

THE DEVELOPMENT OF AMERICAN ARMOR, 1917-1940

BY  
TIMOTHY K. <sup>went</sup>NENNINGER

A thesis submitted in partial fulfillment of  
the requirements for the degree of

MASTER OF ARTS

(History)

at the

UNIVERSITY OF WISCONSIN

1968

AW  
NA 375  
7585

## TABLE OF CONTENTS

	Page
TABLE OF CONTENTS -----	ii
ABBREVIATIONS -----	iv
INTRODUCTION -----	1
Chapter I: THE WORLD WAR I EXPERIENCE -----	4
The Early Efforts -----	4
The United States Plans a Tank Corps -----	16
Training American Tank Troops -----	28
American Tanks in Battle -----	44
The Lessons of the War -----	51
Appendix I -----	53
Appendix II -----	54
Chapter II: THE TWENTIES -----	55
Demobilization -----	55
Reorganization -----	62
Peacetime Tank Activities -----	69
Tank Construction during the Twenties -----	76
The Experimental Mechanized Force -----	83
The Army Studies Mechanization -----	88
A Permanent Mechanized Force -----	100
Chapter III: 1931-1940 -----	107
A Revised Mechanization Policy -----	107
Tank Production during the Thirties -----	118
Infantry Tanks during the Thirties -----	124
Mechanizing a Cavalry Regiment -----	132
Expanding the Mechanized Cavalry -----	148
Mechanized Cavalry Maneuvers -----	151
Mechanized Cavalry Doctrine -----	161
Reassessing War Department Policy -----	167
Forming an Armored Force -----	177
Appendix I -----	189

Table of Contents (Continued)

	Page
Chapter IV: THE EUROPEANS, MILITARY PERIODICALS, AND AMERICAN ARMOR DEVELOPMENT -----	190
The European Influence -----	190
American Military Periodicals -----	197
<u>Military Review</u> -----	197
<u>Army Ordnance</u> -----	209
<u>Cavalry Journal</u> -----	219
<u>Infantry Journal</u> -----	228
CONCLUSION -----	237
BIBLIOGRAPHY -----	243

## ABBREVIATIONS

- AC/S - Assistant Chief of Staff
- AEF - American Expeditionary Force
- AG - Adjutant General
- BG - Brigadier General
- CG - Commanding General
- CO - Commanding Officer
- Cong. - Congress
- C/S - Chief of Staff
- DC/S - Deputy Chief of Staff
- GHQ - General Headquarters
- GPO - Government Printing Office
- G-2 - Staff section concerned with military intelligence.
- G-3 - Staff section concerned with operations and training
- NA - National Archives
- RG - Record Group
- Sess - Session
- TC - Tank Corps
- USMA - United States Military Academy
- WPD - War Plans Division

## INTRODUCTION

Walter Millis in his book Arms and Men declares, "The one great, determining factor which shaped the course of the Second World War was not, as is so often said and so generally believed, independent air power. It was the mechanization of the ground battlefield with automotive transport, with the 'tactical' airplane and above all with the tank."<sup>1</sup> Panzer divisions spearheaded the German attacks into Poland, France, and Russia. The Germans, Italians, and British widely employed tanks in the North African campaigns of 1940, 1941, and 1942. Armor played an important role in the Russian counteroffensive which began after the German defeats at Stalingrad, Moscow, and Leningrad and ended in Berlin. And American armored divisions led the way to the Rhine and the Elbe following the Normandy landing. But American armor did not just emerge in 1944. The United States Army had been

---

<sup>1</sup> Walter Millis, Arms and Men (New York: Mentor Books, 1956), p. 253.

developing tanks and doctrine for mechanized warfare since World War I.

Throughout the period examined here, American armor developed in three interrelated areas: equipment, organization, and doctrine. Slow moving tanks could not perform the mobile missions envisaged by the mechanized cavalry leaders in the late thirties. On the other hand, slow tanks were acceptable for supporting infantry assaults. Tanks organized into companies for supporting infantry battalions were not capable of accomplishing the same missions as a mechanized force composed of tanks and supported by other arms. Obviously then, the armor doctrine, i.e., the ideas behind the tactical use of armored units, depended on and was a result of the type of tanks available and the organization of tank units. To determine why and how American armor developed in the manner it did, it is necessary to focus on each of the three elements: equipment, organization, and doctrine.

In discussions on this subject several terms are often used interchangeably but they actually have distinct meanings. "Tank" was the name applied to the British-built tracked, armored combat vehicle developed in 1915. During the 1920's and 1930's the Army used the term

"mechanization" in reference to the employment of cross-country, combat vehicles (primarily tanks) for ground warfare. In 1940 the organizers of the independent American Armored Force used the word "armored" to escape previous cavalry and infantry terminology which used the words "mechanized" and "tank." Although "armor" was first used in 1940, it has come to be used to describe developments prior to that time, as in: "The Development of American Armor, 1917 to 1940."

## Chapter I

### THE WORLD WAR I EXPERIENCE

The giving of blows without receiving them remains the unchanging object of battle irrespective of the change of weapons.

J.F.C. Fuller, Tanks in the Great War, p. 14.

#### The Early Efforts

In 1914 the Allies and the Central powers possessed similar weapons and in comparatively equal proportions but neither comprehended the implications of the new weapons for offensive combat. After the French and the British Expeditionary Force turned back the initial German attack at the First Battle of the Marne, the Western Front stagnated from the North Sea to Switzerland. Defensively, rapid firing artillery and machine guns proved too powerful for the infantry offensive. Both sides entrenched for protection. Troops with the new rapid fire weapons, in trenches, behind barbed wire entanglements, continually repulsed offensive thrusts.

The belligerents used massed artillery, poison gas, and finally tanks in an attempt to break the deadlock. All

three met with initial success but ultimately failed. By massing a large number of guns an army could direct a tremendous amount of firepower against the enemy's trenches. However, such an artillery barrage sacrificed surprise, traditionally the main advantage of the attacker. It often made such a mess of the terrain that friendly troops could not advance. Rather than restore mobility to the battlefield, massed artillery made movements more difficult. At the Second Battle of Ypres the Germans first used poison gas in an attempt to break the deadlock, but they had not produced gas in sufficient quantity to be effective. Furthermore, the prevailing wind, necessary to carry the gas toward the enemy, was westerly and hence carried the gas clouds back to the German lines. The use of respirators, to counter the effects of the gas, further reduced the infantryman's mobility. At the Battle of the Somme in 1916 the British introduced tanks. Although Lieutenant Colonel Ernest D. Swinton generally receives credit for conceiving the idea of the modern tank, there were many forerunners to the World War I tank.

From the earliest times man has sought to combine armor protection with the means of mobility. According to the Book of Judges, Judah was unable to drive out the

inhabitants of the plain "because they had chariots of iron."<sup>1</sup> The original ancestor of the tank was the war chariot. As early as the fifteenth century B.C. soldiers used the chariot, first as a personnel carrier and later as a fighting vehicle. In the twelfth century B.C. a Chinese emperor invented and used a battle chariot covered with heavy leather for protection. Somewhat later the Assyrians employed large, protected chariots which carried a driver, an archer, and two shield bearers.<sup>2</sup>

Another early predecessor of the tank was the war elephant. Many centuries before Christ the Indians used elephants as instruments of war. Following Alexander's invasion of India in 327 B.C., the use of elephants in warfare spread rapidly throughout the Western world. Since success in battle depended largely on bodily contact, the great mass of the elephant proved a great asset. Archers and spear throwers on the backs of the animals added even more offensive power. As Rome absorbed the

---

<sup>1</sup> Book of Judges, Chapter 1, Verse 7, The Bible (Revised Standard Version), p. 252.

<sup>2</sup> The History and Role of Armor (Fort Knox, Kentucky: U. S. Army Armor School, 1959), p. 2.

Greek world the use of elephants gradually declined. Roman tactics called for the disruption of the elephants' fighting line so that the beasts could be dealt with separately. The parallel with World War I tanks is striking. During the war tank doctrine called for the use of massed tanks so that the attack would not be disrupted by the loss of a few individual vehicles. Lacking adaptability and flexibility, elephants proved incapable of coping with the tactics of the Roman legionnaires. By 27 B.C., the founding of the Roman empire by Augustus, elephants had fallen from use as tools of war.<sup>3</sup>

Heavy cavalry superseded chariots and elephants as the decisive offensive arm during the later period of the Roman empire. For over a thousand years cavalry retained its power of decision. The development of firearms rendered the decisive power of cavalry impotent. Cavalry, elephants, and chariots, as instruments of mobile warfare, were more akin to the tanks of the Second World War than to those primitive machines used on the Western Front from 1916 to 1918. Perhaps the closest ancestor to

---

<sup>3</sup> David M. Young, "The Tanks of Antiquity," Armor, LXXII (November-December, 1963), pp. 41-2.

this early tank was the battering ram. The function of both was to punch holes in semi-permanent fortifications, thus allowing the infantry to penetrate the defense.

In 1482 Leonardo da Vinci invented an armored car propelled by men turning a crankshaft. Voltaire gave Cardinal Richelieu the plan for a horsedrawn armored wagon to be used against the Prussians in 1756. Until the French Revolution manpower or horsepower propelled all of these vehicles. At the time of the revolution a steam powered armored vehicle mounting a cannon appeared. Although capable of knocking down any wall in its way, this vehicle could not be steered. Another steam powered war vehicle, invented in 1854 by James Cowan, also had a major defect; every few minutes men had to replenish its water supply. The development of the internal combustion engine in the late nineteenth century again opened the search for a self-propelled armored vehicle. Armored cars built in the early 1900's had limited use because they lacked a cross country capability.<sup>4</sup> The exigencies of the First World War, notably the deadlock in the West, brought about the development of the tank.

---

<sup>4</sup>The History and Role of Armor, pp. 3-4.

Swinton receives credit for conceiving the World War tank because his ideas were put into practice; yet a number of other people had thought of a cross country, tracked, armored vehicle. As early as September, 1914, the Royal Naval Air Service established an armored car squadron in Flanders to provide protection and ground reconnaissance for the air base at Dunkirk. But as the front became stabilized, the armored cars encountered situations with which they could not cope. The First Lord of the Admiralty, Winston Churchill, said that a number of people realized if the armored car could not move around the enemy's trenches and operate against an open flank "some method should be devised which would enable it to traverse and pass over the trenches themselves."<sup>5</sup> Shortly after the beginning of the war, Rear Admiral R.H.S. Bacon, general manager of the Coventry Ordnance Works, told Churchill that he had designed a mobile, 15 inch howitzer. Churchill responded with the query as to whether the large caterpillar tractors which pulled the gun could cross trenches and carry guns and troops. By May, 1915, the

---

<sup>5</sup>Winston Churchill, The World Crisis, Vol. I (New York: Charles Scribners Sons, 1923), p. 345.

War Office had tested and rejected Bacon's tractors because they proved incapable of fulfilling a number of tasks the War Office thought important. Another British officer also saw the potential military use for tractors. The Holt caterpillar farm tractor impressed R. F. Macfie when he worked in the United States before the war. Macfie, a British Army lieutenant in 1914, proposed the application of caterpillar traction to military vehicles. But like Bacon's first proposal, Macfie thought only of tractors for hauling heavy guns.<sup>6</sup>

In the early months of the war Swinton served as an official correspondent attached to General Headquarters of the British Expeditionary Force. He realized that the war of maneuver was changing into a vast siege. The Allies needed some means to break the deadlock in the trenches. Swinton recalled in his memoirs, "I pictured to myself some form of armored vehicle immune against bullets, which should be capable of ploughing a way through the wire."<sup>7</sup> As had Macfie, Swinton thought of the

---

<sup>6</sup>B. H. Liddell Hart, The Tanks (New York: Frederick Praeger, 1959), p. 21.

<sup>7</sup>Ernest D. Swinton, Eyewitness (Garden City, New York: Doubleday, Doran, and Co., 1933), p. 43.

Holt caterpillar and its military potential. On October 20, 1914, Swinton approached his superior, Colonel Maurice Hankey, with the idea of an armored vehicle. As Secretary of the Committee on Imperial Defense, Hankey was close to many high officers. Outlining Swinton's ideas, Hankey drew up a paper and circulated it to cabinet members. In late 1914 this paper came to the attention of the First Sea Lord. Again impressed with the need for some sort of weapon capable of penetrating the German defenses, Churchill sent a memo of his own to Herbert Asquith, the Prime Minister, and to Lord Kitchener, the Secretary of State for War. Both appeared favorable to the project but somehow the idea became lost in the War Office bureaucracy.<sup>8</sup>

On February 17, 1915, after dining with a number of officers from the armored car squadrons, Churchill renewed his determination to proceed in "the carrying forward in one form or another of the project in which I had so long believed." Three days later Churchill formed the Admiralty Landships Committee and appointed Tennyson-d'Eyncourt president of this body. Dating from the formation of this committee on February 20, 1915, an unbroken chain

---

<sup>8</sup> Churchill, The World Crisis, Vol. II, p. 73.

of causation extends to the first employment of tanks in August of 1916. Tennyson-d'Eyncourt was the link to the successful completion of the project. Following the removal of Churchill from office because of his role in the debacle at Gallipoli, Tennyson-d'Eyncourt appealed to the new First Lord, Arthur Balfour, to continue the landships project. Balfour agreed to the construction of one experimental machine. This one vehicle proved to be "Mother" tank, the prototype of all the World War heavy tanks. "Mother," tested on February 2, 1916, was actually an improved version of an earlier model, "Little Willie," rejected the previous September.<sup>9</sup>

Meanwhile, the War Office, on the recommendation of Sir John French, commander of the British Expeditionary Force, did some investigating of its own but several of the tractors tested by the War Office proved unsatisfactory. However, in July, 1915, the Admiralty and the War Office combined their efforts. In an interdepartmental conference, the officials decided that the Admiralty should continue to design and experiment the machines and take its instructions as to requirements from the War Office, while the Minister

---

<sup>9</sup> Ibid., p. 77.

of Munitions would assume responsibility for actual production of the machines.<sup>10</sup>

Producing a suitable "caterpillar machine gun destroyer" was only part of the problem. Suitable tactics for the employment of the machines also had to be devised. Again, Swinton led the way with a number of papers outlining his ideas on the proper employment of tanks. He envisaged caterpillar machine gun destroyers assisting attacking infantry by breaking through obstacles and eliminating hostile machine guns. Tanks were definitely an auxiliary to the infantry and could only be employed on favorable terrain. A large infantry force would follow the tank attack to maintain the momentum of the assault and to exploit the breakthrough created by the tanks.<sup>11</sup> On June 1, 1915, in a memo to the Chief of Staff, Swinton advocated the use of tanks in large scale attacks only. "There should be no preliminary efforts made with a few machines, the result of which would be to give the scheme away."<sup>12</sup>

At the Battle of the Somme in September, 1916, the

---

<sup>10</sup>Swinton, Eyewitness, pp. 139-45.

<sup>11</sup>Ibid., Appendix II, "Notes on the Employment of Tanks," pp. 308-19.

<sup>12</sup>Ibid., "The Necessity for Machine Gun Destroyers," p. 106.

British high command ignored Swinton's warning. In the initial attack on September 15, only 32 of the 49 tanks employed reached the line of departure. Of those engaged in the assault only nine pushed through to enemy lines, but these nine did cause considerable damage. Mechanical trouble and natural obstacles (particularly the mud), halted most of those tanks not getting into the fight. As J.F.C. Fuller pointed out, this attack was important for the mistakes made and the lessons learned. These mistakes and lessons included the following: in principle, the tank was sound but needed mechanical improvement; the tank had been built for good weather and terrain but was used over pulverized ground; commanders had little or no conception of tactics to apply in tank actions; sufficient time had not been spent in giving tank crews thorough and careful training; tank operations required careful preparation and reconnaissance in order to be successful; tanks needed leading and controlling in battle necessitating a system of communication; a separate supply organization should support tanks in battle; by drawing fire away from the infantry tanks had an encouraging effect

on the attacking troops.<sup>13</sup>

Throughout the next year the British used tanks in a number of battles with only limited success. Spurred on by the leadership of General Baptiste Estienne the French also developed a tank force during this period. Neither the French nor the British knew of the other's efforts. Their efforts similarly met only limited success. Instead of conserving tanks for a large scale attack capable of achieving strategic gains, the Allies squandered their few machines on small immediate gains. But when viewed in the context of the tremendous casualties suffered by the French and British this policy becomes more understandable. Even in small numbers, tanks reduced casualties.

At Cambrai on November 20, 1917, the British launched an assault against a six mile section of the Hindenburg Line, in which three hundred tanks supported five infantry divisions. By noon of the twentieth this force achieved a four mile penetration and captured 4000 enemy prisoners while the English infantry suffered

---

<sup>13</sup>J.F.C. Fuller, Tanks in the Great War (London: John Murray, 1921), pp. 58-9.

relatively light casualties. To exploit the breach in the German line, however, the British depended on horse cavalry. This arm's inability to perform its mission in the face of modern fire and the lack of tank and infantry reserves resulted on November 30 in a German counterattack which regained most of the ground taken in the initial British assault. In spite of these later setbacks, Cambrai proved the value of the tank as an offensive weapon. Enough enthusiasts such as Fuller, Swinton, and Churchill realized the importance of the tank to ensure it a position in the line of battle, at least until the end of hostilities.

#### The United States Plans a Tank Corps

When the United States entered the war in April of 1917 tanks had yet to prove themselves. The War Department's official position in early 1917 reflected the attitude of the American Military Mission in Paris. In view of their disappointing performance the previous year the Mission declared tanks a failure.<sup>14</sup> The General Organization

---

<sup>14</sup>U. S. Army in the World War, 1917-18: Organization of the AEF, Vol. I (Washington: Historical Division, U. S. Army, 1948), p. 138.

Project for the American Army in France reflected this same attitude. Except to recommend that one company of each machine gun battalion be equipped with tanks, the project ignored organizing a tank service. Prior to the arrival of the American Expeditionary Force (AEF), the Military Mission by direction of the Chief of the War College undertook another study of the latest technical and tactical ideas on the use of tanks. Major Frank Parker, a liaison officer with the French Army, directed this study. Parker's report, completed on May 21, 1917, contained two main criticisms of French tanks during the Allied offensive of April, 1917. They possessed insufficient protection against fire and their cooperation with the infantry was poor.<sup>15</sup> Throughout the war, tank-infantry liaison never developed to a satisfactory extent.

Upon arrival in France in June, General John J. Pershing, the Commander-in-Chief of the AEF, detailed a number of committees to study the tactics and organization of the French and British armies. In a report to the Infantry Operations Section of Colonel C. B. Baker's Commission,

---

<sup>15</sup>"Operations of the Tank Corps," by S. D. Rockenbach, 27 December 1918, p. 1, TC Folder #16, AEF Reports, RG. 120, NA.

Lieutenant Colonel Hugh A. Parker discussed the employment of tanks in a manner more reminiscent of the German blitzkrieg of 1939 than of World War I tanks. According to Parker, the establishment of air superiority necessarily preceded any successful tank attack. Tactical air power would disrupt the enemy's defense in the area of the assault, then large numbers of light and medium tanks, to disrupt the enemy's rear areas, would follow the heavy tanks which penetrated the hostile frontline positions. Mobile artillery and truck transported infantry accompanied the deep penetrating attackers.<sup>16</sup> Unfortunately, the mechanical development of the tank did not keep pace with Parker's ideas. World War tanks, and even those developed for some time afterward, proved incapable of carrying out the mobile role envisaged by Colonel Parker, who, incidentally, did not serve with tanks during the war.

Another board appointed by Pershing on July 19 consisted of Colonel Fox Conner, Colonel Frank Parker (who had written the earlier report), Major Nelson E. Margetts, and Lieutenant Colonel Clarence C. Williams. On September 1 the board submitted its report. The salient point of their

---

<sup>16</sup> Fuller, Tanks in the Great War, p. 277.

study was, "The tank is considered a factor which is destined to become an important element in this war." The board considered the six ton French Renault and the thirty ton British Mark VI satisfactory models for use by American troops. Because the Renault had just appeared, the board made a thorough investigation of this machine. To obtain Renaults and Mark VIs the board recommended an American tank procurement program in conjunction with the British and French. One final but important recommendation called for the organization of a separate tank department under the command of a single chief who reported directly to the Commander-in-Chief, AEF.<sup>17</sup> During the war American tank development generally followed these recommendations.

Any tank organization project for the AEF needed tanks. Officers in France expected tanks for the AEF to come from factories in the United States. On July 28, 1917, the Chief Ordnance Officer of the American forces requested information on the number of tanks required by the AEF. He wanted to make arrangements with the War

---

<sup>17</sup>"Report on Tanks," by Conner, Parker, Margetts, and Williams, 1 September 1917, TC Folder #1, G-3 Reports, RG 120, NA.

Department in order to expedite construction. Not until September 14 did Pershing or any other AEF officer speak in terms of any specific number. On that date the Commander-in-Chief requested 600 British Mark VIs and 1200 French Renaults plus replacements at a rate of 15% per month. The Project for the Overseas Tank Corps, approved by Pershing on September 23, outlined the organization of five heavy tank battalions of 375 heavy fighting tanks and twenty light battalions of 1500 light tanks.<sup>18</sup> As we shall see this program was too ambitious and the stress and strain of war prevented its completion.

Despite the plan for tank procurement, AEF headquarters (GHQ) ordered Major Alden and Major James G. Drain of the Ordnance Department to collect information on the use and production of tanks. GHQ received their report on November 10.<sup>19</sup> The Commander designate of the light tank service, Captain George S. Patton, received orders to proceed to the French Light Tank Training Center at Champlieu for a period of study and training. On November 19, Second Lieutenant Elgin Braine, a Field Artillery

---

<sup>18</sup>"Operations of the Tank Corps," p. 1, TC Folder #16.

<sup>19</sup>U.S. Army in the World War, 1917-18: Reports of the Commander-in-Chief, AEF Staff Sections and Services, Vol. XIV (Washington: Historical Section, U.S. Army, 1948), "Report on the Development of the Tank Corps," p. 220.

officer, accompanied Patton to Champlieu. In order to learn about design and construction of tanks the two officers visited the Renault plant on December 2. Returning to GHQ at Chaumont they submitted an extensive report on construction, maintenance, and organization of tanks. Impressed by the Renault, Patton and Braine recommended an American built version of this machine.<sup>20</sup> The War Department generally followed the recommendations of Alden, Braine, Drain, and Patton on construction and procurement of tanks, on development of tank tactics, and on the organization of an American tank service.

Based on the reports submitted to GHQ and on Pershing's recommendations, the Chief of Staff ordered the organization of the American Tank Corps in December, 1917. A Quartermaster officer with over twenty years service in the cavalry, Samuel D. Rockenbach, who Pershing described as having "special qualifications," became a Brigadier General and Chief of the Tank Corps in France.<sup>21</sup>

---

<sup>20</sup>"History of the 304th. Brigade (TC)," p. 1, 314.7 (Military Histories), RG 120, NA.

<sup>21</sup>"Organization of the Tank Corps," Memo from Col. P. D. Lochridge, Acting Chief of the War College Division, for C/S, 8479-11 (12-22-17), RG 165, NA.

As Chief of the Corps, Rockenbach was Pershing's adviser on tanks and responsible for training, organizing, and equipping AEF tank units. Rockenbach also supervised the training of all overseas tank organizations until their attachment to tactical units.<sup>22</sup> A number of problems, relative to desirable tank types, organization, tactics, and functions, confronted Rockenbach when he arrived at GHQ on December 23. Drawing on the experience of the Allies and on the reports by American officers, Rockenbach determined that tanks would assist the infantry through the barbed wire and protect it from hostile rifle and machine gun fire. Because tanks were an auxiliary arm, their tactics would conform to the infantry. To provide reliefs for dead, disabled, and exhausted crews, tank units would be organized to allow the men to work in shifts. Rockenbach committed the American Tank Corps to use the British Mark VIII and the Renault.<sup>23\*</sup> The Mark VIII was not yet in production but it was an improved

---

<sup>22</sup>"Duties of the Chief of Tank Corps," 25 July 1917, GHQ AEF General Orders #121, TC Folder #16, AEF G-3 Reports, RG 120, NA.

<sup>23</sup>"Operations of the Tank Corps," pp. 3-4, TC Folder #16.

\*See Appendix I for characteristics of these two machines.

addition to the Mark series.

Merely determining that the Renault and the Mark VIII were the best models did not assure the delivery of these tanks to the troops. It took a great deal of haggling and the cooperation of the French and the British to accomplish this. In early December, 1917, the Allies convened the Inter-Allied Tank Commission with the purpose of jointly solving problems related to tanks. Of particular importance was tank production. As early as December 6, the United States and Great Britain entered into a tentative agreement for the joint production of 1500 Mark VIII tanks.<sup>24</sup> On January 22, 1918, the two countries concluded final arrangements with the signing of an agreement by Arthur Balfour and the American ambassador, Walter Hines Page. By the terms of this agreement the Americans would provide complete Liberty engines, transmissions, brakes, tracks, and all electrical equipment. The British agreed to supply armor plate, structural members, and armament. To enable the successful completion of the program both governments consented to give the necessary priorities to material, labor, and shipping. Assembly of

---

<sup>24</sup>Ibid., p. 3.

the tanks would be at a factory constructed in France. Deliveries would begin in July and be complete by October 1, 1918.<sup>25</sup> However, the German 1918 offensive and the competition of the American aviation program for Liberty engines disrupted the successful completion of this agreement since both drained resources destined for tank procurement.

In early 1918 American officials recognized the necessity of revising the combat Tank Corps project. AEF headquarters approved a new project on February 18; the War Department gave its approval on March 21. The new organization included a headquarters, five heavy and five light tank battalions, repair and salvage companies for each battalion, replacement companies, and training centers for both light and heavy tank personnel. All tank troops belonged to GHQ Reserve and would be allotted to the infantry divisions according to the nature of the operation. By July, 1918, tanks increased in importance as the Allies took to the offensive. Therefore, GHQ authorized

---

25  
"Anglo American Agreement on Tanks," by W. H. Page and A. J. Balfour, 22 January 1918, AEF AG File #10226, RG 120, NA.

an additional five heavy tank battalions.<sup>26</sup> But merely revising the tank project did not put machines into the hands of the troops.\*

Throughout 1918 the War Department misinformed Tank Corps Headquarters in France as to progress on light tank production. Because the Anglo-American agreement of January only provided for heavy tanks, light tanks had to be built in the United States. In February, 1918, the War Department cabled GHQ that 100 American built Renaults would arrive in France by April. Three hundred would be delivered in May and 600 per month thereafter. At this time only twelve people in the Ordnance Department worked on the project and blueprints for construction were not yet completed. On May 5 Pershing's headquarters received a cablegram indicating that 4400 light tanks, under construction in the United States, would soon arrive in France. The Ordnance Department informed GHQ on June 29 to expect delays in delivery because of difficulties

---

<sup>26</sup> "Tank Organization," Memo from Chief Tank Service for C/S, 9 January 1918, AEF AG File #10226, RG 120, NA.

\* See Appendix II for some indication of the slow progress in organizing the Tank Corps in France.

encountered in Liberty engine production. By the time of the Armistice only twenty-odd American built Renaults arrived in France.<sup>27</sup>

Lack of coordination plagued the Renault production program as a number of private corporations embarked on their own designs ignoring proved models. Ford Motor Company designed a two ton, three man tank and a 7-1/2 ton, three man model. A shoe manufacturer, Endicott-Johnson Company, financed construction of a flamethrowing tank. The Pioneer Tractor Company designed and constructed a tank made of iron pipe and plumbing connections.<sup>28</sup> These several independent attempts to produce a suitable light tank contributed to a dissipation of effort.

Not only was there lack of cooperation between the Ordnance Department and civilian producers but confusion existed within the War Department as well. On January 29, 1918, Captain Elgin Braine returned to the United States to assist in final preparations for shipping Renault tanks to France. GHQ wanted a new turret design

---

<sup>27</sup>U.S. Army in the World War, 1917-18, "Report on the Development of the Tank Corps," p. 221.

<sup>28</sup>Mildred Gillie, Forging the Thunderbolt (Harris-burt, Pa.: Military Service Publishing Company, 1947), p. 9.

implemented on the newest tanks. Braine found one type of turret designed in Washington, a totally different sort being built in Dayton, and absolutely no interest in the design favored by GHQ. Another bit of controversy surrounded the speedometer. The AEF wanted the tank speedometer to read in kilometers; the Ordnance Department in the United States favored readings in miles. After an exchange of cables they reached a compromise: the speedometer read in miles-per-hour, the odometer read in kilometers.<sup>29</sup> The most graphic illustration of the failure of the American tank production program is a request on June 4 from the Chief of Staff to Pershing for 22 light tanks needed to train personnel at Camp Colt, Pennsylvania.<sup>30</sup> Because no tanks had been produced in the States the War Department requested foreign built machines from the AEF. Tank production remained confused until the fall of 1918 when the War Department appointed a civilian coordinator.

Despite the failure of the production program, the American Tank Corps got its tanks. By June, 1918, it was apparent that no useful number of tanks would arrive from

---

<sup>29</sup> Robert J. Icks and Philip Andrews, Tanks and Armored Vehicles (New York: Duell, Sloan, and Pearce, 1945), p.45.

<sup>30</sup> "22 Tanks for Use in the United States," Memo from B. G. Lytle Brown, Director WPD, for C/S, 8479-49 (6-4-18), RG 165, NA.

American factories until 1919--too late for the expected Allied offensive. To facilitate procurement, the French agreed to fully equip two American battalions with Renaults. Under the proviso that it be attached to the BEF, the British equipped one battalion of heavy tanks. For training purposes the Allies provided the Americans with a small number of tanks. Immediately before the St. Mihiel offensive in early September, 1918, the Tank Corps in France consisted of 600 light and 800 heavy tank personnel. An additional 1200 men were training in England for heavy tanks and twelve companies of light tankers were enroute to the AEF from the United States. Personnel of the 35 tank companies training in the United States had never seen a tank.<sup>31</sup>

#### Training American Tank Troops

The training of tank personnel presented as many problems as the production of tanks. Furthermore, a study of Tank Corps training gives an indication of the

---

<sup>31</sup>"Tank Corps Operations," p. 7, TC Folder #16.

ideas behind the tactical doctrine for the employment of tanks.

An officer whose name became synonymous with tanks during World War II deserves much credit for the organization and training of the AEF Tank Corps. Captain George S. Patton went to France as an aide to General Pershing. With proddings from the Commander-in-Chief, Patton requested transfer to the tank service on October 3, 1917.<sup>32</sup> Outlining the reasons why he wanted a command with tanks, Patton said that his cavalry experience would be most helpful because the role of light tanks was analagous to cavalry. Furthermore, he had experience with gasoline engines and machine guns. Concluding his request, Patton said he wanted a tank command not because of any dislike for his present duty but that when "we get 'Tanks' I would be able to do good service with them."<sup>33</sup> Within three weeks, Pershing's Chief of Staff, James G. Harbord, detailed Patton to duty with tanks, directed him to organize the light tank service, and establish a light tank school.

---

<sup>32</sup>Ladislav Farago, Patton, Ordeal and Triumph (New York: Ivan Obolensky, Inc., 1963), p. 68.

<sup>33</sup>"Command in the Tank Service," Letter from Patton to Commander-in-Chief, AEF, 3 October 1917, AEF AG File #3468, RG 120, NA.

