

# THE EVOLUTION OF THE TANK IN THE U.S. ARMY

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No. 1

## THE EVOLUTION OF THE TANK IN THE U.S. ARMY

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This paper summarizes the evolution of the tank in the US Army during the period 1919-1940. It examines the US Army's post World War I concept of future war and explores the evolution of tank design, force organization, and mechanized doctrine through the interwar period. The issues and factors that were crucial to the early evolution of the tank in the US Army were largely responsible for the role the tank played during and after World War II. This suggests that the 1920s and 1930s were the most important period in the history of the tank. Although some conclusions can be drawn from this brief summary, they should remain tentative pending full treatment of the subject.

Despite its brief participation, by the end of World War I the US Army had engaged in intensive combat and had gained some experience with the new technology of the battlefield. The tank, chemical weapons, massed artillery, and the airplane were introduced by the European Allies and the American Expeditionary Force (AEF) readily adopted the new weapons. An AEF Tank Corps was established and a tank brigade comprising three battalions accompanied the infantry into combat during the last two months of the war.<sup>1</sup>

After the war, the US Army drew upon its recent experience in shaping its notion of what a future war would resemble. This concept of future war--large infantry armies attacking

on parallel routes, supported by massive artillery; tanks; and air power, directed by electrical communications, and transported and supplied by motorized vehicles-- established the direction for the interwar development of equipment, organization, and doctrine. Although this concept continued to generate debate, it seems clear that the Army's 'Leadership recognized the importance of the new technologies and their vision of future war included the tank as well as other advances.<sup>2</sup>

Several elements of this future war concept, however, acted as a constraint on the further development of the tank. One element was the requirement for a large wartime Army; another was that the infantry would play the dominant role in a future war. The major US wartime problem, one that has worried Army leaders since the Civil War, 'was how to raise a large force in a short time. Faced with the conceptual requirement for a large force and with only a budget constrained peacetime Army of 130,000 men, the problem of how to quickly mobilize, equip, and train the required force dominated Army thought in the inter war period at the expense of other problems.<sup>3</sup> Preoccupation with the question of how to raise a large Army may have prevented US Army leaders from asking a more fundamental question. In light of the Army's early acceptance of the tank, and other technological advances, the appropriate question might have been what kind of Army should be raised.

The second constraint on further development of the tank was a result of insufficient wartime experience. The US Army's brief appearance, with a large and predominantly infantry force, quickly gave the Allies a decisive numerical advantage. The war, ended before the US Army gained more than a basic appreciation for the demands of trench warfare. Adopting British and French tanks and tactics, the AEF's tank battalions only briefly accompanied the infantry into combat with inconclusive results. The Army interpreted the mixed evidence of its limited experience as an indication that infantry would dominate the future land battle. Thus the US future war concept envisioned that tanks would accompany the infantry and provide support by neutralizing enemy strongpoints and knocking down wire barriers. Because the conventional wisdom of the world military powers at the time agreed with this concept, the possibility that the tank might become more than an infantryman enclosed in armor was difficult to foresee.

In 1919, an economy-minded Congress considered the postwar organization of the US Army. General Pershing the AEF commander, accompanied by his aide Colonel George C. Marshall (the World War II Army Chief of Staff), testified that tanks should remain a supporting arm of the infantry. As a result the 1920 National Defense Act disestablished the Tank Corps, directed that tanks be assigned to the infantry, and denied the establishment of a tank branch. This legislative restriction was not lifted until the 1950 Army Reorganization Act established the Armor Branch.<sup>4</sup>

In Great Britain, J. F. C. Fuller and B. H. Liddell-Hart were asking what kind of future Army could avoid the long and indecisive stalemate of trench warfare. Since Britain also maintained only a small peacetime army the Fuller-Hart solution was to convert the peacetime force into a mobile army built around the tank. In 1927 an Experimental Mechanized Force was established to test the Fuller-Hart theory, and US Secretary of

