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THE AMERICAN EXPEDITIONARY FORCES TANK CORPS IN WORLD WAR I:
FROM CREATION TO COMBAT

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Final Report, 10 March 1988

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A thesis submitted to Temple University, Philadelphia, PA,
in partial fulfillment of the requirements for the degree of
Master of Arts in History.

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188
Exp. Date Jun 30, 1986

1a. REPORT SECURITY CLASSIFICATION		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION / AVAILABILITY OF REPORT	
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S) THE AMERICAN EXPEDITIONARY FORCES TANK CORPS IN WORLD WAR I: FROM CREATION TO COMBAT		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION	6b. OFFICE SYMBOL (if applicable)	7a. NAME OF MONITORING ORGANIZATION Temple University	
6c. ADDRESS (City, State, and ZIP Code)		7b. ADDRESS (City, State, and ZIP Code) Philadelphia, PA 19122	
8a. NAME OF FUNDING / SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (if applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER Student, HODA, MILBERGEN (DAPC-OPA-E) 200 Stovall St., Alexandria, VA 22332	
8c. ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS	
		PROGRAM ELEMENT NO.	PROJECT NO.
		TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) HODA, MILBERGEN (DAPC-OPA-E) 200 Stovall Street, Alexandria, VA 22332			
12. PERSONAL AUTHOR(S)			
13a. TYPE OF REPORT MA Thesis		13b. TIME COVERED FROM Sep 00 TO Mar 00	14. DATE OF REPORT (Year, Month, Day) 880310
15. PAGE COUNT 108			
16. SUPPLEMENTARY NOTATION Approved for Public Release. Distribution Unlimited.			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)			
This thesis provides a detailed account of the creation of the Tank Corps in the American Expeditionary Forces in France during the First World War. Particular attention is devoted to the development of tactics and doctrine for tanks, the formulation of Tables of Organization and Equipment for tank units, and the development and execution of a training program for Tank Corps personnel. A chapter is also devoted to the problems encountered in tank production. (Theses).			
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED / UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION	
22a. NAME OF RESPONSIBLE INDIVIDUAL		22b. TELEPHONE (Include Area Code)	22c. OFFICE SYMBOL

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IN WORLD WAR I:
FROM CREATION TO COMBAT

by
Captain (P) Dale E. Wilson, USA

A Thesis
Submitted in Partial Fulfillment
of the Requirements
for the
Master of Arts Degree
in
History
College of Arts and Sciences

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Second Reader

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Availability Codes	
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INTRODUCTION

The bloody stalemate that settled over the Western Front in late 1914 taxed the best minds of the general staffs of both the Entente and Central Powers as they sought a means to restore mobility to the battlefield. Unfortunately, the power of the tactical defense (aided principally by the machine-gun) had become so immense as to make direct infantry assault suicidal. Armies conducting offensive operations found themselves pouring troops into a meat grinder that churned out casualties by the hundreds of thousands. "Successful" offensive gains were measured in feet and meters—not miles or kilometers.

By October 1914, British Li-utenant Colonel Ernest D. Swinton, serving at the time as a correspondent with the British Expeditionary Forces, had reached the conclusion that an armored machine capable of forcing its way through barbed wire obstacles, climbing over trenches, and destroying or crushing machine-guns was needed if the stalemate was to be broken. Swinton, inspired by a letter from a friend who described the American Holt caterpillar as "a Yankee tractor which could climb like the devil," drafted a proposal that he forwarded to the War Office on 20 October calling for the construction of heavily armored caterpillar tractors armed with artillery pieces and machine-guns.'