GHQ assigned Elgin Braine as Patton's assistant. Following their visit to the French Tank School and the Renault Factory (discussed earlier), Patton and Braine proceeded to the AEF Schools at Langres in the Haute Marne. Reporting there on December 16 they began preparations for a suitable school, training area, and tank park.<sup>34</sup>

Training procedures for the American Tank Corps followed British policy. Commanders of the tank brigades had responsibility for training all officers, non-coms, and enlisted men in their commands. Special instructors, trained at the French and British schools, would assist the commanders in unit training. To insure uniformity of doctrine, the unit commanders would lead the troops they trained in combat. GHQ established schools on a permanent basis for training instructors and reinforcements. For training unit personnel each brigade would set up temporary courses of instruction.<sup>35</sup>

Establishing a school to train troops for a new arm was no easy task. Patton spent the early days of 1918 acquiring additional information about tanks. On

---

<sup>34</sup>Letter from Commander-in-Chief to Patton, 18 October 1917, AEF AG File #3603-68, RG 120, NA.

<sup>35</sup>War Plans Division, Instructions for Training the Tank Corps in France (Washington: War Department, 1918), p. 7.

January 2 he and Rockenbach visited General Estienne, the commander of the French tank service, at the French Tank Center near Chaplieu. Immediately following this trip they spent several days with General Hugh Elles at British Tank Corps Headquarters where they also discussed tank tactics and tank organization.<sup>36</sup>

Finally, on January 9, 22 Second Lieutenants transferred from the Coast Artillery to the Tank Corps.<sup>37</sup> On January 11, two Infantry Lieutenants from the 1st. Division also transferred. These 24 officers, all volunteers, formed the foundation of the American Tank Corps in France. They were the cadre. Subsequently, four of this group were discharged for physical defects, eight cited for bravery, and almost all received wounds. Shortly after their arrival, this group underwent a period of instruction with the French. Much of their training was with the following weapons: the 37 millimeter gun, the German Maxim machine gun, the French Chauchat machine rifle, and the Hotchkiss machine gun. According to Patton's post-war report on the Tank School, "All officers of the tank

---

<sup>36</sup>"History of the 304th. Brigade (TC)," p. 4.

<sup>37</sup>Ibid., pp. 2-3.

school acquitted themselves very creditably." <sup>38</sup> Concluding their weapons instruction with the French, these officers took a ten-day course on map reading and map making at the Army School of the Line. Lectures on camouflage, poison gas defense, and aerial photograph reading followed. That these were all subjects basic to the training of any junior officer indicates the greenness of this group. Special training, not found in an infantry or cavalry field manual, involved the mechanical aspects of the tank. Major General Andre Brewster, Inspector General of the AEF, secured an abandoned Atlas truck for mechanical instruction at the school. The students spent several days studying and dismantling the engine and transmission of the truck. <sup>39</sup> Considering the mechanical unreliability of the early tanks and their penchant for breakdowns, this training proved most valuable.

By early February the officers concluded their preliminary training. On February 13 Patton went to St. Aignan to recruit enlisted men for two tank companies and

---

<sup>38</sup> U. S. Army in the World War, 1917-18, Vol. XIV, "Report of the Army Tank School," by G. S. Patton, Jr., p. 382.

<sup>39</sup> "History of the 304th. Brigade (TC)," p. 4.

for the Tank Center headquarters. From the 6th. Field Artillery and the 41st. Division Patton selected 125 volunteers who formed two companies and the Tank Center Headquarters.<sup>40</sup> Throughout 1918 the Tank Corps looked for men with special qualifications: chauffeurs, mechanics, and caterpillar tractor drivers, in particular, were useful.<sup>41</sup> As the Tank Corps expanded the need for experienced officers increased. To facilitate the acquisition of tank officers, on March 21 the Secretary of War ordered the Director of the Tank Corps, Colonel Ira C. Welborn, to recommend 300 First and Second Lieutenants for appointment to that service. Selection would come from surplus officers attached to divisions and depot brigades or transfers from other organizations.<sup>42</sup> Despite these measures, the Tank Corps in France had difficulty obtaining officers. Rockenbach complained to Pershing about this and suggested the formation of a reservoir of officers

---

<sup>40</sup> Ibid., p. 3.

<sup>41</sup> "Procurement of Personnel," Memo from Chief TC to C/S, 28 January 1918, AEF AG File #10226-I, RG 120, NA.

<sup>42</sup> Memo from B. G. Wm. S. Groves, Assistant to the C/S, to AG, 8479-33 (3-21-18), RG 165, NA.

at LaCourtine specifically for Tank Corps purposes.<sup>43</sup> According to Rockenbach, the Tank Corps received "practically no officers from the Regular Army; I was told there were none to spare."<sup>44</sup> While waiting for officers and men to become available, Rockenbach formed companies for administrative and supply purposes only. Part of the difficulty was the qualifications required for Tank Corps officers. There were not very many Americans at this time who had the practical knowledge of gasoline engines required.<sup>45</sup>

With the arrival of the first tank troops at Langres on February 17 training began in earnest. Because of the isolated environment in which tankers operated, training stressed the necessity of hard discipline, devotion to duty, and esprit de corps. Vigorous attention to close order drill, enforcement of personal neatness, and lectures on the ends sought helped to produce

---

<sup>43</sup> Memo from B.G. S. D. Rockenbach to Commander-in-Chief AEF, 27 March 1918, AEF AG File #10226-A13, RG 120, NA.

<sup>44</sup> U. S. Senate, 66th. Cong., 1st. Sess., Subcommittee of the Committee on Military Affairs, Reorganization of the Army, Vol. I (Washington: GPO, 1919), "Statement by B.G. S. D. Rockenbach," p. 762.

<sup>45</sup> "Qualifications for Officers of the Tank Corps," AEF AG File #10226-A35 (4-20-18), RG 120, NA.

the desired results.<sup>46</sup> The men at Langres worked six-to-six Monday through Saturday and stood inspection on Sunday. In addition to infantry drill, gas instruction, grenade throwing, weapons instruction, signalling, and tank foot drill, the troops built Adrian huts to house expanded Tank School facilities and constructed trenches and wire entanglements for use in field problems. For weapons instruction, they used two machine guns and two 37 millimeter guns, borrowed from the AEF schools. Once again the school used the Atlas truck for mechanical instruction.<sup>47</sup>

At last, on March 23, 1918, ten Renault tanks, which Rockenbach secured from the French, reached the railroad siding at Bourg near Langres. The official history of the 304th. Tank Brigade reported, "As Captain Patton was the only man who had ever seen a tank it was necessary for him to drive each tank off the train." Driving instruction began immediately. First, Patton taught ten men with marked ability as instructors how

---

<sup>46</sup>U. S. Army in the World War, Vol. XIV, "Report of the Army Tank School," by G. S. Patton, Jr., p. 383.

<sup>47</sup>"History of the 304th. Brigade (TC)," p. 4.

to drive the tanks. These ten then instructed small details from each of the companies. As soon as the troops learned to drive the machines, unit exercises began. In these exercises, Patton stressed reconnaissance, acquisitions of targets, tank gunnery, repair work under combat conditions, and tank-infantry cooperation.<sup>48</sup>

American tanks and infantry held their first combined maneuver on April 23 for the benefit of the General Staff College. Critiques, in which observers analyzed the conduct of the troops and commanders worked out problems of coordination, followed each exercise.<sup>49</sup> This tank-infantry training was most valuable since in battle American tanks always operated in direct support of infantry.

As personnel became available the tank units at Langres expanded. By April 5 sufficient men had arrived to form a third company: Company C. On April 28, GHQ organized the First Light Tank Battalion under the command of Patton, now a temporary Lieutenant Colonel, with three

---

<sup>48</sup>Ibid., p. 5.

<sup>49</sup>U. S. Army in the World War, Vol. XIV, "Report of the Army Tank School," by G. S. Patton, Jr., p. 384.

reserve officers, Captains J. W. Viner, Sereno E. Brett, and Herman, as commanders of Companies A, B, and C, respectively. During May a number of this battalion's officers visited French tank units at the front near Montdidier where they witnessed some fighting and gained valuable information. A second battalion formed on June 6 was the only other light tank battalion to see action in the coming months.<sup>50</sup> Until immediately before the Meuse-Argonne offensive these two units retained the incorrect designations of the 326th. and 327th. Light Tank Battalions. In October, 1918, GHQ renumbered them the 344th. and 345th. Light Tank Battalions of the 304th. Brigade (Tank Corps).\*

Fifteen additional light tanks arrived at Langres on June 17. Patton, still in command of the training center, arranged a schedule to allow all six companies maximum instruction with the 25 available tanks. From seven AM until noon details from all companies trained with machine guns, 37 mm guns, hand grenades, or had reconnaissance

---

<sup>50</sup>"History of the 304th. Brigade (TC)," p. 6.

\*Throughout this work the proper designations will be used.

training. One company held maneuvers with the tanks from one PM until six. The remaining companies conducted infantry drill or dug additional trenches for the tanks to attack in exercises. From 7:30 PM until midnight another company held night maneuvers and practiced night driving. By rotating the schedule each company had at least one afternoon maneuver or one night drill per week. Because of the limited number of machines and the long training periods, the tanks took a mechanical beating. According to the French, the Renaults needed a complete overhaul and replacement of worn parts after fifty hours driving time. Because of the care and efficiency of the American maintenance crews the tanks often ran 500 hours before overhauls. To maintain the machines the mechanics worked long hours, often around the clock. By August 15, 900 men and 50 officers had trained at Langres with only 25 tanks available for instruction.<sup>51</sup>

While the light tank units trained in France, the 301st. Heavy Tank Center organized at Bovington Camp, England. In February, 1918, this unit consisted of 58

---

<sup>51</sup>Ibid., p. 8.

unassigned Engineer Reserve officers and 38 enlisted men under the command of Lieutenant Colonel Conrad S. Babcock. Early in March Rockenbach and Patton visited England to assist Babcock in making arrangements for the arrival of an entire heavy tank battalion from the United States. This battalion consisted of three companies of the 65th. Engineers which had trained at Camp Colt, Pennsylvania. Upon arrival in England this group formed the 41st. Heavy Tank Battalion; later it became the 301st. Heavy Tank Battalion.<sup>52</sup> Reflecting an attitude which would plague the development of American tank units for many years, the Chief of Engineers strongly protested the transfer of troops from his branch to tank units.<sup>53</sup> Training of the heavy battalion progressed along lines similar to those followed by the units in France. Officers of the original 301st. Tank Center served as instructors for courses taught to the newly arrived engineers. Throughout the summer of 1918, training continued with borrowed

---

<sup>52</sup>Arch Whitehouse, Tank (Garden City, New York: Doubleday and Co., Inc., 1960), p. 113.

<sup>53</sup>Memo from B.G. F. A. Abbot, Acting Chief of Engineers, to Director WPD, 8479-26 (2-27-18), RG 165, NA.

British heavy tanks. On August 23 the 301st. departed for France, commanded by Major Roger B. Harrison.<sup>54</sup>

During the war tactical doctrine for the employment of tanks changed very little. From the time of Swinton's earliest pronouncements on the use of tanks in 1915 until the Armistice, tanks remained infantry close support weapons. Several factors contributed to this continuity. Mechanically, tanks remained primitive; they were slow; they were mechanically unreliable; they were easily put out of action. If tanks had difficulty accomplishing their primary mission of supporting the infantry, it was difficult to envisage them fulfilling a more independent role. Tanks carried out a valuable function in the system of trench warfare. Infantry needed a close support weapon to neutralize hostile machine guns and break through the barbed wire. Perhaps the most important reasons that tank doctrine changed very little was because it evolved in a static warfare situation.

There were those who saw in the tank greater potential than merely an infantry weapon. The Royal Tank

---

<sup>54</sup> Whitehouse, Tank, p. 114.

Corps Chief of Staff, J.F.C. Fuller, contended that the tank was a revolutionary weapon destined to destroy the old ways of fighting. For this reason it should not be harmonized with the existing artillery-infantry methods of fighting. Fuller began thinking in terms of "tank armies" composed wholly or largely of tanks. Rather than frontal assaults designed to destroy enemy personnel and capture ground, Fuller proposed attacks on the enemy's rear areas which contained his reserves and command network. He thought these attacks would result in a decisive victory. Fuller based his proposals on the use of new British Whippet tanks which were much faster than the other World War models, but only a few Whippets were available before the Armistice. On May 24, 1918, Fuller submitted his report to the Chief of the Imperial General Staff. The plan drew heavily on the report of Lieutenant Colonel Hugh A. Parker to the Baker Commission one year before.<sup>55</sup> The end of the war precluded any thorough analysis of Fuller's plan. It was not needed and therefore ignored.

---

<sup>55</sup> J.F.C. Fuller, Memoirs of an Unconventional Soldier (London: Ivor Nicholson and Watson Ltd., 1936), p. 324.

American tanks went into battle during September and October, 1918, governed by more conventional conceptions of tank tactics. Ideally, any tank action involved both heavy and light vehicles. Heavy tanks, in advance of the infantry and the light tanks, would clear the way by reducing strong points and by keeping the enemy infantry under cover until the arrival of friendly troops. Assigned to infantry battalions, the light tanks would be organized in depth, similar to the attacking infantry. Remaining in reserve until assigned a specific mission by the infantry battalion commander, the light tanks would assist the leading elements delayed by rifle or machine gun fire.<sup>56</sup> This was the ideal employment of tanks. As in most combat situations the ideal seldom occurred. Because of shortages in the number of machines available, American tanks, both light and heavy, were most often used in a leading role, i.e., as heavy tanks in the above description.

Prior to the St. Mihiel offensive in September, 1918, the Operations Section, GHQ, issued instructions regarding the use of tanks. "The employment of tanks with infantry consists in the tanks breaking down the

---

<sup>56</sup>"Role of Tanks in Modern Warfare," 20 October 1918, Board of Officers File #89, RG 120, NA.

wire for the infantry and driving the enemy into his shelters by fire while the infantry advances."<sup>57</sup> Under cover of a smoke screen, tanks advanced not more than 100 yards in front of the infantry and entered the wire at intervals of about 32 meters. The infantry following the tanks passed through the wire in small groups and at a walking pace. Regardless of the actions of the tanks the infantry would continue its prescribed direction of attack. To facilitate successful operations, close liaison and joint planning between tank and infantry commanders were necessary. American doctrine followed Swinton's warning that operations undertaken with insufficient numbers of tanks would fail; so staff planners suggested four tanks to a 200 yard front as the minimum to be used. Long or hard journeys during the approach march, unnecessary changes of position while on the line of departure, and employment over difficult (heavily wooded, muddy, or shell pocked) terrain hindered the effectiveness of tanks and the staff officers recommended that the tank units avoid

---

<sup>57</sup> World War Records, 1st. Division, AEF: Regular Training, Vol. XX, "Combat Instructions for Troops of the First Army," 1 September 1918, G-3-905, p. 7.

these. They hoped that engineer troops assigned to tank units would assist the machines over any difficult ground which could not be bypassed.<sup>58</sup> In practice, however, mechanical capabilities and the exigencies of trench warfare governed tactical doctrine for the use of tanks.

### American Tanks in Battle

American tanks in battle, while not a failure, were something less than spectacular. Only three battalions, the 301st. Heavy Tank Battalion and the 304th. Tank Brigade composed of the 344th. and 345th Light Battalions, saw action. Mechanical breakdowns, heavy tank casualties, insufficient number of machines, poor liaison with the infantry, and use over poor terrain hindered the performance of the American Tank Corps in France.

On September 5, 1918, Lieutenant Colonel Patton received orders attaching the 304th. Brigade to the IVth. Army Corps for operations against the St. Mihiel Salient.<sup>59</sup> The 344th. Light Tank Battalion commanded by Major Brett, the 345th. under Captain Ranulf Compton,

---

<sup>58</sup> Ibid., "Use of Tanks," 9 May 1918, G-3 325.

<sup>59</sup> "History of the 304th. Brigade (TC), p. 13.

and the French 14th. and 17th. Tank Groups composed the brigade. French Renault and Schneider tanks, 131 in all, constituted the brigade's equipment. Attached to the 1st. and 42nd. Divisions, the tanks' mission was to assist the infantry in attacking the southern edge of the salient. Because of the difficult terrain the operations plan detailed the 345th. to follow the 42nd. Division until it passed the Tranchee d' Houblons. From this point the tanks would lead the foot troops in an attack on Essey and Pannes. Despite heavy shell fire and thick mud, the battalion managed to carry out the plan. The tanks of the 345th. overcame several machine gun positions, destroyed a battery of German artillery, and captured 30 enemy soldiers. Operating with the 1st. Division, the 344th. Battalion succeeded in cutting the barbed wire and engaging a number of machine guns in the vicinity of the Bois de Rate. While carrying out these missions many of the tanks became stuck in the mud, but 25 reached their objective, Nonsard, ahead of the infantry and overcame German resistance in that village. A gasoline shortage hampered tank operations on September 13 when the tanks, because of the muddy terrain, consumed more fuel than anticipated. This shortage

prevented the tanks from keeping up with the advance. The tankers spent September 14 attempting to reestablish contact with the infantry. On that day an eight tank patrol from the 344th. attacked without infantry support and dispersed a battalion of German infantry near Woel.<sup>60</sup>

Although lack of serious resistance in the St. Mihiel operation did not provide an opportunity to demonstrate the full offensive value of tanks, the tankers did give valuable aid to infantry. Furthermore, the Americans gained much valuable experience in the use of tanks over difficult terrain. During the four day operation the 304th. Brigade lost one American and one French operated tank destroyed by shell fire, 22 ditched, and 14 because of mechanical difficulties. The brigade suffered 14 casualties among its personnel; but only two of these occurred among troops inside a tank.<sup>61</sup>

The Meuse-Argonne offensive, beginning on September 26, was the largest American operation of the war.

---

<sup>60</sup>"Operations of the 304th. Tank Brigade, 12-15 September 1918, St. Mihiel Salient," by G.S. Patton Jr., 12 November 1918, TC Folder #14, AEF G-3 Reports, RG 120, NA.

<sup>61</sup>"History of the 304th. Brigade (TC)," p. 17.

In the initial phase the two American light tank battalions and the French tank groups operated with the American Ist. Army Corps. Originally the 344th. was to support the corps' advance on the front extending from Vanquois to La Harazee. After reaching the First Army objective the 345th. and the two French tank groups would "leap frog" the 344th. and continue to support the advance as far as possible.<sup>62</sup>

Serious resistance, especially along the edge of the Argonne Forest, necessitated the use of all the tanks by the end of the first day of the offensive. Heavy machine gun fire provided most of the resistance, particularly near Varennes. Although the tanks reached Varennes at 9:30 AM, the infantry did not arrive until 1:30 in the afternoon. While getting tanks forward and rallying disorganized troops, the brigade commander, Colonel Patton was wounded. Major Sereno Brett replaced Patton and led the brigade for the remainder of the campaign. On September 27 and 28 the American tanks

---

<sup>62</sup>"Operations Report, 304th. Tank Brigade, 26 September to 15 October 1918, Foret d' Argonne Attack," by G. S. Patton Jr., 18 November 1918, TC Folder #15, AEF G-3 Reports, RG 120, NA.

answered requests for assistance from the infantry. Although coordination was poor, small groups of tanks supported infantry squads and platoons in reducing strong points. On the 28th, tanks entered and captured Apremont five times before the infantry finally advanced, consolidated, and exploited this success. From September 29 until October 4, 89 American tanks supported the attack of the 1st. and 28th. Divisions. During this period the tankers and infantrymen overcame liaison difficulties and worked well together. In this fighting the brigade suffered heavy losses in men and equipment because of effective German artillery fire. Only 30 tanks, many unfit for combat because of mechanical trouble, remained in action on the morning of October 5. On the next day all American tanks withdrew to Varennes for overhaul.<sup>63</sup>

It was apparent that there were insufficient tanks to reequip the entire brigade. Therefore, brigade headquarters formed a provisional company commanded by Captain Courtney Barnard and ordered the remainder of

---

<sup>63</sup>Ibid., p. 3.

the 304th. back to the Tank Center at Langres. From October 16 until November 1 the provisional company remained in corps reserve at Exermont. In their last action of the war, several tanks of the company participated in the general advance on November 1 in the vicinity of Landres-et-St. Georges and earned the commendation of the commanding general of the 2nd. Division.<sup>64</sup>

Similar to the 344th. and 345th., the 301st. Heavy Tank Battalion met with only limited success. Attached to the 2nd. Tank Brigade of the BEF and equipped with 47 British heavy tanks, the 301st. assisted the IInd. American Corps and an Australian corps in an attack on the Hindenberg Line during late September. Of the 34 tanks supporting the 27th. Division only ten actually became engaged in combat. Most of those disabled ran afoul of an old British minefield. Once again coordination between tanks and infantry was poor. "Due to the fact that the 27th. Division had never had an actual operation with tanks, the Infantry Commanders did

---

<sup>64</sup>"Report on the 304th. Tank Brigade in the Meuse Argonne, 26 September to 10 November 1918," by S.E. Brett, TC Folder #11, AEF G-3 Reports, RG 120, NA.

not seem to grasp the idea of tanks cooperating with Infantry."<sup>65</sup> In conjunction with the British IXth. and XIIIth. and the American IIth. Corps, on October 8 the 301st. successfully attacked German positions northwest of Brancourt. The tanks fought through to the final objective rendering valuable support to the foot troops. Poor visibility disrupted a IInd. Corps-301st. Tank Battalion attack nine days later. Only half of the twenty tanks which started finished the operation. The final attack of the 301st. occurred on October 23 when nine tanks assisted two British divisions near Bazuel. The tank commanders reported little opposition and good targets despite visibility problems and difficult terrain. All nine tanks beginning the attack rallied at its conclusion. The infantry commanders praised the work of the tanks. Following this operation the 301st. Heavy Tank Battalion remained in GHQ reserve until the end of hostilities.<sup>66</sup>

---

<sup>65</sup>"2nd. Tank Brigade: Report on Operations, 27 September to 10 October 1918," p. 5, TC Folder #6, AEF G-3 Reports, RG 120, NA.

<sup>66</sup>"Report on Operations of the 301st. Tank Battalion," by B.G. H. Karstake (British Army), TC Folder #6, AEF G-3 Reports, RG 120, NA.

The Lessons of the War

Military experts disagreed as to the value of tanks during the war. Skeptics could point to the experience of the three American battalions and ask the enthusiasts if this was an example of the ultimate weapon. Poor liaison, mechanical breakdowns, heavy tank casualties (123% from all causes during the Meuse-Argonne), and the inability to operate in certain situations contributed to the pessimistic view of the value of American tanks. On the other hand, tank enthusiasts found cause for optimism in the success of mass tank attacks, such as the British assault at Amiens on August 8, 1918. Luddendorf called this the "black day" of the German Army. Sir Douglas Haig, who in 1917 called tanks "a minor factor under present conditions," said in his final report, "Since the opening of our offensive in August tanks have been employed in every battle and the importance of them can scarcely be exaggerated."<sup>67</sup>

---

<sup>67</sup> Sir Douglas Haig quoted in E. W. Sheppard, Tanks in the Next War (London: Geoffrey Bles, 1938), p. 52.

The debate over the value of tanks continued for nearly two decades after the Armistice. During the early post-war years the experience of tanks from 1915 until 1918 weighed heavily on both sides of the argument.

Appendix I

Mark VIII-British Heavy Tank:

- a. 35 tons
- b. 33 feet long
- c. 12 feet wide
- d. 9 feet 10 inches high
- e. armor proof against all small arms including armor piercing
- f. 7 machine guns and 2 six pounder guns
- g. maximum speed of 6 mph
- h. 10 horse power per ton of weight
- i. 14 foot trench crossing ability
- j. 5 foot vertical bank climbing ability
- k. 4.5 pounds flotation per square inch
- l. communications: 2 pigeons and signal flags; one out of every 16 tanks possessed a radio
- m. cargo: 16 infantrymen in addition to crew or cargo of 2 tons
- n. 50 mile radius of action on one fill of gasoline
- o. transported by rail
- p. barbed wire and 18 inches of mud present no obstacle
- q. obstacles: forests, stumps, boulders, shelled areas soaked with rain

Renault-French Light Tank

- a. 6 tons
- b. 13.5 feet long
- c. 5 feet 7 inches wide
- d. 7 feet high
- e. armor protection against all small arms
- f. one machine gun or one 37 mm gun
- g. 6 mph maximum speed
- h. 25 mile radius of action
- i. 6 foot trench crossing ability
- j. 30 degree slope climbing ability
- k. 5 pounds per square inch flotation
- l. transported by truck, rail, or trailer

"Operations of the Tank Corps," by S. D. Rockenbach, 27 December 1917, TC Folder #16, AEF G-3 Reports, RG 120, NA.

Appendix II

	PROJECT					RECEIVED				
	18 February 1918	20 Feb.	15 Mar.	30 Mar.	15 Apr.					
Personnel										
BG	1	0	0	0	0					
COL	4	1	1	2	2					
LTC	10	0	3	2	2					
MAJ	34	6	5	4	3					
CAPT	119	5	51	20	23					
1LT	249	2	5	34	47					
2LT	505	70	29	41	94					
EM	13905	231	243	332	1054					
Equipment										
Heavy tanks	345	0	0	0	0					
Light tanks	1140	0	0	10	10					

"Progress Report Overseas Tank Corps," 2 April 1918, AEF  
AG File #10226-A15, RG 120, NA.

## Chapter II

### THE TWENTIES

My impression is that very little is being done by any department to advance our knowledge of tank construction and use.

General John J. Pershing, 1923

#### Demobilization

Rapid demobilization followed the Armistice. As soon as possible the War Department returned troops to the United States and discharged them. On November 11, 1918, the Tank Corps consisted of 483 officers and 7700 enlisted men within the continental United States. Seven hundred and fifty-two officers and 11,277 men remained overseas. By May, 1919, most of these troops had been discharged.<sup>1</sup> During late 1918 and early 1919, tank troops from training centers at Camp Colt and Tobyhanna in Pennsylvania, from Fort Benning, Georgia, and from

---

<sup>1</sup> U. S. House of Representatives, 66th. Cong., 2nd. Sess., House Documents, Vol. IXX (Washington: GPO, 1920), "Report of the Director of the Tank Corps," p. 253.

Camp Polk, North Carolina, transferred to Camp Meade, Maryland, the Tank Corps demobilization and storage center. Beginning in March, tank troops from overseas began to arrive with their equipment. The French and the British wanted to produce new models, therefore they would not accept the tanks they loaned the Americans during the war. At Camp Meade the Army collected 218 French Renaults, 450 American built Renaults, 28 British Mark Vs, and 100 Mark VIIIs built at Rock Island Arsenal. Their collective worth was 32 million dollars.<sup>2</sup> These demobilization activities represented the concluding acts of a past war. What about the future of the Tank Corps?

In August, 1919, Secretary of War Newton D. Baker ordered General Rockenbach to return to Camp Meade as Commandant of the Tank Corps.<sup>3</sup> Subsequently, on December 31 Congress fixed the Corps' strength at 154 officers and 2508 enlisted men. Rockenbach protested that this allotment was insufficient to operate in time of war. He

---

<sup>2</sup>U. S. Senate, 66th. Cong., 1st. Sess., Subcommittee of the Committee on Military Affairs, Reorganization of the Army, Vol. I (Washington: GPO, 1919), p. 773.

<sup>3</sup>Memo from C/S to AG, 8479-84 (8-5-19), RG 165, NA.

maintained that the United States needed at least two tank brigades.<sup>4</sup> But Congress was in no mood to appropriate funds for a large military establishment. Tankers had to be satisfied with a small organization and confine their efforts to improving their service with the means at hand. Congress charged the Tank Corps with formulating sound tactical doctrine, developing improved tanks and improving models already developed, and disseminating information on the value of tanks.<sup>5</sup> No one needed to prod tank officers into lobbying for their service. Tank Corps officers, particularly Patton, Brett, and Rockenbach, began to impress upon military and civilian officials the need for tanks in modern warfare.

As Commandant, Rockenbach was in a particularly advantageous position to express his views. In testimony before Congressional committees, in articles for military journals, and in speeches for military gatherings, Rockenbach defended the tank's performance during the war and stressed the need for developing improved tanks

---

<sup>4</sup>Memo from Rockenbach to AG, 320.2 (1-9-20), RG 94, NA.

<sup>5</sup>War Department Annual Reports, 1920 (Washington: GPO, 1921), "Commandant of the Tank Corps Report," pp. 53-4.

in the future. In a lecture at the General Staff College, Rockenbach said that the Tank Corps resisted entangling alliances with any of the traditional branches but its support in combat would be of value to all of them. According to Rockenbach, the use of tanks reduced infantry casualties by making paths through obstacles and by protecting the infantry from hostile machine gun fire. He thought that function and design should govern Tank Corps needs in the future. To carry out their mission, tanks must be designed to cross any defensive position, to go anywhere the infantry could, and must possess sufficient armament to cope with protected machine guns. Despite the necessity of close association between tanks and infantry, Rockenbach opposed permanent attachment of tank units to infantry divisions. Tanks could not be used in every situation and should not be wasted on a division operating in unfavorable terrain.<sup>6</sup> Before a Senate subcommittee, Rockenbach defended the wartime tank organization. He said that the Tank Corps should remain

---

<sup>6</sup>From Rockenbach to C/S (lecture delivered by Rockenbach at the General Staff School, 3 October 1919), 322.999 (11-14-19), RG 94, NA.

a separate entity assigned to General Headquarters for employment as the tactical situation dictates. Because of their special nature, tanks needed their own organization to coordinate with the Ordnance Department the procurement of proper equipment, to conduct the necessary specialist training, and to plan tank-infantry operations with GHQ.<sup>7</sup>

In response to a lecture by Rockenbach, Major General Charles P. Summerall, an outstanding wartime corps commander, wrote, "Far from disagreeing with any part of the lecture, the only comment that I heard . . . was that you had presented the subject in a very conservative manner, and that all were in hearty sympathy with the development and use of the Tank Corps."<sup>8</sup> Some of the Tank Corps' own officers agreed with Summerall. They believed that Rockenbach was too conservative. Rather than experimenting with and developing new tanks, Rockenbach sought to maintain the status quo.

Patton's biographer wrote that upon return to the United States, Patton vigorously promoted research,

---

<sup>7</sup>U. S. Senate, Reorganization of the Army, pp. 770-2.

<sup>8</sup>Letter from Summerall to Rockenbach, 8479-86 (1-13-19), RG 165, NA.

development, and training: three activities essential to the improvement of tanks. Soon after arriving at Camp Meade, Patton realized that several forces, including, he believed, General Rockenbach, combined to thwart his efforts.<sup>9</sup> A close friend of Patton's during this period, Lieutenant Colonel Dwight D. Eisenhower, expresses similar sentiments in his memoirs.

During the war Eisenhower commanded the tank training center at Camp Colt. After the Armistice he went with the tank units to Camp Meade. On the controversy surrounding tanks, Eisenhower writes that he, Patton, and several other young officers disagreed with accepted doctrine. They thought tanks should be fast and should attack in mass formations. This group of officers conducted experiments with World War tanks and held demonstrations for officials. Several of the group, including Eisenhower and Patton, wrote articles for military periodicals expressing their "revolutionary" ideas. But the War Department disapproved of their divergence from established

---

<sup>9</sup> Ladislas Farago, Patton, Ordeal and Triumph (New York: Ivan Obolensky, Inc., 1963), p. 97.

doctrine. Eisenhower writes, "I was told that my ideas were not only wrong but dangerous, and that henceforth I was not to publish anything incompatible with solid infantry doctrine."<sup>10</sup> Patton received a similar warning. In retrospect, one of the articles in question, written for the 1920 Infantry Journal, hardly seems revolutionary. Eisenhower merely reviews the strengths and weaknesses of tanks. Perhaps what provoked the rebuff was his statement that many military men foolishly ignored the tank as a weapon in future war.<sup>11</sup>

Confronted with pressures such as those described above, both Patton and Eisenhower soon departed from the tank service. But during the immediate postwar period a number of other officers, including some destined to become generals in World War II armored units, developed an interest in tanks. The nature of the machines themselves and the proddings of the enthusiasts stirred this interest. Brigadier General Sidney R. Hinds, a 2nd. Armored Division officer from 1940 to 1945, says that he

---

<sup>10</sup> Dwight D. Eisenhower, At Ease! (Garden City, New York: Doubleday and Company, Inc., 1963), p. 97.

