and the constant drain of German armor to the Eastern Front had, at least for a time, destroyed their ability to mass armor against U.S. forces.

Additionally, the Eastern Front battles of 1942 and 1943 demonstrated that steady infantry possessing even marginal antitank weapons could defeat tank units unsupported by infantry and artillery. Even the greatest proponents of armored warfare now admitted that tanks had to be used in close coordination with other, supporting arms. The Germans realized this, but were unable to fully mechanize their infantry, artillery, and logistics, even in their panzer divisions. The ensuing mobility problems, combined with loss of air superiority to the Allies, severely restricted their ability to maneuver.<sup>25</sup>

So the armored threat to U.S. ground forces in the ETO was, except for two occasions, presented by small numbers of German tanks, about half of them newer models. But although restricted by lack of mechanization in their supporting arms and loss of air cover, even the few available German tanks presented a significant danger to U.S. divisions because of the shortcomings of their organic antitank weapons.

## The Inadequacy of U.S. Weapons

The 2.36 inch Bazooka and 57-mm antitank gun, the only organic antitank weapons in an infantry division, proved relatively ineffective against the newer German tanks.<sup>26</sup> The former, although a useful psychological weapon for the infantryman, actually killed few tanks,<sup>27</sup> while the latter was considered ineffective and often abandoned along the roads of France.<sup>28</sup>

The M-6 towed and M-10/M-18 self propelled antitank guns, organic to the separate tank destroyer battalions, were marginally effective against the frontal turret armor on the Panther, but they needed close range, flanking shots against the Tiger I and the even more heavily armored Tiger II, while with their light armor, tank destroyers were extremely vulnerable to German tank fire. Test firings conducted in the ETO by First Army demonstrated that the 3 inch and 76-mm guns on the M-10, M-18, and newer M-4 Sherman tank could only penetrate the turret of a Panther at ranges of less than 200 yards<sup>29</sup> - certainly close range for a tank battle! No wonder General Eisenhower told General Bradley after hearing the results of the field evaluation of the 76mm gun:

"Ordnance told me this 76 would take care of anything the German's had. Now I find you can't knock out a damned thing with it."<sup>30</sup>

The M-36, final version of the tank destroyer, was a self propelled carrier armed with a 90-mm gun, believed capable of defeating any German tank; however, when field tested in December 1944, its rounds

only penetrated the Panther's frontal armor half the time at ranges from 150 to 300 yards. It was, of course, even less effective against the Tiger II.<sup>31</sup> Eisenhower's remarks upon hearing of the 90-mm antitank gun's performance are unrecorded.

The mix of towed and self propelled tank destroyers continued to fluctuate, causing problems in doctrine, production, training, and transportation. Due to the poor performance of self propelled tank destroyers in the North African Campaign, (these were the jury-rigged, undergunned M-3, a 75-mm gun mounted on a half-track), the AGF directed that all self propelled battalions still in the United States be converted to the towed 3-in antitank gun. In November 1943, this decision was modified and half of the 52 tank destroyer battalions programmed for the ETO were organized with the towed, and half with the self propelled weapon. The former had the mission of supporting divisions and the latter of providing a strong antiarmor reserve.<sup>32</sup>

From this point, the trend was upward in weight and cargo space. There were 11 towed and 19 self propelled tank destroyer battalions available in England for the Normandy invasion, but due to lessons of pre-D Day training, the divisions that were to conduct the beach landings all requested that self propelled guns be attached to them for the initial operation.<sup>33</sup> The self propelled guns filled the need for an infantry assault gun, whereas the towed tank destroyer did not. So from the beginning the self propelled weapon began to replace the towed, a trend which continued until the Ardennes Counteroffensive sounded the death knell of the towed gun.

U.S. Army weapons procurers had done a poor job of assessing the German armored threat. The divisional antiarmor weapons available

to U.S. forces were largely ineffective against even a minimal armored threat, while even the nondivisional tank destroyer units had weapons which were barely adequate against the newer German tanks. They could generally destroy enemy tanks with close range flanking shots, but their comparative vulnerability to enemy counterfire caused the death of many brave soldiers.

#### Alternative Weapons

The three major alternative tank killers of World War II were artillery, fighter aircraft and other tanks. Artillery, even the self propelled 105mm howitzer, proved to be a poor antiarmor weapon due to those considerations previously mentioned; however, since the German Army was never able to fully mechanize its supporting arms, U.S. artillery was useful in separating them from the tanks.<sup>34</sup> The individual artillery piece was a poor antitank weapon, but massed artillery could usually disrupt a panzer attack.

U.S. forces had total air superiority from Normandy to the Elbe, allowing the air component almost unrestricted access to German ground forces.<sup>35</sup> Gaining and maintaining this access to the skies was the first priority for the Tactical Air Commands. Second priority was the interdiction of enemy troops and supplies moving into the battle area, followed by close air support as third priority.<sup>36</sup> Although armed reconnaissance and close air support were valuable to the ground commander, 12th Army Group reported "that the most effective capability of medium bomber capabilities was interdiction,"



and allocated 74% of its sorties to destroying enemy forces and supplies prior to their arrival on the battlefield.<sup>37</sup> The Germans themselves blamed U.S. air interdiction both for their failure to have their armored reserves concentrated and close to the front, and for the disrupted and piecemeal manner in which they were committed.<sup>38</sup> U.S. medium bombers and fighter bombers could destroy German tanks with heavy machine gun fire, cannon, rockets, and bombs. When conditions favored their employment, they were effective either attacking armored columns moving to the battle or providing support to engaged forces. But aircraft were limited by weather and visibility to a greater extent than tanks. Given the right conditions, properly armed aircraft could devastate an enemy column; however, if the weather was poor, there was a higher air priority, or a lack of targeting by ground or air reconnaissance, the effectiveness of the aircraft as an antiarmor weapon quickly diminished.

As for the tank as an antiarmor weapon, it was previously noted that beginning in February 1944, the low velocity 75-mm gun of the M-4 Sherman was phased out by the same 76-mm high velocity gun as armed the M-18 tank destroyer. Now mounting the same weapon as the newest available tank destroyer, the newer Shermans could more effectively perform their antitank role, while having a better chance of survival than tank destroyers due to their thicker armor. The M-36, with its 90-mm gun, temporarily returned the armament advantage to the tank destroyer, but by the end of the war in Europe, 310 M-26 Pershing tanks, mounting the same gun, had deployed to the ETO. The M-36 tank destroyer was self propelled, weighed 31 tons, and had 3 inches of

armor on the turret front.<sup>39</sup> The differences between tank and tank destroyer were fast becoming academic.

### Doctrine Rewritten on the Battlefield

Primarily due to the short duration and high intensity of the European war, the written Army doctrine for antitank warfare did not change between the invasion of Normandy and V-E Day. If we accept the definition of doctrine as "a set of authoritative guidelines for the conduct of war,"<sup>40</sup> and accept the premise that it must be known, understood, and respected,<sup>41</sup> there were grave problems with written U.S. antitank doctrine. Official antitank doctrine, in which armored penetrations were halted by massed tank destroyer units deployed in depth, was never used. During the German Ardennes Counteroffensive in December 1944, massed German armor broke through the weakened American lines. Conditions for the tank destroyer doctrine espoused by McNair appeared ideal, yet nowhere in the official U.S. Army history of this battle is there an indication of massed tank destroyers being used, despite many references to the tremendous contributions made by individual weapons, platoons, and companies.<sup>42</sup> Tank destroyer battalions had been dispersed and no attempt was made to reconsolidated them in the chaos of battle. In an official post-war study on tank destroyer operations, the only illustrative example of a tank destroyer group being used to control tactical units in combat was the crossings over the Roer River, where several tank destroyer battalions, controlled by a group headquarters, fired against enemy

strong points in support of the field artillery.<sup>43</sup> No example is given of their massed use against enemy tanks.

Of course, doctrine should not become dogma and conditions must determine the exact application of the principles of war. The inadequacy of the 57-mm antitank gun was so pronounced that some means of antitank defense had to be provided to divisions in combat.<sup>44</sup> Additionally, the nature of U.S. ground combat in the ETO was offensive, meaning that the large scale "ambushes" against enemy armored breakthroughs were rarely necessary. The general paucity of German armor made tank destroyers available for their secondary missions. Yet lessons from North Africa and Sicily, combined with Allied intelligence, should have brought some of these factors to light, aligning doctrine with reality to a greater degree. Admittedly, the so-called secondary missions of indirect fire and infantry support received increased training emphasis beginning in 1943, and the 1944 edition of FM 18-5, Tactical Employment of the Tank Destroyer Unit, deemphasizes offensive operations against enemy tanks, but the doctrine of massed employment of tank destroyers and the organization of antiarmor weapons remained fundamentally unchanged.<sup>45</sup>

#### Combat Redistribution of Tank Destroyers

The basic tank destroyer organization was the battalion, consisting of a headquarters and headquarters company, three lettered companies, and a reconnaissance company.<sup>46</sup> The battalion could be attached to a maneuver division or to a tank destroyer group or

brigade headquarters and retain that flexibility; however, when broken into companies or platoons, a great deal of this flexibility was lost. As tank destroyer units became more fragmented, antitank defenses became both linear and uncoordinated. Rather than massing antiarmor assets on the most dangerous approaches, each regiment or battalion received its tank destroyer "package," to do with as it saw fit. Also, as the tank destroyer battalion commander's loss of tactical control of his companies became more permanent, it became both more difficult for him to retain the allegiance of his company commanders and to keep his staff immersed in what have seemed a meaningless drill of planning for massed employment of the battalion. To illustrate:

"at Mortain, France...a critical, unprotected area developed and the division issued instructions to the tank destroyer battalion that a platoon would be moved to that area at once. The tank destroyer battalion commander reminded the division staff that all units had been attached and nothing remained under battalion control, but recommended and received approval, that one platoon of the tank destroyer company attached to the regiment not engaged be returned to battalion control. Notwithstanding this, the regiment refused to permit the platoon's movement and delayed its detachment for 5 1/2 hours.<sup>47</sup>