War Dwight Davis observed its field maneuvers. At the Secretary's suggestion, a US Army Experimental Mechanized Force was temporarily assembled at Camp Meade, Maryland, to determine the proper equipment and doctrine for mechanized units.<sup>5</sup>

The French Renault light tank and the British Mark VIII heavy tank used by the AEF Tank Corps and by the Experimental Mechanized Force contained severe technical limitations. With maximum speeds of only 6 mph, these tanks were hardly able to keep up with the infantry when crossing a shell-holed battlefield. When separated from the infantry, the tanks were vulnerable to enemy heavy weapons and could not communicate with supporting artillery. These technical limitations, as well as numerous mechanical problems, justifiably confined the World War I tank to an infantry support role. Although the War Department supported and budgeted for the construction of replacement tanks in 1922, little beyond design work was done until 1926.

The initial delay was caused by lack of coordination. The War Department General Staff had outlined requirements for a 5-ton light and a 15-ton heavy tank in 1922, but the Ordnance Department could not act until the Chief of Infantry approved the requirements. In 1924, a Tank Board was established and colocated with the Infantry Tank School at Camp Meade, Maryland, to coordinate tank requirements and design. But by then Ordnance Department tank budgets had been trimmed to an average \$60,000 a year (between 1925 and 1931) and an opportunity to advance the state-of-the-art in tank design was lost. At that funding level, no more than one experimental tank could be built in any year.<sup>6</sup>

Despite inadequate funding, the Ordnance Department managed to develop several experimental light and medium tanks and tested one of Walter Christie's models by 1929. None of these tanks was accepted, usually because each of them exceeded standards set by other Army branches. For instance, several light tank models were rejected because they exceeded the 5-ton cargo capacity of the Transportation Corps trucks, and several medium tank designs were rejected because they exceeded the 15-ton bridge weight limit set by the engineers. Revising truck and bridge standards in order to adopt new tank designs would have required extensive and expensive equipment modernization. With the onset of the 1929 economic depression, it was felt that such modernization was not economically justified.<sup>7</sup>

Following the disbanding of the Experimental Mechanized Force in 1928, a War Department report outlined a long-range plan for mechanization of the Army. It could have changed the Army's future war concept by reversing the roles of the tank and the infantry. This plan, which called for procurement of infantry vehicles, scout cars, self-propelled artillery, and light and heavy tanks, received the support of the Chief of Staff General Summerall and Secretary of War Davis. They ordered the establishment at Camp Eustis, Virginia (later changed to Camp Knox, Kentucky) of another experimental force in 1930 to develop doctrine and organization and a Mechanization Board to oversee the program. Unfortunately the opportunity was lost because the plan was delayed by depression-induced budget cuts and the lack of replacements for the obsolete French and British tanks.<sup>8</sup>

Lack of progress in tank development and mechanization aroused Congressional criticism in the early 1930s. The Army, critics charged, was bound by tradition to support the manpower requirements for an expandible Army and blind to the possibilities offered by mechanization.<sup>9</sup> On the other hand critics within the Army charged there was too much progress.

Some infantrymen saw the establishment of a separate Experimental Mechanized Force as threatening their exclusive control over tanks and tank development. Some cavalrymen, noting the improved speed and cross-country mobility of experimental tanks, saw the mechanized force as a rival for their role. To overcome these fears and to allay Congressional criticisms, in 1931 the Chief of Staff, General MacArthur, ordered the Mechanized Force to be reorganized as a mechanized cavalry regiment, the infantry to retain its tanks, and directed all branches to mechanize as much as possible.<sup>10</sup> This last directive decentralized and diluted the long-range mechanization plan among the Army's branches. In light of future events, to expect that the traditional arms could perceive and would exploit the tank's full potential would have been an unreasonable assumption.<sup>11</sup>