<sup>11</sup> Dwight D. Eisenhower, "A Tank Discussion," Infantry Journal, XVII (November, 1920), p. 453.

was first attracted to tanks during 1920. "As a student at the Infantry School, I was interested and enthused by the Tank Section headed by Major Sereno Brett, and the fantastic demonstrations put on by the WW I 'monsters'."<sup>12</sup> A future Armored School Commandant, Brigadier General Joseph A. Holly, developed an interest in tanks after riding in a Renault and a Mark VIII at Fort Benning during April, 1920.<sup>13</sup> While Patton perceived no immediate future for himself in infantry tanks he alerted other officers to the potential of independent tank forces. Patton encouraged officers such as Willard A. Holbrook, Junior, a future Brigadier General in the 11th. Armored Division, to become interested in tanks.<sup>14</sup>

#### Reorganization

Official War Department doctrine called for tanks to be used as close support weapons for the infantry, thus wartime practices for the employment of tanks would continue. A board of officers convened by the War

---

<sup>12</sup>S. R. Hinds, 13 July 1967, correspondence with author.

<sup>13</sup>Joseph A. Holly, 24 July 1967, correspondence with author.

<sup>14</sup>W. A. Holbrook, 23 August 1967, correspondence with author.

Department in 1919 to study tank tactics recognized the value of tanks as an adjunct to the infantry but declared them incapable of independent action. To further emphasize the association of tanks and infantry the board declared that the "Tank Service should be under the general supervision of the Chief of Infantry and should not constitute an independent service."<sup>15</sup> Their recommendation that tanks be under infantry control broke with the wartime arrangement by which the Tank Corps retained autonomy from branch authority. Peacetime exigencies gradually pushed the War Department into placing tanks under the control of the Chief of Infantry.

Ultimately the question of a separate Tank Corps came before Congressional committees holding hearings on the reorganization of the Army. The question raised in these committees was not over the usefulness of tanks but of the necessity for a separate service. General Peyton C. March, the Chief of Staff, said that American military authorities were fully convinced of the offensive

---

<sup>15</sup>  
"Report by Board of Officers to Consider Tactics," 24 April 1919, AEF Board of Officers, File #78, RG 120, NA.

value of tanks.<sup>16</sup> March himself believed the Tank Corps was "technical enough and important enough to keep it as a separate arm."<sup>17</sup> Disagreeing with March, General Pershing expressed the belief that tanks should be under the control of the Chief of Infantry; they were an adjunct to that arm.<sup>18</sup> For Congress the question of a separate tank service became one of economics. Could the government afford an independent tank organization in view of reduced postwar military budgets? Congressman Harry E. Hull of Iowa presented the question as follows: "I can see how perhaps in the case of war there might be some need of a separate organization for tanks, but I am unable absolutely to see any reason during peacetime for the creation of the overhead that would have to be established to give you a separate organization."<sup>19</sup> Evidently the majority of Congress supported Mr. Hull. Section 17 of the National Defense Act, as amended by

---

<sup>16</sup> U. S. House of Representatives, 66th Cong., 1st Sess., Hearings before Committee on Military Affairs, Vol. I (Washington: GPO, 1919), "Testimony of C/S Peyton C. March," p. 187.

<sup>17</sup> Ibid., "March Testimony," p. 59.

<sup>18</sup> Ibid., "Testimony of John J. Pershing," p. 1438.

<sup>19</sup> Ibid., "Statement by Congressman Harry E. Hull," p. 285.

Congress on June 4, 1920, assigned all tank units to the infantry.<sup>20</sup>

In tactics as well as organization, the reorganization of 1920 had a tremendous impact on tank development. Under infantry control, tanks naturally had to conform to infantry tactics which meant continuing the close support mission tanks performed during the war. Independent tank attacks, as envisaged by Patton, Eisenhower, and the other young officers, had no place in infantry doctrine.

A conference held by the General Service Schools of Fort Leavenworth, Kansas, in October and November, 1921, discussed the organization and tactics of infantry tanks. The conference's report and comments from other officers elicited by the report indicate post-1920 thought on the use of tanks. To secure close cooperation between tanks and infantry, the report proposed assigning light tank companies as organic components of infantry divisions. Additional tank units would compose a GHQ reserve. This

---

<sup>20</sup>The National Defense Act, Approved 3 June 1916, As Amended by Act Approved 4 June 1920 (Washington: GPO, 1920), p. 15.

would insure the maximum use of a limited number of tanks. GHQ tanks, distributed in depth, would be allotted to the corps delivering the main assault. Terrain and the mission of the assault divisions dictated the distribution of available tanks. Departing from established doctrine, the conference suggested the allotment of additional machine guns to each tank company. In a defensive situation these units could then serve as machine gun companies. Again departing from normal doctrine, the conference maintained that in certain situations tanks might successfully assist horse cavalry.<sup>21</sup>

Criticism of this report came from several sources in the War Department. On December 9, 1921, the Tank Board met at Fort Meade to consider the report of the General Service Schools conference. The board criticized the proposal for using tank companies as machine gun units. Tank units required additional training, equipment, and personnel in order to carry out any dual missions. The board maintained that tanks were offensive

---

<sup>21</sup>"General Service Conference on Tanks," 322.999 (12-8-21), RG 94, NA.

weapons only.<sup>22</sup> According to the Infantry Board, the number of tanks available during wartime would not be sufficient to maintain division tank companies as well as GHQ tank units. Furthermore, divisions might not operate in terrain suitable for the employment of tanks. Tank companies organic to infantry divisions could prove to be more of a burden than an asset.<sup>23</sup> Writing to the Commandant of the General Service Schools, the Adjutant General charged that the instructors at the conference failed to deal with the existing organizations, units, and arms. Instead, they made unauthorized assumptions regarding the tank service. The Adjutant General said that uniformity of tactical doctrine cannot exist unless all schools base their teaching on existing organization. Tactically, tanks served as an auxiliary of the infantry. According to the Adjutant General, any discussion of tank tactics had to begin with this premise.<sup>24</sup>

---

<sup>22</sup>"Proceedings of Tank Board," 9 December 1921, 322.999 (12-8-21), RG 94, NA.

<sup>23</sup>Memo from Infantry Board to Chief of Infantry, 2 May 1922, 322.999 (12-8-21), RG 94, NA.

<sup>24</sup>Memo from AG to Commandant, General Service Schools, 5 September 1922, 322.999 (12-8-21), RG 94, NA.

Even before the reorganization the Army took steps to insure closer cooperation between tanks and infantry. Early in 1920 the Secretary of War, in response to a request by the 1st. Division commander, General Summerall, assigned one tank company to each infantry division and assigned one battalion of tanks to the Infantry School at Fort Benning. Two light and one heavy tank companies comprised the battalion at Benning. After the reorganization the units retained at Camp Meade included the 16th. Tank Battalion (Light), the 17th. Tank Battalion (Heavy), and a maintenance company. Meade was also the location of the Tank School and the hub of postwar American tank activities. In event of future war Meade would become a tank mobilization, training, and replacement center. Four light tank companies and six separate light tank platoons were the remaining tank units assigned to Regular Army posts. In addition, the National Guard had fifteen light tank companies located throughout the United States. All tank organizations, both National Guard and Regular Army, were units organic to an infantry division.

---

<sup>25</sup> Memo from Summerall to AG, 322.999 (2-3-20), RG 94, NA; Memo from AG to Chief of the Tank Corps, 322.999 (3-17-20), RG 94, NA.

### Peacetime Tank Activities

Lack of funds restricted but did not halt the post-war activities of American tank units. For fiscal year 1921 Congress appropriated only \$79,000 for Tank Corps purposes.<sup>26</sup> During the war tank crews operated their machines for the entire day but peacetime budgets dictated that tanks could only be driven for a few hours at most because of shortage of funds for fuel. Despite the inconveniences caused by tight budgets, tank units conducted important training and attempted to stimulate interest in tanks. A letter from First Lieutenant Eugene F. Smith, platoon leader of 1st. Platoon, 9th. Tank Company at Fort Devens, Massachusetts, to Colonel Rockenbach aptly reflects the difficulties and the nature of Tank Corps training during the twenties.

Smith's platoon moved from winter quarters to Fort Davens between May 12 and 17, 1924. Upon arriving at their training area at Devens, they constructed a tank park to house and protect their vehicles. Beginning on

---

<sup>26</sup> War Department Annual Report, 1920, p. 54.

June 9 and continuing for three weeks the tanks helped in felling trees and clearing land for a drill field. This was valuable experience because it gave all hands an opportunity to drive the tanks under difficult conditions. After completing the preparation of their training area, the platoon held a test mobilization on July 3. Despite only 24 hours notice, the test went well. From July 7 to 9 two tanks assisted the 5th. Infantry in conducting demonstrations for an Elks convention in Boston. During the second and third weeks of July the platoon assisted in the summer training of the 26th. Tank Company of the Massachusetts National Guard. Several reserve tank officers trained with the platoon from July 21 until August 2. Tactical exercises with infantry regiments constituted the unit's primary activity in the latter part of July. On July 15 and 16 the platoon participated in field problems with the 13th. and 5th. Infantry Regiments; these were part of the regiments' annual tactical inspection. During both of the exercises the tanks moved about eight miles under their own power and impressed the infantry officers with their ability to keep up with the march column. On July 24, 28, and 31 Smith's unit participated in the tactical inspection of the 18th.

Infantry Brigade, which was observed by the 1st. Corps Area commander and some War Department officials. To advertise tank mobility and strength, on the 31st. the platoon conducted a demonstration for the visiting dignitaries. One tank crossed a trench system, drove across a bridge, knocked down a tree and returned. Smith wrote Rockenbach, "We received some very good publicity in the Boston papers because of it." The platoon held a demonstration of tank-infantry coordination in the attack for ROTC and organized reserve personnel on August 1. Following this exercise, several officers expressed their surprise that tanks could move so rapidly and assist the attacking infantry so well. More than just training his own men, Smith attempted to publicize the tank and impress other officers with its possibilities. The performance of the tanks in these maneuvers convinced many officers that they could rely upon tanks in any combat situation. Smith concluded his letter, "They don't have to know that on one problem we had to stop and put a new fan belt on one tank, a new water pipe from the pump to the radiator on another and stop every half mile and fill the radiator on another because it sprang a

bad leak."<sup>27</sup>

The most important tank organization of the twenties was the Tank School at Fort Meade. But in 1932, in order to bring tank-infantry activities into closer proximity, the school moved to Fort Benning where it became the Tank Section of the Infantry School. Among its more important functions the school furnished trained personnel to tank units such as Lieutenant Smith's platoon. Although the enlisted men received instruction only in their specialties, the officers took a more comprehensive course. Included in the officers' syllabus was instruction on motors, ignition systems and battery maintenance, vehicle chassis, light tanks, heavy tanks, weapons, tank marksmanship, tank combat practice, tank history, tank organization, tank tactics, reconnaissance and intelligence, and chemical warfare. The courses were balanced between theory and practice. Beginning in March of each year, the National Guard and reserve officers course continued for three months. The

---

<sup>27</sup> Letter from First Lieutenant E. F. Smith to Rockenbach, 470.8/5114-B (8-19-24), RG 177, NA.

Regular officers course lasted for ten months; only one class graduated each year. Specialty schools for enlisted men were generally about three months in duration. After graduation the officers served a tour of several years with a tank organization. Most of the enlisted students came from the tank units stationed at Meade. Upon completion of the course of study they returned to their former units.<sup>28</sup> But the type of training received by the men created some problems. The skills developed at the school were valuable in a society becoming rapidly motorized and many Tank School graduates left the service to take higher paying civilian jobs. In order to retain trained personnel, the Army began to assign students to the school who had at least two years remaining on their enlistments.<sup>29</sup>

One important function of the Tank School was the collection and dissemination of information about tanks.

---

<sup>28</sup> Ralph E. Jones, "The Tank School and Tank Board," Infantry Journal, XXXVI (January, 1930), pp. 47-51; William H. Speidel, "The Tank School," Infantry Journal, XXVI (June, 1925), pp. 646-9.

<sup>29</sup> Memo from Röckenbach to AG, 220.63 (3-24-20) (1), RG 94, NA.

So that all tank units might profit from the experience of others, each organization submitted a periodic letter to the Tank School Commandant describing its activities. Individuals could also send data on their experiences with tanks. Every three months the school prepared a mimeographed memo from the information collected and distributed it to all tank commands. Included in the memo was information on tank tactics, mechanical aspects of tanks, and data on foreign tanks secured from the Military Intelligence Division of the General Staff.<sup>30</sup>

Another activity located at Meade and closely associated with the school was the Tank Board. Originally organized in 1919 as the Tank Corps Technical Board, this body conducted tests, undertook studies, and made recommendations about tanks, tank equipment, tank unit transportation, and similar technical matters. Following the reorganization in 1920 the board disbanded until 1924. In October of that year the Commandant of the Tank School, with the approval of the Chief of Infantry,

---

30

"Collection, Distribution, and Interchange of Ideas and General Information upon Tanks," Memo from J. H. Hughes, Executive for the Chief of Infantry to All Tank Units, 470.8/3949-B (3-20-24), RG 177, NA.

appointed four permanent members of the Tank Board. This board cooperated with the Tank School, the Ordnance Department, and the other branches to keep abreast of mechanical improvements and to facilitate tank development. Army Regulations 75-60 of April 30, 1926, reorganized the board. Rather than four permanently assigned officers, the board now consisted of the Commandant and Assistant Commandant of the Tank School, three officers designated by the Chief of Infantry, and one officer assigned by the Chief of Ordnance. In 1929 the Chief of Infantry, upon recommendation by the president of the board, named a recorder and two other permanent members. Similar to the Infantry Board, the Tank Board became part of the Office of the Chief of Infantry.<sup>31</sup>

For initial equipment requirements the Tank Board prepared performance specifications. Upon request of the Chief of Infantry, the proper supply facility procured the item and sent it to the board for tests. The board exercised a coordinating role between the tank

---

<sup>31</sup>Jones, "The Tank School and Tank Board," p. 49.

troops and the supply department. Following the conclusion of tests, the board issued a report on the acceptability of the particular piece of equipment. Among the items considered by the Tank Board were communications systems, maintenance equipment for tank units, accompanying guns for tanks, a trench digging tank, tank machine guns, and development of new tank models. Members of the board and the test officers worked on projects individually. At frequent meetings the board as a whole reviewed and reported on the individual projects.<sup>32</sup>

#### Tank Construction during the Twenties

Construction of improved tanks constituted a neglected part of postwar American tank development. In 1919 the War Department had no long term plans for developing tanks as it had for artillery and small arms. Lack of coordination between the tank units and the Ordnance Department hampered efforts to develop suitable experimental models. After 1924 the Tank Board facilitated these efforts. The assignment of tanks to the

---

<sup>32</sup>"The Tank Board," Infantry Journal, XXIX (XXIX (August, 1926)).

infantry in 1920 precluded any interest in cross-country combat vehicles by any other branch. Wartime experience inclined the Army to favor both light and heavy tanks for different missions, but in peacetime the interest in heavy tanks declined. They were too heavy for emergency bridges. Besides, test models of light and medium tanks were much cheaper to build. During the twenties the conviction grew that light, fast models had a greater tactical value than heavy tanks.

Although the War Department approved construction of light tanks in 1922, nothing was done for four years. Originally, the infantry wanted a light tank weighing no more than five tons (light enough to be transported by truck), capable of doing twelve miles per hour and possessing a fifty mile cruising radius. By 1926 the infantry's interest in tanks had grown. The speed requirements for this model tank increased to a maximum speed of 20 miles per hour; the weight limit increased to six tons. "The preference of light, fast tanks over heavier ones was nourished, if not induced, by study of British ideas both as expressed in the writings of Liddel Hart and as reported by the Secretary of War after a visit to

Aldershot in 1927."<sup>33</sup> Despite the interest in improved light tanks, until 1927 the Army relied on modified World War models for tactical and mechanical experiments. The T1-E1 Light Tank, built for the Ordnance Department by the Cunningham Motor Company of Rochester, represented the first experimental light tank completed after the war. Weighing 7-1/2 tons and capable of 18 miles per hour, the T1-E1 was the fastest tank built in the United States during this period. The six T1-E1 models built in 1927 represented a great improvement over the wartime tanks. Because of its speed the infantry considered this tank suitable for either an accompanying or a leading role.<sup>34</sup> When the cavalry became interested in tanks during the middle and late thirties the Army undertook a somewhat more ambitious light tank construction program.

Throughout the 1920's the emphasis was on

---

<sup>33</sup> Constance M. Green, Harry C. Thomson, and Peter C. Roots, The Ordnance Department: Planning Munitions for War (Washington: Department of the Army, 1955), pp. 189-96. This work gives a brief but thorough account of tank development during the twenties and thirties. It is fully documented and cites primary War Department sources. For this reason the author relied heavily on this work for information on the technical development of tanks.

<sup>34</sup> Ralph E. Jones, "U. S. Tanks and Tank Organization," Infantry Journal, XXXV (November, 1929), pp. 490-4.

developing a medium tank combining the characteristics of both light and heavy models. On April 5, 1922, the Adjutant General's office and the Ordnance Department outlined a program for the development of medium tanks. Medium tanks would be capable of doing all that light tanks could do except be transported by truck. The War Department program limited the weight of medium tanks to 15 tons, hence, two earlier medium tanks, the M1921 and M1922 which weighed over 20 tons, proved unsatisfactory. Additional study and experiment concurrent with the development of pilot models would determine other essential characteristics. Because of limited funds the War Department delayed the manufacture of complete medium tank units pending the approval of suitable pilot models.<sup>35</sup> The 15 ton Model 1924 was the Ordnance Department's first attempt to carry out the 1922 tank program. Infantry and Tank Board specifications precluded the acceptance of this tank. These agencies insisted on one inch thick armor plate to stop 50 caliber armor

---

<sup>35</sup>War Department Statement on Tank Development," 4 April 1922, cited in Green, Thomson, and Roots, The Ordnance Department, p. 190.

piercing ammunition. A four man crew, needed to operate the machine, and its armament added more weight. Keeping the weight under the 15 ton limit proved impossible. The Tank Board President, Colonel Oliver O. Eskridge, protested, ". . . everyone familiar with the tank situation knows that an attempt to build a satisfactory tank within the 15 ton limit is a waste of funds."<sup>36</sup> To meet the infantry and Tank Board specifications and still remain within the 15 ton limit, the tank needed a light weight engine. This would leave the machine underpowered, a situation as intolerable as too much weight. Reluctantly, in 1926 the General Staff approved a shift in emphasis to a 20 ton medium tank, but ordered continued experiments with the 15 ton model as well. For the next nine years the Ordnance Department designed, built, and tested several 23 ton and 15 ton medium tanks; none were standardized.<sup>37</sup>

Accumulation of data and experience represented

---

<sup>36</sup> Letter from Colonel O. O. Eskridge to Chief of Infantry, 2 June 1924, 451.25/2098, 00, NA, quoted in Ibid., p. 198.

<sup>37</sup> Ibid., p. 198.

the only real accomplishments of the tank development program until 1929. Making mechanical perfection the criterion for standardization hampered any progress. Dispersion of funds and effort on developing accessories, such as compasses, gun mounts, and sights, also impeded progress. Ordnance engineers advised concentrating on the development of a successful chassis but officers of the using arm believed effective tanks depended on having suitable accessories. Arguments over the merits of the Christie\* convertible tanks, designed to operate on tracks or on solid rubber bogie wheels, resulted in further dispersion of effort. Infantry officers witnessing the test of the Christie Model 1940, capable of forty miles per hour on tracks and nearly seventy on wheels, were enthusiastic about the vehicle; yet Ordnance

---

\*J. Walter Christie was an American automotive designer and builder. From 1919 into the 1930's he built numerous tanks, at great expense to himself, only to have them rejected by the Ordnance Department. His vehicles, featuring an independent suspension system and with the capability of very high speed, interested the British and the Russians. Both of these countries incorporated features of Christie's vehicles into the tanks they built during the 30's and 40's. Christie exerted some influence on American tank development. His vehicles demonstrated the feasibility of fast tanks breaking away from the close support of the infantry.

officials remained skeptical. They thought the machine was mechanically unreliable, and called attention to the light armor and firepower, the lack of room inside the tank, and they questioned the value of the convertible chassis. Nevertheless, in 1927 the Ordnance Department procured six Christies for experiment. Because they lacked durability the Army rejected these models for standardization.<sup>38</sup> At best, the production of suitable tanks was difficult; given the often conflicting specifications imposed by the various War Department agencies it nearly proved impossible. "In a machine so complex as a tank, achieving one desired characteristic often necessitates sacrifice of another. Determination of what is to be a primary consideration in design, what a secondary, must depend on clear understanding of the tactical use intended."<sup>39</sup> Development of suitable tanks depended on the tactical use intended; tactical use depended on the capability of the tank; what tanks were capable of depended on developing models for predetermined

---

<sup>38</sup> Ibid., pp. 199-200.

<sup>39</sup> Ibid., p. 190.

use. The lack of real combat data on capabilities and the failure to fully agree on their tactical role hindered American tank production during the twenties.

### The Experimental Mechanized Force

By the latter part of the decade, as the mechanical capability of the tank increased, military officials became more farsighted about its use. Increased mobility and heavier firepower enabled tanks to assume a more independent role. The Chief of Infantry, Major General Robert H. Allen wrote, "My studies at the General Service Schools at Fort Leavenworth have convinced me that the tank was the only new ground weapon born during the World War that would, in future wars, play a role as conspicuous as the airplane, being the only weapon that could be relied on to overcome the machine gun and prevent a recurrence of the stabilized condition of 'trench warfare' similar to the Western Front."<sup>40</sup> Tanks neutralized the defensive advantage of the machine gun, thus forcing warfare into the open. Even the cavalry, generally one of

---

<sup>40</sup>"Tank Development," Memo from Chief of Infantry to AG, 470.8/7521B (2-25-27), RG 177, NA.

the more reactionary branches, saw possibilities for tanks. In 1927 Major General Herbert O. Crosby, the Chief of Cavalry, recommended incorporating tank units into cavalry divisions and assigning anti-tank weapons to cavalry regiments. The Secretary of War accepted Crosby's recommendation as the basis for a program of future development only.<sup>41</sup> Rockenbach proposed that the cavalry and other branches, as well as the infantry, contribute to tank development. He said, "I submit that the recent developments by the British will have an effect in modifying our ideas in regard to tanks and that the role of tanks is no longer a special weapon for infantry, but that it is just as important to cavalry division, corps, and the Army."<sup>42</sup> The British efforts, not the proddings of the Americans, precipitated an important change in American tank development.

In early 1927 Secretary of War Dwight Davis witnessed the maneuvers of the British Experimental Mechanized Force at Salisbury Plain. This force, composed

---

<sup>41</sup>Memo from Chief of Cavalry to AG, 320.2 (4-12-27), RG 94, NA.

<sup>42</sup>Memo from Rockenbach to AG, 470.8/7251-B (12-7-26), RG 177, NA.

largely of tanks and other cross-country mechanized vehicles, impressed him so much that later in the year he ordered the organization of a similar American unit to serve as a military laboratory.<sup>43</sup> Including troops from all branches, infantry, cavalry, tanks, artillery, air, ordnance, supply, the force would be self-sufficient. Davis gave the commanding officer the authority to ignore existing regulations concerning organization, armament, and equipment. By conducting tests, the War Department sought to develop proper equipment and correct doctrine for the mechanization of additional units. General Charles P. Summerall, then the Chief of Staff, ordered the Operations and Training Section (G-3) of the War Department General Staff to conduct a study of mechanization, which would serve as the basis for the organization of a temporary Experimental Mechanized Force.<sup>44</sup> On December 30, 1927, Summerall approved a preliminary G-3 report for the organization of that force.<sup>45</sup> Elements of the Mechanized Force would organize and train

---

<sup>43</sup>Memo from C/S to AC/S G-3, 354.2 (11-7-27), RG 94, NA.

<sup>44</sup>Memo from AC/S G-3 to C/S, 537.3 (11-7-27), RG 94, NA.

<sup>45</sup>AG Memo, 354.2 (7-11-28), RG 94, NA.

at their permanent stations and then assemble at Fort Meade (during this period Meade was temporarily renamed Fort Leonard Wood) during the summer of 1928.

An infantry tank officer and former Commandant of the Tank School, Colonel Oliver Eskridge, commanded the Fort Meade force. Units assigned to the Experimental Mechanized Force included the 16th. and 17th. Tank Battalions plus one separate tank platoon, one battalion of the 34th. Infantry Regiment, an armored car troop, one battalion of the 6th. Field Artillery, an engineer company, a signal company, a medical detachment, the 1st. Ammunition Train, a chemical warfare platoon, an ordnance maintenance platoon, and a provisional motor repair section. By July 3, 1928, the entire force had assembled. Major Douglas T. Green, Plans and Training Officer for the force, outlined the program of instruction, training, and tactical exercises. From July 9 to 14 training would consist of instruction on equipment, inspection by the commanding officer, and instruction in short route marches to determine proper methods and procedures for road travel. Following this preliminary training, the entire organization would take a five day

march to Aberdeen Proving Ground, Carlisle Barracks, and return to Meade. Such an exercise would provide valuable experience in determining proper grouping in march columns, economical rates of march, means of command, supply, and reconnaissance while on the march, and methods of conducting night marches. During the latter part of July and into August the unit would undergo tactical training for offensive operations. From August 27 until September 15 the training schedule called for the solution of field problems to test the tactics taught during the preceding training.<sup>46</sup>

Although the unit generally followed the training program, difficulties arose. Obsolete, wartime equipment, which often broke down, proved the greatest handicap. Insufficient equipment and improper balance made the force a poor demonstration unit. Colonel Eskridge requested that the War Department cancel a proposed visit by foreign military attaches to a training exercise because he feared that a poor performance by his troops

---

<sup>46</sup>"Training Memo #1, Experimental Mechanized Force," 21 June 1928, 354.2 (12-21-27), RG 94, NA.

might embarrass the entire Army.<sup>47</sup> Despite its imperfections the Experimental Mechanized Force could not be considered a failure. Both Eskridge and the Assistant Chief of Staff G-3, Brigadier General Frank Parker, concurred in the opinion that the force provided useful technical and tactical information. By the end of September, 1928, the force had accomplished its mission. Therefore, on September 19 Parker recommended to the Chief of Staff that the unit be disbanded as originally planned.\* Summerall approved this on the twentieth.<sup>48</sup> After October 1 all the component units of the Experimental Mechanized Force returned to their home stations.

#### The Army Studies Mechanization

In the spring of 1928, while plans progressed for the organization of the experimental unit, the War

---

<sup>47</sup>Memo from AC/S G-3 to C/S, 354.2 (8-31-28), RG 94, NA.

<sup>48</sup>Memo from AC/S G-3 to C/S, 354.2 (9-19-28), RG 94, NA.

\*A number of works, including Gillie's Forging the Thunderbolt and Ogorkiewicz's Armor, give the impression that the EMF was disbanded because of continual mechanical breakdowns. The equipment was poor and breakdowns did occur. But as originally planned the 1928 force was a temporary unit. The War Department expected to disband the force by October, 1928, in any event.

Department began planning for a long-range mechanization program. General Parker submitted a report in March, 1928, which emphasized the necessity of firepower and mobility to achieve success in modern warfare. Parker regarded tanks as a means of restoring the power of decision to battle. During the war and after, tanks were tied to the infantry thus reducing their mobility and shock effect. Infantry tanks figuratively looked backward to see how the foot troops advanced. Instead of this, Parker believed that they should drive forward and attack hostile reserves and rear installations. Tanks employed strictly as infantry support weapons were wasted. Parker did not adopt an extreme pro-mechanization position. He considered entirely mechanized armies inconceivable.\* They were prohibitively expensive; logistical support would be difficult; machines could not operate in all types of terrain and weather. But mechanized units were valuable additions to any offensive operation. As equipment improved the value of mechanized forces would increase. The potential uses of mechanized units outlined in Parker's report included operating as

---

\*Some of the British tank enthusiasts, particularly J. F. C. Fuller, strongly advocated all-tank armies.

the spearhead of an important attack, as a counter attack force, and as the advance or flank guard of strategic formations. Proper organization was necessary for any mechanized force. Mechanized units needed to be large enough to deploy on a wide front thus avoiding hostile artillery concentrations. They required sufficient striking power to penetrate the enemy's defense and disorganize his reserves. But mechanized units could not be so large as to become unwieldy. Tank companies comprised the principal striking power of any mechanized force. Light tanks, the leading element in an assault, attacked weak points in the defense; enemy flanks were particularly vulnerable. Self-propelled artillery and medium tanks supported the advance by overcoming strong points and widening gaps in the enemy's line. Infantry, brought forward in mechanized vehicles, consolidated the ground captured by the tanks. All supply, maintenance, and other support elements needed mechanized transportation in order to keep up with the advance. In concluding his report, Parker made several specific recommendations for the long-range development of mechanization in the United States Army. He proposed that procurement of equipment for mechanized units, including light and

medium tanks, a reconnaissance car, cross-country vehicles for infantry and support units, and self-propelled artillery, commence during the 1930 fiscal year. Congress must pass the necessary legislation to establish one permanent mechanized unit during fiscal 1931. This unit would use modern and obsolete equipment. During 1931 and 1932 the obsolete material would be progressively phased out.<sup>49</sup> Secretary of War Davis approved Parker's report as the basis for future development and organized a board of General Staff officers to prepare the details for future action.<sup>50</sup>

Among those appointed to this board was Major Adna R. Chaffee, Junior, a former cavalryman and a member of the G-3 Section of the War Department General Staff. From the time of his assignment to G-3 in June, 1927, until his death in the summer of 1941 Chaffee remained one of the leading American advocates of mechanization. Before 1927 Chaffee knew nothing about tanks.

---

<sup>49</sup>"A Mechanized Force," Memo from AC/S G-3 to C/S, 537.3 (3-20-28), RG 94, NA.

<sup>50</sup>Memo from AC/S G-3 to AG, 537.3 (4-14-28), RG 94, NA.

Realizing that G-3 was beginning studies on mechanization, Chaffee learned all he could about the subject. At Rochester he witnessed the demonstration of a new tank, capable of 18 miles per hour, built by James Cunningham and Sons. Chaffee also saw a test of the Christie tank which could go 42 miles per hour. These demonstrations convinced Chaffee that tanks should not be tied to the infantry which advanced at a walking pace.<sup>51</sup> Properly organized and supported, tanks could constitute the principal arm of a new and powerful force. The maneuvers of the British mechanized units also aroused Chaffee's interest. At this time a friend of his, Charles G. Mettler, served as Military Attache to Great Britain. When Mettler visited Washington in 1927 Chaffee questioned him about British efforts in mechanization. Some years later Mettler recalled, "He loaded me with a terrible list of things he wanted to know and expected me to find out for him when I returned to London."<sup>52</sup> His own

---

<sup>51</sup>"Mechanized Cavalry," address by Adna Chaffee to the Army War College, 29 September 1939, p. 1, Mechanized Cavalry Board Maneuvers 1929-39, Box #1, RG 177, NA.

<sup>52</sup>Charles G. Mettler, "Chaffee's Obituary," West Point Assembly, Association of Graduates, USMA, I (April, 1942), p. 14.

observations and information received from sources such as Mettler stimulated Chaffee to promote mechanization in the United States Army. Although not immediately the moving force in American mechanization, he ranked sixth in seniority on the Mechanization Board appointed in 1928 by Secretary Davis, gradually Chaffee's influence increased. But the development of mechanization cannot be attributed to any one person. Progress was slow and the result of the efforts of many officers.