The loss of flexibility did have its compensations. The 634th Tank Destroyer Battalion had been attached to the 1st Infantry Division since Normandy. During the Hurtgen Forest battles, a platoon of the 634th, along with two platoons from the 745th Separate Tank Battalion, supported an infantry attack on a hill in the vicinity of the town of Hamich. All three units had worked together repeatedly, and in the words of one observer, "...it was the sweetest

example of infantry - tank cooperation that I have ever seen." The hill was secured with the loss of no infantry or tank destroyers and only one tank.<sup>48</sup> This degree of cooperation was not usually achieved by units thrown together for the first time in combat, but was rather the result of long term association.<sup>49</sup> The ability to mass antiarmor weapons at the critical time and place had been degraded in order to provide combat power to divisions, regiments, and battalions. As Kent Greenfield so well puts it:

"...the tank menace of 1940 was overcome, the idea of the invulnerability of armored forces exploded, and armored forces consequently reintegrated into a tactics of combined arms. Special tank destroyer battalions became proportionately less necessary as armored forces lost their ability (insofar as they ever had it) to fight as a separate arm. As tanks came to be less commonly employed in armored masses there was less need for tank destroyer battalions capable of rapid concentration."<sup>50</sup>

#### Resource Constraints vs Need

McNair's concept of streamlining and pooling was based on the need for economy and flexibility, and the distribution of tank destroyers practiced in the ETO was the antithesis of those needs. Manpower continued to be a great constraint for the Army Ground Forces throughout the war.<sup>51</sup> Although no more tank destroyer battalions were sent to Europe than planned, the cost in dollars, industrial capacity, and training continued to rise as the self propelled gun replaced the towed, and the 90-mm gun replaced the 76-mm and 3 inch. "Economy of Force," getting maximum use out of each asset, should have had increased importance in 1944 and 1945, yet tank destroyer

battalions continued to be attached to divisions, then further fragmented. There were several reasons for this seeming disregard for economy.

First, the premise of AGF planners that the bazooka and 57-mm antitank gun would provide sufficient antiarmor protection for the infantry division against all but massed enemy armor was false. Tank destroyer battalions had to be attached to infantry and armored divisions (the short 75-mm gun still armed most M-4 Sherman) then distributed to subordinate regiments, combat commands, and battalions for protection against even the limited numbers of enemy tanks normally encountered.

Once attached, the supported commanders found the tank destroyer's high velocity gun useful in providing direct fire support for attacks against enemy strongpoints, as well as for supplementing indirect fires.<sup>52</sup> They soon viewed the tank destroyer as a necessary augmentation to the combat power of their unit in almost every type offensive and defensive operation.<sup>53</sup> In the opinion of these commanders, McNair's dictum, that a unit should have organic those assets always needed, now applied to the tank destroyer. Most commanders normally preferred the more heavily armored tank to the tank destroyer in the infantry support role, especially after the M-4 Sherman received the 76-mm gun, but as late as December 1944, only 73 separate tank battalions had been activated,<sup>54</sup> and only 28 of them were in the ETO.<sup>55</sup> With 42 infantry divisions deployed to Europe, this was not enough, and the self propelled tank destroyer was often used (or misused) as an infantry support tank.<sup>56</sup> In this role,

certainly many of the tank destroyer crews, especially in the M-18, would have gladly traded 20 miles per hour of road speed for an extra inch of armor. The towed tank destroyer lacked the necessary protection and maneuverability for this role, and was phased out after disproportionate losses during the Ardennes Counteroffensive.<sup>57</sup> Combat is a wasteful activity, and in the ETO efficiency (or economy of force) quickly became subordinated to the need for an effective antiarmor weapon and assault gun in division, regiments, and battalions.

Also, by June 1944, the overseas shipping crisis which had so affected operations early in the war was largely a thing of the past.<sup>58</sup> The 5,850 pound towed M-6 and its 9 ton M-3 half track prime mover were replaced by the 20 ton M-18 and 33 ton M-10. As the need for a heavier weapon surfaced, they in turn, were replaced by the 31 ton M-36. Cargo space taken by the towed gun and its prime mover was about equal to that of the self propelled gun, but the support required by the tracked vehicle, combined with the ability to replace a destroyed towed gun's prime mover with another vehicle, equated to a large increase in total cargo space for the self propelled weapon.

So it was that the 912 pound 37-mm towed antitank gun and 3,280 pound 37-mm self propelled gun were replaced by weapons weighing many times as much.<sup>59</sup> The need for the self propelled, heavily gunned tank destroyer finally produced a weapon with the same weight and bulk as the Sherman tank. Deployability ceased to be a significant consideration.

## Problems of Command and Control

When tank destroyer battalions, trained to fight primarily as independent units, were fragmented among infantry and armored forces, problems ensued. Most infantry and armor commanders had never trained with tank destroyers and either did not know or ignored their doctrinal use.<sup>60</sup> Conversely, most tank destroyer units had been given little combined arms training and lacked both proficiency and confidence in this role.<sup>61</sup> The failure of doctrine to properly link training with the realities of combat initially caused many problems between the tank destroyers and their supported units which took time, and often casualties to sort out. Once the tank destroyers were fully integrated into the combined arms team, supported commanders were reluctant to release them to another unit or for return to the pool. This reluctance eventually resulted in the semi-permanent attachment of tank destroyer units.<sup>62</sup> This caused problems with support, for tank destroyer battalions were organized to be logistically removed from field army control only temporarily, and tank destroyer companies had little independent administrative or logistic capability.<sup>63</sup>

Thus, the organization, training, and employment of tank destroyer units tended to complicate, rather than simplify command, control, and support. Crews were generally proficient with their weapons, but were not well trained in combined arms operations. Part of the problem was a lack of equipment which had been endemic in 1942 and 1943 when nondivisional units were only being issued 20% of their



authorized equipment prior to deployment overseas, making combined arms training difficult to accomplish.<sup>64</sup> Another problem was the continued weapons retraining necessary as improved antitank guns were developed and issued, leaving little time for combined arms training. For example, the 610th Tank Destroyer Battalion, between April 1942 and September 1944, was sequentially armed with the 37-mm towed antitank gun, the M-3 self propelled 75-mm gun, the M10A1 self propelled 3 inch gun, the M-10 (diesel), the M-3 towed 3 inch gun (just 6 weeks prior to deployment to Europe), and the M-36 self propelled 90-mm gun.<sup>65</sup>

#### Lessons Learned

The war in Europe ended on 6 May 1945, a victory for the Allies. However, serious deficiencies in the organization of Army Ground Force units had been noted, the most conspicuous being the difficulties encountered when employing infantry, tanks and antitank weapons in a combined arms effort.<sup>66</sup> At the end of World War II, lessons concerning antitank weapons were taken primarily from combat experiences in the ETO.

The tank of 1945 was more heavily armed and armored than its 1940 counterpart. The newest production German tanks had the feared 88-mm gun and 150-mm of sloped frontal armor (Tiger II); however, their speed had dropped to 24 mph (28 mph in the Panther) and the cruising range was only 68 miles for the Tiger II and 110 miles for the Panther. The USSR had the T-34 medium tank with an 85-mm gun and 75-mm of sloped frontal armor, and the JS-II heavy tank with a 122-mm

gun and 120-mm of frontal armor. The former had a speed of 31 mph and a 140 mile range, while the latter's speed was 23 mph with a range of 150 miles. The U.S. Army's newest tank, the M-26, had a 90-mm gun and 102-mm of frontal armor. It had a maximum speed of 20 mph and a range of 75 miles.<sup>67</sup> Clearly, speed and range were generally being sacrificed for heavier armor and armament.

The bazooka and 57-mm antitank gun could not penetrate the armor of these newer, heavier tanks. The 3.5 inch rocket launcher, planned successor for the bazooka, was still under development and would not be fielded until the Korean War. By the end of World War II, 57-mm and 75-mm recoilless rifles were in production, and a 105-mm recoilless rifle was planned. The 57-mm weighed 40 pounds and the 75-mm 114 pounds, light enough for distribution to platoon and company level. Neither was fielded early enough to see service in the ETO.<sup>69</sup>

A committee was formed by the General Board, U.S. Forces European Theater, to make recommendations on future force structure. In the introduction to its report, the committee stated that it was aware of the loss of maneuverability of divisions as units were added to their basic structure; however, "there are overriding advantages in assigning organically to the division supporting units which habitually had to be attached."<sup>70</sup> The committee affirmed the close interdependence between infantry and tanks (or tank destroyers) and that:

"This intimate relationship...necessitates that they be thoroughly integrated into an effective fighting unit. The development of standing operational procedures and techniques between infantry and tanks must not be left until arrival in the combat zone."<sup>71</sup>