For a time, however, this produced a compromise in tank design. Both infantry and cavalry agreed upon a fast, mobile tank that, despite Ordnance Department protests, was lightly armored and armed. Light tank designs moved ahead, and small quantities of nonstandard light tanks were built for the infantry and cavalry. This prewar progress in light tank design led to the development of World War II tanks that were reliable in terms of mobility, but vulnerable in armor and armament.<sup>12</sup>

In 1937, reports from the Spanish Civil War indicated that German and Russian tanks had heavier armor and larger armament. At this point competition between mobility and armaments slowed US tank development. Medium tank development, which had been barely creeping along, picked up speed by 1939. But by the time Germany invaded France in May 1940, the US Army possessed only 28 new tanks (10 medium and 18 light tanks) and 900 obsolete models scattered among the infantry, mechanized cavalry, and ordnance depots.<sup>13</sup>

While the technological experience of World War I created a climate conducive to the acceptance of new weapons, most world military powers attempted to shape the tank to fit their existing infantry doctrines. In the US Army, several factors slowed reconsideration of doctrine and limited the tank's role. The 1920 National Defense Act assigned the tank to the infantry. When the cavalry was directed to begin mechanized experiments with tanks, this legal restriction was skirted by calling the vehicles "combat cars."<sup>14</sup> The cavalry's desire for a fast, mobile light tank to match the combat car description also may have imposed a psychological restriction on the mechanized cavalry's doctrinal developers.<sup>15</sup> This psychological restriction was present in the early 1920s when several officers destined for high rank published articles suggesting an expanded role for the tank. Their views met an official condemnation that made these officers reluctant to further challenge conventional wisdom concerning the tank.<sup>16</sup>

When the Experimental Mechanized Forces and the Mechanized Cavalry Regiment were established, a significant amount of their effort was devoted to vehicle training and small unit tactics which were undoubtedly useful in developing the tactical techniques of combined arms combat. But the lack of large scale field exercises before the 1940 Louisiana maneuvers probably prevented development of an operational doctrine for large armored forces. In contrast, as early as 1935 the Germans were conducting corps-size exercises for the purpose of developing armor doctrine.<sup>17</sup>

Because the tanks belonged to the infantry between the wars, doctrinal change was largely confined to refinements in the use of tanks in close support of infantry. In the 1930s, the existing base of tank doctrine expanded only when the cavalry adapted the tank for its role in screening, security, reconnaissance, and exploitation. (Ironically, doctrinal development for helicopters also was assigned to the infantry and later to the armor--in a cavalry role--schools.)<sup>18</sup> When in 1940 the Armored Force was established, the Army, having witnessed the German success with tanks, realized it had an inadequate doctrine and tried to overcome these deficiencies.

By drawing upon the familiar infantry-based close support doctrine, the cavalry exploitation doctrine and the organizational experience of the Experimental Mechanized Forces, the Army quickly developed a combined arms doctrine for the tank. Since this doctrine emphasized tanks and infantry in partnership, it was compatible with the Army's 1920 infantry-oriented future war concept. Acceptance was assured and the doctrine was institutionalized by the mix of arms in the armored division organization.

Expanding tank doctrine to permit the concentrated employment of large armored forces, however, proved impossible. The Army had no first-hand experience from large field maneuvers to draw upon. Such field maneuver experience, even if it had been available, would have confronted the World War I experience and the legacy of an infantry-oriented future war concept. Without a doctrine of concentration to support their existence, such organizations as the Armored Force and the Armored Corps were shortlived.

The opening battles of World War II suggested that the organization of German tank forces was well ahead of the US. Indeed, during the 1930s, all the major European powers explored the organization of tank forces to a much greater degree than the US Army.

In 1934, Britain, having evaluated the results of earlier mechanized experiments, organized a pure tank brigade (pure in the sense that it contained only tanks) on a permanent basis. A 1938 experiment in combining pure tank, infantry, cavalry, and artillery brigades at the division level was judged unsuccessful until the German military success in Poland led the British to organize a combined, but tank-heavy, armored division in 1939.