Initially, the eleven-man Mechanization Board met on May 15, 1928, in Room 346 of the State, War, and Navy Building. Thereafter, it met from time to time as work demanded. Members of the board, who were from all branches of the Army, witnessed demonstrations of new tank models and the exercises of the Experimental Mechanized Force. In their report, issued in October, 1928, the board reached conclusions about mechanization similar to Parker's report. They outlined the requirements and capabilities of a potential mechanized force. Tanks were the backbone of the force and provided its mobility and striking power. Infantrymen, carried forward in mechanized vehicles and armed with machine guns and semi-automatic rifles, provided the tanks with close support.

There was a significant departure from current doctrine in that the former roles of tanks and infantry were reversed; formerly, tanks provided support for the infantry. Self-propelled artillery rendered support by shelling enemy anti-tank concentrations and maintenance and supply vehicles would be capable of cross-country movement. Similar to Parker's report, this report outlined a tentative program for the development of mechanization. The board recommended the organization of a unit, similar to the recently disbanded Experimental Mechanized Force, to serve as a technical and tactical laboratory. They envisioned a force of 131 officers and 1896 enlisted men, who would make up a headquarters, one light tank battalion, one field artillery battalion, two mechanized infantry battalions, one engineer company, and an attached medical company. In order that tactical doctrine would keep pace with mechanical developments, the board recommended supplying the force with the latest equipment. Furthermore, the board proposed placing the supervision of further study on mechanization in the hands of the commander of the force. Although not recommending formation of a separate branch, the board emphasized the necessity of forgetting traditional branch rivalries and traditions

in order to make progress in the field of mechanization.<sup>53</sup> With one exception all of the branch chiefs concurred in the report. On October 31, 1928, the Secretary of War approved the recommendations, but because of budgetary requirements postponed organizing a mechanized force from fiscal 1930 until fiscal 1931.<sup>54</sup>

The Chief of Infantry, Stephen O. Fuqua, was the exception among the branch chiefs who concurred in the Mechanization Board report. Earlier he had disagreed with the conclusions of General Parker's report. Fuqua's criticism was based strictly on branch rivalry; the sort of thing the Mechanization Board wanted to avoid. A separate mechanized force threatened the complete control over tanks which the infantry possessed since 1920. Fuqua protested to Parker, "The tendency in this study to set up another branch of the service with the tank as its nucleus is heartily opposed. It is as unsound as was the attempt by the Air Corps to separate itself from

---

<sup>53</sup>"Proceedings of the Board of Officers Who Met to Make Recommendations for the Development of a Mechanized Force," 537.3 (10-1-28), RG 94, NA.

<sup>54</sup>Memo from DC/S B.H. Wells to C/S, 310 October 1928, 537.3 (3-20-28), RG 94, NA.

the rest of the Army. The tank is a weapon and as such it is an auxiliary to the Infantryman, as is every other arm or weapon that exists."<sup>55</sup> According to Fuqua, the authority for tank development should remain where it was: under the Chief of Infantry. Use of a mechanized force as laboratory conflicted with War Department provisions outlining duties of the chiefs of combatant branches. Normally these chiefs had the prerogative of submitting recommendations as to the material needs of their respective branches. Assigning this task to the mechanized force commander would retard weapons development. Combat arms would have weapons thrust upon them which they did not develop themselves and which might be unsuitable. Fuqua believed such infringement upon the rights of the branch chiefs would be detrimental to the best interests of the service. His disagreement also rested on tactical reasons. Tanks with infantry divisions increased the mobility of the rifleman and brought firepower down to the level of the footsoldier. Since earliest days tanks were for the benefit of the infantry.

---

<sup>55</sup>Memo from Chief of Infantry to AC/S G-3, 26 March 1928, 537.3 (3-20-28), RG 94, NA.

Infantry personnel were better qualified to develop tanks and mechanized units than the personnel of any other branch.<sup>56</sup> Despite Fuqua's protests, the War Department proceeded with plans for a mechanization program.

Early in 1929 the Secretary of War directed that Colonel James K. Parsons take command of field development of the Mechanized Force as well as perform his duties as Commandant of the Tank School and commanding officer of Fort Meade.<sup>57</sup> His responsibilities led Parsons to submit far-reaching proposals for a mechanization program. In a report to the Adjutant General, Parsons recommended formation of six tank divisions. These would be self-contained units suited for extended operations. Parsons said that these tank divisions were not suited for assault missions because this would waste the units' superior mobility. Covering the advance or retirement of an army, attacking the enemy's flank or rear, exploiting a breakthrough, seizing strategic positions, and filling a gap

---

<sup>56</sup> Memo from Chief of Infantry to AG, 537.3 (3-24-31), RG 94, NA.

<sup>57</sup> Memo from Acting AC/S Ed. O. Croft to C/S, 537.3 (4-12-29), RG 94, NA.

in the line were all missions well suited for these tank divisions. Parsons listed some statistics to indicate the relative strengths and mobile capabilities of tank, cavalry, and infantry divisions.

	Tank	Cavalry	Infantry
Strength			
Officers	819	554	972
Enlisted men	<u>7300</u>	<u>9208</u>	<u>20,203</u>
Total	8119	9762	21,175
Mobility			
Miles per hour	20	5	2-1/2
Miles per day	100	30	15

Each tank division would have 486 combat tanks, 172 reconnaissance tanks, and 87 command tanks. The total cost of forming and equipping the six divisions would not exceed \$270 million. According to Parsons, this was a small amount compared to the \$640 million spent for developing the Air Corps at the beginning of the World War. Parsons did not expect these divisions to replace or restrict development of any existing Army unit.<sup>58</sup> During World War II the rapid expansion of

---

<sup>58</sup> Memo from J. K. Parsons to AG, 17 April 1930, 537.3 (3-21-30), RG 94, NA.

armored divisions proceeded along lines similar to Parsons' recommendations.

Criticism of this study came from an unexpected source. According to George Patton, only three geographical regions existed where tanks could be used on so vast a scale as Parsons proposed. Each of these regions possessed physical conditions which prohibited large scale mechanized operations. Insufficient shipping would hinder support of tank forces in Western Europe. The poor road and railway network in Asia would not support mechanized operations in that region. Patton said that the problems encountered by the United States in undertaking operations in Europe also hindered European nations attempting tank operations in North America. Another argument against a large tank production program was that the equipment became rapidly obsolete. By 1930 the 900 Renaults and 100 Mark VIIIs possessed by the United States after the end of the World War were useless. Considering the thrust across France by Patton's Third Army in 1944 this criticism seems particularly ironic. "The high rates of speed and daily length of march claimed for machines if correct are not particularly desirable." Patton contended that use of high speed over

great distances in independent operations could result in disaster. By-passed enemy troops could cut off the tanks, deny them supplies, and eventually destroy them. According to Patton, a small mechanized force composed of combined arms offered the best chance of fruitful mechanized development.<sup>59</sup> Addressing his comments to the Chief of Cavalry, Patton was reflecting the cavalry viewpoint.

The War Department obviously agreed with Patton's analysis; besides, the Army lacked funds to undertake the production program proposed by Colonel Parsons, whose study represented the most radical American suggestion for mechanization during this period. Given the limitations imposed by budgets and the uncertainty about possible performance of large mechanized units, only a modest effort in the field of mechanization was possible in 1930.

#### A Permanent Mechanized Force

In his 1930 annual report, the Chief of Staff, General Summerall, reaffirmed the Army's commitment to

---

<sup>59</sup>  
Memo from Patton to Chief of Cavalry, 19 May 1930, 537.3 (5-15-30), RG 94, NA.

proceed with formation of a mechanized force. "From being an immediate auxiliary of the infantry the tank will become a weapon exercising offensive power in its own right."<sup>60</sup> Recognizing the importance of a suitable tank force, Summerall ordered that the proposed Mechanized Force become a permanent unit, not a temporary or experimental organization.<sup>61</sup> But the development program, so carefully planned, ran into unexpected difficulties.

The inability of the Ordnance Department to produce a tank acceptable to the Tank Board and the lack of funds delayed the organization of the Mechanized Force. Failure to produce a suitable tank was particularly crucial. Tanks formed the nucleus of the force. Everything else might disappear and tanks still could accomplish at least part of the mission; but without tanks the remainder of the force was useless. Until the late twenties the Army used surplus wartime equipment. As the experience of the Experimental Mechanized Force indicated, this equipment was obsolete. Unfortunately, the

---

<sup>60</sup> War Department Annual Reports, 1930 (Washington: GPO, 1930), "Report of C/S Charles P. Summerall," p. 124.

<sup>61</sup> Memo from C/S to AC/S G-3, 19 August 1930, 537.3 (2-21-30), RG 94, NA.

advent of the Depression paralleled the decline of the wartime equipment. The policy of retrenchment and stabilization of military budgets made a modernization and reequipment program difficult. As a result of the reduction of military budgets by the Hoover and Roosevelt administrations, the War Department had to determine how best to maintain the Army with limited funds and availability of funds often affected policy. Ordnance Department estimates for fiscal year 1932 reflected this trend. Priorities for the submitted Ordnance budget of \$2.4 million were for limited service tests and procurement of semi-automatic rifles, 3 inch anti-aircraft guns, and as many tanks as possible with the remaining money. When the final War Department budget directive reduced the amount to \$1 million, the General Staff, which determined priorities, decided to use this money for the highest priority items: the rifles and a few tanks. The Staff decided that progress in tank development warranted the purchase of only a few tanks to test tactics and keep up with the latest technology.<sup>62</sup>

---

<sup>62</sup> John W. Killigrew, "The Impact of the Great Depression on the Army, 1929-36" (unpublished Ph.D. dissertation, Indiana University, 1960), p. III-4.

Because of these decisions, the Mechanized Force, when finally organized at Fort Eustis in November of 1930, used unsuitable, obsolete equipment.

On November 24, 1930, Colonel Edward O. Croft, the Acting Assistant Chief of Staff, G-3, selected units for the force. Company A of the 1st. Tank Regiment, supplied with six World War Renaults, five modernized Renaults, and four T1-E1 tanks, formed the nucleus of the unit. One armored car troop of ten vehicles provided the reconnaissance element. One battery of the 6th. Field Artillery, equipped with obsolete service trucks, not self-propelled guns as the War Department studies advocated, provided long range fire support. Equipment problems also plagued the engineer company assigned to the Mechanized Force. Its transportation initially consisted of horse drawn wagons. By early November, however, modern trucks replaced the horses and wagons. The chemical warfare detachment, the anti-aircraft platoon, and the ordnance company operated with their original equipment. Fifteen light tanks, ten armored cars, seven tractors, sixty-six trucks, twenty-two automobiles, and less than six hundred men composed the

Mechanized Force.<sup>63</sup>

General Summerall selected Colonel Daniel Van Voorhis as commander of the force. Van Voorhis, a career cavalry officer and recent (1929) graduate of the Army War College, had no experience with tanks. As executive officer Summerall selected Major Sereno E. Brett, a former wartime commander of the 304th. Tank Brigade. During September, 1930, Van Voorhis, Brett, and Chaffee, now head of the G-3 Troop Training Section, visited Aberdeen Proving Ground, Holibird Quartermaster Depot, and Fort Eustis. They conferred with officers at these posts relative to the equipment and organization of the Mechanized Force.<sup>64</sup> The Chief of Staff based the tactical and training missions of the force on the findings of these officers. In combat the Mechanized Force would execute missions presenting an opportunity for tactical and strategical mobility and quick, hard striking power. The training mission of the unit was to determine the proper tactics involved in the operation of fast tanks

---

<sup>63</sup> Memo from Acting AC/S G-3 to C/S, 537.3 (9-24-30), RG 94, NA.

<sup>64</sup> Memo from AG to Van Voorhis, Brett, Chaffee, 16 September 1930, 537.3 (9-13-30), RG 94, NA.

with other mechanized or motorized arms. From November 1 until December 31 the Mechanized Force would organize and conduct individual training. Unit training and combined drills to perfect tactical teamwork followed. Beginning in March and continuing until the end of the fiscal year in June, the force planned to hold field exercises and maneuvers with troops of other arms.<sup>65</sup>

During the period from November 1, 1930, until June 31, 1931, the Mechanized Force carried out its proposed training schedule. The 34th. Infantry (Motorized) and the Air Corps Tactical School assisted in some of the maneuvers. Operations consisted of command post exercises, field problems, maneuvers, demonstrations, and ceremonies. Among the exercises were night, tactical, and strategical marches, offensive combat against entrenched infantry, offensive operations against another mechanized force, attacks involving wide turning movements, seizure *of* key positions, and operations as a covering force for a larger unit.<sup>66</sup>

---

<sup>65</sup>Memo from Acting AC/S G-3 to C/S, 537.3 (10-20-30), RG 94, NA.

<sup>66</sup>"Consolidated Report of Operations," Colonel Daniel Van Voorhis, commanding Mechanized Force, 537.1-49 (7-1-31), RG 94, NA.

All of the missions executed by the Mechanized Force emphasized the mobility of that unit. Traditionally, cavalry was the branch of mobile warfare. But during the twenties the cavalry did little in the way of mechanization. Recognizing these facts, Douglas MacArthur, who became Chief of Staff on November 21, 1930, ordered the Mechanized Force disbanded and directed all branches, in particular the cavalry, to mechanize so far as possible. This decision affected the development of American mechanization down to the organization of the Armored Force in 1940.

## Chapter III

1931-1940

It is often said, and it may be true in the abstract, that the principles of war do not change. It is nevertheless, absolutely true, that methods do change and are constantly changing. We must study the great captains of the past to learn of their principles, and, above all, of their character, but do not let us be tied too much to their methods. For methods change with every change of armament and equipment.

Adna R. Chaffee, Jr.

### A Revised Mechanization Policy

Many military experts recognized that tanks possessed characteristics similar to horse cavalry. As the mobility of tanks increased the similarity became more apparent. Although the tanks available were unsuitable for a mobile role, the War Department organized the two mechanized forces in 1928 and 1930 to carry out mobile, independent missions. Yet the opposition to an independent mechanized organization hampered armor development. Such a force threatened the infantry's exclusive control of tanks, while the cavalry feared that a mechanized

force might completely take over its traditional mobile role. As Chief of Staff, Douglas MacArthur attempted to allay these fears by ordering all branches to mechanize so far as practical.

On May 1, 1931, MacArthur issued a memorandum entitled "General Principles to Govern Mechanization and Modernization throughout the Army." For nearly a decade this memo governed the Army's mechanization policies. In this document MacArthur states, "Too often in the past organization has been attempted from the standpoint of equipment rather than from the standpoint of missions assigned." This was unsound policy because few classes of equipment belong exclusively to one arm. As tanks gained strategic mobility they appeared in organizations having missions beyond those normally assigned to infantry and, at the same time, modern weaponry eliminated the horse as a decisive factor on the battlefield. Tanks could replace horses as the principal means of cavalry combat. Mechanized cavalry would be developed to accomplish traditional horse cavalry missions: reconnaissance, pursuit, exploitation, as well as its roles as a covering force and as a reserve. To assist the cavalry in developing its organization and

equipment for modern warfare, MacArthur ordered the Mechanized Force reorganized as a mechanized cavalry regiment.<sup>1</sup> He also recognized that one of the principal roles of tanks remained close support of the infantry. Tanks with infantry were primarily assault weapons and depended on armor, tactical mobility, and firepower to dislodge the enemy from defensive positions. Speed and strategic mobility were the important characteristics of tanks in mechanized cavalry units. Finally, MacArthur declared that the evolution from mounted trooper to mechanized cavalryman would be complete only when vehicles could perform those tasks formerly assigned to the horse.<sup>2</sup> In an attempt to distinguish between cavalry and infantry tanks and to bypass the National Defense Act which assigned tanks exclusively to the infantry, tanks operating with the mechanized cavalry were called "combat cars."

---

<sup>1</sup>"General Principles to Govern Mechanization and Motorization Throughout the Army," 2045-1192 (5-1-31), RG 165, NA.

<sup>2</sup>War Department Annual Reports, 1932 (Washington: GPO, 1932), "Report of the Chief of Staff," p. 82.

MacArthur's mechanization program encountered opposition from several quarters. Colonel Van Voorhis, the Mechanized Force commander, feared that branch jealousies would disrupt the proposed program. He advocated strengthening the Mechanized Force and continuing development independent of any branch control.<sup>3</sup> Subsequent events proved Van Voorhis' fear of branch rivalry correct. True to form, the Chief of Infantry, Stephen Fuqua, who opposed the Mechanized Force, disagreed with the new War Department mechanization policy. According to Fuqua, tanks were infantry weapons and fighting with infantry was their habitual role; this arrangement should remain unchanged. Furthermore, Fuqua pointed out that the assignment of tanks, or combat cars, to the cavalry violated Section 17 of the National Defense Act.<sup>4</sup> Fuqua believed that neither the cavalry nor the infantry should contribute the personnel required to build up mechanized units. Surprisingly, Fuqua, an infantryman,

---

<sup>3</sup>Historical Section, Army Ground Forces, History of the Armored Force, Command and Center (Study #27, Army Ground Forces, 1946), p. 3.

<sup>4</sup>Memo from Chief of Infantry to DC/S, 537.3 (5-13-31), RG 94, NA.

came to the defense of the horse cavalry. He said that dehorning cavalry regiments to form mechanized units would constitute an irretrievable loss to the Army.<sup>5</sup>

Cavalry reaction to the new policy was mixed. Major General Guy V. Henry, Jr., the Chief of Cavalry, welcomed the addition of mechanized units to his arm and thought that combat cars could replace horses without changing the essential mission of the cavalry. Mechanized cavalry would not in any way be analogous to the infantry tank units.<sup>6</sup> Henry believed that mechanized cavalry could apply the tactics and techniques of horse cavalry to motor vehicles. This depended on the developments of mechanized vehicles capable of great mobility.<sup>7</sup> Not all cavalry officers shared Henry's enthusiasm for mechanization. Many could not accept the fact that the horse had a limited use on the modern battlefield. Brigadier General Hamilton S.

---

<sup>5</sup>Memo from Chief of Infantry to DC/S, 537.3 (5-27-31), RG 94, NA.

<sup>6</sup>Memo from Chief of Cavalry to DC/S, 3 July 1931, 537.3 (2-21-30), RG 94, NA.

<sup>7</sup>Guy V. Henry, Jr., 11 June 1967, correspondence with author.

Hawkins epitomized this reactionary horse cavalry group. Even after World War II Hawkins wrote articles for Cavalry Journal pointing out what he considered the limitations of tanks and advocating an increase in the number of Army horses. Even one of the most enthusiastic advocates of mechanized cavalry, Adna Chaffee, an ardent horse lover throughout his life, had reservations about ending the service of the horse.<sup>8</sup> Most cavalrymen took a moderate, somewhat philosophical, view of the subject. Cavalry officers always considered themselves a bit above everyone else. Both literally and figuratively, cavalrymen thought they had a wider perspective than others: one could see farther from the back of a horse than walking in the dust. Besides, all cavalrymen hated to see the elimination of the horse. But most recognized the necessity of fighting from something more substantial than the back of a horse.<sup>9</sup> Mechanized cavalry offered a logical alternate to the

---

<sup>8</sup>Charles G. Mettler, "Chaffee's Obituary," West Point Assembly, Association of Graduates, USMA, I (April, 1942), p. 14.

<sup>9</sup>Interview with Willis D. Crittenberger, 19 July 1967, Washington, D.C. Clarence C. Clendenen, a career cavalry officer, reinforced Crittenberger's statements on this subject. The author talked with Clendenen on 20 July 1967 at the National Archives in Washington.

horse.

Some Congressmen expressed concern over MacArthur's change in the mechanization policy. Despite the claims of its proponents, mechanization was expensive. During the Depression, particularly while Herbert Hoover was President, Congress was reluctant about appropriating funds for the military. Some people in Congress as well as in the War Department considered mechanization an unnecessary expense. Among the Congressional supporters of an aggressive mechanization program was Ross Collins (Democrat from Mississippi), the chairman of a subcommittee on military affairs of the House Appropriations Committee. When MacArthur appeared before his committee during the hearings on the 1932 War Department Appropriations Bill, Collins asked the Chief of Staff why the Mechanized Force had been abandoned. Collins declared that his committee was always the champion of an independent mechanized organization. MacArthur replied that "a small independent Mechanized Force could not reach the ultimate development of mechanized possibilities." Furthermore, as mechanized and motorized equipment increased the number of Army horses and mules would decrease by about 3000 per year. Reassured that

this would keep the cost of mechanization to a minimum, Collins replied that he was most encouraged about future developments.<sup>10</sup>

Despite the optimism of its strongest Congressional supporter and the apparent support of the Chief of Staff, War Department budget appropriations restricted the development of mechanization during the thirties. The cost of equipping one light tank battalion was approximately \$2 million. During the early thirties this was a great deal to spend on the military.\* The Army-Navy Journal editorialized on the cost of mechanization and the prospect of acquiring the needed appropriations. "While Congress might feel kindly toward the mechanization of the Army it was realized that the extreme cost of any extensive mechanization would run up against the 'wall of budgetary limitations'."<sup>11</sup>

---

<sup>10</sup>U. S. House of Representatives, 72nd. Cong., 1st. Sess., Hearings before the Subcommittee of the House Committee on Appropriations, War Department Appropriations Bill, 1933 (Washington: GPO, 1933), 21 December 1931.

<sup>11</sup>Army-Navy Journal, 23 May 1931, p. 898 quoted in John W. Killigrew, "The Impact of the Great Depression on the Army, 1929-36," (unpublished Ph.D. dissertation, Indiana University, 1960), p. IV-17, footnote.

\*See Appendix I for annual War Department budgets for this period.

Congress was actually more willing to appropriate funds for mechanization than the Army-Navy Journal anticipated. The problem was one of priorities; the War Department, not Congress, determined the priorities.

Rather than spending money for many tanks and complete mechanized units, MacArthur advocated a gradual approach. He believed that progress in mechanization should consist of producing the best pilot vehicles, making arrangements to speed tank production in time of emergency, producing sufficient tanks for thorough tactical tests to develop doctrine, and indoctrinating the entire Army as to the capabilities of mechanized units. At that time he thought production of large numbers of tanks was a useless expense because they would become rapidly obsolete. MacArthur hoped that eventually tank technology would become stable. As the effective life of tanks increased, additional investments in mechanization would be warranted.<sup>12</sup> But during the early thirties mechanization received only a small share of military appropriations.

---

<sup>12</sup>U. S. Senate, 73rd. Cong., 1st. Sess., Hearings before the Committee on Military Affairs (Washington: GPO, 1933), MacArthur statement on 26 April 1933, p. 29.

Some years later MacArthur claimed he "stormed, begged, ranted and roared; I almost licked the boots of certain gentlemen to get funds for motorization and mechanization and air power."<sup>13</sup> The Chief of Staff did strongly support mechanization in theory. He was no horse cavalry reactionary. But MacArthur had to make a choice between appropriating funds for mechanized equipment and money to support more personnel for the Army. Faced with this decision, MacArthur chose the latter. The General Staff wanted to maintain a large, well-trained officer corps and strong civilian components capable of rapid expansion in time of war. An expandible Army, they reasoned, could better meet any threat facing the country. Mechanized units were not as adaptable; weather, terrain, and availability of gasoline limited mechanized combat.

Congressman Collins strongly opposed this policy. In a House speech on May 10, 1932, he declared that the United States Army and the General Staff in particular,

---

<sup>13</sup> Douglas MacArthur, Reminiscences (New York: McGraw Hill Books Co., 1964), p. 99.

were "utterly unable to lift themselves out of the rut and apply new principles to military science in the United States." Collins emphasized the need for developing modern weapons such as tanks and airplanes. According to Collins, a comparatively small Army of well-trained experts, utilizing the newest concepts of warfare, would provide the best defense for the United States. Because MacArthur put preservation before progress, Collins opposed increasing War Department appropriations. If Congress appropriated more money, Collins feared that the Army would spend it on pay for more men and not on modernization.<sup>14</sup>

It is apparent that budgetary limitations played an important role in determining such purely military matters as tactical doctrine. Because of the limited funds available, prospects for a large mechanization project were bleak. Until the late thirties when the Roosevelt Administration began spending more for defense,

---

<sup>14</sup> 72nd. Cong., 1st. Sess., Congressional Record, Vol. 75, Part 9, pp.9932-5, quoted in Killigrew, "Impact of the Great Depression on the Army," pp. V-22-25.

American mechanized forces consisted of two regiments of mechanized cavalry and the infantry tank units remaining from the 1920's. Because of insufficient equipment the War Department actually skeletonized several of the infantry tank companies during this period. Conforming to the policy outlined by MacArthur, the Army concentrated on developing tactical doctrine for mechanized combat and on producing a few pilot models to improve the mechanical capabilities of tanks.

#### Tank Production during the Thirties

When cavalry entered the mechanization field in 1931 the Ordnance Department reached a compromise on tank development. Because of the limited funds available one series of tanks had to satisfy both cavalry and infantry needs. The solution was to develop tanks for the infantry and modify these to permit cavalry use. For cavalry reconnaissance the Ordnance Department developed a special line of fast, wheeled scout cars. In spite of warnings by Ordnance experts, the War Department continued to stress the development of light, fast tanks. Secretary of War George Dern announced in 1933 that no tank for use with the infantry or cavalry

could exceed 7.5 tons in weight. He based this limitation on the supposition that trucks would carry the tanks to battle. No change in this policy occurred until reports from the Spanish Civil War clearly indicated the vulnerability of light tanks. Intelligence sources described heavy, foreign tanks as being superior to American models, particularly in firepower. By the end of the decade weight ceased to be the important criterion in producing American tanks.<sup>15</sup>

Tank designers faced the technical problem of finding a balance between three essential features: the guns to provide firepower, armor plate to protect the crew, and the chassis and engine to provide mobility. Ordnance officials considered engines and suspension systems most important. The primary concern of the using arms were maneuverability, speed, and protective armor; later in the decade, firepower became a factor. Engineer officers voiced concern over the weight of tanks

---

<sup>15</sup>Constance M. Green, Harry C. Thomson, and Peter C. Roots, The Ordnance Department: Planning Munitions for War (Washington: Department of the Army, 1955), p. 193.

and its effect on roads and bridges. The difficulty of incorporating characteristics acceptable to all concerned sometimes produced what seemed to be irreconcilable controversies. Rising costs and declining appropriations compounded the difficulty. In 1931 the cost of a single Christie tank, without guns, armor, engine, or radio, was \$34,500. Seven years later the cost was approximately \$50,000. Annual appropriations for tank development between 1925 and 1939 amounted to only \$60,000.<sup>16</sup> Disputes over suitable characteristics, rising costs, and lack of funds resulted in slow tank development during the thirties.

By 1935 the experimental light tanks T2-E1 and T2-E2, successors to the T1-E1 built and developed during the late twenties, received a limited procurement status. Unless an improved version superseded the original models, standardization and mass production would follow, but the Ordnance Department never standardized these two tanks. Both the T1-E2 and the T2-E2, redesignated light Tanks M2-A1 and M2-A2, mounted one 50 caliber and three 30 caliber machine guns. These two

---

<sup>16</sup> Ibid., pp. 193-5.

tanks were capable of speeds up to 45 miles-per-hour. The major difference between the two models was that the M2-A2 had two round turrets; the other model had only a single turret. Rock Island Arsenal built only 19 of these light tanks in 1936 and 154 the next year. With the appearance of another light tank, the M2-A4, in 1938, the Ordnance Department began to increase the thickness of the armor and reduce the road speed. The 12 ton weight of the M2-A4 equalled that envisaged earlier for medium tanks. In 1938 the Ordnance Department produced 74 of this model. Early in October, 1938, the Army awarded the American Car and Foundry Company a contract for 329 M2-A4 light tanks. This was the first American tank order placed with industry since the World War.<sup>17</sup>

Controversy over the Christie convertible suspension system prevented standardization of any medium tanks during the thirties. Although Walter Christie submitted several convertible tanks to the Ordnance Department for experiments, conclusive tests were impossible because Christie built his tanks without guns, gun mountings,

---

<sup>17</sup>Ibid., p. 197, 202.

or turrets. Ordnance officials believed that the suspension system of independent spring wheels could not stand up under combat conditions. Christie's High Speed Model T12, demonstrated in 1938, convinced the Ordnance Department that similar to its predecessors (the T3 and T4 experimental tanks), this model lacked features essential to a combat vehicle. After 1938 tank suspension systems used springs which were much stronger than the Christie system. Reflecting European trends, one of the T5 medium tanks which appeared in 1938 mounted a 75 millimeter pack howitzer. But the M2 and M2-A1 mediums, built in 1939, carried only machine guns and a 37 millimeter gun. Although German tanks mounted 88 millimeter cannons, many American officers considered heavy armament useless. Following extensive tests, the War Department accepted the T5 for standardization in June, 1939. During that year, Rock Island produced 18 of these tanks, thereafter designated the Medium Tank M2. An order for 126 improved models was submitted in 1940, but the Ordnance Department opposed further production. It urged the adoption of a more powerful tank with a 75 millimeter

gun and heavier armor.<sup>18</sup>

When the German panzers swept through France in May, 1940, the United States Army possessed only 28 new tanks and these 10 mediums and 18 lights soon became as obsolete as the 900 other tanks in storage. This dearth of suitable tanks was largely a result of the Army's refusal to standardize and mass produce any of the models tested during the period. But this refusal was in line with the policy outlined by MacArthur in 1931: the Army would build pilot models only. If these were found acceptable they would be standardized and mass produced. In practice the program did not work well because the using arms refused to accept any tanks for standardization unless they were totally free from defects. Ordnance engineers believed that the use of tanks by troops in the field would better reveal defects. Proving ground and formal service tests could not do this. With a better sample, i.e., more tanks used under field conditions, the Ordnance people would have more

---

<sup>18</sup> Harry C. Thomson and Lida Mayo, The Ordnance Department: Procurement and Supply (Washington: Department of the Army, 1960), pp. 225-6.

evidence on which to base improved design. But the cavalry and infantry thought that the Ordnance Department should correct the defects using a few experimental models.<sup>19</sup> Essentially the problem was one of obtaining the funds with which to produce the tanks. Tank production received little money because Army planners believed that other projects were more important.

#### Infantry Tanks during the Thirties

Although the War Department mechanization program of 1931 directed all branches to mechanize, this order primarily concerned the cavalry and infantry. Throughout the thirties officers with mechanized cavalry developed new concepts for the use of tanks. The tactics of armored divisions during World War II evolved from these concepts. For this reason the infantry tank organizations of the period were often forgotten. During the 1930's the infantry tanks functioned as they had in the past as their primary mission remained to assist the advance of

---

<sup>19</sup>Green, Thomson, and Roots, The Ordnance Department, p. 202.

the rifleman.

The Infantry Field Manual of 1931 outlined the missions of infantry tanks. Leading tanks proceeded the main assault force, broke into the hostile defense, and penetrated deeply to facilitate the rapid and extensive advance of friendly troops. Fast tanks were best suited for this mission but firepower was even more important since the tanks rendered close support to assault troops. Normally organized in light tank platoons and attached to infantry battalions, accompanying tanks reduced points of resistance which developed in front of or to the flanks of the unit they supported.<sup>20</sup> Apparently the infantry still thought in terms of fighting a static war similar to the Western Front from 1914 to 1918. Certainly they did not envisage the mobile warfare of World War II practiced by Guderian in Poland and the Low Countries or by Patton in France. When confronted by hostile troops in prepared positions, infantry tanks assisted the foot soldiers in a frontal assault. The

---

<sup>20</sup>U. S. Army, Infantry Field Manual, Vol. II, Tank Units (Washington: GPO, 1931), p. 181.

infantry gave no thought to bypassing these positions and isolating them from their command and supply facilities. Mechanized cavalry might attempt such a solution but the infantry rejected the use of tanks in independent, mobile missions.