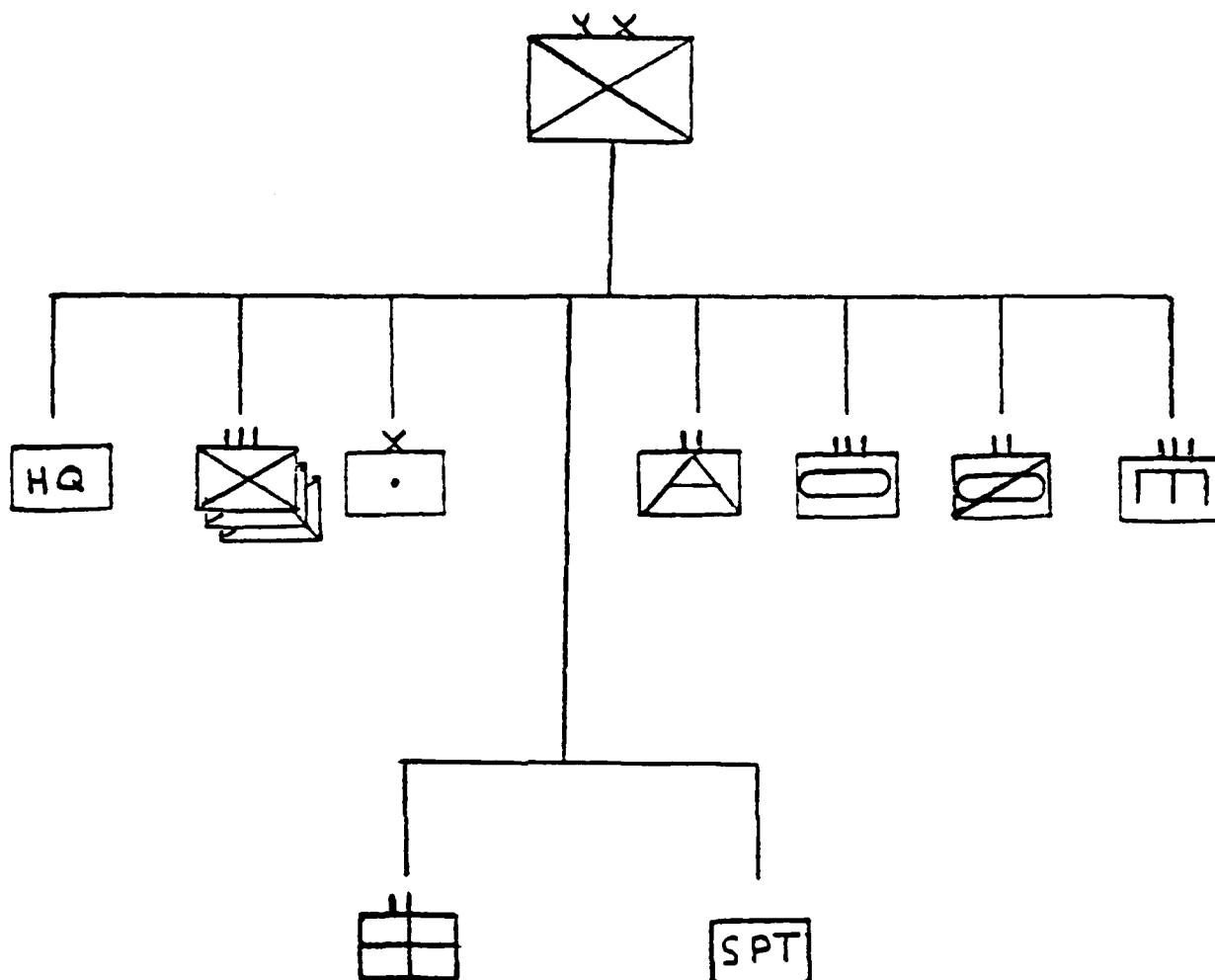
After action reports showed that most often effective infantry tank operations occurred only after a "break-in period" during which the units sustained casualties, and that the resulting procedures and techniques were too often the product of trial and error. Therefore, the committee recommended that either two battalions, or a regiment of three battalions, of armor be organic to to each division, and used primarily to support the infantry regiments. The tank destroyer was considered for this role, but the committee found that virtually all field commanders preferred the tank.<sup>72</sup>

Air power, both through interdiction and close air support, played a major antiarmor role in the War in Europe. However, despite the generally superb support given by the air arm in the ETO, the establishment of the U.S. Air Force as a separate service and its emphasis on strategic bombing left the Army with no assurance that high quality air support would continue.<sup>74</sup>

Artillery was a superb means of separating enemy tanks and infantry but, with the exception of antitank guns, was generally ineffective in destroying moving tanks and was considered best employed as a supporting weapon.

After much deliberation, The General Board recommended that separate infantry and armored divisions be retained, rather than developing an all purpose division. Although there would be both tanks and infantry in each:

"...there is one pronounced and fundamental difference which cannot be reconciled. The tanks in the infantry division are support weapons and their primary mission is to assist the advance of the infantry. The tanks in



Recommended Post - World War II Infantry Division<sup>73</sup>

the armored division are the main striking force and the infantry is the support with the mission of breaking the tanks free."<sup>75</sup>

Even in the armored division, there was requirement for a combined arms effort. The tank had been assimilated as a military weapon, and would fight using a doctrine which coordinated its use with other weapons in a manner which would maximize the capabilities of each. The doctrine for antiarmor warfare now focused on breaking down this coordinated effort as well as killing individual tanks. It is key to note that the tank was no longer considered an independent weapon, to be countered by specialized antitank weapons, but rather as a subsystem of a combined arms team which could only be countered by another combined arms effort.

The troop basis for 30 June 1945 authorized 63 separate tank and 78 tank destroyer battalions,<sup>76</sup> yet the General Board recommended that no separate tank or tank destroyer battalions be retained in the post war force structure.<sup>77</sup> Although they appreciated the increased flexibility gained by retaining nondivisional combat units in a reserve Army planners realized that future forces must be versatile, highly mobile, and hard hitting. As the tank destroyer approached the tank in terms of size, expense, and manpower, it was no longer the "economical" means for killing a much more expensive tank envisioned by McNair. The tank destroyer could no longer be considered justified in terms of economy, while the tank was now a multipurpose tank killer, infantry support weapon, and tool for exploitation and pursuit. Due to the requirement for worldwide aerial deployment, the airborne division was retained in the post war army,<sup>16</sup> and with the U.S. merchant marine at an all time high, apparently no scarcity of assets for shipboard

deployment of forces was foreseen.

Increasing the organic antiarmor assets organic to the division only caused an apparent increase in the complexity of command and control, logistics, and training; World War II experiences showed that these units tended to become semi- permanently attached to the divisions, and that it actually simplified matters to make them pool, experiences in the ETO showed that the continual need for these units at lower command levels, combined with their generally poor performance when initially participating in combined arms operations, more than negated any theoretical advantage. To quote:

"...the committee feels that there are overriding advantages in assigning organically to the division supporting units which habitually had to be attached....The advantages result principally from greater esprit de corps and teamwork, better understanding of standard operating procedures, and an increase in morale of the attached units. These units want to wear the division shoulder patch and to feel that they have a home.<sup>15</sup>

organic, which allowed them to respond to the same command and control structure, be resupplied and administratively supported, and train in accordance with wartime doctrinal employment. A major lesson learned was that if a type unit had to be routinely attached, it was better made organic.

#### Summary

During the course of the Allied campaign in northern Europe, the functional organization of antiarmor weapons underwent radical

changes. The tank destroyer battalions, designed to be used primarily by corps, army, and army group commanders in highly maneuverable, task organized formations, instead were fragmented into companies, platoons, and even squads, then further distributed to infantry units where they were used primarily as mobile assault guns.

The primary reasons for these changes as a result of lessons learned from that period, were:

a. At the operational level the enemy armored threat, as previously assessed, was incorrect. A combination of attrition on the Eastern Front, effective U.S. air interdiction, and production problems in their tank industry left Germany with too little armor in the West to routinely employ massed armor. The proliferation of antiarmor weapons on the battlefield and the effectiveness of air support no longer allowed German tanks the unbridled maneuverability on the battlefield they once enjoyed. The piecemeal employment of German armor encouraged distribution of U.S. antiarmor weapons.

b. At the tactical level the ability of Germany to arm and armor individual tanks outpaced the U.S. Army's ability to field antitank weapons able to defeat them. Antiarmor weapons became progressively larger as the war continued. The inability of even the larger antitank guns to destroy German armor at long ranges demanded that for survival they be heavily protected and maneuverable - more like a tanks. Organic divisional weapons were only marginally effective against the newer German tanks, and U.S. tank destroyer units had to be distributed in order to provide protection.

c. Although artillery and mines could disrupt their supporting arms, the only multipurpose weapons effective against

German tanks themselves were other tanks and aircraft. As these weapons were not organic to U.S. infantry divisions, the necessity for distribution of tank destroyers was further supported.

d. U.S. Army operations in the ETO were predominately offensive. Infantry commanders felt they needed a mobile support gun. They already had the 105-mm regimental artillery battery, but also wanted a direct fire weapon capable of reducing pillboxes, strongpoints, and an occasional German tank. The self propelled tank destroyer could fill this role and divisions demanded, and received them. The depletion of the antiarmor weapons "pool" at the corps, army, and army group level became permanent in order to increase divisional combat power.

e. Resource constraints which so dominated the thinking of planners early in the war became less critical as the United States completed mobilization. The fact that fewer tank destroyer units were shipped to the ETO than originally planned was more a function of a lessened enemy armor threat than one of resource constraints; however, if the Normandy landings had been conducted in 1942 or 1943 there is little doubt that shipping and production limitations would have played a major role in the availability of tank destroyers. By the end of World War II, the tank destroyer was thoroughly integrated into both infantry and armored divisions. Its characteristics and missions had merged with those of the tank and the two arms were soon combined. The tank itself became the primary antiarmor weapon of the U.S. Army and was doctrinally employed as a member of a combined arms team. The primary antiarmor weapon of the Army became a distributed asset.



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## CHAPTER FIVE

### TRENDS FROM 1946 TO THE PRESENT

#### The Threat

"Only armor can assure the rapid and total destruction of the enemy. It alone can achieve swift and decisive victory under modern conditions. Armor is the basic maneuver element of the Soviet Army - it plays the decisive role in the attack."

Marshal of Tank Forces  
F.A. Rotmistrov<sup>1</sup>

The United States Army must be prepared to fight throughout a "spectrum" of conflicts, ranging from "economic, political, and cultural competition to total war."<sup>2</sup> We must be prepared to defeat the highly mechanized armies of the Warsaw Pact, forces which combine rapid maneuver and massive fires of all types to achieve victory; an enemy who rejects classic "breakthrough" tactics, and penetrates with a combination of speed, deception, and violent action throughout the depth of the battlefield, producing relentless pressure designed to keep our forces in disarray until destroyed.<sup>3</sup> Within this doctrine, the tank is the predominant Soviet weapon. It requires the support of the other arms to accomplish its missions, but the tank division is the primary maneuver force of the Soviet Army, and the tank army is the exploitation force of the Soviet Front.<sup>4</sup> With 134 motorized rifle divisions, 50 tank divisions, and 7 airborne divisions in the Soviet Army alone, containing over 50,000 main battle tanks, the armored threat presented by the Warsaw Pack is daunting.<sup>5</sup> The USSR has a

great numerical superiority in tanks, and intends to use them offensively as the base weapon in combined arms operations. Tables A and B contain information on Warsaw Pact tanks compiled from unclassified sources.