During the interwar period, the French continued their World War I pattern by combining a tank battalion with an infantry division. Although they experimented in the mid 1930s

with a tank heavy combined arms division, the German attack in 1940 found the French frantically trying to organize armored divisions. Both the Germans and Russians moved more rapidly than others in organizing tank forces. By 1940 the Russians had tested and fielded both pure tank and combined arms organizations at all echelons up to corps.<sup>19</sup>

The Germans, with fewer opportunities for experimentation, secretly trained with the Russians in the 1920s and organized armored divisions on a permanent basis by 1935. Their armored divisions adopted the combined arms concept with a TO&E mix of infantry, artillery, and tank regiments which were task organized in combat. But the divisions were then concentrated together rather than dispersed among larger infantry formations. This gave the Germans the shock power advantage of the pure tank theory while retaining the combined arms concept. (Appendix 1 contains charts of early tank organizations.)<sup>20</sup>

Conforming to the US Army's infantry-oriented future war concept, tanks were organized into one tank company per infantry division during the interwar period. This paralleled, albeit on a smaller scale, the French pattern of combining tanks in support of infantry. The initial mechanization experiments made substantial improvement by organizing a more balanced combination of tanks, infantry, and artillery at the brigade level. And the 1928 War Department plan for mechanization of the Army proposed this balanced, combined arms organization at division level. At the time, it would have represented a significant advance over existing European tank force organization. This possible advantage was lost in 1931 when the Chief of Staff ordered the Experimental Mechanized Force to be reorganized as a Mechanized Cavalry Regiment. Under the new directive, the infantry divisions retained their tank companies for support. The cavalry, rejecting the balanced combined arms approach, organized its mechanized regiment along pure tank lines.

The employment of an improvised armored division without artillery or substantial infantry during the 1940 Louisiana maneuvers reacquainted the Army with earlier lessons about the balance of tank, infantry, and artillery forces in a combined arms organization. After the maneuvers when the War Department formed a two-division Armored Force, the combined arms organization was again adopted. Each armored division TO&E had a mix of tank, infantry, and artillery battalions.<sup>21</sup>

On 15 July 1940 the Armored Force was reorganized as I Armored Corps. The decision to concentrate US armored forces was prompted by the recognition that Germany's concentrated armor divisions had just defeated France's infantry-dominated Army in six weeks. The decision seemed to suggest that the role of the tank was to be something more than either a replacement for the cavalry horse or mobile fire support for the infantry. Whatever new role the decision suggested, it did not fit with the concept of future war articulated by the Army in the 1920s and implemented in the 1940s.

During World War II the Army gradually accepted the combined arms organization of armored forces, but rejected their concentration. Instead of concentrating and



employing its armored divisions at corps and above as the principal striking force, as the Germans and Russians had done, the US Army rejected the idea without a battlefield test. In 1943 Lieutenant General McNair, who as Commander of Army Ground Forces was responsible for the training, organization, and doctrine for the combat arms, directed a reorganization of all armored formations. His directive disestablished the armored corps, prescribed the assignment of the armored divisions to predominately infantry corps, and reduced the size of the armored divisions to provide a separate tank battalion for each infantry division. The net effect of this reorganization was to shift the bulk of the Army's tank strength from the armored divisions to the infantry.<sup>22</sup>

General McNair, who largely ignored the Armored Force (except when criticizing it), may have been prompted to take this action by the Chief of Staff General Marshall. Marshall was a conformist rather than a visionary infantryman. A former Assistant Commandant of the Infantry School, and as Pershing's closest aide, he probably was one of the architects of the Army's infantry-dominated future war concept.<sup>23</sup> In any event, based on his action and his views it seems clear that General McNair restrained the tank to a combined arms role and rejected its concentrated organization and employment (his views are contained at Appendix 2).