In 1933 Major General Edward Croft, the Chief of Infantry, expressed his views on tanks in a letter to the President of the Infantry Board. According to Croft, the infantry should leave the development of mobile mechanized forces to the cavalry. Croft, who believed in concentrating on the use of tanks with the infantry said, "Personally I doubt very much if in the next war tanks will be able to go charging about the battlefield in the face of anti-tank weapons no matter how hard we try to overcome inherent weaknesses. The success of tanks in battle will lie . . . in cooperation with the Infantry foot troops."<sup>21</sup> Small groups of tanks, not large formations, would assist the riflemen. Tanks supported the infantrymen; infantry, artillery, engineers, and tremendous supply organizations should not support

---

<sup>21</sup>Letter from Chief of Infantry to President of the Infantry Board, 470.8/550B (8-25-33), RG 177, NA.

the tanks. The Infantry Board disagreed with Croft's assessment of the situation and pointed out that possibilities existed for the employment of tanks other than as direct support for infantry or as part of the mechanized cavalry. Often tanks could effectively support riflemen from a position other than immediately in front of them. Members of the Infantry Board thought, "The modern tank should not pull the foot troops forward by their boot straps if there is any possibility of maneuvering against the position holding up such foot troops from the flank or rear."<sup>22</sup> Nevertheless, Croft's ideas eventually prevailed. His successor, George A. Lynch, restated official infantry views on tactics and the employment of tanks in order to ensure a unity of views within the branch. Infantry training needed to stress the use of tanks in close support of the foot soldier. Lynch said that tank attacks should be launched against clearly defined objectives. Only in exceptional circumstances and only when mechanized cavalry was unavailable would infantry tanks engage in the pursuit of a

---

<sup>22</sup>"Views of the Infantry Board on Tanks," 470.8/550B (8-25-33), RG 177, NA.

defeated enemy or any similar mobile missions.<sup>23</sup> The limited use of tanks by the infantry, exemplified by the views of Croft and Lynch, prevailed until the spring of 1940. At that time the War Department concentrated all infantry tank units and formed a Provisional Tank Brigade for use in the Louisiana Maneuvers.

For some time the Army had planned to move the Tank School from Fort Meade to the Infantry School at Fort Benning, where tank doctrine would more likely conform to the dictates of the infantry. In January, 1932, the Secretary of War directed that the Tank School move to Fort Benning and become the Tank Section of the Infantry School.<sup>24</sup> Curriculum of the Tank Section remained similar to that of the Tank School at Fort Meade but some changes were made. One improvement was that all officers in the Infantry Company Officers Course received sufficient instruction in tank tactics to enable them to understand the powers and limitations of tanks.

---

<sup>23</sup>"Tank Tactics," Memo from Chief of Infantry to Commandant of the Infantry School, 470.8/550B-XII-A (7-12-37), RG 177, NA.

<sup>24</sup>Memo from AC/S G-3 to AG, 352 (1-2-32), RG 94, NA.

However, the Secretary reduced the course for officers regularly assigned to tank units from one year to five months. Tank personnel had to learn conventional infantry tactics before studying their specialty. The Secretary wanted to avoid too much specialization.<sup>25</sup>

During the thirties infantry tank units, often skeletonized and understrength, were stationed at many posts. Forts Benning, Meade, and Devens held elements of the 66th. and 67th. Infantry (Light Tanks). Company F at Benning was the only active unit of the 67th. Divisional tank companies, organic to infantry divisions, served at the home stations of their parent units. Posts housing the seven divisional companies stretched from Miller Field, New York, to Schofield Barracks, Territory of Hawaii. About 2000 enlisted men and 120 officers served in the two regiments and the divisional companies.<sup>26</sup> By 1939 unanimity of opinion existed throughout the Army of the need to eliminate the light tank

---

<sup>25</sup>Memo from Chief of Infantry to AG, 352 (10-9-31), RG 94, NA.

<sup>26</sup>U. S. House of Representatives, 71st. Cong., 3rd Sess., Hearings before Subcommittee of the House Committee on Appropriations, War Department Appropriations Bill, 1932 (Washington: GPO, 1930), p. 605.

company as an organic unit of the infantry division because the new infantry doctrine called for use of tanks in mass. The Chief of Infantry, George A. Lynch, ordered the organization of all light tank companies into battalions; training would proceed on the basis of the battalion organization. Only in rare circumstances would tanks be used in units smaller than a battalion.<sup>27</sup> Redesignated the 68th. Infantry, all the divisional tank companies concentrated at Fort Benning in January, 1940. Combined with the other infantry tank units, the 68th, participated in the 1940 maneuvers as part of the Provisional Tank Brigade. At this time the infantry tanks and the mechanized cavalry became closely allied.

A caustic letter from Lieutenant Colonel James R. N. Weaver, a battalion commander in the 66th. Infantry, to the Office of the Chief of Infantry aptly reflects the state of infantry tank development during the thirties. Writing in 1939, Weaver presents a case

---

<sup>27</sup>Memo from Chief of Infantry to AG, 320.3/4370 (8-31-39), RG 177, NA.

for the adoption by the infantry of the M2 medium tank, "We can get what we want if we insist on it. I saw the cavalry get everything it asked for including the non-statute light tank by calling it a combat car; I saw them get 56 so-called combat cars when all we had was 18; I saw them get (through General-then Colonel Chaffee's intercession as Chief of the Budget and Legislative Branch, WDGS), \$600,000 of the President's reserve for equipment of the cavalry mechanized brigade. I saw the Chief of Cavalry demand (of the cavalryman in G-4) 5 combat cars to every 3 light tanks delivery [sic]." <sup>28</sup> Throughout the thirties the mechanized cavalry overshadowed the infantry tanks. The mechanized cavalry developed new tactics and generally projected a more spectacular image while infantry tank theory remained tactically stagnant since the First World War. Furthermore, Adna Chaffee, a proponent of mechanized cavalry since its inception, served as chief of the General Staff section which planned War Department budgets.

---

<sup>28</sup>Letter from J. R. N. Weaver to Executive Office of the Chief of Infantry, 470.8/550BXX (6-5-39), RG 177, NA.

From this powerful position he lobbied for the cause of mechanized cavalry. All these factors contributed to limiting the infantry's share of the already small War Department mechanization appropriations.

#### Mechanizing a Cavalry Regiment

As outlined by MacArthur in 1931 the Army planned to immediately mechanize one regiment of cavalry. Pending the success of this first unit, the War Department would mechanize a second regiment as soon as possible. The first regiment selected for mechanization was the 1st. Cavalry stationed at Fort Russell, Marfa, Texas. General Henry, the Chief of Cavalry, wrote the commander of the regiment, "It is with a feeling of sadness that we see this change in our oldest mounted organization with memories of a century's service as such."<sup>29</sup> The 1st. Cavalry had regrets over parting with its horses; indeed, some of the officers and men transferred to other cavalry units. This was partly a negative reaction to

---

<sup>29</sup>Memo from Chief of Cavalry to CO 1st. Cavalry, 322.02 (11-17-31), RG 94, NA.

the new arm and partly the result of War Department planning. Many of the cavalry troopers lacked the mechanical skills necessary to operate the regiment's newly acquired motor vehicles. To provide the skilled personnel the War Department replaced the cavalrymen with troops from the recently disbanded Mechanized Force. Vehicles, equipment, maintenance, and service detachments from the Mechanized Force also joined the cavalry regiment.<sup>30</sup>

Before the entire regiment organized, a Mechanized Cavalry Detachment, formed from the Mechanized Force troops, met during the early summer of 1931 at Fort Eustis. About 150 men, organized into a headquarters, an armored car troop, a machine gun troop, and a combat car troop of four Christie tanks, composed the detachment. As early as 1930, General Staff officers declared Fort Eustis unacceptable for mechanized training since it had only one 1500 by 150 yard area suitable for maneuvers. In December, 1930, Chaffee and

---

<sup>30</sup> Memo from AG to all Corps Area Commanders, Chiefs of War Department Arms and Services, etc., 537.3 (5-13-31), RG 94, NA.

Van Voorhis traveled to Camp Knox near Louisville, Kentucky, to study the feasibility of using that post as a mechanized training center and found the 33,000 acres of rugged, rolling terrain well suited for mechanized units. The War Department accepted the recommendation of Chaffee and Van Voorhis to station the mechanized cavalry at Knox.<sup>31</sup> In November, 1931, the detachment made the trek from Virginia to Knox. Chaffee, who left his position on the General Staff to join the mechanized cavalry as Regimental Executive, commanded this detachment. The Mechanized Force commander, Colonel Van Voorhis, became the Regimental Commander of the 1st. Cavalry. Post commander at Fort Knox was Brigadier General Julian R. Lindsey. All three of these officers concentrated their immediate efforts on housing the troops and in preparing the post for the arrival of the cavalry troops from Texas. Because the bulk of the regiment remained at Fort Russell, the troops at Knox had a limited training schedule during 1931 and 1932.

---

<sup>31</sup>"Need for More Suitable Terrain than Fort Eustis," Memo from AC/S G-3 to C/S, 537.3 (12-5-30), RG 94, NA.

As well as preparing housing for the remainder of the regiment, the Detachment, 1st. Cavalry (Mechanized), conducted classes on mechanization for both officers and enlisted men. The graduates of the first schools served as instructors for the cavalrymen when they arrived. Troop schools for enlisted men and the Basic and Advanced Courses for officers continued on a permanent basis until the formation of the Armored School in 1940. In the school for mechanics, mechanized cavalrymen learned about the installation, maintenance, and repair of automotive equipment. The curriculum of the unit schools conducted by the troop commanders included instruction on radios, map reading, tactics, weapons, vehicular servicing and operation. The students at the four month Officers' Advanced Course studied the employment of a mechanized cavalry regiment with particular emphasis on tactics and logistics. Officers also studied the basic mechanical aspects of the mechanized vehicles. This enabled them to carry out inspections and supervise maintenance.<sup>32</sup> Unlike many infantry tank

---

<sup>32</sup>"Training Program, Mechanized Cavalry Detachment," 353 (9-10-31)(1) Sect. 1, RG 94, NA.

units, both officers and men in the mechanized cavalry learned the basic elements of maintenance as an extension of the cavalry philosophy of taking care of one's own horse.<sup>33</sup>

Concurrent with the school instruction, the detachment at Fort Knox conducted limited field and command post exercises (CPX), the latter to train officers and communications personnel. Throughout the summer of 1932 reserve officers underwent training at Fort Knox. Because the mechanized detachment assisted in the training of these officers it had little time for its own training. Once the reserves departed mechanized training began in earnest. Within limitations imposed by available personnel, the troops at Knox attempted to apply mechanization to the mission of cavalry.<sup>34</sup> The detachment held CPX's twice a month from September through November. These exercises, based on a regimental organization, formed the basis of tactical studies at

---

<sup>33</sup>Crittenberger interview, 19 July 1967, Lieutenant Colonel O. W. Martin, Jr., also present at the interview, brought up this point.

<sup>34</sup>Training Directive from AG to Mechanized Cavalry Regiment, 28 December 1931, 353 (11-27-31), RG 94, NA.

the officers' schools. Furthermore, they indicated the requirements for drill and combat training of the other elements of the detachment. Most of the field training involved no tactical considerations since the entire regiment was needed to work out proper tactical doctrine.<sup>35</sup> But road marches afforded much experience in moving troops and vehicles over long distances. These marches demonstrated the mobile capabilities of mechanized cavalry. One day's march of 125 miles was appropriate for all types of equipment. Mechanized units could maintain such a pace indefinitely.<sup>36</sup> Training on this limited scale continued until November of 1932. More extensive training could soon begin because the 1st. Cavalry would move from Texas to Fort Knox in early 1933.

Although the War Department announced its intention to mechanize the 1st. Cavalry in 1931, for over a year this regiment remained in Texas with the War Department's plans seemingly forgotten. Politics played

---

<sup>35</sup>"Program of Training, 1st. Cavalry (Mechanized)," Memo from Van Voorhis to AG, 353 (1-25-32), RG 94, NA.

<sup>36</sup>"Operations Report #6," Memo from Major R. W. Grow to AG, 353 (9-2-32), RG 94, NA.

an important role in creating this impasse because Congressmen from Texas opposed the transfer of the 1st. Cavalry from Marfa. They wanted the mechanized troops stationed on the border. Kentucky Congressmen wanted to keep the mechanized cavalry in their state. Not wanting to alienate either group the War Department waited. The Army could not afford Congressional enemies particularly with appropriations already so small. Chaffee went to Washington in September, 1932, in order to determine what the Army planned to do. In a letter dated October 5 Chaffee wrote, "I was given to understand . . . that the War Department would take up, following a political promise that had been made, a proposition to furnish the personnel of this regiment (mechanized) by abandoning D. A. Russell after the election; and they were hoping that this would be organized by the 1st. of January." Should the plan to abandon Fort Russell fail, the mechanized cavalry would move to Texas. A slight possibility existed that the War Department would scrap the mechanized cavalry idea entirely.<sup>37</sup> However, the

---

<sup>37</sup> Chaffee quoted in Mildred Gillie, Forging the Thunderbolt (Harrisburg, Pa.: Military Service Publishing Co., 1947), p. 56.

Army went ahead with the original plans. Colonel Van Voorhis received orders in early November to proceed to Texas with sufficient motor equipment to return the 1st. Cavalry to Fort Knox. A convoy left for Marfa on December 17 and returned to Kentucky shortly after the New Year.<sup>38</sup>

Regimental training in early 1933 was similar to the training of the mechanized detachment one year earlier. Training was conducted in progressive steps. Before field training began the troops had to become familiar with their equipment. Throughout the year the regiment held field problems based on the CPX's and the school studies conducted by the detachment in 1932. From the beginning the officers stressed the cavalry side of mechanized cavalry. Van Voorhis, in particular, emphasized cavalry "traditions, esprit, and smartness."<sup>39</sup> Lessons learned in the horse cavalry carried over to the mechanized unit. These lessons included: the need

---

<sup>38</sup>Ibid., p. 58.

<sup>39</sup>Geoffrey Keyes, taped reply to questions submitted by author, received 23 September 1967.

to "think mounted," i.e., to make quick estimates and decisions; there are no "fox-holes for horses" (or tanks); mounted men always have an advantage over dismounted opponents.<sup>40</sup>

Van Voorhis and Chaffee, both former cavalrymen, dominated the activities of the regiment. Chaffee was outgoing, gregarious, and possessed a certain charisma. On the other hand, Colonel Van Voorhis was more reserved and austere.<sup>41</sup> A future Lieutenant General and wartime Chief of Staff of the 8th. Armored Division, Charles G. Dodge, said of Van Voorhis, "He impressed me as an administrator who had little influence on the development of armored doctrine and equipment." Chaffee was regimental commander when Dodge joined the 1st. Cavalry in 1937. He "was an outstanding, forward-thinking officer who had a major influence on the development of armored doctrine, tactics, and equipment. He was one of the early pioneers."<sup>42</sup> Major General Robert W. Grow,

---

<sup>40</sup> Robert W. Grow, 10 June 1967, correspondence with author.

<sup>41</sup> W. H. S. Wright, 23 June 1967, correspondence with author.

<sup>42</sup> Charles G. Dodge, 3 July 1967, correspondence with author.

commander of the 6th. Armored Division in France and Germany, supports Dodge's analysis. Grow thought that Chaffee's foresight and breadth of vision was an inspiration to his subordinates. Chaffee possessed a fine tactical mind and maintained, "The mission of Cavalry [horse or mechanized] is to fight." According to Grow, "Van Voorhis was a splendid administrator" and an "ideal regimental commander."<sup>43</sup> Because they were in command positions Chaffee and Van Voorhis exerted much influence on the development of mechanized cavalry.

There was a continual exchange of ideas and proposals between the War Department and the officers of the 1st. Cavalry. The Chief of Cavalry, General Henry, presented Van Voorhis with several proposed plans for the organization of mechanized cavalry regiments. One such plan envisaged mechanized cavalry units equipped with wheeled armored cars rather than with tracked combat cars or tanks. Van Voorhis declared that such a unit would lack offensive power and pointed out that exercises of the mechanized regiment indicated that armored cars were suitable for reconnaissance and march

---

<sup>43</sup>Grow correspondence.

security but not for heavy combat. Accepting Van Voorhis' recommendation, the Chief of Cavalry dropped the plan.<sup>44</sup> Periodically, War Department officials thought it necessary to remind the mechanized cavalry officers of their mission. The Deputy Chief of Staff, George Van Horn Moseley, wrote Van Voorhis, ". . . remember that we are building up a force that had great mobility and great fire power." Mechanized and horse units had the same mission. Moseley said that the only difference was that mechanized units could do the job faster.<sup>45</sup> Since many mechanized cavalry officers tended to expand the role of their units beyond normal cavalry missions, no doubt their heretical efforts prompted memos such as Moseley's.

In 1933 the Academic Section of the Cavalry School released a training manual entitled Mechanized Cavalry. The limited field exercises of the regiment at Fort Knox and previous studies provided the basis for this manual. It represented the most definitive American

---

<sup>44</sup>Memo from Van Voorhis to Chief of Cavalry, 320.22 (7-11-33), RG 177, NA.

<sup>45</sup>Memo from DC/S to Van Voorhis, 322.02 (2-16-33), RG 177, NA.

statement on the employment of mechanized cavalry available at the time. Because it originated at the Cavalry School, the manual stressed the use of mechanized units in the traditional cavalry missions. Early and thorough reconnaissance was the first step in a successful mechanized operation. Prompt command decisions were another necessity in mobile warfare. Surprise, gained through speed of maneuver, offered the best chance for penetrating a hastily prepared position, or for turning an enemy's flank. In tactical situations mechanized cavalry should employ simple formations to facilitate easy control. Finally, as in all combat, fire superiority had to be gained early in the engagement and maintained until the objective was taken. On the offensive, a mechanized cavalry regiment attacked with the combat car squadron on a 600 to 1000 yard front. One command combat car, three fighting combat cars, and one self-propelled gun formed a platoon, the basic unit of the combat car troop. The covering squadron assisted the combat cars by engaging in distant and battle reconnaissance and by providing rear, advance, and flank guards for security. To accomplish these missions the covering squadron used wheeled armored cars and a

few combat cars. The machine gun troop could temporarily hold the ground secured by the combat car units. But this unit's primary mission was to provide fire support for the combat cars.<sup>46</sup> Because the Cavalry School based this manual on the early experience of the mechanized cavalry regiment, the doctrine outlined was tentative. As the regiment conducted more maneuvers defects in both tactical doctrine and organization appeared.

When planning the mechanization program in 1931 the War Department expected to make changes in the organization of the mechanized cavalry regiment. Attaching a number of other units to the 1st. Cavalry would have complicated that regiment's initial training. But the Army recognized that eventually other units would probably be added. On July 15, 1931, General Moseley wrote the Assistant Chief of Staff G-3 that the first step was to get a mechanized cavalry regiment capable of operating in all weather and terrain. As soon as the

---

<sup>46</sup> Academic Division, The Cavalry School, Mechanized Cavalry (Fort Riley, Kansas: The Cavalry School, 1933), pp. 61-5.

regiment developed sound tactical doctrine other elements would be added.<sup>47</sup> Only four months after the 1st. Cavalry arrived at Fort Knox, the Chief of Cavalry and officers of the regiment recognized the need for changes. General Henry suggested a major revision of the regiment's Tables of Organization (T/O) in his proposal to increase the number of combat car squadrons from one to three.<sup>48</sup> The post commander at Fort Knox, General Lindsey, recommended a reduction of supply vehicles in the regiment. Lindsey thought that these vehicles should be taken out of the combat car squadrons and grouped under a separate administrative unit. Some of the fighting vehicles could carry supplies needed for immediate action.<sup>49</sup> Eventually the regiment implemented both suggestions; however, too many supply vehicles and the proportion of fighting vehicles to other elements remained among the major organizational problems confronting planners throughout this period. Changes in

---

<sup>47</sup>Memo from DC/S to AC/S G-3, 15 July 1931, 537.2 (2-21-30), RG 94, NA.

<sup>48</sup>Memo from Chief of Cavalry to CG Fort Knox, 320.2 (4-7-33), RG 94, NA.

<sup>49</sup>3rd. Indorsement of Memo from Chief of Cavalry to CG Fort Knox, from J. C. Lindsey to CG 5th. Corps Area, 1 May 1933, 320.2 (4-7-44), RG 94, NA.

the T/Os of the mechanized cavalry units were frequent. Even after the formation of the Armored Force in 1940 organizational changes continued.

The first major changes began in 1935. Maneuvers at Fort Riley in April and May, 1934, and subsequent exercises at Knox indicated deficiencies in flexibility and offensive power. Accepting the recommendations of mechanized cavalry officers\* and the Chief of Cavalry, Leon B. Kromer, on April 26, 1935, the Secretary of War approved new T/Os for the regiment. A battalion of the 68th. Field Artillery joined the regiment after the Riley maneuvers in 1934. To provide even more fire support, the new T/O included a 4.2 inch mortar unit. Supply and maintenance units were withdrawn from the head-

---

\* During this period there were many changes among the officers at Knox. In early 1934 Van Voorhis went to the Hawaiian Department. Chaffee replaced him as regimental commander. Later in that year Chaffee was ordered to the War Department General Staff. Colonel Bruce Palmer, former Assistant Commandant of the Cavalry School, took over command of the 1st. Cavalry. Colonel Henry Baird was Palmer's executive officer. Lieutenant Colonel Willis D. Crittenberger became regimental G-3; he played an important role in developing tactics until he moved to the Office of the Chief of Cavalry as a mechanization expert. General Lindsey retired in 1934. The former Chief of Cavalry, General Henry, replaced him as post commander until 1936 when Van Voorhis returned from Hawaii and became post commander.

quarters and combat car troops to form a new service troop. The new T/O eliminated the scout troop and assigned its elements to the machine gun and combat car units. An additional rifle platoon added holding power to the machine gun troop. Commanders encountered difficulty in controlling the five vehicle combat car platoon during the Fort Riley maneuvers. Attempting to remedy this, the new T/O reduced the number of combat cars from five to three per platoon. But the total cars for the regiment increased from 42 to 56. Each of the two combat car squadrons had 27 vehicles with one car for the regimental commander and one for the machine gun troop commander. These changes in organization entailed an increase in personnel from 42 to 46 officers and from 610 to 749 enlisted men.<sup>50</sup> Chaffee strongly favored the adoption of the T/O recommended by General Kromer. He wrote General Moseley, "In my opinion the organization proposed by the Chief of Cavalry is a sound, forward and necessary step."<sup>51</sup>

---

<sup>50</sup>"Continuation of Development of Mechanized Cavalry," Memo from Chief of Cavalry to AG, 322.02 (3-28-35), RG 177, NA.

<sup>51</sup>Memo from Chaffee to DC/S, 322.02 (4-22-35), RG 177, NA.

Expanding the Mechanized Cavalry

As Chief of the Budget and Legislative Planning Branch of the War Department General Staff, Chaffee was in a position to materially promote mechanization. Unexpectedly, in late 1934 the President allotted an additional \$45 million for the War Department. Chaffee designated \$5 million of this amount for procurement of tanks and other mechanized vehicles.<sup>52</sup> Reorganization and expansion of the mechanized cavalry also cost money. By 1936 the War Department added signal, ordnance, quartermaster, and additional field artillery to the regiment at Fort Knox. One major hindrance to sending auxiliary units to Knox was the lack of sufficient housing for the troops. Although the regiment needed additional support units, it was often difficult to provide them.<sup>53</sup> Once again Chaffee's position proved beneficial. He gave housing projects at Fort Knox a favored position in War Department budget estimates.

---

<sup>52</sup>Gillie, Forging the Thunderbolt, pp. 91-2.

<sup>53</sup>"Additions to 7th. Cavalry Brigade (Mechanized)," Memo from Major LeRoy Martin to Office of the Chief of Cavalry, 322.02 (12-16-36), RG 177, NA.

When he went to the Budget and Legislative Planning Branch in 1934 Chaffee exerted his influence to effect the mechanization of a second mechanized cavalry regiment. Insufficient funds, lack of housing, and intrabranh politics hindered his efforts. The War Department budget of 1935 alloted a 400 man increase to the cavalry. Upon Chaffee's recommendation, the Assistant Chief of Staff G-3 submitted a plan to mechanize the 4th. Cavalry and transfer it from Fort Meade to Knox. The loss of horse troops would be offset by the 400 man increase. Both the Chief of Cavalry and the Chief of Infantry approved the plan. But as Chaffee wrote at the time, "From a political point of view the plan has proved to be impractical and has had to be dropped."<sup>54</sup> Despite this setback Chaffee continued his efforts to get another regiment. He submitted another proposal to reactivate the 15th. Cavalry and station it at Fort Knox. The 400 man increase in cavalry strength and 200 additional men secured by reducing the overhead in the horse regiments would provide personnel

---

<sup>54</sup> Chaffee quoted in Gillie, Forging the Thunderbolt, p. 92.

for this regiment. Although the Chief of Cavalry, General Kromer, approved the plan, the General Staff voiced opposition. General Malin Craig, the Chief of Staff, eventually rejected it on the basis that the cost of reactivating the 15th. was prohibitive, but offered an alternative plan. Craig suggested mechanizing either the 2nd. or the 13th. Cavalry regiments at Fort Riley and increasing the remaining regiment there to war strength. On May 27, 1936, the Secretary of War approved the mechanization of the 13th. Cavalry.<sup>55</sup> In early September nine officers and 229 enlisted men of the 13th. proceeded from Fort Riley to Knox. The remainder of the regiment, 450 men, combined with the 2nd. Cavalry, raising that unit to full strength. Additional personnel joined the new mechanized regiment in Kentucky.<sup>56</sup>

Colonel Charles L. Scott, former director of instruction at the Cavalry School and a developer of an armored scout car, became commander of the 13th. Cavalry.

---

<sup>55</sup>AG Memo, 320.2 (3-30-36), RG 94, NA.

<sup>56</sup>AG Memo, 320.2 (9-21-37), RG 94, NA.

As an administrator and organizer of mechanized and armored units Scott, in the view of Lieutenant General Geoffrey Keyes, an armor pioneer, is "entitled to much more credit than he has been given."<sup>57</sup> Throughout the late 1930's Scott was one of the leaders in developing mechanized cavalry and became commander of the Armored Force in 1941.

#### Mechanized Cavalry Maneuvers

Field exercises, particularly large scale maneuvers, were important in determining proper organization and tactical doctrine. Maneuvers in conjunction with other Army units exposed the personnel of those units to the capabilities of mechanized cavalry. Many officers who rose to high rank in World War II armored divisions had their first exposure to mechanized units at these maneuvers. John L. Ryan, Junior, a Captain in the mechanized cavalry during the late thirties, recalled that the extended exercises at Fort Riley, Plattsburg (New York), and in Louisiana "provided an opportunity for lively discussions with other officers."<sup>58</sup> One of

---

<sup>57</sup>Keyes tape.

<sup>58</sup>John L. Ryan, Jr., 15 June 1967, correspondence with author.

the "other officers," Paul M. Robinett, commander of Combat Command B of the 1st. Armored Division in North Africa, first saw the mechanized cavalry at Fort Riley while he attended the Command and General Staff School at Fort Leavenworth. "I . . . thought it did a great job in a maneuver and later followed it during the Plattsburg Maneuvers, where I was convinced of its possibilities."<sup>54</sup> Prior to practical exercises many officers, including some maneuver umpires, failed to realize the capabilities of mechanized cavalry. The general impression prevailed that once mechanized cavalry left the road it became completely immobilized. Umpires had to be convinced that a three-inch sapling or a ten-inch log thrown across a road would not stop a combat car.<sup>60</sup> Perhaps in the long-run the exposure of these officers to mechanization was more important than the original objectives of the maneuvers.

As early as 1933 the War Department suggested that

---

<sup>59</sup> Paul M. Robinett, 20 June 1967, correspondence with author.

<sup>60</sup> "Mechanized Cavalry Operating with other Arms," Address by C. L. Scott to Brigade Officers' Tactical School, 14 January 1938, Mechanized Cavalry Board Maneuvers, 1929-39, Box #1, RG 177, NA.

a detachment of mechanized cavalry participate in the spring maneuvers in the South. Because the newly formed regiment at this time had little training, mechanized cavalry officers maintained that the unit should not engage in large scale maneuvers for at least a year. Therefore, these officers suggested including the regiment in maneuvers at Fort Riley the next year. On April 19, 1934, a column of 189 vehicles, 587 men, and 37 officers left Fort Knox enroute to Kansas. One-and-a-half-ton trucks painted with a yellow band represented combat cars made up the regiment's deficiency. Air and artillery units, attached for the duration of the exercises, helped to fill other gaps in organization and equipment.<sup>61</sup>

The Riley Maneuvers of 1934 sought to answer two questions. First, to what extent could mechanized cavalry replace horse units? Since military experts generally agreed that mechanized units would never totally replace horses, the second question was particularly crucial-- could horse and mechanized cavalry operate together?

---

<sup>61</sup> Gillie, Forging the Thunderbolt, pp. 61-3.

The maneuvers extended from May 15 to 26 and involved a number of exercises. In one exercise the horse cavalry opposing the mechanized units destroyed bridges across the Big Blue River. To bypass the river the 1st. Cavalry traversed the entire state of Kansas and part of Nebraska. This aptly demonstrated the need for an engineer unit attached to the mechanized regiment. Another exercise began with the opposing horse and mechanized units vying for a strategic position. Its superior strategic mobility enabled the mechanized cavalry to reach the position first. However, the horse cavalry waited until after dark and then successfully attacked the mechanized troops. The regiment obviously needed additional supporting units, particularly infantry. During one exercise when horse and mechanized units operated together, the mechanized cavalry bivouacked three times as far from the objective as the horse units. This ensured their simultaneous arrival at the designated objective.<sup>62</sup>

If the maneuvers pointed out the deficiencies and capabilities of mechanized cavalry, the weaknesses

---

<sup>62</sup>Ibid., pp. 66-7.

of horse units also became apparent. One observer noted, "The maneuver scheduled for May 25-27, inclusive, was called off due to the condition of the horses, which, . . . were reaching the limit of their endurance."<sup>63</sup> Nevertheless, many observers, particularly cavalrymen, remained unconvinced of the potential of mechanized cavalry. Some continued to believe that mechanized cavalry could best be used in combination with the horse units. This angered Chaffee who commanded the 1st. Cavalry during the maneuvers. He said, "I believe that mechanization and horses will not greatly mix within the cavalry division. I believe we have a place for cavalry divisions, and I believe we have a place for mechanized brigades, and that they must develop each along its own line to carry out the mobile mission of the army rather than the narrow view of the horse mission of the army."<sup>64</sup> Subsequent maneuvers proved this view correct.

---

<sup>63</sup>"Report on Observations at Fort Riley Maneuvers," by Major Jesse A. Ladd, 537.3/7884B (5-26-34), RG 177, NA.

<sup>64</sup>Chaffee quoted in Gillie, Forging the Thunderbolt, pp. 67-8.