Although the mainstay of the Soviet armored force is still the T-62, these are being replaced in Category I units by the T-72, currently produced at the rate of 2,500 annually.<sup>6</sup> Other characteristics of newer (T64/72/80) Soviet main battle tanks are:

- a. Integral CBR protection for the crew.
- b. Laser range finders.
- c. Passive night vision devices.
- d. Laminate armor.<sup>7</sup>

In summary, the armored threat from our most potentially dangerous enemy has the following characteristics:

- a. Doctrinal
  - (1) His forces move fast and hit hard.
  - (2) Firepower is used as maneuver.
  - (3) Large numbers of armored vehicles are organized as combined arms teams.
  - (4) He attacks through the entire depth of the defense.
  - (5) His forces are offensively oriented.
  - (6) He attacks in echelons.
  - (7) He exploits success to the fullest.
  - (8) His ground forces are supported by massive numbers of aircraft.

Table A  
Warsaw Pact Main Battle Tanks\*\*\*

Tank	Years Produced	Estimated Number	Main Armament	Speed	Range	**Armor
T-80	1981	?	125-mm 70km/hr (improved)		450/650*km	lamine protection unknown
T-72	1971-	20,000	125-mm	60km/hr	480/700*km	conventional/ lamine 500-600-mm protection on front slope.
T-64	1967- 1981	6,000	125-mm	70km/hr	450/700*km	Same as T-72
T-62	1961- 1972	40,000	115-mm	50km/hr	450/650*km	180-200-mm conventional protection on front slope
T-57/ 55	1950- 1961	50,000	100-mm	48km/hr	400/600*km	120-150-mm conventional protection on front slope

\* with auxillary fuel tanks

\*\* all armor statistics for equivalent protection of homogeneous steel

\*\*\* statistical data from Jane's Armor and Artillery, 1983-1984, pp. 59-73.

Table 8  
Penetration (mm at 0 slope) Against Conventional  
Armor of Soviet Main Tank Guns\*

<u>Gun</u>	<u>Ammunition</u>	<u>500</u>	<u>1,000</u>	<u>1,500</u>	<u>2,000</u>	<u>3,000</u>
100-mm	HVADPS	-	264	-	237	-
	AOS-T	-	175	-	156	-
	HEAT	380 at any range				
115-mm	HVAPFSDS	350	300	285	270	215
	HEAT	432 at any range				
125-mm	HVAPCFSDS	450	425	400	375	325
	HEAT	475-mm at any range				

\* statistical data from David Isby's Weapons and Tactics of the Soviet Army, pp. 88, 97, 107.



b. Tanks, especially T-62 and newer:

- (1) Are well protected frontally, especially against HEAT ammunition.
- (2) Have excellent main gun and fire control system.
- (3) Can penetrate to operational depth quickly without refueling.
- (4) Can fight during periods of limited visibility and in a CBR environment.
- (5) New prototypes are quickly fielded and produced in massive quantities. Older models are either sold to allies or put in reserve stocks (or Category III units).

### Countering the Threat - Technology

The technological battle between tank design and the development of antiarmor weapons resembles a see-saw, with first the tank, then the antitank weapon dominating. At the end of World War II, some soldiers believed that the main battle tank was fast becoming obsolete due to the proliferation of inexpensive shaped charge antitank weapons on the battlefield.<sup>8</sup> It seems as if every generation of military officers makes this assertion at least once. During the early 1970's, the ground and air launched guided missile again had many predicting the demise of the tank. Today, some proponents for many "smart" munitions come to the same conclusion, yet armor is still with us.

There are several ways of putting a tank out of action - by

defeating its armor, destroying its mobility, or killing its crew. Generally, passive means such as mines and obstacles have been used to limit or destroy the tank's mobility, along with such desperation weapons as antitank grenades.

Tank crews can be disabled without defeating the tank's armor through the use of NBC weapons, including flame. Although these can prove effective against older model tanks, both moral constraints and the environmental protection offered by most modern armored vehicles limit their use and effectiveness.

The tank can be defeated by producing an antitank gun capable of firing a projectile at sufficiently high velocity to force its way through the tank's armor. This was the main thrust of antitank gun development during World War II, when the size of the standard U.S. antitank gun increased from 37-mm to 90-mm. Penetration became such a preoccupation with designers that, as one author put it:

"Up to the fifties most designers of armor-defeating ammunition, like bridegrooms in a nonpermissive society, were so concerned with achieving penetration that they paid little attention to what happened afterwards."<sup>9</sup>

It was not long before the resultant gun became unreasonably large and expensive. The alternative was, and is, the development of a superior shell or warhead. Table C on the next page shows some of the concepts developed for the defeat of armor.

Barring a major technological breakthrough, the sabot (now called kinetic energy or KE) round will remain the most effective type of antitank munition for the immediate future. The combination of improved KE munitions, including use of a depleted uranium (DU)

Table C

Characteristics of Various Types of Armor Defeating Concepts<sup>30</sup>

<u>Concept</u>	<u>Description</u>	<u>How Used</u>	<u>Advantages</u>	<u>Disadvantages</u>
Armor Piercing Shot (AP)	Solid projectile made of alloy steel. Sometimes used a ballistic cap to improve accuracy and velocity.	Main tank and antitank guns. Seldom used today.	1. Simple	1. Takes a very large weapon to defeat good armor. 2. Tends to break up against case hardened armor. 3. Penetration reduced dramatically with increased range.
Armor Piercing Discarding Sabot (APDS)	A very hard, dense core is surrounded by a light material which is discarded after it leaves the weapon muzzle.	Main tank and antitank guns.	1. High velocity obtained without excess chamber pressure. 2. High velocity & dense material gives greater penetration. 3. High velocity = flat trajectory = greater accuracy due to minimizing the effect of range error and target movement.	1. Elements used to make the core are scarce and expensive. 2. Still must rely on kinetic energy for penetration.

penetrator, and the increased effectiveness of compound armor in disrupting the effects of shaped charge rounds leads to this conclusion. Of course, compound armor also reduces the penetration of both shaped charge and KE munitions, but is far less effective against the latter.<sup>10</sup> As a result, we cannot expect most shaped charge munitions, which include virtually all U.S. antitank weapons except main tank rounds, to defeat the frontal armor of the newest Soviet tanks.

This does not, however, relegate antitank guided missiles (ATGM), "smart" munitions, and bomblets to obsolescence. Many of these were never meant to defeat frontal armor, but rather to attack the weaker top, sides, rear, or bottom of the tank, where compound armor is impractical. Just as the World War II 57-mm antitank gunner was told to position his weapon and wait for a flank or rear shot,<sup>11</sup> so is the ATGM gunner today.<sup>12</sup> Also, these weapons are still effective against armored personnel carriers, self propelled artillery, and other support vehicles required for successful armored operations.

With these factors in mind, it is now possible to take a look at current weapons in the U.S. Army inventory with a primary antiarmor role:

a. The Tank. For most of the period from World War II until the present, the main battle tank has been the most potent antiarmor weapon.<sup>14</sup> It is mobile, protected, and has superior firepower. Immediately after World War II, certain critics believed the newly developed recoilless weapons would make the tank obsolete;

however, faster and better armored and armed tanks soon appeared and the tank again assumed dominance. The invention of the antitank guided missile (ATGM) in the 1950's again sounded the death knell for the tank. Although the high velocity kinetic energy tank round was also improved at this time, the light weight, extended range, and lethality of the ATGM made it the superior antiarmor weapon for a time.<sup>15</sup> The introduction of compound armor in the 1970's again brought the tank into a position of dominance, for although compound armor provides improved protection against both chemical energy and kinetic energy projectiles, it is most effective against the former. The force of the chemical (shaped charge) warhead is diffused, but unless the kinetic energy penetrator bounces off, all of its energy is transferred to the target, probably knocking it out of action even without penetrating.<sup>16</sup> Today's U.S. tanks are designed as antitank weapons. The new M-1 Abrams tank carries only 55 rounds of ammunition for its 105-mm gun,<sup>17</sup> and of the 17 types of ammunition in production or under development for this gun, only two, smoke and high explosive, have any function other than killing armor.<sup>18</sup> The M1E1 variant will mount the 120-mm gun and even less ammunition. Even though they mount machine guns for air and ground defense, U.S. tank design for the past 40 years has been based on an antiarmor function.

d. The Heavy Antitank Weapon. This started out in the post-World War II era as a recoilless rifle. The Korean War infantry regiment and battalion had two 75-mm recoilless rifles in its heavy weapons company.<sup>19</sup> These weapons, although reasonably accurate,

had slow rates of fire, large signatures, and limited armor penetration.<sup>20</sup> After the Korean War it was replaced by the 106-mm recoilless rifle, which remained in service in the U.S. Army until the mid-1970's when replaced by the M-220 TOW, a guided missile with a range of 65-3750 meters which can be fired from a ground mount, an armored or unarmored vehicle, or an aerial platform. Under ideal conditions the M-220 has an 80% probability of hitting a vehicle moving up to 20 miles per hour at any distance within range, and with its improved HEAT munitions can penetrate over 480-mm of armor plate.<sup>21</sup> Because it is a chemical energy round, its penetration is degraded by compound armor.

c. Medium Antitank Weapon (MAW). After World War II, this role was assumed by the 57-mm recoilless rifle - three per infantry company.<sup>22</sup> Immediately prior to and during the Korean War, it was replaced by the larger 90-mm recoilless rifle, which remained in service until the early 1980's. Its replacement, the M-47 Dragon, is an antitank guided missile with a range of 65 to 1000 meters, within which it has a 70% probability of hitting an enemy vehicle moving at 25 km/hr or less.<sup>23</sup> Penetration of the Dragon is classified but is roughly the same as the TOW.

d. Light Antitank Weapon (LAW). From World War II until Korea, the 2.75 inch bazooka remained the infantryman's last protection, but with its failure to defeat the North Korean T-34's, the Ordnance Department pulled out the plans for the 3.5 inch rocket launcher, which remained in service in the Army until replaced in the early 1960's by the M-72 Light Antitank Weapon (LAW). The

LAW is actually a round of ammunition within a disposable launcher. It has an effective range of 200 meters and contains a HEAT warhead capable of penetrating 260-mm of plate (again, not composite) armor.<sup>24</sup> Although considered obsolete, no suitable replacement has been purchased.

e. The Attack Helicopter. The attack helicopter is a relatively new weapon. It was at first merely a standard utility helicopter mounting rockets and guns, but soon became a separate and distinct helicopter type, the AH-1 Cobra series. The S-model Cobra, developed primarily as an antiarmor weapons system for the division and corps commander, carries up to 8 TOW missiles, a 20-mm cannon, and 2.75 inch rockets. It has a maximum flight time of 1-2 hours, depending on payload.<sup>25</sup> The primary antiarmor weapon of the AH-1S is the improved TOW missile with essentially the same characteristics as the infantry weapon.