Although the reaction of many leaders to Swinton's proposal was less than enthusiastic, it fired the imagination of at least one powerful Englishman: Winston Churchill, the First Lord of the Admiralty. In

January 1915, Churchill, anxious to get his Royal Naval Air Service (RNAS) involved on the continent, ordered Captain Murray Sueter, director of the Admiralty Air Department, to put his staff to work designing a vehicle capable of crushing trench works.²

During the months that followed, a number of experimental wheeled and caterpillar-tracked armored vehicles were developed and tested by officers of the Admiralty Air Department before Sir William Tritton and a Lieutenant Wilson of the RNAS made a major design breakthrough. The Tritton-Wilson vehicle was the first tank to be configured in the now familiar rhomboidal shape with the track encircling the body. It featured a pair of sponsons designed by Sir Tennyson D'Eyncourt in which two six-pounder guns were mounted. This vehicle was demonstrated publicly on 26 January 1916, and is considered to be the first true British tank.³ It quickly earned the nickname "Mother," and all subsequent tanks of this type were called "Big Willies."⁴

Because of the Royal Navy's involvement in tank development, a number of nautical terms such as hull, ports, bow, and hatch were used to designate various tank parts.

The British went to great lengths to conceal the existence of their "landships" from the enemy. Everyone in any way involved with the project was sworn to secrecy, and personnel suspected of discussing the project were threatened with internment under the Defence of the Realm Act. Women known to have been informed of the project were "told that if the secret reached the enemy thousands of lives would be lost. . . . [Other personnel] who knew about the existence of the Landship Committee were informed that all the experiments had failed, and that the people

concerned had lost their jobs" It was a report that was readily accepted.⁵

To further protect the secret, the Landship Committee decided to change the vehicle's name out of fear the very word "landship" might betray the secret. One author describes how the new name was chosen in the following (probably apochryphal) story:

In the earlier stages of the vehicles' manufacture the machine resembled a cistern or reservoir, and it was decided to call it a 'water-carrier.' . . . [But,] the secretary of the 'Water Carrier' Committee thought that the new title would be highly unsuitable, if not ludicrous [if only the committee's initials were used to identify it, a common government practice]! The name was therefore changed to 'tank,' and the committee was called the 'Tank Supply' or 'T.S.' Committee.⁶

A more widely accepted (though less colorful) explanation for how the tank got its name is that the British, in an effort to deceive the enemy, when shipping early models to France for battlefield testing, listed them on ships' manifests as water tanks en route to Russia.⁷

The French experimented with tank designs during this same period. The only similarity between their vehicles and those of the British, however, was the combination of firepower under armor with the added power of caterpillar traction. The tactical theories of the two allies differed radically, and so too did the design of the tanks they produced.⁸

The British became the first to employ tanks in combat, deploying forty-nine Mark I models on 15 September 1916 during the Battle of the Somme. Their effectiveness was hampered by the fact that they were not employed en masse, but were instead scattered piecemeal on the battlefield. As might have been expected with such a primitive mechanical

design, breakdowns were frequent. Nevertheless, results were encouraging.⁹

On 16 November the British used two tanks to lead the attack at Beaumont-Hamel. One crossed the Germans' frontline trench and became stuck, while the other became mired in front of the trench. Despite this fiasco, the Germans were so shocked by the tanks' appearance on the battlefield that soldiers in both the frontline and supporting trenches began waving white cloths to signal their surrender. The tank crews and supporting infantry were able to capture the entire garrison before the Germans could discover that the tanks were immobilized and all but at their mercy.¹⁰

Inspired by the manner in which the British employed their tanks offensively, the French scrapped their plan to use tanks as troop carriers and decided instead to employ them as accompanying artillery.¹¹ This decision was reflected in the design of the Schneider and St. Chaumont tanks. The Schneiders made their battlefield debut on 16 April 1917, when 132 were deployed at the Chemin des Dames. The St. Chaumont was first used on 5 May 1917, with sixteen joining an attack at Laffaux Mill.¹²

The French learned that accompanying artillery with tractor power did not really require the armor of a tank, so they designed a lightweight, highly-mobile, turreted tank to serve in the infantry support role.¹³ This tank, the Renault Char FT (for "faible [light] tonnage"), featured a two-man crew (significantly smaller than the six- to nine-man crews employed in the heavier British and French tanks) and mounted either a single 37mm gun or an 8mm machine-gun in its turret. This

vehicle became the backbone of the French Tank Corps, although it was not used in combat for the first time until 31 May 1918.¹⁴

All of these developments captured the attention of the chief of the U.S. Army War College, who had seen reports on tank developments submitted by the American Military Mission in Paris. While most of those reports had been highly critical of early tank operations and the Paris-based observers declared tanks a failure (which became the official position of the War Department in early 1917¹⁵), the War College director ordered the Mission to report on the latest British and French tank theories and operations. That report, dated 21 May 1917, included the personal observations of Major Frank Parker, liaison officer at the headquarters of the French Armies of the North and North-East, on French tank operations in the April offensive.¹⁶ This report would have significant influence on the future of tanks in the United States Army during World War I.