Until 1936 the mechanized cavalry limited its activities to field problems at Fort Knox and the modest maneuvers at the Cavalry School. The first real test of mechanized cavalry against a large mass of troops came in the Second Army Maneuvers of 1936. Allegan, Michigan, and the area around Fort Knox were the sites of the two-phased maneuvers. National Guard motorized infantry, several batteries of artillery, observation aircraft, horse cavalry, and a quartermaster regiment supported the 1st. Cavalry (Mechanized) against two infantry divisions designated the Blue Force. Colonel Bruce Palmer commanded the mechanized Red Force. Officers of the mechanized regiment believed that these maneuvers proved the organization generally sound. However, the exercises again emphasized the need for additional supporting units: engineers, artillery, and especially motorized infantry. By combining these various elements during the maneuvers Palmer and his subordinates built up a combat team to meet changing situations.<sup>65</sup> This ability to adjust to changing

---

<sup>65</sup>"Extracts from the Report on the Second Army Maneuvers, 1936," 320.2 (7-8-37), RG 94, NA.

circumstances was characteristic of mechanized cavalry during the late thirties.

Flexibility in organization carried over into the combat command structure of American armored divisions in World War II.\* The combat command arrangement, arising out of experience with mechanized cavalry, was the conception of Chaffee. He visualized it as a tactical headquarters to which any number of battalions could be attached. As originally planned, combat commands were to have no set composition.<sup>66</sup> In explaining the difference between regular and mechanized artillery units to Robert M. Danford, the Chief of Field Artillery, Chaffee outlined what would become the combat command idea and its stress on flexibility. He wrote, "In the mechanized brigade we have two regiments. Certain tactical situations call for the formation of

---

<sup>66</sup>Wayne T. Smart, "Armored Divisions' Combat Commands," Cavalry Journal, LX (March-April, 1946), pp. 42-4.

\*Each armored division had two combat command headquarters and a reserve command as well; they were designated CCA, CCB, and CCR. Flexibility was the keynote. The combat commands came under divisional headquarters and could assume command of any number of the divisions' units. The mission assigned determined the organization of the command.

two tactical teams, each composed of one cavalry regiment with a group of two artillery batteries in direct support." According to Chaffee the artillery assigned to the mechanized cavalry needed two tactical headquarters available for command. These headquarters would combine or subdivide to meet changes in the tactical situation.<sup>67</sup> The genesis of this idea came during the maneuvers of the thirties.

Failure in war normally results from enemy superiority, difficulties of terrain, or breakdown in personnel and equipment. During the 1936 maneuvers the mechanized cavalry had to overcome natural obstacles and artificial ones as well. Umpire conferences, roads congested with observers, and difficulties over unleased parcels of land caused innumerable delays. But the great mobility of mechanized units made these problems much less serious for them than for conventional forces. In the maneuvers the mechanized Red Force attempted to place its diversified fighting power in positions offering a varied course of action. Once again mobility enabled

---

<sup>67</sup>Letter from Chaffee to Danford, 10 October 1939, 320.2 (11-11-36), RG 94, NA.

the mechanized cavalry to do this. Maneuvering against the hostile flanks, rear, and marching columns the mechanized units won decisive victories over the Blue Force.<sup>68</sup> Operations with motorized infantry proved most useful since certain duties in combat can only be performed by riflemen. Palmer used his infantry for protecting flanks and rear areas from enemy attack, for protection of artillery positions, for patrolling, and for outpost duties.<sup>69</sup> Eventually the mechanized cavalry regiment T/O included organic infantry to carry out these tasks.

In 1939 the First Army Maneuvers at Plattsburg, New York, offered the mechanized cavalry, now a full brigade, its greatest opportunity to demonstrate its power. Colonel Chaffee, the brigade commander, had to overcome some difficulties, such as procuring sufficient funds to pay for transportation, to get to Plattsburg. Despite problems, the brigade arrived at the maneuver area on August 8, 1939.

---

<sup>68</sup>"Report of the Mechanized Force in the Second Army Maneuvers, 1936," Mechanized Cavalry Board Maneuvers, 1929-30, Box #2, RG 177, NA.

<sup>69</sup>Bruce Palmer, "Mechanized Cavalry in the Second Army Maneuvers," Cavalry Journal, XLV (November-December, 1936), pp. 461-78.

Two separate corps exercises preceeded the Army maneuvers. During these preliminaries, held on August 21 and 22, the two corps commanders divided the mechanized brigade so that detachments could participate in each exercise. The mechanized cavalry officers, particularly Chaffee, strongly opposed this. They maintained that the brigade should be used as a team to ensure maximum effectiveness of its various elements. But during the Army maneuvers the brigade played a decisive role in the success of the Blue Force. On the third day of the exercise the mechanized cavalry, after a march of eleven miles, outflanked the Black Army and attacked its supply and communications lines. Because the Black Army possessed little anti-tank defense the mechanized units caused much damage. A heavy rain forced the premature cancellation of the maneuvers on August 25. The 7th. Brigade impressed newsmen, First Army Commander Hugh A. Drum, and other observers. Chaffee was pleased. He knew that when assigned missions of mobile combat, the brigade was "capable of affecting the operation of the entire Army."<sup>70</sup>

---

<sup>70</sup>Adna Chaffee, "The 7th. Cavalry Brigade in the First Army Maneuvers," Cavalry Journal, XLVII (November-December, 1939), pp. 460-1.

### Mechanized Cavalry Doctrine

These maneuvers provided an opportunity to test the tactical doctrine devised by the mechanized cavalry officers. Although traditional horse cavalry doctrine served as a model, discussions, tests, and maneuvers guided the development of tactical doctrine more than any theoretical conceptions.<sup>71</sup> Formulation of doctrine resulted from the collaboration of numerous officers, particularly those at Fort Knox. Whether planning a training manual or an address to some Army agency, such as the War College, Chaffee, Van Voorhis, Palmer, Scott, Crittenberger, Grow, all contributed their ideas to the final product.<sup>72</sup>

Most of the mechanized cavalry leaders agreed with Van Voorhis when he said, "In my study and approach to mechanization I have never looked upon it as a substitute for the basic arms as we now know them. Mechanization

---

<sup>71</sup>Clovis E. Byers, 14 June 1967, correspondence with author. Byers states this explicitly. Correspondence with other officers involved reinforce Byers' contention.

<sup>72</sup>Crittenberger interview, 25 July 1967. The Archives has drafts of addresses delivered at the Army War College by officers in the Mechanized Cavalry Brigade. These have comments and notations of many of the brigade officers attached. Mechanized Cavalry Board Boxes #1 and 3, RG 177, NA.

is but an additional weapon placed in the hands of the commander, with which he can more readily and effectively accomplish his mission."<sup>73</sup> The employment of mechanized cavalry differed little from the use of horse cavalry. As General Isaac D. White explained, "Armored vehicles merely gave it greater mobility and firepower. It was to be used for traditional cavalry missions. When mechanized cavalry was expanded to armored divisions the missions were considered the same."<sup>74</sup> The adoption of normal cavalry tactics was natural enough. Nearly all the officers at Fort Knox were former horse cavalrymen.

General Van Voorhis expressed his views before the Army War College in 1937. The more mobile a unit the greater the difficulty in controlling its several elements in combat, hence simplicity was an important characteristic of mechanized cavalry organizations. Practical experience indicated that the number of combat

---

<sup>73</sup>"Mechanization," Address by Van Voorhis to Army War College, 13 October 1937, Mechanized Cavalry Board Maneuvers, 1929-39, Box #1, RG 177, NA.

<sup>74</sup>Isaac D. White, 20 June 1967, correspondence with author. Correspondence with other officers supports White's statement. They all say mechanized cavalry was a natural extension of horse cavalry.

vehicles a commander could employ at any one time was limited.<sup>75</sup> According to a cavalry field manual, organization had to be simple yet capable of facilitating the performance of four tactical functions. The regiment was the smallest unit capable of carrying out all these functions. Each regiment had a reconnaissance troop for advanced (up to 100 miles) and close-in reconnaissance missions. Machine gun and rifle elements provided fire support for mechanized cavalry regiments. These units covered withdrawals, repelled counterattacks, fired on hostile anti-tank gun crews, and occupied the ground taken by the combat cars. Chemical mortars served a defensive function by laying down smoke to prevent well aimed fire from falling on assault vehicles.<sup>76</sup> The combat car squadron, the striking power of the regiment, was most effectively employed as part of a combat team operating with other supporting elements.<sup>77</sup>

---

<sup>75</sup>Van Voorhis address, 13 October 1937.

<sup>76</sup>Tactics and Techniques of Cavalry, Advanced, Vol. III (Harrisburg, Pa.: Military Service Publishing Co., 1940), p. 175.

<sup>77</sup>"Draft of Cavalry Field Manual 2-10," 9 April 1940, Mechanized Cavalry Case Files, Box #3, RG 177, NA.

In a lecture entitled "Mechanized Cavalry Operating with Other Arms," Colonel Charles L. Scott outlined the principles a commander should follow when employing mechanized cavalry. Nearly all military experts assumed that mechanized cavalry would be used offensively as part of a larger force. According to Scott, the only appropriate missions for mechanized units were those which contributed significantly to the accomplishment of the primary objective of the entire force. Commanders must permit mechanized cavalry to use its mobility and flexibility to the fullest extent. This meant it should not be attached to slower moving units such as horse cavalry. The commanders should permit the mechanized cavalry all possible maneuver space and a varied course of action in attaining its objective. Above all, Scott warned higher commanders not to break up the tactical team of mechanized cavalry and its supporting elements.<sup>78</sup>

Mechanized cavalry attacked the enemy in two ways, Colonel Bruce Palmer explained to the War College in 1936. One was to place combat vehicles in favorable position

---

<sup>78</sup>C. L. Scott address, 14 January 1938.

to deliver effective fire upon the enemy. The other was a supported assault by the combat cars against a given objective. A combat car assault included several steps. When nearing the enemy the advance reconnaissance elements assumed the role of combat patrols and served as a covering force. Not only did they seek information by visual methods, but they attempted to make physical contact with hostile forces. These patrols then furnished the mechanized cavalry commander with information on the enemy and the terrain. Targets for artillery generally appeared about the time of the contact by the covering force. At this time the brigade commander had to begin his plan of maneuver and assign regimental missions. Having received their missions the subordinate commanders determined direction, width, depth and division of forces for the combat car attack. Support units (mortars, machine guns, and riflemen) took up positions from which to fire on hostile anti-tank guns and then displace forward following the assault. As a rule, the foregoing was readily accomplished. Controlling the combat car element after it reached the objective presented a more difficult problem. Palmer pointed out that to

maintain control, subordinate commanders had to assume much of the command responsibility for the units in the attack.<sup>79</sup> Several methods of attack were possible. A mounted assault by waves proved most successful against an enemy whose flank could not be turned. Rear elements widened the breach in the enemy line and mopped up by-passed resistance. Against a lightly defended position a mounted assault in line was best. As protection against strong anti-tank defenses mechanized cavalry used an assault in echelon. The attacking elements fell obliquely upon the enemy's line.<sup>80</sup>

When terrain was unfavorable for an assault mechanized units engaged the enemy by means of the fire fight. This involved placing combat cars and support weapons in a position where they could effectively fire on enemy troops and material. Fire fights sought to force the enemy into a course of action advantageous to the mechanized cavalry.<sup>81</sup> Many military men failed to

---

<sup>79</sup>Address by Bruce Palmer to Army War College, 12 October 1936, Mechanized Cavalry Board Maneuvers, 1929-39, Box #1, RG 177, NA.

<sup>80</sup>"Draft of Cavalry Field Manual 2-10."

<sup>81</sup>Palmer address, 12 October, 1936.

realize the importance of mechanized cavalry fire fights. One major criticism of mechanized units was that they could not operate in certain types of terrain: mountains, forests, and marshes for example.\* But mechanized units did not have to physically occupy ground in order to control it. By means of a fire fight the mechanized cavalry could control terrain by means of fire and force the enemy to withdraw or deny him the use of a particular area.

#### Reassessing War Department Policy

During the late thirties two questions arose concerning the performance and the future of mechanized units. Were mechanized cavalry and infantry tank units fulfilling their missions? Should the size of America's mechanized units be expanded? Once again, as in MacArthur's decision to extend mechanization throughout the Army,

---

\*During World War II armored units operated in all types of terrain. Twice, the German panzers attacked through the Ardennes Forest. Two armored divisions, the 1st. American and the 6th. South African, provided support for the advance through the mountains in Italy. American tankers also fought in the marshy terrain of Holland.

branch rivalries played an important role. Neither the infantry nor the cavalry wanted to relinquish control over tanks. On the other hand, neither branch would expand mechanized units at the expense of horse cavalry or foot troops. Because infantry tanks and cavalry combat cars were essentially the same vehicles, mechanized cavalry and infantry tank units often performed similar tasks. Furthermore, mechanized cavalry tended to go beyond traditional cavalry functions and undertake missions of an independent force. This raised the question of the need for separate mechanized units for each branch. This is a confusing period in the development of American armor, characterized by much talk, numerous studies, and little positive action. Important War Department officials often took ambiguous stands on the question of expanding mechanized units. What they said they were going to do and what they actually did were often quite different.

In June, 1937, the Chief of Staff, General Craig, ordered a restudy of the Army's mechanization policy. Craig believed that cavalry and mechanized cavalry had no relation in regard to tactics. If the Chiefs of

Cavalry and Infantry refused to view mechanization as an entirely new force, neither cavalry nor infantry, and refused to permit it to develop in every possible way, the Chief of Staff would "inaugurate a mechanized force without regard to arm of service in order to keep abreast of current developments."<sup>82</sup> According to General Craig, dividing responsibility for tank development between the two branches led to a wide variety of technical ideas and no clearcut policy of development.<sup>83</sup> Craig directed the Operations and Training Section of the General Staff to study American mechanization policies.

Assistant Chief of Staff, George P. Tyner, submitted the G-3 report on October 25, 1937. It began, "Experience [in the Spanish Civil War and the 1936 Second Army Maneuvers] has shown that the older arms will fight in their traditional way and that, except for the mechanized reconnaissance detachments of the Cavalry, mechanization can be applied only through what it is in

---

<sup>82</sup>"Mechanized Forces," Memo from C/S to DC/S, 537.3 (6-28-37), RG 94, NA.

<sup>83</sup>Memo from C/S to AC/S G-3, 537.3 (10-14-37), RG 94, NA.

effect, if not in name, a new arm." Tyner recommended rescinding the War Department policy of general mechanization throughout the Army and supported the conception of an independent mechanized force.<sup>84</sup> Major General George A. Lynch, the Chief of Infantry, disagreed with the recommendations of the G-3 report. According to Lynch, no justification existed for restricting mechanization to certain designated units. He maintained, "Tanks should be used whenever and wherever they will contribute to the effectiveness of the unit considered."<sup>85</sup>

Despite such opposition, in March, 1938, the War Department modified its decentralized mechanization policy. The Adjutant General announced, "Hereafter, mechanization will be applied to certain cavalry and infantry units to the extent necessary to enable these arms to better carry out their prescribed tactical functions." Infantry tanks would increase the power of that arm to engage in

---

<sup>84</sup>"Tanks and Mechanized Units," Memo from AC/S G-3 to C/S, 470.8/550-B (10-25-37), RG 94, NA.

<sup>85</sup>Memo from Chief of Infantry to AC/S G-3, 451/9264-B (11-5-37), RG 177, NA.

close combat and overcome strongly organized resistance. The War Department rejected the conception of leading tanks operating beyond the range of infantry and artillery. Mechanization applied to cavalry would increase the mobility, fighting power, and radius of action of that branch. Breaking with the 1931 policy of mechanized cavalry carrying out traditional cavalry roles, the 1938 directive recognized the need for an independent, self-contained mechanized cavalry force capable of distant strategic employment.<sup>86</sup> In the sense that both the infantry and cavalry retained control of their mechanized units this directive changed things very little. But it was important for sanctioning the development of a mechanized cavalry force capable of independent missions.

Chaffee and Van Voorhis were particularly vehement advocates of independent missions for mechanized units. In his 1937 address to the Army War College, Van Voorhis expressed a belief in the necessity of eventually organizing a heavy mechanized striking force. This shock

---

<sup>86</sup>"Policies Governing Mechanization," Memo from AC to all Branch Chiefs, Schools., Corps Area Commanders, 537.3 (3-25-38), RG 94, NA.

division would consist of tanks supported by all other components.<sup>87</sup> Chaffee was even more explicit in an address to the War College in 1939. According to him, the Army needed both mobile mechanized cavalry and infantry tank units for close support. But Chaffee believed that above all the Army should foster development of mobile mechanized units. Each of the four Field Armies needed one mechanized cavalry division. Experience in the Plattsburg Maneuvers convinced Chaffee that independent mechanized cavalry units could deliver a decisive, hard-hitting blow.<sup>88</sup> Such a conception extended the traditional cavalry role to include heavy combat. Under Chaffee's leadership, during the late thirties, as commander of the 7th. Mechanized Cavalry Brigade from 1938 when he was promoted to Brigadier General until the formation of the Armored Force in 1940, the mechanized cavalry developed as an independent striking force.

Although the mechanized cavalry leaders had some control over the development of tactical doctrine, they

---

<sup>87</sup>Van Voorhis address, 13 October 1937.

<sup>88</sup>"Mechanized Cavalry," Address by Chaffee to Army War College, 29 September 1939, Mechanized Cavalry Board Maneuvers, 1929-39, Box #1, RG 177, NA.

could not directly influence expansion of mechanized units. As before, budget limitations and opposition from within the War Department prevented expansion beyond the two regiments already at Fort Knox.

The G-3 report submitted by General Tyner in October, 1937, recommended organization of a self-contained tank division consisting of three mechanized cavalry regiments.<sup>89</sup> Taking a more conservative tack, Van Voorhis proposed expanding the mechanized brigade at Fort Knox. He said that the addition of reconnaissance and support elements to the two mechanized cavalry regiments would in effect create a mechanized division.<sup>90</sup> The Chief of Cavalry, Leon Kromer, supported Van Voorhis' idea. But the War Department approved a plan submitted by Kromer for organizing a 3000 man mechanized cavalry division "for planning purposes only."<sup>91</sup> In May, 1939, Van Voorhis, now a Major General and commander of the Vth. Corps Area, again recommended expanding the mechanized brigade to division size. According to Van Voorhis, the

---

<sup>89</sup>AC/S G-3 memo, (10-25-37).

<sup>90</sup>Van Voorhis address, 13 October, 1937.

<sup>91</sup>Memo from Chief of Cavalry to AG, 320.2 (7-8-37), RG 94, NA.

brigade, as organized, was not tactically sound; it needed augmentation. Once again he proposed the addition of support and reconnaissance elements without disturbing the tactical integrity of the mechanized cavalry regiments.<sup>92</sup> Major General Robert M. Beck, the Assistant Chief of Staff G-3, Tyner's successor, agreed with Van Voorhis and stated that the two-regiment plan submitted by him was sound and more conservative than some other proposals. But it was some time before the War Department carried out these recommendations.

Major General John K. Herr, who became Chief of Cavalry on March 26, 1938, was less friendly to mechanization than his immediate predecessors. Similar to many old cavalrymen, Herr hated to see the demise of the horse. As late as 1953 he contended, "One basic and immutable truth stands out through all our wars. Sometimes our commanders have to learn it the hard way: There is no substitute for cavalry!"<sup>93</sup> During the late thirties Herr was no advocate of mechanized cavalry. He wrote the

---

<sup>92</sup>Memo from Van Voorhis to C/S, 537.3 (5-17-39), RG 94, NA.

<sup>93</sup>John K. Herr and Ed. S. Wallace, The Story of the U. S. Cavalry (Boston: Little, Brown and Co., 1953), p. 261.

Chief of Staff in 1938, "It [mechanized cavalry] has not yet reached the place in which it can be relied upon to displace horse cavalry. For a considerable period of time it is bound to play an important but minor role while the horse cavalry plays the major role so far as our country is concerned."<sup>94</sup> Herr was unwilling to sacrifice a single horse or man from the horse cavalry regiments in order to organize any mechanized units.<sup>95</sup> An officer serving in the Office of the Chief of Cavalry during the late thirties recalled of Herr, "I can hear him in the corridors of the old Munitions Bldg.: 'Not one horse will I give up'."<sup>96</sup> As Chief of Cavalry, Herr exerted much influence over priorities for funds. Needless to say, he did not consider expansion of mechanized cavalry a top priority item. In 1939 Herr ranked the expansion of the 7th. Cavalry Brigade (Mechanized) fourth out of five on a list of priorities for expanding the cavalry. Two of the first three items concerned the expansion and

---

<sup>94</sup>Memo from Chief of Cavalry to C/S, 320.2 (10-17-38), RG 94, NA.

<sup>95</sup>Remarks re Conference with AC/S G-3, 7 October 1938, 322.02 (10-10-38), RG 177, NA.

<sup>96</sup>Grow correspondence.

reactivation of horse regiments. The other item was the organization of a combat car squadron for demonstration purposes at the Cavalry School.<sup>97</sup>

Herr's advocacy of horse cavalry, at the expense of mechanized units, received support from some important sources. During the Senate Hearings for the 1938 War Department Appropriations Bill, Senator William G. McAdoo asked the Chief of Staff whether mechanized cavalry had superseded horse units and relegated them to insignificance. Craig replied that horse units performed a necessary role in the modern Army. The Senator responded, "I am glad to hear that."<sup>98</sup> With the Chief of Cavalry, the Chief of Staff, and at least one important Senator strong horse cavalry supporters, mechanized cavalry had little chance for expansion. It is little wonder that on January 31, 1938, Craig reported to the House Appropriations Committee that the War Department

---

<sup>97</sup>Memo from AC/S G-3 to C/S, 320.2 (9-5-39), RG 94, NA.

<sup>98</sup>U. S. Senate, 75th. Cong., 1st. Sess., Subcommittee of the Committee on Appropriations, War Department Appropriations Bill, 1938 (Washington: GPO, 1937), p. 55.

had no equipment on hand or in the stage of procurement for the planned expansion of mechanized cavalry from brigade to division size.<sup>99</sup>

#### Forming an Armored Force

Events in Europe during the fall of 1939 forced a reassessment of War Department priorities. German successes in Poland proved unquestionably the capability of mechanized units. On September 15 Chaffee submitted a memorandum outlining his "Observations and Recommendations on the Expansion and Development of Mechanized Cavalry." He believed that the development of mechanization by both the cavalry and the infantry was a sound policy. According to Chaffee, the United States had the basis for the three elements which composed the German panzer forces: mechanized cavalry, highly mobile infantry, and medium tanks. But they needed to be expanded and the 7th. Brigade offered the best initial nucleus for any expansion. Chaffee made the following recommendations:

---

<sup>99</sup>U. S. House of Representatives, 75th. Cong., 3rd. Sess., Subcommittee of the Committee on Appropriations, Military Establishment Appropriations Bill, 1939 (Washington: GPO, 1938), statement by Malin C. Craig, p. 11.

immediate approval of the T/Os for a mechanized cavalry division, procurement of equipment for the division from fiscal 1939 and 1940 funds, full officer and enlisted complements for the unit plus a 50% surplus of personnel supplied at the expense of horse cavalry and infantry units, assignment of Regular Army officers of command capability to the mechanized cavalry, and purchase of additional land at Fort Knox for training purposes. By accepting Chaffee's proposals the Army could organize and train one mechanized cavalry division while concurrently training the cadres of two divisions on the same equipment.<sup>100</sup>

Van Voorhis concurred in Chaffee's recommendations and took the opportunity to criticize the slow pace of past developments in the field of mechanization. He wrote the Adjutant General, "While the War Department launched the project it can be said that the emphasis it gave did not measure up to the efforts of those of us

---

<sup>100</sup>"Observations and Recommendations on Expansion and Development of Mechanized Cavalry," Memo from Chaffee to AG, 320.2 (9-15-39), RG 94, NA.

in the field to place it in the fighting team."<sup>101</sup> Even General Herr, influenced by events in Europe, advocated a radical expansion of the mechanized cavalry. Surpassing previous recommendations for a 3000 man mechanized cavalry division, Herr proposed expanding the 7th. Brigade to a division of from 8 to 10,000 men. Furthermore, Herr thought that each of the four field armies should possess a mechanized division.<sup>102</sup> But Herr did not concur in the method of procuring the personnel for expansion suggested by Chaffee, i.e., from horse and infantry units. He maintained that horse units needed strengthening. Seemingly irritated by what he considered Chaffee's interference, Herr wrote, "In closing I cannot refrain from adding that recommendations as to methods to be employed in any expansion of cavalry units are within the province of the Chief of Cavalry rather than of any commander of any individual unit in the field."<sup>103</sup> Although the Assistant Chief of Staff,

---

<sup>101</sup>Memo from Van Voorhis to AG, 320.2 (9-15-39), RG 94, NA.

<sup>102</sup>"Expansion of Mechanized Cavalry," Memo from Chief of Cavalry to C/S, 322.2 (10-3-39), RG 177, NA.

<sup>103</sup>Memo from Chief of Cavalry to AG, 320.2 (9-15-39), RG 94, NA.

Frank M. Andrews, supported Chaffee, Van Voorhis, and Herr in the effort to expand and strengthen mechanized cavalry, he pointed out significantly that the personnel for any expansion was not immediately available.<sup>104</sup>

In the wake of the German successes the War Department appeared ready to accept augmentation of mechanized units despite the difficulties involved. However, inter-branch and intra-branch rivalries again delayed expansion. As already noted, the Chief of Cavalry opposed expanding mechanized cavalry at the expense of horse units. Similarly, the Chief of Infantry rejected a G-3 proposal for converting various infantry units into mechanized troops.<sup>105</sup> Although they opposed expanding mechanized units at the expense of traditional arms, the Chiefs of Cavalry and Infantry competed to secure any expansion which might increase the strength of their particular branch. Both branches wanted control over mechanized troops but were unwilling

---

<sup>104</sup>Memo from AC/S to C/S, 320.2 (10-11-39),  
RG 94, NA.

<sup>105</sup>History of Armored Force, Command and Center,  
p. 5.

to sacrifice to attain them. Certainly at this time the mechanized cavalry was better prepared than the infantry tank units to absorb any expansion. The largest active infantry tank organization was a battalion. Any major expansion in the fall of 1939 had to be under cavalry control. But as Chaffee commented at the time, "There are too many individuals who are not ready to let the cavalry absorb such a large mechanized expansion as proposed."<sup>106</sup> These bickerings within the War Department prevented the immediate expansion of mechanization by direct means.

The commanding generals of the Second, Third, and Fourth Field Armies, aware of the possibilities of mechanization, wanted the 7th. Brigade to participate in the forthcoming maneuvers during the spring of 1940. Major General Stanley D. Embick, commanding the Third Army and formerly Chaffee's superior at the War Department Budget and Legislative Planning Branch, was particularly enthusiastic. Embick and his Chief of Staff, Lieutenant Colonel John S. Wood, travelled to Washington

---

<sup>106</sup> Chaffee quoted in Gillie, Forging the Thunderbolt, p. 146.

in January, 1940, to confer with General Staff officers about the maneuvers. At this meeting the War Department tentatively agreed to organize a provisional mechanized division by attaching an infantry regiment to the mechanized cavalry brigade for the maneuvers.<sup>107</sup> Chaffee's proddings, Embick's enthusiasm, and the experience of the Germans were important factors in determining the War Department's decision. During the next few months Chaffee and Embick continued to cooperate in finalizing arrangements for the maneuvers. On April 9 Chaffee wrote Colonel Scott, "A month ago I went to Atlanta, and as an upshot of that and some missionary work in the War Department I will have the Sixth Infantry in trucks attached to the Brigade for the period of the Third Army Maneuvers. . . . So little by little we are getting the troops if not the name and dignity of a mechanized division."<sup>108</sup> The Chief of Staff, George C. Marshall, reported to a Congressional subcommittee that troops taken from the 14th. Cavalry would

---

<sup>107</sup> Ibid., p. 148.

<sup>108</sup> Chaffee to Scott, 9 April 1940, quoted in History of the Armored Force, Command and Center, p. 6.

form a reconnaissance and support squadron for the brigade. These troops in addition to the 6th. Infantry provided a holding force necessary to what was essentially a mechanized cavalry division.<sup>109</sup> With these preparations complete, Chaffee led the 7th. Brigade and its attached units to the Louisiana maneuvers in early May. The Provisional Tank Brigade, formed from the infantry tank units, commanded by Brigadier General Bruce Magruder, and consisting of one regiment and two separate battalions of light tanks and one company of mediums, also participated in the maneuvers.

Virtually all the tank and mechanized units in the United States Army were in Louisiana.\* During the maneuvers the commanders used the tanks and mechanized troops in various combinations. In the second phase, the infantry tanks and the mechanized cavalry combined to form a single force. "The makeshift force worked smoothly and inspired the leading officers to take

---

<sup>109</sup>U. S. Senate, 76th. Cong., 3rd. Sess., Hearings before the Subcommittee of the Committee on Appropriations, Military Establishment Appropriations Bill for 1941 (Washington: GPO, 1940), p. 58.

\*One light tank company remained at Fort Lewis, Washington; another was in Hawaii.

thought of the future organization of such a unit."<sup>110</sup>  
Not only did these maneuvers demonstrate the possibilities of mechanized units, but once again the Germans provided a graphic example. On May 10 they ended the sitzkrieg in the West by attacking through the Netherlands and Holland. By the twentieth the German panzers had reached the English Channel, cutting off many French and British troops. Magruder's executive officer and future Lieutenant General, Alvan C. Gillem recalled, the German success and the experience of combining the American mechanized and tank units resulted in discussions among the officers at the maneuvers "as to the need for a Force composed of Infantry, Cavalry, and Artillery. The thought was not along the lines of the old Infantry and Cavalry tanks but of a Force separate from all current Arms and one that combined not only the combat elements but the essential support units to make a tactical entity."<sup>111</sup>

On May 25 a number of officers, including Chaffee,

---

<sup>110</sup> History of the Armored Force, Command and Center, pp. 6-7.

<sup>111</sup> Alvan C. Gillem, 27 September 1967, correspondence with author.

Magruder, Gillem, Sereno Brett, Colonel George S. Patton an observer at the maneuvers, and the Assistant Chief of Staff G-3, Frank M. Andrews, met in the basement of the high school in Alexandria, Louisiana, to discuss the future of mechanization. These officers unanimously agreed that the War Department could no longer delay development of mechanized units under a unified command. They thought mechanization should proceed free from cavalry or infantry control. Andrews conveyed the opinions of this conference to the Chief of Staff.<sup>112</sup> But Marshall also heard the other side. General Herr wrote, "It is recommended that all GHQ mechanization, not specifically designed for close cooperation with infantry units, be assigned to the cavalry arm, and that the Chief of Cavalry be charged with its development, organization, and training."<sup>113</sup> Despite such opposition, the Chief of Staff called a

---

<sup>112</sup>Memo from AC/S G-3 to C/S, 29 May 1940, War Department G-3 Files, 41665 (Section 1), quoted in History of the Armored Force, Command and Center, p. 8.

<sup>113</sup>Memo from Chief of Cavalry to C/S, 322.02 (5-27-40), RG 177, NA.

meeting of the Assistant Chiefs of Staff, the branch chiefs, representatives of the War Plans Division of the General Staff, and mechanized cavalry and infantry tank officers to finalize plans for organizing a separate armored force. The word "armored" symbolized the break with the past. On June 10 this group met at 10 AM in the State, War and Navy Building. Again the old-order was holding out and raising questions by intimating that the task was impossible. Finally Chaffee said, "Speed is essential. . . . We must not stop and haggle over a lot of detail and figure out a lot of things that have been studied over by boards and commanding officers in the field and tested in maneuvers time and again." Because Marshall had already made the decision to form an armored force such bickering was useless and disruptive. At last the conferees agreed to support Marshall's decision. The conference unanimously declared that the recent German successes proved the value of armored forces, that American tactical and technical development had proceeded along sound lines but on too modest a scale, that all mechanized resources must be consolidated under one head to obtain the maximum value

from the limited personnel and equipment available, and that the expansion of armored units was imperative.<sup>114</sup>

On July 10, 1940, the War Department issued a directive which declared, "For purposes of service test, an Armored Force is created."<sup>115\*</sup> Chaffee became Chief of the Armored Force and assumed the duties of a branch chief. The mechanized cavalry brigade formed the nucleus of the 1st. Armored Division with Magruder as division commander. Charles L. Scott was commanding general of the 2nd. Armored organized from the infantry tank units at Fort Benning. These two divisions constituted the 1st. Armored Corps. Other elements of the

---

<sup>114</sup>War Department G-3 File #337 on conference held 10 June 1940, cited in History of the Armored Force, Command and Center, p. 8. For information on this conference see statement by Chaffee on 14 May 1941 in U. S. House of Representatives, 76th. Cong., 1st. Sess., Hearings before the Subcommittee of the Committee on Appropriations, Military Establishment Appropriations Bill for 1942 (Washington: GPO, 1941), p. 558.