The next generation of attack helicopter, the AH-64 Apache, is faster and capable of carrying a heavier payload than the Cobra. It is armed with the 30-mm chain gun, up to 16 Hellfire missiles, and 2.75 inch rockets. The Hellfire has a shaped charge warhead and a range of 6,000 meters. The Apache also has an extensive night fighting capability.<sup>26</sup>

Beginning in the mid-1970's and continuing to the present, there was talk of the attack helicopter driving the tank from its primary role on the battlefield. The mobility and accurate, lethal firepower the helicopter can place on enemy tanks at long ranges certainly looked promising, but the advent of compound armor, the

helicopter's relatively short time on station, advanced electronic warfare, and the helicopter's vulnerability to improved threat air and air defense, modified the picture.<sup>27</sup> Even with these shortcomings, the attack helicopter is a valuable weapon. It can move about the battlefield much faster than the tank, and is better able than a ground-mounted system to position itself to attack the tank's weaker top, side, and rear armor.

f. Field Artillery. U.S. artillery pieces, even self propelled, are normally lightly protected and fire low velocity, heavy munitions. Rather than attempting to develop a high velocity antitank shell for these guns (as was done during World War II), effective antiarmor munitions, which capitalize on the high trajectory of the artillery shell are being developed. Munitions for the 155-mm howitzer include a Remote Anti-Armor Mine System (RAAMS), in which 9 antitank mines are base-ejected from each projectile, and the M-483, containing 64 antipersonnel and 24 dual purpose grenades which attack the enemy tank on its thinly armored top. The Cannon Launched Guided Projective (Copperhead), is guided to the target by a laser designator. Again, although the warhead is a shaped charge, both size and high angle of attack add to its effectiveness. Several other Copperhead-type munitions as well as Search and Destroy Armor (SADARM) projectiles containing submunitions which will sense, then attack, armored vehicles, are under development for both the 155-mm and 203-mm howitzer. These "top attack" projectiles attack the tank vertically, greatly enhancing the effectiveness of their shaped charge warheads.



Mating these projectiles to the new extended range munitions will allow field artillery to engage and disrupt enemy armored columns at ranges up to 40 km. The 227-mm multiple rocket launcher systems (MLRS) now being fielded has the capability of firing 12 rockets, each with 644 M-77 dual purpose shaped charge bomblets with an armored penetration of 100-mm, up to 40 km.<sup>28</sup> These new munitions, coupled with improved intelligence gathering, make the field artillery both a potent means of interdiction and an effective close support weapon, able to destroy enemy armor while remaining protected from their direct fire weapons.

g. U.S. Air Force Aircraft. The Army Air Corps, at least nominally under ground force control during World War II, made a complete break in 1947. Its fixation with strategic nuclear and conventional bombing caused the capability to support ground forces to deteriorate until first the Korean War, then Vietnam, demonstrated both the importance of air support of ground forces and the inability of the Air Force to provide it.<sup>29</sup> Throughout the 1960's and 70's, close air support received increased emphasis. Today, the Air Force has the A-10 Thunderbolt II, specifically designed for the close air support role. It is armed with the 30-mm cannon and Maverick missile, both effective antiarmor weapons. Both the A-7 Corsair II and AC-130 can also serve in this role.<sup>30</sup> Yet all three aircraft, especially the AC-130, are highly vulnerable to a sophisticated enemy air defense threat. Additionally, after several years of close examination, the Army has concluded that close air support is not the only airpower mission requiring input from the ground component commander.

One of the four tenants of AirLand Battle is depth, the ability "to use the entire depth of the battlefield to strike the enemy and to prevent him from concentrating his firepower or maneuvering his forces to a point of his choice."<sup>31</sup> With this concept in mind, the Air Force's air interdiction campaign assumes great significance for the ground commander, yet Air Force doctrine does not yet emphasize the importance of a coordinated air/ground unity of command.<sup>32</sup> But despite interservice rivalries, steady improvement is being made. Since 1976, joint agreements between the Army and Air Force have increased both services' understanding of the other's role on the battlefield, and should eventually lead to acceptable joint doctrine. Military aircraft are an effective antiarmor weapon, and despite shortcomings in night and limited visibility operations, time on station, target identification, and communications, the methods of fighting employed by the opposing ground armored forces will largely depend on the results of the air war.

Although the tank and ATGM are the primary tank killers in the inventory, alternatives to dedicated antiarmor weapons are assuming increasing significance in both the interdiction and close support roles. Yet certain key issues need to be reviewed prior to final assessment of their roles as antiarmor weapons.

a. Most alternative weapons use shaped charge warheads, against which modern armor is becoming increasingly resilient.

b. Antiarmor munitions tend to be specialized and can prove to be expensive and of only limited usefulness unless

conditions for their employment are ideal.

c. The alternative weapons are not effective under all conditions under which armored combat can be expected to occur.

### Countering the Threat Doctrine and Organization

At the end of World War II, the division was the centerpiece of U.S. ground forces. Combat resources originally "pooled" for the use of theater, army, and corps commanders were quickly depleted in order to strengthen divisions during the course of the war.

The emphasis on divisions continued during the post-war years. In the 1954 edition of FM 100-5, Operations, the division was defined as, "the basic combat unit of the combined arms and services."<sup>33</sup> To perform its antiarmor role, each infantry regiment was provided an organic tank company, normally employed as platoons attached to infantry battalions or rifle companies.<sup>34</sup> The tank in the infantry division provided antiarmor protection. Armored divisions were given the specific mission to destroy large enemy armored formations in offensive and defensive action.<sup>35</sup> No nondivisional tank or antiarmor units were formed, and the division remained the centerpiece of the battlefield.

The 1962 edition of FM 100-5, Operations, again defined the division as, "the basic Army unit of the combined arms and services,"<sup>36</sup> again emphasizing the role of this echelon on the battlefield. The mechanized infantry division was introduced, and for the first time the standard infantry division, formerly the

"backbone" of the Army, was relegated to a secondary role. Both the mechanized and armored divisions were organized with pure battalions of mechanized infantry and tanks, but the former had more infantry, and the latter, more tank battalions. These divisions were structured to work together; the mechanized infantry division accomplishing most traditional infantry missions, and the armored division providing the breakthrough and exploitation force.<sup>37</sup>

Tanks still provided the primary means of antiarmor defense for the infantry, but improved infantry antitank weapons again allowed greater concentration of armor rather than its organic distribution among infantry formations.<sup>38</sup> No specific antiarmor doctrine was developed. Instead, the entire battlefield was mechanized, and combined arms formations, with tank and mechanized infantry battalions cross attaching companies and platoons, fought combined arms enemy units. For the first time infantry (when mechanized), so long as they had accompanying tanks, were considered capable of performing missions formerly reserved for armored units, and armor units, "although especially suited to offensive operations...(were) prepared to fight under all...conditions of terrain and weather."<sup>39</sup> Soon, both mechanized and armored divisions would become virtually indistinguishable in organization and function.

From 1964 to 1974, Vietnam shifted the emphasis of U.S. doctrine to counterinsurgency operations. During this ten year period, a new weapon, the armed helicopter, and the beginnings of a doctrine for its use were developed. After the U.S. withdrawal from Southeast Asia, the Army again confronted the possibility of facing

an enemy vastly superior numerically in both men and equipment. At the same time, the 1973 Mideast War clearly demonstrated "the stunning advance in the lethality of modern weaponry and the essentiality of better suppressive tactics, use of terrain, camouflage, routes of advance, and combined arms coordination."<sup>40</sup>

In 1976, after almost three years of discussion and analysis, a new edition of FM 100-5, Operations, was published. This manual described Soviet weapons and doctrine, analyzed them against U.S. and NATO weapons, and prescribed a concept of firepower and attrition oriented defense. This concept, the Active Defense, made best use of the capabilities of U.S. antiarmor weapons, especially improved tank guns and long range antitank guided missiles. For the first time, the infantry had a weapon, the M-220 TOW, which could outrange a tank main gun.<sup>41</sup>

Under Active Defense doctrine, strong divisions remained the centerpiece of battle. Careful terrain analysis identified threat avenues of approach, including the size enemy force each would support and projected rates of advance.

"Carefully marshalled tactics and a 'battle calculus' characterized the defender's actions. U.S. units would give battle at known ranges...comparison of opposing forces by troop strength and weapon type, rate of enemy advance, intervisibilities across terrain, best ranges of fire by weapon type, comparative rates of fire, number and opportunities to fire, number of command decisions, and time lengths to call for and receive attack helicopter...and close air support...permitted calculation of targets to be 'serviced' - the central task of the central battle."<sup>42</sup>

Full use was made of the advantages of the defender, and the enemy

was forced to attack a series of well disposed positions manned by soldiers armed with lethal long and short range antiarmor weapons. Offensive action by friendly forces, although not ignored, was taken only if the enemy would sustain disproportionate casualties or when it was necessary to seize a vital objective.<sup>43</sup>

As the battle progressed, the division or corps commander, identifying the main enemy thrust, would laterally maneuver sufficient forces to meet and defeat it. The key to the entire process was to manage forces and firepower so to be sufficiently strong to defeat the enemy main attack, while never allowing a sector to become so weak as to be overwhelmed.

The Active Defense depended on winning numerous tactical battles, fought by semi-autonomous combined arms teams and task forces. The complex, tactical orientation of the battle necessitated a high degree of teamwork among the various arms. Great emphasis was placed on the development of habitual relationships, especially between infantry and tank units.<sup>44</sup> As there was little need for a large reserve, the armored and mechanized infantry divisions merged in all but name.