What follows is a study of the American Expeditionary Forces Tank Corps in World War I, from its creation to the debut of its combat units in the St. Mihiel offensive on 12 September 1918. Particular attention is devoted to the development of equipment, organization and tactics, and a training program, all of which had to be accomplished rapidly from scratch in order to prepare the tanks and the men who would use them for combat.

It is hoped that this work will serve not only as a detailed account of a neglected part of America's military history, but as a case study for military leaders faced with the difficult task of preparing new weapons systems for battlefield employment in this era of increas-

ingly rapid technological change.

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CHAPTER I

THE BIRTH OF THE TANK CORPS

The beginnings of the American Expeditionary Forces (AEF) Tank Corps can be traced to June 1917 when, shortly after arriving in Paris, General John J. Pershing read a copy of the American Military Mission's 21 May report on British and French tank tactics and operations and was favorably impressed. Pershing, commander-in-chief of the AEF, immediately appointed several committees to study tank warfare, and some of his staff members were detailed to go to the front lines to study British and French equipment, organization, and tactics.

Initial reports from Pershing's staff indicated that early operations had been marred by numerous mechanical failures, but that the effects of the tanks on the enemy more than compensated for their mechanical shortcomings. Despite the misgivings of some officers, Pershing thought that British-style heavy tanks and French light tanks could prove to be valuable assets to the AEF.¹

All observers agreed that the French Schneider and St. Chaumont vehicles were unsatisfactory. Neither vehicle could truly be classified as a tank. Instead, they were nothing more than armored artillery carriers requiring infantry skirmishers to lead them into battle, carefully marking the routes they should follow. Underpowered and lightly-armored, they did poorly traveling cross-country, and crews suffered

badly if they received direct hits from artillery fire. Another factor contributing to the decision to investigate further the British heavy tanks and French Renault tanks was the inability of members of a joint French-British tank board to reconcile their theories on tactics and equipment when that body met in London in May 1917. The British insisted on using the heavy tank to clear the way for the infantry, while the French argued that light tanks operating in close liaison with the infantry offered the optimum battlefield solution. Their concept was to deploy the Renaults with the battalion support, advancing them only when the infantry assault bogged down."

On 19 July Pershing ordered the creation of an American tank board to perform a detailed study of the French Renault and British heavy tanks. The board's members, Colonels Fox Conner and Frank Parker, Lieutenant Colonel Clarence C. Williams, and Major Nelson E. Margetts, were decidedly pro-tank, and their findings had significant influence on subsequent events."

Ten days later, after being advised of Pershing's decision to have tanks in the AEF, the AEF's Chief Ordnance Officer requested information on the number that would be required so a requisition could be passed on to the War Department in Washington. In response, Pershing ordered Lieutenant Colonel LeRoy Eltinge, a member of his staff, to take charge of all tank matters and accomplish this task."

The members of the tank board submitted a report containing their findings on 1 September. They concluded that the tank was "destined to become an important element in this war," and that a separate Tank Department operating under a single chief reporting directly to Persh-

ing, be organized immediately. They further observed that of all the tank types then in production or being planned, only the French Renault and British Mark VI (a 27- to 30-ton heavy tank that never reached production) could be expected to provide satisfactory results. Based on a projected strength of twenty combat divisions, the board's members recommended a fleet of 2,000 light and 200 heavy tanks be procured, with production geared to provide for a 15 percent per month replacement rate."