<sup>115</sup>War Department Directive of 10 July 1940 quoted in History of the Armored Force, Command and Center, p. 8.

\*The term service test was used to circumvent the National Defense Act which prohibited creating a new branch without Congressional authority. The Armored Force was in essence a new branch. The use of this terminology permitted the War Department to raise the necessary armored troops and equipment.

Armored Force included the 70th. GHQ Reserve Tank Battalion, the Armored Force Board, and the Armored Force School and Replacement Training Center. American armored units during World War II emerged from this structure.

As in World War I when the exigencies of trench warfare called for developing a "caterpillar machine gun destroyer," the military situation in 1940 demanded a separate Armored Force. War Department officials were able to overcome the branch rivalries which inhibited development for the previous decade. The Administration and Congress were also more willing to provide funds for the expansion of the Army in general and of mechanization in particular. But the officers from the infantry tank units and particularly from the mechanized cavalry brigade were best prepared for expansion of mechanization and for a separate command as their efforts in organizing armored divisions for the campaigns of the Second World War clearly indicated.

Appendix IAnnual Expenditures of the War Department  
(in thousands of dollars)

1917	-	377,941	1929	-	425,947
1918	-	4,869,955	1930	-	464,854
1919	-	9,009,076	1931	-	486,142
1920	-	1,621,953	1932	-	476,305
1921	-	1,118,076	1933	-	434,621
1922	-	457,756	1934	-	408,587
1923	-	397,051	1935	-	487,995
1924	-	357,017	1936	-	618,587
1925	-	370,981	1937	-	628,104
1926	-	364,000	1938	-	644,264
1927	-	369,114	1939	-	695,256
1928	-	400,990	1940	-	907,160

---

Russell F. Weigley, History of the United States Army  
(New York: Macmillan, 1967), p. 560.

## Chapter IV

### THE EUROPEANS, MILITARY PERIODICALS, AND AMERICAN ARMOR DEVELOPMENT

The writings of the European mechanization enthusiasts, the experience of European armies, and articles in military journals were sources of ideas for American officers concerned with armor. Not all Army officers served with tank units; few read official War Department memos on the subject of mechanization; only a small number of officers heard addresses by Chaffee, Palmer, Scott, or Van Voorhis on the employment of mechanized cavalry. But nearly all American officers read the important military journals of the period. And most officers had at least heard of J.F.C. Fuller and Liddell Hart.

#### The European Influence

The development of American mechanization did not occur in a vacuum. European armies and military writers were also concerned with the subject. Certainly

the developments in Europe had some impact on the Americans. But in what ways and to what extent did European mechanization affect progress in the United States?

Throughout the period, from 1917 until 1940, mechanization in the United States Army received impetus from European sources. The American Tank Corps in the First World War used French and British tanks and tank tactics. Secretary of War Davis' visit to the British mechanized maneuvers in 1927 led to the formation of the American Experimental Mechanized Force. Military attaches were a primary source of information on foreign mechanization. For instance, in 1931 Chief of Cavalry Henry requested data on mechanized cavalry in Great Britain, France, Germany, Poland, Japan, and Russia and the attaches provided this information. Henry said that knowledge of European efforts would be of use in the mechanization of the 1st. Cavalry Regiment.<sup>1</sup> Both sides in the Spanish Civil War employed tanks with varying degrees of success. American military observers

---

<sup>1</sup>Memo from Chief of Cavalry to AC/S G-2, MID 265.214/6 (5-18-31), RG 165, NA.

on the scene reported the tactical errors and the need for technical improvements, such as heavier tanks with greater gun power.<sup>2</sup> During the late 1930's Ordnance officials increased their efforts to produce such machines. American military men, from the Chief of Staff down to officers in the mechanized cavalry brigade, were impressed by the success of the German armored units in Poland and France. The German experience lent weight to those Americans arguing for a separate Armored Force. Poland and France convinced many of the doubters of the need for such a force. Thus in a general way the Europeans had an influence on American armored development. The Europeans provided a stimulus and encouraged interest in the subject.

Yet, it is questionable whether the European mechanization advocates had any real specific impact on the Americans. J. F. C. Fuller and B. H. Liddell Hart were much more theoretical in their writings than the Americans were in their thinking. In Paris, or

---

<sup>2</sup>"Tanks in the Spanish Civil War," Memo from Sumner Waite, Assistant Military Attache, Paris, OKD 451.25/185 (5-25-37), RG 165, NA.

the Future of War, Liddell Hart stressed the need to strike at moral and political objectives. He and Fuller were concerned with formulating an entirely new system of warfare. They envisaged the tank as the revolutionary weapon capable of returning to warfare the lost (during World War I) art of strategy. In 1927 when Fuller published an article in the Infantry Journal, the comments by American officers on the article gave some indication of reaction in the United States to the writings of the Englishmen. Fuller foresaw petrol as revolutionizing the art of war by enabling greater mobility, offensive power and protective power to be attained. He advocated an all tank army with several types of specialized tanks to fulfill the tactical functions of finding, holding, hitting, and smashing the enemy as well as protecting the friendly troops. Generally, the Americans were more hesitant than Fuller in advocating an all tank army. Commenting on Fuller's article, Samuel D. Rockenbach, the wartime commander of the American Tank Corps, said that an intelligent combination of arms in support of infantry would ensure victory. Rockenbach did agree with Fuller that mechanical advances had brought warfare to the threshold of

revolutionary changes. Colonel Frank Cocheu, Assistant Commandant of the Infantry School, totally disagreed with Fuller's analysis and maintained that infantry won the last war and would also win the next one. An instructor at the Army War College, Lieutenant Colonel Wilson B. Burtt, generally agreed with Fuller's thesis, but said that relying on a single weapon was dangerous. Another officer and instructor at the Infantry School, Lieutenant Colonel Paul S. Bond, also took a restrained view, saying that the function of mechanized arms should be to support man power, not to replace it. The final opinion on Fuller's article was expressed by Major Matthew H. Thomlinson, the Chief of the War Plans Section of the Office of the Chief of Infantry. Thomlinson said that no one weapon or branch of service should be held for use in the execution of one function to the exclusion of all others.<sup>3</sup>

Most of the American officers concerned with the development of mechanization read the works of these

---

<sup>3</sup>J. F. C. Fuller, "Tanks and Mechanization" (with comments by American officers), Infantry Journal, XXX (May, 1927), pp. 464-75.

European writers.<sup>4</sup> After the success of the Germans in 1939 and 1940 the works of Heinz Guderian, commander of German panzer troops in the operations, became very popular. A future armored division commander, Ernest N. Harmon, wrote that at the time the Americans read "all we could get in our hands--- especially the Germans who I considered the best of all."<sup>5</sup> But this is no indication of the extent to which these writers influenced the Americans. Another future armor leader maintained, "To my knowledge such authors as J. F. C. Fuller and B. H. Liddell Hart had no direct impact on the development of American Armor. Admitting to some bias (and possibly ignorance) my experience and association with proponents of Armor convinced me that our concepts and doctrine were a product of homegrown vision

---

<sup>4</sup>The author sent questionnaires to a number of officers involved in mechanization during the 20's and 30's. One question was: what European and American literature did you and your contemporaries read on the subject of armor? Nearly all replied that they read Fuller and Liddell Hart, and somewhat fewer included Guderian.

<sup>5</sup>Ernest N. Harmon, 14 June 1967, correspondence with author.

coupled with application of cavalry principles of mobility, shock and surprise."<sup>6</sup> Another armored division commander, Isaac D. White, reaffirmed the view that mechanized cavalry doctrine evolved from the principles of employing horse cavalry, not from the writings of the Europeans.<sup>7</sup> The Americans, particularly those in the mechanized cavalry brigade, were too busy with day-to-day activities to study thoroughly the writings of Fuller, Liddell Hart or Guderian.<sup>8</sup> For them the development of mechanization involved the planning of the next tactical exercise, getting more money for men and equipment, repairing the broken track on a combat car, preparing for the next VIP inspection, convincing the War Department that it should increase the number of combat car squadrons from two to three per regiment, and numerous other practical matters.

---

<sup>6</sup>John L. Ryan, 21 June 1967, correspondence with author.

<sup>7</sup>I. D. White, 20 June 1967, correspondence with author.

<sup>8</sup>Hobart Gay, 16 June 1967, correspondence with author; Willis D. Crittenberger, 19 July 1967, interview with author.

### American Military Journals

Military periodicals provide an indication of the development of American mechanization during the twenties and thirties. As unofficial organs of the various branches they provide some insight into the position taken by each branch on the question of mechanization. As vehicles of expression they provided officers with an opportunity to present a wide range of opinion on the problem. Articles published in the military journals were one of the principal sources of American ideas on armor doctrine during the period.<sup>9</sup> There were no Fullers or Liddell Harts in the United States, but a number of officers wrote articles for the periodicals.

### Military Review

During the 1920's and especially in the 1930's, the Command and General Staff School at Fort Leavenworth did much to further the study of mechanization. Instructors at the school, such as Lieutenant Colonels Allen F. Kingman and Sereno E. Brett, were vocal exponents

---

<sup>9</sup>Robert J. Icks, 12 June 1967, correspondence with author.

of a mobile, mechanized force.<sup>10</sup> They advocated using such a force in a manner similar to the methods of armored divisions in World War II. Generally, the War Department selected these instructors from officers experienced in tanks or mechanized cavalry.<sup>11</sup> Many of the leading armor officers of the Second World War attended Leavenworth during this period. The lectures by Brett, and Kingman in particular, influenced the thinking of these future armor leaders.<sup>12</sup> Military Review,\* the Command and General Staff School publication, reflected the school's great interest in mechanization.

As the title would seem to indicate this journal was primarily a review of books, articles, and documents pertaining to military subjects. It also abstracted and

---

<sup>10</sup>Historical Section, Army Ground Forces, History of the Armored Force, Command and Center (Study #27, Army Ground Forces, 1946), p. 4.

<sup>11</sup>Memo from Commandant Command and General Staff School to AG, 210.63 (11-4-37), RG 94, NA.

<sup>12</sup>Peter C. Hains, III, 10 July 1967; S. R. Hinds, 13 July 1967; I. D. White, 20 June 1967, correspondence with author.

\*Originally entitled Review of Current Military Literature, 1922-39.

translated foreign military studies. One department, "Academic Notes," reprinted current memoranda affecting institutional procedure and tactical doctrine. Publication of original military studies by students and instructors at the staff school originated in the June, 1935, issue. One timely addition to the journal was "Military News around the World" in December of 1937. In subsequent issues this department contained information on military preparation and rearmament in Europe, the war in Asia, the Spanish Civil War, the Russo-Finnish War, and the World War in Europe. A final feature of Military Review was a subject index similar to that in the Reader's Guide to Periodical Literature. Between the first issue in February, 1922, and June, 1940, this index listed approximately 1100 articles from foreign and American journals under the subject heading: "Tanks." Unlike some articles in Infantry Journal and Army Ordnance, almost all articles in Military Review were unconcerned with the purely technical aspects of the tank itself. The history and the tactical employment of tanks were the primary subjects.

Reviews of foreign articles dominated the early editions of this journal. For instance, the March, 1922,

issue contained an abstract of an article by J. F. C. Fuller, the English tank enthusiast and wartime Chief of Staff of the Royal Tank Corps, on the "Problems of Mechanized Warfare." Originally published in the Army Quarterly (an English publication), Fuller's article proclaimed that with increased mobility tanks in the future would create a tactical condition similar to that in the Middle Ages. At that time the armored knight relegated infantry to a purely defensive role. Resulting from the tank's ability to cover large areas in a short period of time, Fuller concluded that the length of future wars would be materially decreased.<sup>13</sup> Military Review reflected the controversy surrounding the use of tanks by printing in its next issue a rebuttal to visionaries such as Fuller. Another Englishman, Lieutenant Colonel J. C. Dundas of the Royal Artillery, in an article reviewed by the Military Review and entitled "Anti-Tank," raised the question of whether the visionaries' conception of the value of tanks might be

---

<sup>13</sup>Review of "Problem of Mechanical Warfare" by J. F. C. Fuller, from Army Quarterly, in Military Review, I (March, 1922), pp. 8-9. Hereafter cited as MR.

an exaggerated one. Dundas examined the other side of the tank question by discussing defenses against which the tank might be helpless.<sup>14</sup>

Throughout this period reviews of British, French, and German articles which aptly reflected various tank developments in the nations of their respective authors filled the pages of Military Review. English tank enthusiasts argued for highly mobile all-tank armies to restore tactical and strategical mobility to the art of war.<sup>15</sup> Organized in 1927, the British Experimental Mechanized Force paved the way for future armored development and led to demands for armored forces composed largely or entirely of tanks.<sup>16</sup> Subsequent English

---

<sup>14</sup>Review of "Anti-Tank" by J. C. Dundas, from Journal Royal United Service Institution, in MR, I (April, 1922), p. 4.

<sup>15</sup>Review of "The Influence of Fast Moving Tanks on the Encounter of Battle" by J.F.C. Fuller, from Royal Tank Corps Journal, in MR, III (July, 1924), p. 5; review of In the Wake of the Tank by Gifford le Q. Martel, in MR, XI (March 1932), p. 77; review of On Future Warfare by Fuller, in MR, VIII (December, 1928), p. 44.

<sup>16</sup>Richard M. Ogorkiewicz, "The Structure and Functions of Armored Divisions, Part I," Armor, LXVII (Jan.-Feb., 1958), p. 15. See this three part series for a good description of armor development in Europe during the inter-war period.

tank experiments concentrated on the all-tank idea with the result that in the early part of World War II British tanks suffered from a lack of support from other arms. Reviews of French articles on tanks illustrated the fact that until the 1930's there was little done in the French Army toward formulating a mobile role for tanks. French soldiers thought of tanks as merely infantry support weapons. A review of an article from the French journal Revue d' Infanterie in the October, 1923, issue of Military Review maintained that it was futile to employ tanks in an independent role where they cannot receive adequate protection from antitank weapons and constant close support from the infantry with whom they should operate.<sup>17</sup> Tanks and infantry had to operate as mutually supporting arms. German studies during this period were most often concerned with theoretical employment of mechanized units. Two such studies from Militar Wöchenblatt, translated in September, 1931, Military Review, dealt with the use of a mechanized force in German Army maneuvers and with the possible organization of German motorized

---

<sup>17</sup>Review of "The Action in the French Tenth Army" by Peraldi Fiorella, from Revue d' Infanterie, in MR, II (October, 1923), p. 7.

18  
divisions. Prohibited by the Versailles Treaty from possessing tanks, the Germans could only theorize publicly about armor development in the twenties. However, there were some clandestine German experiments with tanks in Sweden and the Soviet Union. In the 1930's with German rearmament and the establishment of large panzer forces Military Review translated, abstracted, and reviewed many more articles and books by Germans on the subject of tanks. Throughout this decade, German writers increasingly discussed integrated mechanized commands, composed of tanks, infantry, artillery, and support units, and the subject of anti-tank defense. Some, although not many, Soviet articles on tanks appeared in Military Review during this period. If this journal is any indication the American military was well aware of European tank developments between the two World wars.

With the exception of articles from American journals listed in index and an occasional review of an article, Military Review was little concerned with the

---

18  
Translation of "Employment of a Mechanized Force" by von Wedel and "Suggestions for the Motorization of the Army," from Militar Wöchenblatt, in MR, XI (September, 1931), p. 27 and p. 39.

development of tanks in the United States during the twenties. Perhaps this in itself is an indication of a lack of interest in American mechanization. But coverage given the subject in other journals would seem to disprove this contention. The establishment of the Experimental Mechanized Force at Fort Meade in 1928 and the organization of the Mechanized Cavalry Regiment at Fort Knox in 1932 no doubt stimulated American interest in tanks. A change in the format of Military Review, allowing publication of original military studies by Command and General Staff School personnel, coupled with this renewed interest in tanks resulted in more essays written by American officers on the subject of mechanization.

In two original studies in the June, 1935, issue the authors discussed the impact of technical improvements, producing faster, more reliable vehicles, on the employment of tanks as combat machines. Major Leland S. Hobbs, in his article entitled "Tactical and Strategic Effects of the Development of the Fast Tank," contended that fast tanks embodied the most advanced design of highly mobile ground weapons that were available to any nation. The inevitable trend toward greater

strategical maneuver and increased firepower, resulting in wider dispersion, will give the more mobile army the advantage of the initiative.<sup>19</sup> Reaching somewhat the same conclusion, Major Robert W. Grow, a future Armored Division commander in World War II, in an article on the "Mechanized Elements of the Cavalry Division," said that mechanization increases the sphere of action and combat power of the cavalry division.<sup>20</sup> Tactical doctrine of this period had not yet caught up with the optimistic statements of the above officers. Reflecting this fact, the "Academic Notes" department of the June, 1937, Military Review, said that although mechanized cavalry extended the sphere of action of the cavalry division, "the main force is assumed to be made up of foot or horse elements to which the mechanized elements are auxiliary." Support of the infantry and horse cavalry in carrying out their traditional missions was the function of tanks. Tanks were not to be used as an

---

<sup>19</sup> L. S. Hobbs, "Tactical and Strategical Effects of the Development of the Fast Tank," MR, XV (June, 1935), pp. 19-20.

<sup>20</sup> Robert W. Grow, "Mechanized Elements of the Mechanized Cavalry Division," MR, XV (June, 1935), p. 203.

21

independent striking force.

The most significant event in stimulating inter-war discussion of armor doctrine was the Spanish Civil War. Some military observers concluded that the poor performance of tanks in Spain proved that they were not the weapon of the future but vastly overrated figments of visionaries' imaginations. Other observers maintained that tanks had not been properly used: in the Spanish war the belligerents used tanks in small numbers, without infantry or artillery support in marshy terrain. For these reasons tanks failed to fulfill expectations. Articles in Military Review generally took this latter position.

An American infantry officer, Captain Wendell G. Johnson, wrote in the March, 1939, Military Review, "Numerous hasty and unjustified deductions and not a few unsound conclusions have been formed by military observers in Spain. . . . For example, to say that the Spanish Civil War has shown tanks to be worthless, as

---

<sup>21</sup>"Academic Notes: Tactical Employment of the Mechanized Division," MR, XVII (June, 1937), p. 203.

some would have us believe, is an absurd, unsubstantiated statement which is disproved by their continued use if nothing else." Johnson concluded that the experience in Spain had not disproved the soundness of already established tank doctrine. Tanks must be conserved for vital, decisive missions and employed on suitable terrain, not in mud as at Guadalajara.<sup>22</sup> Later in 1939 an article in the "Military News Around the World" department of this journal declared that too few tanks were used in Spain to shed much light on the question of whether they can be used to break up wars of position and restore mobility to warfare. In Spain "little use was made of the principle of mobility."<sup>23</sup>

By late 1939 the success of the Germans in Poland and the employment of the 7th, Cavalry Brigade (Mechanized) in the August, 1939, First Army maneuvers at Plattsburg stimulated even more American interest in tanks. The Polish campaign in particular did much to

---

<sup>22</sup>Wendell G. Johnson, "The Employment of Supporting Arms in the Spanish Civil War," MR, XIX (March, 1938), p. 14.

<sup>23</sup>"Military News Around the World: Lessons from Spain," MR, XIX (June, 1939), p. 33.

restore confidence in the combat ability of tanks. But the German experience also pointed up the fact that tanks had certain limitations to be successful they had to be properly organized, equipped, and employed.

Lieutenant Colonel Enrique M. Benitez, in an original study in the December, 1939, Military Review, outlined the reasons behind the German success. Among the reasons were the sound strategical conception upon which the Germans based their campaign and the expert employment of their air and mechanized forces in exploiting the advantages offered by the situation.<sup>24</sup> Re-jecting the auxiliary role foreseen by earlier writers, Major Rufus S. Ramey in "Notes on the Organization and Employment of Mechanized Cavalry" said that mechanized cavalry was a powerful striking force possessing great strategical and tactical mobility.<sup>25</sup> Mechanized cavalry should be organized to carry out independent missions. Another article by Ramey, based on his experience as an

---

<sup>24</sup>E. M. Benitz, "The European War," MR, XIX (December, 1939), p. 36.

<sup>25</sup>R. S. Ramey, "Notes on the Employment and Organization of Mechanized Cavalry," MR, XX (March, 1940), p. 79.

observer at the Plattsburg maneuvers, concludes, "The 7th Cavalry Brigade, Mechanized, demonstrated its high value and effectiveness in mobile operations . . . though the maneuver area was far from favorable for its best and most effective employment.<sup>26</sup> Particularly in the late thirties original articles by American officers in the Military Review supported the development of mechanized units for use in an independent, mobile role. The fact that these authors were instructors and students at Fort Leavenworth supports the contention that Command and General Staff School personnel were armor advocates during this period.

#### Army Ordnance

During the mid-twenties Army Ordnance published numerous articles dealing with the technical side of tank development; "The New Packard Tank Engine," "Medium Tank, Model 1921," "The Heavy Armored Car," "Automotive Equipment of the Army." Throughout the interwar period this

---

<sup>26</sup> R. S. Ramey, "Strategical and Tactical Mobility," MR, XX (March, 1940), p. 95.

journal is a good source for tracing the mechanical evolution of American tanks. As an unofficial organ of the Ordnance Department this journal was naturally more concerned with the production of tanks and with their mechanical characteristics than with the tactical doctrines behind their use. But to the extent that mechanical characteristics affect a tank's performance and thus determine how it might be used the Ordnance Department would necessarily be interested in doctrine. The Department's interest in armor doctrine and the whole question of whether or not to mechanize was reflected in Army Ordnance articles during the 1920's and 1930's. An article by Major Raymond E. Carlson in the November-December, 1920, issue set the tone for future articles concerning tanks and mechanization. Carlson wrote, "This past war has proved beyond the peradventure of a doubt the wondrous possibilities of mechanical warfare. . . . Whether or not we profit from this war's experience depends on ourselves. A broad and comprehensive military policy for the use of tanks must constantly be preached."<sup>27</sup>

---

<sup>27</sup> Raymond E. Carlson, "Tanks," Army Ordnance, I (November-December, 1920), p. 117. Hereafter cited as AO.

Past accomplishments in the field of mechanization, both in the United States and in Europe, comprised the majority of journal articles during this period. Writing in the 1929 Army Ordnance, Chaffee's friend Charles G. Mettler, the former Assistant Military Attache in London, described the British mechanized forces. Favorably impressed with the impact of mechanized units on the morale of the British soldier, Mettler wrote, "Man has greater courage in the presence of power and protection and company." Strategically, mechanized <sup>vehicles</sup> give mobility to the side possessing them, allowing domination of the battlefield. In that sense, Mettler concluded that a mechanized force might be able to shorten a war.<sup>28</sup> A most prolific writer, having articles published in several American journals, and a future 1st. Armored Division regimental commander in North Africa, Clarence C. Benson wrote a series in the 1933 Army Ordnance on "Mechanization in Europe." Benson wrote little on mechanization in Russia, Germany and France. Information about the Soviets was difficult to obtain. Forbidden to possess

---

<sup>28</sup> Charles G. Mettler, "The British Armored Forces," AO, X (July-August, 1929), p. 10.

tanks by the Treaty of Versailles the Germans did little more than experiment. The French, seeing Germany as their primary rival, thought that since the Germans had no tanks France needed none either. Like Mettler, Benson seemed impressed by the English efforts at mechanization. Benson discussed the maneuvers of the British mechanized units in 1928 and 1929 as well as discussing the equipment tested then.<sup>29</sup>

During the thirties a number of studies of American accomplishments in the field of armor appeared in Army Ordnance. An ordnance officer, Major Burton C. Lewis, discussed the establishment of the permanent mechanized unit at Fort Eustis in 1930. Organized on the theory that modern light tanks were a principal offensive weapon, the mechanized force had the task of testing tank tactics and equipment. Lewis' article discussed the equipment, tanks, armored cars, trucks, artillery and the organization of the Fort Eustis unit.<sup>30</sup>

---

<sup>29</sup>C. C. Benson, "Mechanization in Europe," AO, X (July-August, 1929), pp. 29-36.

<sup>30</sup>Burton O. Lewis, "The Mechanized Force, United States Army," AO, XI (May-June, 1931), p. 431.

According to John K. Christmas, another ordnance officer, the Experimental Mechanized Force at Fort Meade in 1928 and the Eustis mechanized force in 1930 reflected the evolution of tactical thought on mechanization. From the idea of a force of all arms wholly mechanized (at Fort Meade) American military thought changed to a mechanized cavalry arm (at Fort Eustis) to carry out a limited cavalry role. Captain Christmas said that perfecting high-speed track laying tanks was the major problem confronting the Ordnance Department in the field of mechanization.<sup>31</sup> In the May-June, 1937, issue Robert J. Icks wrote an account on the evolution of American armored fighting vehicles. Icks traced developments from the problems of procuring tanks for the AEF in World War I to the post-war efforts in producing a fifteen-ton-all-purpose tank to the revival of interest in fast light tanks for infantry support in the late 1920's. The author notes the difficulties encountered in finding vehicles suitable of the tactical role expected of them. "All during this period, there

---

<sup>31</sup>John K. Christmas, "Mechanization in Our Army Today," AO, XIII (July-August, 1932), p. 11.

had been differences of opinion between the using services and the designing service."<sup>32</sup>

A dialogue between an advocate and a critic of mechanization developed in Army Ordnance in 1931 and 1932. Their articles provide an indication of the controversy surrounding mechanization. Characterizing the history of warfare as a succession of cycles in which one arm then another dominates, J. F. C. Fuller said that the artillery cycle waned as the period of mechanization approached. Fuller maintained the necessity to restore mobility to war and to overcome the tactical deadlock brought on by massed artillery and the machine gun. The experience of the First World War illustrated, according to Fuller, that relatively primitive tanks enabled the Allies to achieve some cheap, in both terms of lives and money, victories.<sup>33</sup> Frederick H. Wagner, a Colonel in the Ordnance Reserve, disagreed with Fuller and asserted that with the exception of Cambrai, where

---

<sup>32</sup> Robert J. Icks, "Four Decades of Mechanization," AO, XVII (May-June, 1937), p. 338.

<sup>33</sup> J.F.C. Fuller, "The Mechanization of War," AO, XI (January-February, 1931), p. 261.

the initial success was reversed in a few days anyway, "The tank may be considered somewhat of a failure." Wagner believed that tanks in future wars would be even less successful because armies in the future would be prepared to defeat them. The tank's only real weapon in the World War was surprise and that would be impossible in a future war.<sup>34</sup> In subsequent articles Warner went on to dispute Fuller's analysis of the tank's success in battle pointing out the high attrition rate among the tanks, that the Germans in the spring of 1918 carried out an offensive without the benefit of tanks, and that surprise accounted for any success tanks achieved. Replying to Wagner in a letter to the journal, Fuller charged that Wagner had a "GHQ" mind, the sort which opposed the use of tanks during the war. "To me it seems that his fundamental defect is, that in place of relying on his own ideas, he has ransacked the history of tank warfare in order to discover wherever he can, some weak point, defect, or error, and then to build his theories on these." Fuller said that Wagner apparently envisaged all

---

<sup>34</sup>Fred H. Wagner, "Possibilities of the Tank, Part I," AO, XI (May-June, 1931), p. 437.

war as siege war like World War I and failed to understand that tanks opened the way for the more mobile campaigns in the summer and fall of 1918.<sup>35</sup> This was not the end of the controversy. In still another letter in reply to Fuller's letter, Wagner wrote that he published the original series of articles to present the other side of the tank question. "So much one-sided information had been published regarding tanks, that the man in the street in many cases had reached the conclusion that some few thousands of these new implements of warfare were all that was necessary to win a battle." Wagner charged that Fuller, suffering from the specialist's inability to see a rational course, failed to realize that antitank weapons had kept pace with the tank and could render tanks impotent.<sup>36</sup> Obviously this argument might have gone on indefinitely. Army Ordnance, taking an interest in mechanization, published numerous articles during the thirties presenting both sides of the argument.

---

<sup>35</sup>J.F.C. Fuller, "A Reply to Colonel Wagner's series of Articles in this Journal," AO, XIII (September-October, 1932), p. 80.

<sup>36</sup>Fred H. Wagner, "Communications: Possibilities of the Tank," AO, XIII (November-December, 1932), p. 172.

Editorially this journal urged modernizing, including mechanization and motorization, the Army. An editorial in the September-October, 1933, issue criticized the Administration for not going ahead with modernization plans despite the support of such plans by the Secretaries of War and Navy. Fulfillment of the plans would provide much needed mechanized and motorized equipment, thus renovating a military machine lacking up-to-date fighting vehicles. The writer also recognized the current unemployment situation by commenting, "At least eighty-five per cent of every dollar spent for mechanization and motorization will go for labor."<sup>37</sup> Such a program would benefit the domestic economy. Mechanization, whether carried out under the auspices of the infantry or the cavalry or by an independent command, and regardless of how the tanks might be used, enhanced the position of the Ordnance Department. Designing, producing, and testing mechanized equipment required a larger percentage of the defense budget and an increase

---

<sup>37</sup>"Month by Month: Mechanization and Motorization," AO, XIV (September-October, 1933), p. 100.

in personnel for the department. Perhaps this explains to some extent the editorial support given mechanization by Army Ordnance.

In the late 1930's this journal, like the other military periodicals, published articles which illustrated the difference of opinion over the value of tanks in the Spanish Civil War. An Italian Army officer, Emilio Canevari, declared that the Spanish war confirmed the importance of infantry and at "the same time has witnessed the breakdown of practically all hopes based on tanks." Well-prepared and forewarned defenders destroyed attacking tanks in every encounter.<sup>38</sup> But the evidence from Spain was by no means conclusive. Liddell Hart wrote in a 1938 article, "The influence of the tanks on the rapid progress of the Santander offensive confirmed the oft expressed view of their protagonists that their effect would depend in employing them in quantity and that such use would bring results in far more than arithmetical proportions to their increased numbers." Failures of tanks in Spain resulted from mistakes, similar

---

<sup>38</sup> Emilio Canevari, "Forecasts from the War in Spain," AO, XVII (March-April, 1938), p. 275.

to the mistakes of 1916 and 1917, in their employment.<sup>39</sup> In spite of the coverage given the tanks in Spain, almost no articles appeared in Army Ordnance on the use of German tank units in Poland and France. One explanation for this might be that by 1940 the United States had begun to rearm. Most articles in the journal at this time discussed subjects directly related to rearmament, such as industrial mobilization and production procedures for various weapons.