Although generally well received, many military and political figures were disturbed by the defensive orientation, emphasis on firepower and attrition, and lack of operational reserves in the new doctrine, believing a greater emphasis on maneuver was necessary.<sup>45</sup> Additionally, the overwhelming numerical superiority of Soviet artillery and tactical aircraft made fast lateral movement of friendly antiarmor weapons questionable at best.<sup>46</sup>

In 1982 came a radical departure from the doctrine of Active Defense - the current AirLand Battle. The new doctrine is:

"...based on securing and retaining the initiative and exercising it aggressively to defeat the enemy. Destruction of the opposing force is achieved by throwing the enemy off balance with powerful initial blows from unexpected directions and then following up rapidly to prevent his recovery. The best results are obtained when initial blows are struck against critical units and areas whose loss will degrade the coherence of enemy operations, rather than merely against the enemy's leading formations."<sup>47</sup>

This contrasts greatly with Active Defense, in which enemy forces were to be defeated sequentially as they were committed. Present Army doctrine concentrates on the simultaneous delay, disruption, and destruction of enemy committed and uncommitted forces. Rather than concentrating friendly forces against enemy strength, the commander instead looks through the full depth of the enemy formation for critical weaknesses to exploit.<sup>48</sup>

AirLand Battle doctrine makes it necessary to organize the battlefield in depth as well as laterally. For the first time since World War II, the corps becomes the focal point of the battle. This is not to say that the results of division, brigade and battalion battles are unimportant, but it is at corps level and higher where they are coordinated and exploited decisively.<sup>49</sup>

AirLand Battle doctrine has had a significant impact on the organization of antiarmor weapons. When the main battle was fought on or near the forward line of troops (FLOT), it was logical to allocate maximum combat power to divisions and lower echelons. The intent was to destroy the enemy as he appeared, and the best means

of doing that was to engage him at the maximum range of the various weapons systems available rather than to use maneuver to extend these ranges. An example is the attack helicopter, which in the Active Defense was normally used near or behind the FLOT in support of the ground force.<sup>50</sup> Even nondivisional attack helicopter units were "destined for employment with the division maneuver elements."<sup>51</sup>

This certainly contrasts with the AirLand Battle concept, in which many attack helicopters have been taken from divisions and pooled under the corps combat aviation brigade, from which they "conduct combat operations throughout the corps area of operations to include corps deep battle."<sup>52</sup> The corps now visualizes its battle out to 72 hours, and turns the battle over to divisions when the enemy or objective is approximately 24 hours away.<sup>53</sup> The corps must maintain forces under its control to destroy, delay and disrupt enemy forces at this depth, primarily Army and Air Force aircraft and long range artillery, although conventional and unconventional ground units are also an option.<sup>54</sup>

Thus, AirLand Battle doctrine leaves the close battle to divisions and their subordinate units. The classic combined arms teams of infantry, armor, artillery, close air support (both Army and Air Force), and others are still necessary for victory. Yet in extending the battlefield to a greater depth, by emphasizing the deep interdiction of uncommitted enemy forces, and because corps and higher echelons are responsible for this battle, combat power must be transferred from divisions and allocated to these higher headquarters.



The Army has performed this reallocation in a number of ways. First, it has joined the Air Force in reemphasizing the importance of the air interdiction campaign. Current aerospace doctrine states that although strategic attacks against enemy industry, cities, and communications networks will produce a desirable affect, they will have little immediate impact on his combat forces; therefore, it is necessary for the air commander to "attack not only those enemy forces in contact, but enemy forces in reserve or rear echelons as well."<sup>55</sup> The interdiction of uncommitted enemy forces or terrain targets having an intermediate affect on the battle, referred to as battlefield air interdiction, is now, for the first time since World War II, beginning to be doctrinally coordinated with the ground force commander.<sup>56</sup>

Within its own resources, the Army has streamlined existing divisions, much as did McNair in the early years of World War II. The Army force structure since World War II has stressed the tactical flexibility gained by large, powerful divisions. The Army of Excellence (AOE), the force structure supporting AirLand Battle, lightens divisions in order to increase the operational flexibility of the corps and higher commanders.

As the Army's largest maneuver unit, the corps "provides the link between tactical operations and strategic objectives," the operational level of war. As the focal point of the AirLand Battle, the corps commander must retain the flexibility to influence the battle throughout his entire corps sector. Although there is no fixed corps structure, he is normally given two to five divisions,

an aviation brigade, an artillery force, a corps support command, and separate combat, combat support, and combat service support units.<sup>57</sup> The corps commander assigns missions to divisions and other subordinate units and augments them sufficiently to accomplish their missions, weighing the corps main effort.<sup>58</sup> The new Army of Excellence (AOE) divisions, both light and heavy, are more streamlined than their predecessors, and this task organization becomes a matter of even greater importance than before,<sup>59</sup> yet the corps commander must also retain sufficient assets to form a powerful corps reserve, protect his rear area, and with which to attack enemy follow-on echelons.<sup>60</sup> To do so, he must sacrifice combat power in some divisions in order to increase his operational flexibility.

Such force structure initiatives as removing some attack helicopters from divisions and pooling them at corps, and creating light divisions which can relieve heavy forces in urban and difficult terrain, freeing the heavy units for missions capitalizing on their maneuverability, firepower, and protection, have increased the corps commander's options.<sup>61</sup> The new emphasis on maneuver warfare in the 1980's has many parallels with the doctrine of the early 1940's. A doctrine which emphasizes winning at the operational level is forcing organizational changes in which tactical units become smaller and weaker individually in order to give higher level commanders the flexibility they require.

Although AirLand Battle doctrine stresses flexibility for operational commanders, how flexible are the instruments they wield? The modern battlefield is expected to be fast moving,

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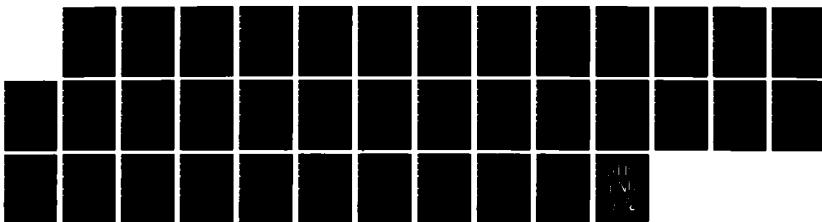
CONSIDERATIONS FOR THE DISTRIBUTION OF ANTIARMOR  
WEAPONS(U) ARMY COMMAND AND GENERAL STAFF COLL FORT  
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stressful, and highly lethal. In this environment, U.S. forces plan to use the tenets of AirLand Battle - initiative, depth, agility, and synchronization - to defeat a numerically superior enemy.<sup>62</sup>

Units must act rapidly and with singleness of purpose, driven by subordinates' understanding of the commander's concept of operations, reminiscent of a style of leadership using mission-type orders, called "Auftragstaktik", used by the German Army of World War II.<sup>63</sup>

The degree of cohesion within and between units necessary to win the AirLand Battle requires that units train as they will fight, yet time and resources remain limited, and units are only able to become well trained for a finite number of missions. Organic combined arms units, such as separate brigades, tend to be more easily transferred between corps and divisions than units which must first be task organized. The manner in which a separate brigade or cavalry regiment fights as part of a division is nearly identical to the way it fights under command of the corps commander, but an attack helicopter battalion would probably fight very differently if attached as separate companies in support of brigades than it would if fighting under corps or division control as an integral unit.

Non-organic units normally retain their flexibility so long as they are employed in direct or general support. In these roles, the supporting unit's chain of command and methods of operations remain unchanged.<sup>64</sup> It is necessary that coordination be conducted with the supported unit and that the supported commander's

concept be fully understood, but organizational integrity of the unit has not been disrupted. However, when these units are attached, and especially in cases when their subordinate units are sub-attached, major changes in command and control ensue, and unless there has been an habitual relationship of attachment between the maneuver and support units, there is a period of confusion and loss of efficiency until operational procedures are sorted out and the units learn to work well together.<sup>65</sup> Single arm combat units, such as attack helicopter battalions, have much in common with the tank destroyer battalions of World War II. They have a spectrum of missions, ranging from augmenting the antiarmor fires of ground maneuver forces to independent attack of enemy armored columns far beyond the FLOT. Like tank destroyer battalions, they cannot be equally adept in all missions. The corps or division commander who employs his attack helicopter battalions as integral maneuver units in training, then parcels them out to subordinates in battle does his command a great disservice.

Thus, the flexibility of a unit depends largely on how well its training approximates its combat employment. Antiarmor weapons organized (whether by TOE or habitual association) and trained as a fighting unit will prove relatively easy to shift between commands when employed as such, but once this cohesion is destroyed it will take time and effort to reestablish effectiveness. For example, an armored battalion commander in most brigades expects the almost automatic detachment of one of his tank companies and attachment of a mechanized infantry company. As a matter of course, he habitually

detaches the same tank company and expects his counterpart infantry battalion commander to give him the same infantry company when possible. If another company is attached, either because the normal unit is unavailable or because an additional infantry company is required, its operations within the task force are seldom smooth, and it initially requires greater supervision by the task force commander and his staff. This conflicts with the current organizational philosophy which equates flexibility with rapid changes in task organization; however, the factors that make units flexible reside in the moral, not the technical domain. As in World War II, we cannot take a unit, tear its chain of command apart, integrate it with strangers, employ it in unexpected ways, and still expect success.

As antiarmor weapons become increasingly expensive, it is even more important that each is used effectively. The cost of modern weapons may well make the wastage associated with past wars unacceptable. At \$2.7 million apiece, today's tanks cost 10 times as much, in constant dollars, as their predecessor of the 1950's, while the AH-64 Apache attack helicopter is far more expensive.<sup>66</sup> There is an understandable tendency to produce fewer of these systems, both due to their high cost and because the next prototype will be even better (and probably more expensive).

The combination of cost and scarcity tends to discourage distribution of the weapon, for even if it was proven that their most effective use was within rifle companies, it would be unrealistic with many costly systems to even attempt to procure the

numbers required. The exponentially rising costs of antiarmor weapons and munitions produces a scarcity which may, in some cases, mandate a distribution scheme not supported by doctrine, and in the future we can expect to see more antiarmor assets pooled at higher command levels, then attached to those subordinate units supporting the main effort. Although this appears a reasonable, and certainly an efficient solution, today's Army may be in danger of repeating the mistakes of World War II, producing units unable to survive in a wartime environment without extensive augmentation which may not always be available. War is an inefficient business, and to rely too heavily on assets rapidly and effectively redeploying on the battlefield is to ignore Clausewitz's concept of "friction." The key is to balance this need for efficiency against the equally important requirement for cohesiveness.