Armed with the board's findings, Eltinge set out to draft specific requirements for a "Combat Tank Service" for the AEF. Working in close coordination with other members of the AEF staff, Eltinge determined the number of tanks that would be required, the number and type of units, and the number of personnel needed to man the force. He based his recommendations on the needs of an army consisting of twenty fighting and ten replacement divisions."

Pershing approved Eltinge's preliminary recommendations and directed him to immediately notify the War Department's Chief of Ordnance of the AEF's tank requirements. Eltinge dispatched the following cable on 14 September:

. . . Careful study French and British experience with tanks completed and will be forwarded by early mail. Project includes 350 heavy tanks of British Mark VI pattern; 20 similar tanks equipped for signal purposes; 40 similar tanks for supply of gasoline and oil; 140 tanks arranged to carry 25 soldiers or five tons supplies; 50 similar tanks with upper platform for field gun; total 600 heavy tanks. Also following Renault tanks: 1,030 for fighting purposes; 130 for supply; 40 for signal purposes; total 1,200 Renault tanks. Replacement of tanks requires 15 per cent per month after arrival here. . . ."

Eltinge further recommended that the Mark VIs be produced in two

versions, one mounting a six-pounder gun and four machine-guns, the other mounting six machine-guns. It was suggested that the armament for the Renaults be either a single machine-gun, six-pounder, or three-inch gun, with production to be fixed at a 2:1 ratio in favor of machine-guns. A number of automotive requirements were also listed, including 300 six-ton trucks for transporting Renault tanks, 60 three-ton trucks, 270 three-ton trucks with trailers, 90 three-ton trucks with kitchen trailers, 90 Ford automobiles, and 180 motorcycles.⁸

Eltinge also reported that the French were willing to permit manufacture of the Renault tank in the United States, and that the Renault Works would supply a model to facilitate production. In exchange, the French desired 2,000 Renaults from the United States. The British, in the same spirit of cooperation, agreed to provide complete plans and specifications for their Mark VI tank so that production of that vehicle could also be begun in America.⁹

Organizational and personnel requirements were included in a detailed memorandum sent to the War Department on 23 September. This document requested authorization for thirty light tank companies for Division Troops; thirty light and fifteen heavy tank companies, five carrier companies, and two artillery carrier companies for Army Troops; ten training and replacement companies; five repair and salvage companies; a depot company; and support troops for Army Headquarters and General Headquarters (GHQ). It was estimated that 14,827 soldiers would be needed to man these organizations.¹⁰

Little was accomplished during the next three weeks, but then, on 14 October, Majors James A. Drain and Herbert W. Alden were detailed by

the Chief of Ordnance in Washington to gather more information on the use, design, and production of tanks.¹¹

Between 16 October and 4 November, Drain and Alden toured a number of French and British tank facilities, studying production, training, supply, and repair and salvage operations. At Circotte, the main French tank training camp and supply depot, Drain observed that the French were "laying this place out on a very large scale, evidencing an intention to make the tank a large and important arm of the service."¹²

On 2 November the two officers met in Paris with other allied tank experts to discuss a common tank design program that would involve the United States, England, and possibly France. A tentative design for a heavy tank was agreed upon with the British, and the French exhibited interest in obtaining "at least a moderate number" of the proposed machines.¹³

Drain and Alden submitted a detailed report of their findings on 10 November. In it they recommended that the United States accept the Renault tank as it was—except for the turret, which they thought should be made of armor plate instead of cast iron. They also recommended that the United States produce only one type of heavy tank. Because they thought all of the British heavy tanks then in existence were inadequate, they proposed a joint British-American effort, with a detailed design to be "worked out at once in England" by engineers from the two countries. Production, they said, could best be accomplished in France, with the British supplying the armor and armament and the Americans providing Liberty twelve-cylinder aircraft engines and other automotive parts.¹⁴

It would be useless in their opinion, however, to have good tanks without good men to operate them. They observed somewhat jingoistically that Americans would make good tank crewmen because they "are a strong race" and "of good character."¹⁵ Drain and Alden recommended that personnel with a "high standard of fighting quality" be carefully selected from the ranks of these "good men" and that a comprehensive, "carefully worked out plan for training [them] be inaugurated at once."¹⁶