#### Cavalry Journal

Because the National Defense Act of 1920 gave control of tanks to the infantry, almost no Cavalry Journal articles on the subject appeared in the immediate post-war period. Quite a few of this journal's articles pondered the past performance and the future possibilities of horse cavalry. Writing on "The Future of Cavalry," Lieutenant Anthony J. Tittinger attributed the failure of the German 1914 offensive to a lack of cavalry. According to this officer, who ignored the effectiveness

---

<sup>39</sup>B. H. Liddell Hart, "Lessons of the Spanish War," AO, XVIII (January-February, 1938), p. 202.

of the machine gun, the employment of large cavalry forces rendered position war of the Western Front variety impossible. "As for tanks their invention has no effect whatsoever on the future of cavalry." Tittinger said that tanks were valuable for trench warfare but if cavalry were used that sort of warfare would be impossible anyway.<sup>40</sup> Another cavalry officer, Colonel Hamilton S. Hawkins, said that had mass cavalry assaults been used by the Allies, German positions on the Western Front might have been breached with small losses. Modern weapons, such as machine guns and artillery, gave horse cavalry better protection than was previously possible, according to Hawkins.<sup>41</sup> An infantryman who served in a tank unit, Bradford G. Chynoweth, wrote the only Cavalry Journal article specifically about tanks during this period. In a forward looking discussion, Chynoweth concluded that tanks should be under neither cavalry nor infantry control. Being a new and special weapon

---

<sup>40</sup>A. J. Tittinger, "The Future of Cavalry," Cavalry Journal, XXIX (April, 1920), p. 69. Hereafter cited as CJ.

<sup>41</sup>Hamilton S. Hawkins, "The Role of Cavalry," CJ, XXIX (October, 1920), p. 265.

tanks should be properly formed into a tank corps for employment in cooperation with other arms as circumstances warranted.<sup>42</sup>

With the development of independent mechanized forces in the late twenties and the revision of the War Department mechanization policy in 1931, cavalry interest in tanks grew. Consequently the number of Cavalry Journal articles on the subject increased. The more advocates of mechanization sought to publicize their position and win converts, the more vehement the opponents of mechanization became in their defense of the horse.

Throughout the late twenties and during the thirties quite a few articles of the Tittinger-Hawkins variety, criticising mechanization and lauding the horse, appeared in this journal. Hawkins himself wrote a monthly column, until his death after World War II, in which he continued to oppose attempts to dehorse cavalry units. In 1926 he wrote, "The people like novelties and

---

<sup>42</sup>Bradford G. Chynoweth, "Cavalry Tanks," CJ, XXX (July, 1921), p. 252.

fanciful toys, especially those of a mechanical variety." Hawkins thought tanks too limited in capabilities to significantly contribute to future warfare.<sup>43</sup> Once the Mechanized Force formed in 1930 Hawkins disparaged the mobility of mechanized units, comparing it to infantry moving by railroad. The need for gas and oil limited the mobility of mechanized units to road travel. According to Hawkins, horse units could maneuver on any terrain even when separated from supplies and forage for several days. Increased firepower to suppress enemy fire made cavalry more important than ever.<sup>44</sup> The Mechanized Force at Fort Eustis elicited numerous comments from Cavalry Journal contributors. Major John B. Smith, a Kansas National Guard cavalry officer, wrote that the "motor-minded" public accepted uncritically the need for mechanized and motorized troops. Smith contended that the horse remained an integral part of the Army. "While it is conceivable that his hoof print will

---

<sup>43</sup>Hamilton S. Hawkins, "The Importance of Modern Cavalry," CJ, XXXV (October, 1926), p. 87.

<sup>44</sup>Hamilton S. Hawkins, "Cavalry and the Mechanized Force," CJ, XL (September-October, 1931), p. 19.

someday be found only in the fossilized exhibits of the museum, the tire tread cannot as yet claim mastery over his domain."<sup>45</sup> As the following quote from a Cavalry Journal editorial indicates, the critics of mechanization and the defenders of the horse often based their arguments on pure sentimentality. "Combine the two animals, man and horse, in sympathetic understanding of nerve and muscle, stimulated by the knowledge of their combined speed and power and you have a different and exalted being; superior in daring, dash, elan, and all-round 'ground mobility' to any combination of man and machine."<sup>46</sup>

Writing in 1926 Lieutenant Eugene F. Smith, an infantry tank officer, discussed the possible use of "Armored Vehicles with Cavalry." Smith's article outlined the argument expressed by the moderate mechanization advocates during the thirties. According to this argument, armies of the future would never become totally

---

<sup>45</sup>John B. Smith, "The Effects of Mechanization Upon Cavalry," CJ, XL (November-December, 1931), p. 24.

<sup>46</sup>"Mechanized Cavalry," CJ, XL (November-December, 1931), p. 56.

mechanized. But mechanized units ably supplement horse cavalry. Traditional cavalry missions which mechanized forces could perform included reconnaissance, exploitation of a breakthrough, delaying actions, and pursuit.<sup>47</sup> The World War I tank commander, George S. Patton, explained the advantages and disadvantages of mechanization in a 1933 Cavalry Journal article. Under many conditions of terrain and weather mechanized units possessed a wider range of tactical and strategical mobility than other ground troops. But their sensitivity to terrain and weather and the difficulty in controlling them were the main disadvantages of mechanized units. At this time Patton believed that tanks were primarily infantry weapons. But he also thought that the cavalry could ill afford to totally ignore the potential of mechanization.<sup>48</sup> In 1933 a cavalry officer, Captain Francis T. Bonsteel, wrote on "The Employment of a Mechanized Cavalry Brigade." This author believed

---

<sup>47</sup>E. F. Smith, "Armored Vehicles with Cavalry," CJ, XXXVII (January, 1926), p. 94.

<sup>48</sup>G. S. Patton, "Mechanized Forces," CJ, XLII (September-October, 1933), p. 6.

that mechanized cavalry enabled the commander to extend his power beyond the sphere of action of other arms and to influence the course of events by striking a decisive blow in a vital direction. Bonsteel maintained that mechanized cavalry would achieve its greatest results when concentrated in large masses and employed to exploit fleeting opportunities.<sup>49</sup> Offering a different opinion, Major Robert W. Grow wrote in 1938, "Combat cars today are the backbone of mechanized cavalry but their independent employment is never contemplated." Grow, an officer in the mechanized brigade at Fort Knox, reflected the prevalent American view of mechanized cavalry; it merely added speed and power to the traditional employment of horse cavalry.<sup>50</sup>

During the late thirties many of the articles on mechanized cavalry published in Cavalry Journal described the activities of the 7th. Cavalry Brigade (Mechanized). Colonel Bruce Palmer wrote on "Mechanized Cavalry in the

---

<sup>49</sup>F. T. Bonsteel, "The Employment of a Mechanized Cavalry Brigade," CJ, XLII (September-October, 1933), p.26.

<sup>50</sup>R. W. Grow, "Mechanized Cavalry," CJ, XLVII (January-February, 1938), p. 30.

Second Army Maneuvers, 1936"; Willis D. Crittenberger described "Cavalry Maneuvers at Fort Knox"; Adna Chaffee analyzed the performance of the "7th. Cavalry Brigade in the First Army Maneuvers." Similar to other military periodicals examined, Cavalry Journal published several articles on the German campaigns in Poland and France. H. Rowan-Robinson, a retired British Army officer, described the Polish campaign in the May-June, 1940, issue of the journal. According to Rowan-Robinson, the German blitz tactics warranted much study.<sup>51</sup>

Throughout the twenties and thirties Cavalry Journal articles reflected the general attitude of the cavalry branch toward the subject of mechanization. Many of the authors took the anti-mechanization position outlined by Lieutenant Colonel Kinzie B. Edmunds, an advocate of more extensive mechanization. Edmunds lamented, "Our country is instinctively hostile to any machine which may supplant the horse, and inclined to disparage

---

<sup>51</sup>H. Rowan-Robinson, "Lessons of a Blitzkrieg," CJ, XLIX (May-June, 1940), p. 211.

its effect."<sup>52</sup> The majority of articles which favored mechanization outlined a moderate approach. Authors such as Patton, Grow, and Lieutenant Smith weighed both sides of the argument. These authors recognized that mechanized units had strengths and weaknesses but they believed that the cavalry should exploit the capabilities of mechanized units for its own use. As the cavalry became more interested in mechanization after 1931, the number of Cavalry Journal articles on mechanization increased. By the late 1930's the events in Europe and the performance of the American mechanized cavalry became the primary topics of articles on mechanization. Despite increased cavalry interest in the subject of mechanization, throughout this period Cavalry Journal remained overwhelmingly oriented toward the horse. Most articles were about traditional cavalry topics: horses, horse care and breeding, horse cavalry tactics, polo, and even saber drill.

---

<sup>52</sup>K. B. Edmunds, "Tactics of a Mechanized Force: A Prophecy," CJ, XXXIX (April, 1930), p. 411.

Infantry Journal

The assignment of tanks to infantry stimulated many articles in Infantry Journal during the 1920's and early 1930's. As control of tanks passed to the cavalry the number of articles in this journal on the subject of tanks decreased discernibly. During the middle and late thirties only one or two such articles appeared each year in Infantry Journal, while in the 1920's and early 1930's there were between three to seven. With the successful German invasion of Poland in September, 1939, a deluge of tank articles again appeared. Subjects studied by these writers included the use of tanks during World War I, developments in tank organization after the war, technical aspects of tanks such as engines, weapons, armor plate, compasses, radios, and articles on tank doctrine. But to some extent all the articles dealt with doctrine. The historical-type studies served to illustrate the author's views of how tanks should be used. Almost all of the articles appearing in 1939 and 1940 discussed the German tank operations in Europe.

The war-time commander of the Tank Corps,

Samuel D. Rockenbach, was a regular contributor of tank articles to Infantry Journal. Most of Rockenbach's articles dealt with the tank's use during the war. Unlike many tank advocates, Rockenbach pointed out the weaknesses and limitations of tanks. He stated that the local successes at St. Mihiel and in the Argonne must not be taken as a basis for conclusions on tanks' use. For the future, improved tanks must be designed and manufactured. To achieve results tank units should be trained and organized with infantry.<sup>53</sup> Another study by Rockenbach in 1922 on "Tanks at the Battle of Amiens" reached a number of conclusions about the use of tanks based upon personal observation and on narratives by British officers who participated in the battle. One salient conclusion was that none of the war-time tanks had sufficient speed or endurance for sustained open warfare.<sup>54</sup> Captain George H. Rarey, another tank enthusiast and prolific writer, contributed seven articles to Infantry Journal on the subject of "Tanks in

---

<sup>53</sup> Samuel D. Rockenbach, "Tanks and Their Cooperation with Other Arms," Infantry Journal, XVI (January, 1920), p. 538. Hereafter cited as IJ.

<sup>54</sup> Samuel D. Rockenbach, "Tanks in the Battle of Amiens," IJ, XXI (August, 1922), p. 148.

the Great War." By the latter part of the twenties articles on tanks in the war gave way to studies on developments since 1920. In 1928 the Chief of Infantry, Robert H. Allen, summarizing American tank developments in the postwar era, concluded that the tank must be looked upon as a weapon which would restore the balance of power to the offensive and nullify the advantage of the machine gun.<sup>55</sup> Allen proclaimed that the tank was a weapon which could prevent stabilized warfare of the World War variety. A series of four articles by Ralph E. Jones, entitled "Our Tanks," went into great detail examining American tank organization, equipment, and doctrine following the First World War. This series of articles running from October, 1929, through January, 1930, maintained that in the future tanks would be an even more important auxiliary than before. Future army commanders would have an armored force from which to choose leading or accompanying tanks to accomplish any mission.<sup>56</sup> Even in narrative articles authors managed

---

<sup>55</sup>R. H. Allen, "A Resume of Tank Development in the United States Army," IJ, XXXII (January, 1928), p. 8.

<sup>56</sup>Ralph E. Jones, "Our Tanks," IJ, XXXV (December, 1929), p. 598.

to proclaim their beliefs on how future tanks should be used. The major question in this dispute was whether tanks should remain tied to their infantry support mission or should they be employed independently, striking the enemy at weak points and penetrating to his rear.

A majority of Infantry Journal articles during the twenties and thirties were theoretical in nature dealing solely with how tanks should be organized and used. Writing on "Tanks in Future Warfare," George Patton, in 1920, said that the Tanks Corps should remain a separate entity to be used by higher commanders where its presence would do the most good.<sup>57</sup> The following issue contained a report by a board of officers assigned by the AEF to make recommendations on the future organization of the army. In part the report read, "The tank should be recognized as an infantry supporting weapon incapable of independent decisive action."<sup>58</sup> It should be pointed out that these articles written in 1920 had

---

<sup>57</sup>George S. Patton, "Tanks in Future Wars," IJ, XVI (May, 1920), p. 962.

<sup>58</sup>"Infantry Organization," IJ, XVI (June, 1920), p. 1037.

only the slow, cumbersome World War I tanks upon which to base their conclusions. By the end of the decade development of faster, more dependable tank models had changed the situation. Because of this, talk of an independent armored force was more realistic in 1928 than it was in 1920. As interpreted by Major Ralph E. Jones the problem became one of three interdependent factors: purpose, vehicle type, organization. Improvements in tank design had to be accompanied by better tactics and organization.<sup>59</sup> Echoing earlier cries for an independent mechanized branch, Major Clarence C. Benson in 1929 said that the cavalry and infantry could not be expected to specialize in mechanization and fulfill their other missions as well.<sup>60</sup> The purpose of an independent force would be to provide commanders with an additional powerful weapon, combining firepower, shock, and speed to a greater degree than was previously possible.

---

<sup>59</sup> Ralph E. Jones, "The Tactical Influence of Recent Tank Developments," IJ, XXXV (May, 1928), p. 457.

<sup>60</sup> C. C. Benson, "Mechanization--Aloft and Alow," IJ, XXXIV (January, 1929), p. 23.

Organization of the experimental mechanized units in the late twenties and the assignment of tanks to cavalry in 1930 brought varied responses in the Infantry Journal. Sereno Brett said that the experimental units showed the need for balanced flexible forces. Tanks could not operate alone but had to be supported by infantry, artillery, engineers, and supply elements, all of which required mechanized vehicles to keep pace with the tanks.<sup>61</sup> Others had different definitions on what constituted balanced, flexible forces. The Chief of Cavalry, Guy V. Henry, thought in terms of combining horse and mechanized troops. "The use of our combined cavalry (mechanized-horse) in wars of the near future will be the same as that laid down for our cavalry of today. Each must be used in conjunction with but not tied to the other to obtain its maximum efficiency. Both horse and mechanized cavalry have their powers and limitations."<sup>62</sup> Disagreeing with Henry's assessment of the situation, an infantry officer, Lieutenant Colonel

---

<sup>61</sup>Sereno Brett, "Tank Reorganization," IJ, XXXVI (January, 1930), pp. 29-30.

<sup>62</sup>Guy V. Henry, "The Trend of Organization and Equipment of the Cavalry," IJ, XXXIX (March-April, 1932), p. 100.

Lee D. Davis said, "No one advocates incorporating cavalry (horse) with infantry (foot), yet there is as much reason for doing this as for combining horse cavalry and mechanized elements or infantry and mechanized units. As between infantry and cavalry and mechanized forces there is a step up in speed and radius of action which makes each distinct from the others."<sup>63</sup> An article by another infantryman, William C. Lee, proposed a solution quite similar to the Armored Force organization in 1940. Realizing that high-speed, self-contained tank formations were less and less for direct infantry support, but apprehensive of any attempts to strip infantry of that support, Lee asked the question: how can the foot-soldier best be aided? Lee concluded that concentrated armored formations acting as a mobile arm, supporting the general action by wide maneuvering against the enemy's flank and rear, would both aid the infantryman and take advantage of the inherent mobility

---

<sup>63</sup> Lee D. Davis, "The New Arm," IJ, XLII (January-February, 1935), p. 56.

of tanks.<sup>64</sup>

With the outbreak of war in Europe the number of Infantry Journal tank articles greatly increased. Most of these writers analyzed the German campaigns in Poland and France in an attempt to discover the reasons for their rapid success. Some skeptics, such as Major Thomas R. Phillips of the Coast Artillery, remained. Writing in the March-April, 1940, Infantry Journal, just prior to the campaign in France and the Lowlands, Phillips said that an attack on the Maginot Line would be more difficult than the German assault on Verdun in 1916.<sup>65</sup> Failing to realize the Germans' mobility allowed them to bypass strategic defenses, Phillips should have written his article two months later. The majority of these studies recognized that the German mechanized forces represented an important new combat formation. Following the fall of France in June, Captain H. W. Ehr Gott wrote that the Germans combined speed and overwhelming power in their panzer forces to defeat the French and British.<sup>66</sup>

---

<sup>64</sup>William C. Lee, "The Use of Inherent Mobility," IJ, XLII (January-February, 1936), pp. 11-12.

<sup>65</sup>Thomas R. Phillips, "Attack or Defense?", IJ, XLVII (March-April, 1940), p. 98.

<sup>66</sup>H. W. Ehr Gott, "Power Plus Speed," IJ, XLVII (July-August, 1940), p. 306.

American military journals in the period from 1920 to 1940 presented a wide range of opinion on the development of armor doctrine. Tanks had both their partisans and their critics who used these journals as vehicles for expressing their views. A wide range of articles, covering a variety of topics related to armor, such as historical accounts of tanks in the World War and after, studies on foreign mechanized development, technical discussions of tank equipment, and theoretical treatises on armor doctrine, might be found in these periodicals. While they presented articles on both sides of the mechanization issue, the service journals reflected the views of their respective branches in their editorial positions on the control of tanks and on the various plans for modernization.

## CONCLUSION

During the First World War the British developed tanks to support infantry attacks on heavily defended trenches. Tanks led the way and made the task of the foot soldier much easier. The American Tank Corps adopted the tanks and the tank tactics first developed by the British and the French. Difficulties in manufacturing tanks eventually forced the Americans to borrow the vehicles from the Allies to equip three tank battalions. These were the only battalions of the American Tank Corps to see combat during the war. Poor coordination with the infantry, mechanical unreliability, insufficient numbers, and improper employment contributed to the poor performance of American tanks in 1918. But some military men saw the potential of tanks. Properly employed, they could significantly reduce casualties and restore mobility to warfare. The realization that tanks possessed this potential and the somewhat more successful use of tanks by the British stimulated postwar interest.

In an attempt to bring tanks under closer supervision of the infantry and to reduce postwar military

budgets, Congress in the National Defense Act of 1920 disbanded the Tank Corps and placed all future tank development under the control of the Chief of Infantry. During the 1920's tanks operated as close support weapons for the infantry (the mission they possessed since 1917); hence tanks conformed to the speed and tactics of infantry. In 1927 however, Secretary of War Dwight Davis organized the Experimental Mechanized Force to study the use of tanks, supported by other arms, in independent, mobile roles; but both the infantry and cavalry opposed an independent force which was free from branch control. Such a mechanized force threatened the infantry's exclusive control over tanks which Congress assured in 1920 while many cavalymen thought that mechanized units might replace horse cavalry as the Army's principal arm of mobile combat. When the War Department established a permanent Mechanized Force in 1930 the two branch chiefs voiced even stronger opposition.

In 1931 the Chief of Staff, Douglas MacArthur, revised the Army's mechanization policy. To take advantage of the capabilities of mechanized vehicles, MacArthur ordered all branches to mechanize so far as possible.

The Army disbanded the Mechanized Force and formed a mechanized cavalry regiment. Reaction to this move was mixed. Again the infantry protested that this was contrary to the National Defense Act of 1920 which placed control of tanks exclusively under the Chief of Infantry. Some cavalry officers made clear their resentment of the intrusion of motor vehicles into the realm of the horse. On the other hand, forward thinking cavalrymen saw the tank as a means to extend the mobility and increase the fighting power of their branch. For them, mechanization was both necessary and logical progress. Organized in 1933, the mechanized cavalry regiment, later expanded to a brigade, was the primary American mechanized unit of the decade. Officers of this unit developed the tactical doctrine employed by armored divisions in the Second World War. At first, mechanized cavalry merely used motor vehicles to accomplish traditional horse cavalry missions. But by the late thirties officers of the brigade envisaged mechanized cavalry as a force capable of sustained, independent combat and of exerting a decisive influence on the outcome of any battle. These officers attempted to "sell" their ideas to the War Department in an effort to get the Army to expand its mechanized units.

Two interrelated obstacles prevented an expansion of mechanized cavalry during the 1930's. The branches primarily concerned with mechanization, the cavalry and the infantry, were reluctant to convert horse or infantry units into mechanized troops. During much of the Depression era Congress was unwilling to appropriate money for any unnecessary military activity; within the Army the Chief of Staff and the War Department General Staff exerted much influence in determining how the limited funds would be spent. Given the choice between funds for supporting more Army personnel and funds for mechanization the General Staff chose the former. This is not to say that mechanization was completely ignored by Congress and the War Department. In fact, Lieutenant Colonel Adna Chaffee, long an advocate of extensive mechanization, served in the War Department Budget and Legislative Planning Branch and was an effective lobbyist for increasing the Army's mechanized units. But until 1940 efforts to increase American mechanized units were only moderately successful.

Expansion of mechanization appeared imminent at the beginning of World War II in the fall of 1939.

German mechanized forces, using tactics similar to those of the American mechanized cavalry, easily overran Poland and thus proved the viability of the ideas advocated by the American mechanization enthusiasts. But again branch rivalry intervened to obstruct any immediate expansion. Faced with the probability of an increase in mechanized forces, the Chiefs of Cavalry and Infantry each wanted to have expansion occur within their branch. In May, 1940, all American tank and mechanized cavalry units participated in maneuvers in Louisiana. This was also the month that the German armored forces burst through France. The maneuvers and the battle in France reaffirmed the capabilities of mechanization. At last, officers in the mechanized cavalry and infantry tank units convinced the War Department that only an independent force, separate from the rivalries of the infantry and cavalry, could achieve the full potential of mechanization.

By late 1940 the two obstacles to development of mechanization were overcome. Faced with what many considered a world crisis the United States could not avoid, Congress was more willing to spend money for

the military. The independent armored organization removed the hindrance of branch rivalry and branch traditionalism. Organized shortly after the 1940 maneuvers, the American Armored Force contained all of the infantry tank and mechanized cavalry units. The Armored Force was the culmination of the previous twenty years development and provided the basis for development of American armored divisions during World War II.

## BIBLIOGRAPHY

### Primary Sources

#### Records in the National Archives

Record Group 94  
Office of the Adjutant General - Central File.

Record Group 120  
American Expeditionary Force Adjutant General  
File.  
American Expeditionary Force General Headquarters  
File.  
G-3 Report File.

Record Group 165  
War College Division File.  
Military Intelligence Division File.

Record Group 177  
Chief of Cavalry File.  
Chief of Infantry File.  
Mechanized Cavalry Board File.

#### Interview

Crittenberger, Lieutenant General Willis D., Washing-  
ton, D. C., 19 July 1967, 25 July 1967.

#### Correspondence

Allen, Colonel Arthur W., Jr., 22 June 1967.

Byers, Lieutenant General Clovis E., 16 June 1967.

Clarke, General Bruce C., 10 June 1967.

Collier, Lieutenant General John H., 29 June 1967.

Devers, General Jacob L., 27 June 1967.

Dodge, Lieutenant General Charles G., 3 July 1967.

Gay, Lieutenant General Hobart, 16 June 1967.

Gillem, Lieutenant General Alvan C., Jr., 26 July,  
22 September, 27 September 1967.

Grow, Major General Robert W., 10 June 1967.

Hains, Major General Peter C., III, 10 July 1967.

Harmon, Major General E. N., 14 June 1967.

Hasbrouck, Major General Robert W., 19 June 1967.

Henry, Major General Guy V., 11 June 1967.

Hightower, Major General Louis V., 24 July 1967.

Hinds, Brigadier General Sidney R., 13 July 1967.

Holbrook, Brigadier General Willard A., Jr., 23 August  
1967.

Holly, Brigadier General Joseph A., 24 July 1967.

Howze, General H. H., 15 June 1967.

Icks, Colonel Robert J., 12 June 1967.

Johnson, Major General W. Paul, 16 June 1967.

Keyes, Lieutenant General Geoffrey, 23 September  
1967 (taped reply to author's questionnaire).

Lodge, Major General Henry Cabot, 15 June 1967.

McGowan, Major General D. W., 12 June 1967.

Myers, Lieutenant General Samuel L., 9 June 1967.  
Newton, Brigadier General Henry C., 10 June 1967.  
Nutter, Major General William H., 19 June 1967.  
Palmer, General Charles D., 14 June 1967.  
Palmer, General Williston B., 17 July 1967.  
Pattison, Brigadier General Hal C., 19 June 1967.  
Patton, Lieutenant Colonel George S., 12 June 1967.  
Peckham, Major General Howard L., 19 June 1967.  
Robinett, Brigadier General Paul M., 20 June 1967.  
Ryan, Lieutenant General John L., Jr., 15 June 1967.  
Waters, General John K., 13 June 1967.  
Webb, Brigadier General Willard, 15 June 1967.  
White, General Isaac D., 20 June 1967.  
Wright, Lieutenant General W. H. S., 23 June 1967.  
Wyman, General W. G., 12 June 1967.

Published Official Documents

Academic Division, The Cavalry School. Mechanized Cavalry. Fort Riley, Kansas: The Cavalry School, 1933.

The General Service Schools. The Tactical Employment of Tanks in Battle. Fort Leavenworth, Kansas: The General Service Schools Press, 1923.

The National Defense Act, Approved June 3, 1913, As Amended by Act Approved June 4, 1920. Washington: Government Printing Office, 1920.

Tactics and Technique of Cavalry, Advanced. Harrisburg, Pa.: Military Service Publishing Co., 1940.

United States Army, Infantry Field Manual, Vol. II. Tank Units. Washington: Government Printing Office, 1931.

The United States Army in the World War, 1917-19, Vol. I, Organization of the AEF. Washington: Historical Division, Department of the Army, 1948.

The United States Army in the World War, 1917-19, Vol. XIV, Reports of the Commander-in-Chief AEF, Staff Sections and Services. Washington: Historical Division, Department of the Army, 1948.

- U. S. House of Representatives, 66th. Cong., 1st. Sess., Hearings before the House Committee on Military Affairs. Army Reorganization, Vol. I. Washington: Government Printing Office, 1919.
- U. S. House of Representatives, 66th. Cong., 1st. Sess. House Documents, Vol. XVII. Washington: Government Printing Office, 1920.
- U. S. House of Representatives, 71st. Cong., 3rd. Sess., Hearings before the Subcommittee of the House Committee on Appropriations. The War Department Appropriations Bill for 1932. Washington: Government Printing Office, 1930.
- U. S. House of Representatives, 72nd. Cong., 1st. Sess., Hearings before the Subcommittee of the House Committee on Appropriations. The War Department Appropriations Bill for 1933. Washington: Government Printing Office, 1932.

- U. S. House of Representatives, 75th. Cong., 3rd. Sess., Hearings before the Subcommittee of the House Committee on Appropriations, Military Establishment Appropriations Bill for 1939. Washington: Government Printing Office, 1938.
- U. S. House of Representatives, 76th. Cong., 1st. Sess., Hearings before the Subcommittee of the House Committee on Appropriations. Military Establishment Appropriations Bill for 1942. Washington: Government Printing Office, 1941.
- U. S. Senate, 66th. Cong., 1st. Sess., Hearings before the Subcommittee of the Senate Committee on Military Affairs. Reorganization of the Army. Washington: Government Printing Office, 1919.
- U. S. Senate, 73rd. Cong., 1st. Sess. Hearings before the Committee on Military Affairs. Washington: Government Printing Office, 1933.
- U. S. Senate, 75th. Cong., 1st. Sess., Hearings before the Subcommittee of the Senate Committee on Appropriations. War Department Appropriations Bill for 1938. Washington: Government Printing Office, 1938.
- U. S. Senate, 76th. Cong., 3rd. Sess., Hearings before the Subcommittee of the Senate Committee on Appropriations. Military Establishment Appropriations Bill for 1941. Washington: Government Printing Office, 1940.
- War Department Annual Reports, 1920, 1930, 1933.
- War Plans Division. Instructions for the Training of the Tank Corps in France. Washington: War Department, 1918.
- World War Records, 1st. Division AEF, Regular Training, Vol. XX.

Periodicals, 1920-1940

Army Ordnance.

Cavalry Journal.

Infantry Journal.

Military Review.

Books, Memoirs, and Articles

Churchill, Winston S. The World Crisis, Vols. I & II.  
New York: Charles Scribner's Sons, 1923.

De Gaulle, Charles. The Army of the Future. New  
York: J. B. Lippincott Co., 1941.

Eisenhower, Dwight D. At Ease! Garden City, New  
York: Doubleday Co., Inc., 1967.

Fuller, J. F. C. Memoirs of an Unconventional  
Soldier. London: Ivor Nicholson and Watson,  
Ltd., 1936.

Gulderian, Heinz. Panzer Leader, trans. by  
Constantine Fitzgibbon. New York: E. P. Dutton  
and Co., Inc., 1952.

Herr, John K. and Ed. S. Wallace. The Story of  
the U. S. Cavalry. Boston: Little, Brown and  
Co., 1953.

Liddell Hart, B. H. Paris or the Future of War.  
London: Kegan Paul, Trench, Trubner and Co.,  
Ltd., 1925.

MacArthur, Douglas. Reminiscences. New York:  
McGraw-Hill Books, Co., 1964.

Mettler, Charles. "Chaffee's Obituary," West  
Point Assembly, Association of Graduates USMA,  
I (April, 1942), p. 14.

Swinton, Ernest D. Eyewitness. Garden City, New  
York: Doubleday, Doran, and Co., Inc., 1933.

Secondary Sources

- Ciccarelli, John E. "America's Forgotten Tanker," Armor, LXXIV (July-August, 1965), pp. 20-3.
- Farago, Ladislas. Patton, Ordeal and Triumph. New York: Ivan Obolensky, Inc., 1963.
- Fuller, J. F. C. Tanks in the Great War. London: John Murray, 1920.
- Gillie, Mildred. Forging the Thunderbolt. Harrisburg, Pa.: Military Service Publishing Co., 1947.
- Green, Constance M., Harry C. Thomson, and Peter C. Roots. The Ordnance Department: Planning Munitions for War. Washington: Office of the Chief of Military History, Department of the Army, 1955.
- Historical Section Army Ground Forces. History of the Armored Force, Command and Center. Study #27, Army Ground Forces, 1946.
- History and Role of Armor. Fort Knox, Kentucky: U. S. Army Armor School, 1959.
- Icks, Robert J. and Philip Andrews. Tanks and Armored Vehicles. New York: Duell, Sloan, and Pearce, 1945.
- Killigrew, John W. "The Impact of the Great Depression on the Army, 1929-36." Unpublished Ph.D. dissertation, Indiana University, 1960.
- Liddell Hart, B. H. The Tanks. New York: Frederick A. Praeger, 1959.
- Millis, Walter. Arms and Men. New York: Mentor Books, 1956.
- Ogorkiewicz, Richard M. Armor. New York: Frederick A. Praeger, 1960.

- Ogorkiewicz, Richard. "The Structure and Function of Armored Divisions," Armor, LXVII (January-February, 1958), pp. 14-21.
- Sheppard, E. W. Tanks in the Next War. London: Geoffrey Bles, 1938.
- Smart, Wayne T. "Armored Divisions' Combat Commands," Cavalry Journal, LX (March-April, 1946), pp. 42-4.
- Thomson, Harry C. and Lida Mayo. The Ordnance Department: Procurement and Supply. Washington: Office of the Chief of Military History, Department of the Army, 1960.
- Weigley, Russell F. History of the United States Army. New York: Macmillan, 1967.
- Whitehouse, Arch. Tank. Garden City, New York: Doubleday and Co., Inc., 1960.
- Young, David M. "The Tanks of Antiquity," Armor, LXXII (November-December, 1963), pp. 41-2.

APPROVED:

Edward H. Coffman

DATE:

March 19, 1968