### Deployment Shortfalls

The World War II ground forces deployed by sea. Today, any major overseas movement of ground forces relies on a combination of air and sealift. The current U.S. concept is to deploy troops and high priority supplies and equipment by air, and heavy equipment and supplies by sea. In the NATO Theater, some units have prepositioned equipment and supplies, easing some of the burden, but for a war in an undeveloped theater or a protracted war anywhere, the bulk of supplies and equipment will still have to be transported by sea.<sup>67</sup> There are some problems with this concept which apply directly to antiarmor weapons.



The Congressionally Mandated Mobility Study of 1981 recognized the requirement for an additional 25 million ton-mile per day increase in airlift capacity alone, of which 10 million was to be in outsized cargo capacity.<sup>68</sup> The following is the number of C141 equivalent sorties it takes to move the various types of Army divisions, excluding any nondivisional augmentation.<sup>69</sup>

Infantry	1443
High Tech/Motorized	1362
Air Assault	1111
Airborne	1004
10,000 man Light	478

There is currently no plan to airlift significant portions of the equipment of mechanized infantry and armored divisions, but if for some reason it was necessary, the total C-141 equivalent loads needed are over 3,000; a high proportion of these oversized cargos which only the C-5 can carry.

These figures demonstrate that rapid air deployment of an effective antiarmor force is only possible if the weapons can be prepositioned on land or sea near the war zone or if effective antiarmor weapons systems, capable of defeating the regional threat U.S. forces will face, are compact enough to deploy with U.S. light forces without significantly increasing their airlift requirements. The 75-mm high velocity gun is but one attempt to meet these criteria. Of course, even if these light systems do prove capable

of defeating enemy armored vehicles, their own lack of protection makes them highly vulnerable to enemy counterfires.

The second means of overseas deployment, sealift, is a major source of concern. In 1950, the United States had the world's largest merchant marine, with over 1800 seagoing vessels. Today, we have dropped to 11th place and have only 470 civilian and 220 government owned ships in our merchant fleet. NATO seagoing nations have been tasked to provide most of the necessary sealift for U.S. ground forces in a European war, but it is doubtful if this shipping will be available for deployments to other theaters.<sup>70</sup> Also, political considerations may delay or limit the amount of shipping available prior to a declaration of war in Europe, a critical shortfall since U.S. deployment must be well underway prior to major hostilities if NATO defense plans are to be successful.

The U.S. Navy currently allocates less than 1% of its budget for ship building and conversion to sealift. Even the 13-ship troop carrier program currently underway is aimed primarily toward support of U.S. Marine Corps operations. By 1989, there will be an estimated sealift shortfall of 100,000 short tons per day.<sup>71</sup>

Since World War II, the United States has developed an airlift capacity unimaginable in 1945; however, the bulk of heavy equipment and sustaining supplies must still go by sea. Long term shortfalls, in strategic mobility have caused the Army to emphasize equipment prepositioning and development of lighter forces. The former is expensive, vulnerable to preemptive attack, and politically unacceptable in much of the world. The latter

alternative has produced units of only limited usefulness against a significant armored threat in all but the most rugged terrain.<sup>72</sup> Production of an inexpensive, light, long range and highly lethal antiarmor weapon, a dream which came close to reality in the 1970's with development of the ATGM, so far eludes modern technology. If developed, such a weapon would greatly enhance the combat power of light forces and would either make the tank obsolete or, more likely, lead to the next generation of armored protection.

### The Quest for Simplicity

By the 1970's, the wish to provide increasingly integrated combined arms capabilities to lower levels of command resulted in highly complex battalions and companies. A rifle company, in addition to organic mortars, Dragons and TOWs, could expect to have air defense weapons, ground surveillance radars, and tanks to be placed in direct support or attached. An infantry battalion had organic TOWs, mortars, radars, and air defense weapons. The Division Restructuring Study of 1976 found:

"The volume and array of firepower available to the company commander organically and by attachment exceeded manageable quantities. A tendency in organizational planning to incorporate significant new weapons as 'tag-alongs' to tactical units...had to be avoided....The trend toward full mechanization of the armored and mechanized infantry divisions meant that there would be more and increasingly complex equipment to maintain and rearm during combat operations."<sup>73</sup>

This assessment resulted in the TOW antitank missile and

mortar being removed from rifle companies and centralized under battalion control. Companies became single purpose units, with the arms doctrinally combining at battalion rather than company level.<sup>74</sup> Radars and air defense weapons were centralized at division level, although the Stinger antiaircraft missile is still often attached to maneuver battalions during combat operations. The attempt to simplify the organization of antiarmor weapons by centralizing them at a higher echelon of command resulted in a doctrine in which infantry rifle and tank companies normally fight as "pure" units, and are integrated into combined arms operations at battalion level. Attack helicopters are doctrinally employed by divisions and corps, and will only occasionally come under the command of brigades.<sup>75</sup>

These force structure changes ease the problems of command and control in garrison operations. Whether they will in combat again depends on the actual use of these antiarmor weapons. If tanks and infantry are employed as company teams, or brigades find they require routine control of attack helicopters, centralization of these assets only increases the confusion of battle.

#### Summary

Distribution of antiarmor weapons in the years since World War II has been affected by the perceived threat, effects of technology, U.S. Army doctrine, and resource constraints.

- a. The sophisticated, mechanized land armies of the

Warsaw pact, dominated by those of the Soviet Union, have continued to be the most dangerous armored threat; however, the U.S. Army has had to increasingly react to lesser dangers worldwide. Although enemy armor played a minor role in Korea, in no war fought by this nation since 1945 would it be appropriate to deploy the sort of antiarmor force structure necessary for the defense of Europe.

b. There has been a dynamic tension between armor protection and armor defeating technology. Every improvement in one results in a reactive improvement in the other. As armor increased in thickness, antiarmor weapons increased in size in order to fire larger and higher-velocity projectiles. A major breakthrough, the shaped charge, allowed antiarmor weapons to again be relatively small and inexpensive, but new means of defeating chemical energy weapons caused them also to grow in size and expense, again making the kinetic energy projectile, now with a high-density core, the most effective armor defeating weapon.

c. For most of the years since World War II, U.S. Army antiarmor doctrine was based on tactical defensive operations in which U.S. ground forces attrited Warsaw Pact armored columns as they entered close combat. The Air Force was responsible for an interdiction campaign which might or might not support the plans of the ground commander. AirLand Battle doctrine, although (at least in Europe) based on a defensive strategy, addresses the enemy throughout the depth of his formation and is oriented operationally toward offensive, proactive maneuver.

d. Resources have always been constrained, especially

in times of peace. The United States has not mobilized significantly since 1945, and shortages of manpower, money, and deployment assets have consistently restricted the distribution of antiarmor weapons.

In summary, since 1946, U.S. Army force developers have attempted to adapt to changes in threat, technology, doctrine, and resources. They have tried to design units which can fight effectively within a spectrum of conflict, using appropriate technology and doctrine, while adhering to constraints in manpower, budget, and deployment assets. There currently seems to be a trend towards centralizing antiarmor assets at higher echelons in both "heavy" and "light" units, although not surprisingly the main emphasis is in the latter. The process of streamlining tactical units to enhance deployability, efficiency, and operational flexibility is reminiscent of McNair's "streamlining and pooling" in the early days of World War II. It is the duty of professional military officers to ensure that the advantages of that approach are exploited and the mistakes not repeated.

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## CHAPTER SIX

### CONCLUSIONS

"We trained hard, but it seemed that every time we were beginning to form up into teams we would be reorganized. I was to learn later in life that we tend to meet any new situation by reorganizing...producing confusion, inefficiency, and demoralization."

Petronius Arbiter  
210 BC<sup>1</sup>

"A swallow can outmaneuver an eagle but he is not feared. Speed and mobility not linked with fighting capacity are valueless."

George S. Patton  
1930<sup>2</sup>

The final chapter of this paper will identify historically significant threads of continuity in the organization of antiarmor weapons and develop them as a set of considerations to be used by force developers. These will be based on the history of antiarmor weapons, doctrine, and organization since the 1930's, and their applicability to the current U.S. Army force structure, the Army of Excellence will be demonstrated.

#### Fifty Years of Antiarmor History

Prior to World War II, U.S. planners regarded the tank as an infantry support weapon and designed weapons and doctrine accordingly. Then in 1939 and 1940, the Germany Army demonstrated to the world that it had developed a new arm, with the tank as the centerpiece, which gave it a decisive advantage on the battlefield.

The U.S. Army rapidly improved its antiarmor weapons and revised both doctrine and organization between 1940 and 1944 to meet the new threat. Divisions were given only those antiarmor weapons considered necessary for survival, while tank destroyers, the Army's primary antiarmor weapons, were organized into specialized, nondivisional battalions. Tank destroyer units could be attached to divisions when necessary, but were normally to be consolidated under corps and field army command and used to destroy massed armored penetrations of friendly lines.

In the European Theater of Operations, the U.S. divisional antitank weapons were found to be only marginally effective against newer German tanks. Also, for a variety of reason, German armor was rarely employed in mass. Thus, the tank destroyer battalions were both available for secondary missions and were needed to protect divisions. They were integrated into maneuver divisions and soon lost their identity as separate units.

After World War II, the tank destroyer branch was discontinued, and its personnel and doctrine assimilated into the armor branch. During the course of the war, the tank and tank destroyer had gradually merged in physical characteristics and function, and the decision to consolidate them into a single arm was overdue.

Since World War II, the main battle tank, distributed as part of a combined arms team at battalion and company level, has generally been considered to be the U.S. Army's primary antitank weapon; however, at various times the recoilless rifle, rocket launcher, and more recently, the antitank guided missile, both ground and helicopter

mounted, have challenged its supremacy. The next challenge may well come from specialized artillery rounds, lasers, or other high technology weapons.