This rejection of a new role for the tank, 'concentrated and employed as the principal striking force, suggested something that may be as apparent today as yesterday. It suggested that the US Army tends to fit new weapons, such as the tank and the helicopter, into existing organizations and doctrine rather than allowing full development of the weapon to shape organization and doctrine.<sup>24</sup>

### CONCLUSIONS

The evolution of the tank during the inter-war years was constrained by the limited vision of the Army's concept of future war that emerged after World War I. This vision of large infantry armies, with the tank in a support role, accepted but did not exploit new technology weapons. Interwar concern for the size of the future Army and not its composition may have been the result of failing to ask the right questions at the end of World War I.

Conservative estimates of the future potential of the tank and other new weapons tended to suppress them within existing Army branches, organization, and doctrine. The limited role assigned to tanks in a predominately infantry force imposed armament constraints on tank design. In turn, the lack of improved designs prevented early recognition of an expanded role for tanks. All of this was exacerbated by postwar force reductions and the economic depression.

When opportunities occurred which could have led to a reevaluation of the tank's potential, the Army reacted too slowly. The reaction was again conservative and within the parameters of what was acceptable to the Army's vision. The early mechanized experiments formed around a combined arms organization that was acceptable to the Army's infantry penetration and cavalry exploitation future war concept. The adoption of

the combined arms organization at all echelons rejected the possibility of concentrating armored forces at corps level. Confining tanks to small unit field exercises developed useful combined arms tactical techniques, but the lack of large armored force exercises prevented development of an operational doctrine for echelons above division and reinforced the rejection of the principle of concentration.

### ENDNOTES

1. Timothy K. Nenninger, "The Development of American Armor, 1917-1940" (Masters Thesis, University of Wisconsin, 1968), pp. 16-50.
2. Russell F. Weigley, *The American Way of War* (New York: MacMillan Publishing Co., Inc.), pp. 215-222.
3. Successive Chiefs of Staff, down to Malin Craig, the pre-World War II Chief of Staff, considered mobilization to be the Army's most pressing issue. Weigley, *History of the United States Army*, pp. 399-417.
4. Forrest C. Pogue, *George C. Marshall: Education of a General* (New York: The Viking Press, 1963), pp. 209-214.
5. Kenneth Macksey, *The Tank Pioneers* (London, Janes, 1981), pp. 18-78, and Nenninger, "The Development of American Armor 1917-1940," pp. 83-88.
6. Constance M. Green, Harry C. Thomson and Peter C. Roots, *The United States Army in World War II The Ordnance Department: Planning Munitions for War* (Washington, D.C.: U.S. Government Printing Office, 1955), pp. 189-195.
7. *Ibid.*, pp. 139-191.
8. Nenninger, "The Development of American Armor," pp. 88-92.
9. D. Clayton James, *The Years of MacArthur: 1880-1941* (Boston, Houghton Mifflin Company, 1970), pp. 356-359.
10. Green, Thomson and Roots, *The United States Army in World War II The Ordnance Department: Planning Munitions for War*, pp. 193-195.
11. James, pp. 358-359.
12. Green, Thomson and Roots, *The United States Army in World War II The Ordnance Department: Planning Munitions for War*, pp. 107-111.
13. Harry C. Thomson and Lida Mayo, *The United States Army in World War II The Ordnance Department: Procurement and Supply* (Washington, D.C.: U.S. Government Printing Office, 1960), pp. 201-202.
14. Gillie, *Forging the Thunderbolt A History of the Development of the Armored Force*, p. 48. The 1920 National Defense Act restriction on tanks was not formally lifted until the Army Reorganization Act of 1950.
15. Gillie, *Forging the Thunderbolt A History of the Development of the Armored Force*, pp. 111-112.
16. Dwight D. Eisenhower, *At Ease: Stories I Tell My Friends* (Garden City, New York: Doubleday and Company, Inc., 1963), p. 97
17. Ogorkiewicz, *Armoured Forces A History of Armoured Forces and Their Vehicles*, pp. 72-74.
18. John J. Tolson, *Vietnam Studies Air Mobility 1961-1971* (Washington, D.C.: U.S. Government Printing Office, 1973), p. 5.