#### Four Possible Considerations For Distribution

The force designer today contends with a multitude of competing imperatives. The unit he designs must be capable of accomplishing its assigned mission in a variety of situations and environments. It must be able to use technology in accordance with doctrine in an effective manner, while at the same time conforming to the resource constraints placed upon it and the Army as a whole. Most importantly, the unit must be designed to be flexible enough to adjust to the actual conditions it will face in combat.

The distribution of antiarmor weapons is best visualized as a spectrum ranging from rounds of ammunition and simple antitank weapons assigned to individuals and small units, up to the centralized pooling of specialized units at corps, army, and theater level. Generally, over the last 50 years there have been four major considerations which have governed the level of distribution on this spectrum for specific antiarmor weapons:

- Threat
- Technology
- Doctrine
- Resources

These considerations are interdependent and cannot be viewed in isolation. For example, the enemy armored threat cannot be examined

without concurrently assessing the effects of current and future technology, doctrine, and resource constraints.

#### Historical Significance of the Four Considerations

The constant battle for supremacy between the technologies of armored protection and antiarmor weapons has been the driving force behind the development of both. A significant breakthrough in one has historically triggered a counterreaction in the other. Ideally, every soldier on the battlefield could carry a means of countering enemy armor, a concept that came close to reality during World War II with the development of 2.36 inch rocket launcher, and most recently during the 1960's and 70's with the proliferation of relatively inexpensive chemical energy (shaped charge) weapons. These weapons were mass produced and distributed to the lowest level; however, good as they were, they were designed primarily for protection against individual or small groups of enemy armored vehicles.

The destruction of large armored units has normally been the mission of larger, more expensive weapons possessing greater range and lethality. These have generally fallen into the two categories of kinetic energy and chemical energy weapons. The modern main battle tank mounts the former, while the most recent generation of chemical energy weapons have been ground and aerial antitank guided missiles. Historically, these lethal weapons have been organized under the command level most likely to obtain decisive results with them in

accordance with contemporary doctrine.

A successful distribution scheme is based on the concept of providing antiarmor protection to all units while reserving the more lethal weapons for a decisive role under centralized control. A concept of distribution for antiarmor weapons was effective so long as the protective distributed weapons were perceived as being sufficient in their role. However, if enemy armored technology outstripped the ability to field an effective light protective weapon, or U.S. forces perceived themselves vulnerable to enemy armor, a major imbalance was created. The larger, more lethal weapons, generally still able to destroy enemy armor, were then distributed to protect the force. Due to the relative scarcity of these weapons, their distribution would then degrade or destroy the ability of the higher level commander to influence the battle. Also, antiarmor units, designed and trained to fight as cohesive units under centralized control, had to be integrated into a combined arms team (decentralized), producing the temporary (yet often catastrophic) loss of effectiveness best shown by the experiences of tank destroyer units during World War II.

Based on historical precedence, for a successful distribution of antiarmor weapons Army planners must properly assess the enemy armored threat (quality and quantity), use technology to provide protective antiarmor weapons at all levels, and centralize the complex, expensive, and highly lethal antiarmor weapons at command echelons where, by doctrine, they will be decisive. In doing all this, they must remain within resource limitations.



## Future Trends

The explosive rate of technological change greatly complicates force design. The U.S. Army's Training and Doctrine Command (TRADOC) has developed a methodology, the Concept Based Requirements System (CBRS) which uses Army missions, an analysis of present and future threats to national security, and the effects of technology, to produce operational concepts as a base for doctrine, equipment development, training, and organization.<sup>3</sup> This system, although conceptually sound, has still not been able to keep pace with the rapid rate of change, and training, equipment, and organizational concepts may be outmoded even as they are fielded.

There is little doubt that the future battlefield will be complex. In low intensity conflict, this complexity may be caused by the interrelationship between political, social, economic, ideological, and military objectives. In more conventional wars, of greater relevance to this paper, high mobility and the increasing lethality of conventional and NBC weapons will greatly increase command and control problems. As the helicopter becomes better armed and armored, air mechanization may provide a "flying tank" force, a technological breakthrough as great as development of the armored vehicle. Finally, the fear of escalation between the two superpowers means U.S. forces may fight next against a surrogate force, armed and trained by the Warsaw Pact, in a regional conflict. There will continue to be a premium placed on weapons systems that are highly lethal, yet also transportable and deployable worldwide.

Based on their vision of the future battlefield, Army planners must develop doctrine and focus technology within reasonable resource constraints. This vision and its resulting outputs must be continually refined to address revised estimates of both enemy and friendly capabilities. This requires high quality, futuristic thinking, because decisions concerning future threat, technology, doctrine, and resources must be made well in advance if they are to be implemented before being rendered obsolete. Incorrect decisions in these areas can be both expensive and detrimental to national security.

The rapid pace of change will not abate, and only through a futuristic analysis of the developing nature of warfare will the Army be able to develop doctrine, influence technology, and allocate resources to defeat a future threat. We shall now look at these considerations and their applicability to antiarmor weapons distribution in the Army of Excellence (AOE).

#### Applicability to the Army of Excellence

The Army of Excellence (AOE) is the force structure designed to implement AirLand Battle doctrine. This doctrine emphasizes winning the operational level battle and requires that high level commanders use maneuver to strike at enemy centers of gravity. AirLand Battle doctrine visualizes two forces. The first force is the operational reserve, with which the commander gains the initiative and strikes a decisive blow against the enemy. It is imperative that the operational reserve be powerful enough to have a decisive effect when

used. However, often neglected is the second force, those units which must protect the operational reserve, prevent the enemy from forcing its commitment in a piecemeal or reactive fashion, and create opportunities for its use. These are best thought of as economy of force units. They must have enough combat power to accomplish their missions, yet cannot absorb so much combat power that they sap the strength of the operational reserve.

The challenge of today's Army of Excellence (AOE) force structure is to provide sufficient weaponry to protect the economy of force units from destruction while concurrently consolidating decisive combat power at those higher echelons of command which conduct decisive operational maneuver. As always, this must be accomplished within budgetary, manpower, and deployment constraints. Some possible solutions which may assist the U.S. Army achieve tactical sufficiency and operational superiority in the antiarmor field are:

- a. Concentrate on producing major armor defeating capabilities in multipurpose weapons such as artillery. Development of antiarmor ammunition such as COPPERHEAD is normally more economical than fielding specialized antiarmor weapons, as well as more efficient since the multipurpose weapon has a wider variety of uses.

- b. In the area of protective weapons, produce large numbers of simple, inexpensive, relatively effective weapons rather than fewer numbers of marginally superior, far more expensive weapons. A major effort must be directed toward producing protective systems which can be reasonably distributed. An improved shaped charge or weapon which, when fired, attacks the lightly armored top of

the threat tank (such as bomblets from mortar rounds) may soon be developed in unsophisticated versions. Other possibilities are chemical energy weapons which can produce intense heat of sufficient duration to kill the crew or ignite the flammables in the vehicle, directed energy weapons to degrade or destroy critical electronic components in the vehicle, and the use of lasers to destroy optics and blind the crew. All these currently involve advanced technology, but have the potential for development in relatively light, inexpensive versions.

c. Complex weapons such as attack helicopters may also be useful in a simpler form. Although a weapons system as complex as the Apache AH-64 may be necessary for use as a corps maneuver element, perhaps a simpler helicopter like the AH-1 Cobra is sufficient to provide supporting fires to ground elements. The M-1 Abrams, with all its speed and protection, has little chance to use these advantages when combined with light or M-113 equipped mechanized forces. The use of simpler, less expensive, multipurpose weapons in the antiarmor protection role leaves the force developer less constrained and gives him greater latitude in supporting the operational commander with the necessary combat power to accomplish AirLand Battle doctrine.

d. Synchronization of the combined arms and capabilities of other services is a tenet of AirLand Battle doctrine. Thus, any specific antiarmor capability must be viewed in light of its interaction with other weapons. This interaction should be synergistic. Attack helicopters, USAF aircraft, indirect and direct fire weapons controlled separately produce only an additive effect on

the enemy force; however, when properly coordinated, the combined effects of these weapons is multiplied. Units must be organized to facilitate this coordinated effort.

e. One of the most distinguishing aspects of AirLand Battle doctrine is that it examines the possibilities of maneuver to win the operational battle. If the focus of the operational battle happens to be achieving victory by cutting the enemy's lines of communications rather than physical destruction of his combat units, then antiarmor protection, still necessary at the tactical level, becomes of secondary importance to the operational commander who can then distribute more antiarmor assets to tactical units.

f. The importance of U.S. rear area units, combined with the nonlinear character of the projected future battlefield, dictates that combat support and combat service support units must have some effective means of antiarmor protection.

g. Current U.S. light infantry forces are organized with only very limited antiarmor capabilities until augmented by higher echelons. If there is one lesson deduced from this study, it is that this augmentation should not be in the form of weapons systems or "pure" units such as TOW battalions, meant to be integrated throughout the light units. Rather, integral units with antiarmor capabilities should be employed in support of light units, taking advantage of both their antiarmor capabilities and cohesiveness.

In summary, AirLand Battle doctrine focuses on winning the operational battle by maneuvering against decisive enemy weaknesses. The armored units of the Warsaw Pack are its strength, while its

relatively austere logistical support may well prove to be a critical weakness. Thus, AirLand Battle doctrine appears to favor distribution of sufficient defensive antiarmor weapons to tactical units to permit them to both protect themselves sufficiently to prevent the premature commitment of the operational reserves as reinforcements for units involved in the direct fire battle. Then, a combination of combined arms and joint assets, consolidated by the operational commander as his reserve, can be employed in overwhelming strength at the critical place and time, destroying any armored threat encountered and achieving decisive victory.

## ENDNOTES

<sup>1</sup> As quoted in Anthony Kellett, Combat Motivation (Boston: Nijhoff Publishing, 1980), p. 43.

<sup>2</sup> As quoted in Martin Blumenson, The PeQQro Papers (Boston: Houghton Mifflin Co., 1972), p. 959.

<sup>3</sup> Department of the Army, Operational Concepts and Army Doctrine, TRADOC Reg FM 11-7 (Fort Monroe, VA: Training and Doctrine Command, 1982), pp. 3-13.

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