19. R.M. Ogorkiewicz, *Armoured Forces: A History of Armoured Forces and Their Vehicles* (New York: Arco Publishing Company, Inc., 1970), pp. 55-97. Ogorkiewicz' account is accurate except for his description of the Russian tank effort. I have relied on the more detailed studies of LTC David M. Glantz as used in Course P612, the U.S. Army Command and General Staff College, School Year 1981/82 for the Russians.
  20. *Ibid.*, pp. 72-85, 206-221.
  21. Mildred Hanson Gillie, *Forging the Thunderbolt A History of the Development of the Armored Force* (Harrisburg, PA: The Military Service Publishing Company, 1947), p. 162.
  22. Kent Roberts Greenfield, Robert R. Palmer and Bell I. Wiley, *United States Army in World War II, The Army Ground Forces, The Organization of Ground Combat Troops* (Washington, D.C.: U.S. Government Printing Office, 1947), pp. 319-335, 413-417.
  23. Pogue, George C. *Marshall: Education of a General*, p. 253.
  24. The helicopter appears to follow the same pattern as the tank. Initially adapted to support the Infantry with the establishment of the 11th Air Assault Division at Fort Benning in the 1960s, the helicopter was further adapted in Vietnam to the Cavalry role.
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#### **MEMORANDUM BY COMMANDER ARMY GROUND FORCES, 23. Jan 1943 for CSA**

1. The basic memorandum presents clearly, and impressively a broad picture of tremendous significance--one which, in my view, we have not yet faced adequately.
2. It is believed that our general concept of an armored force--that it is an instrument of exploitation, not greatly different in principle from horse cavalry of old--is sound. However, some particularly armored enthusiasts, have been led away from this concept by current events which have been misinterpreted. The German armored force of 1940 was organized for a particular situation, and was brilliantly successful for that reason. It was used at the outset as a force of exploitation, since it was well known, that nothing in Europe at that time was capable of stopping it; the antitank measures then in vogue were wholly and hopelessly inadequate.
3. The struggles in Libya--particularly the battles of late May and early June 1942--demonstrated conclusively that armor could not assault strong, organized positions except with prohibitive losses. The German 88 ruined the British armored force, which was employed unsoundly. The German armored force then exploited the success obtained and ruined the entire British force.
4. The battle of El Alamein demonstrated the correct employment of the British armor, which was held in reserve until the infantry, artillery, and air had opened a hole. The British armor then exploited the success and destroyed the German force.

5. Thus, we need large armored units to exploit the success of our infantry. We need small armored units also, in order to assist the infantry locally. The Russians appear to have devoted their armor largely to the latter principle, influenced undoubtedly by the fact that until recently they have been on the defensive strategically. It seems doubtful that they will need large armored units in the near future. If they do, such units can be formed readily.

6. It is believed unwise to adopt the hybrid infantry-armored division of the British, since a division normally should contain organically only those elements which are needed in all situations. Armor is not needed on the defensive under our concept, tank destroyers being provided for the defeat of armored attacks, and having demonstrated their effectiveness for this purpose. Our GHQ tank battalions are sound for attachment to infantry divisions on the offensive where terrain and situation permit their effective employment.

7. It is believed that our 1943 troop basis has entirely too many armored divisions, considering their proper tactical employment, and too few GHQ tank battalions. It is particularly important that the latter be available in quantities to permit all infantry divisions to work with them freely and frequently. Such training has been impracticable in the past and probably will be so in 1943. This matter was brought up in connection with consideration of the 1943 troop basis, but the view presented by this headquarters was not favored by the War Department.

8. A reorganization of the armored division will be proposed in the near future, in accordance with your memorandum of January 26, 1943.