Finally, the two officers proposed that an American Tank Commissioner be appointed, "clothed with sufficient authority to enable him to fully represent our forces," and that an advisory staff of American, French, and British officers responsible for formulating a program for the combined use of tanks be created.¹⁷ This latter recommendation was acted on almost immediately. Shortly after their report was filed, the Inter-Allied Tank Commission was organized, with Drain appointed to act as the American representative. He was ordered to seek "an agreement with the British and French as to the best type of tank to be constructed and coordinate the production effort so as to get the largest number of Tanks in the minimum time."¹⁸

The growing interest in tanks in the American ranks caught the attention of a young cavalry captain serving on General Pershing's staff. This officer, George S. Patton, Jr., was none too happy with his job as post adjutant and commander of the AEF Headquarters Company at Chaumont. Patton expressed this dissatisfaction in a letter to his wife in September. He explained that he was interested in all of the talk about tanks because he could "see no future to my present job." While he had heard that the tanks themselves suffered a high attrition rate,

"the people in them are pretty safe" Not wanting to alarm her further, he observed that it would "be a long long time yet before we have any [tanks]" and that they would have plenty of opportunity to discuss the matter before he could submit an application for tank duty.¹⁹

But the opportunity to work with tanks presented itself sooner than he had expected. In an undated diary entry, Patton recalled that he was approached by Colonel Eltinge "about the end of September" and asked if he wanted to become a tank officer. "I said yes and also talked the matter over with Col. [Frank] McCoy [the assistant chief of staff] who advised me to write a letter asking that in the event of Tanks being organized that my name be considered."²⁰

Patton followed up on this recommendation on 3 October with a letter to Pershing outlining what he thought were singular attributes he possessed qualifying him for command of tanks. In the letter, Patton highlighted his cavalry experience because he thought working with light tanks would be "analagous to the duty performed by cavalry in normal wars." He explained that his previous experience as a Machine-Gun Troop commander would prove valuable because it provided him with a working knowledge of the machine-gun's mechanism and skill in employing the weapon, two skills he thought would be needed by a tank officer because "accurate fire is very necessary to good use of tanks."

Patton also pointed out his mechanical ability and French language capability, noting that "I speak and read French better than 95% of American officers . . . [and] I have also been to school in France and have always gotten on well with frenchmen."

Finally, he stressed his aggressive spirit, adding that he thought he was "the only American who has ever made an attack in a motor vehicle [a feat he accomplished on 14 May 1916 while serving as Pershing's aide de camp during the Punitive Expedition into Mexico]."²¹

Major Robert Bacon, the Headquarters Commandant, endorsed the letter and forwarded it to the AEF commander with the observation that he thought Patton was "unusually well equipped & fitted in every way for the command."²²

Throughout the remainder of October 1917, however, Patton's ambitious nature caused him to waver in his resolve to join the Tank Service. The fact that the tanks were in an unsettled state caused him to seek command of an infantry battalion instead.²³

In early November Patton changed his mind again and agreed to become the head of the AEF's light tank school, soon to be activated at Langres. He made this decision after Colonel Paul B. Malone, director of the AEF Schools, informed him that Colonel Eltinge had recommended him for the post, and after Major Bacon and Colonel Martin C. Shallenberger, one of Pershing's aides, both advised him to throw in his lot with tanks. The reason was simple: An assignment with the fledgling Tank Service "aperes the way to high command if I make a go of it."²⁴

Patton became the first American soldier officially assigned to duty with tanks when, on 10 November, AEF headquarters issued orders directing him to report to the commandant of Army Schools at Langres for the purpose of establishing a tank school for the First Army.²⁵ First Lieutenant Elgin Braine, a Reserve artillery officer assigned to Battery D, 6th Field Artillery in the 1st Infantry Division, was ordered to

report to Patton and serve as his assistant.²⁶ Braine, a highly-trained technician, possibly a mechanical engineer, was well-versed in the operation of internal combustion engines, blueprints, and other facets of industrial engineering. These skills proved to make him an invaluable asset to the Tank Corps when a production program was later devised.

Whatever their individual strengths, Patton and Braine knew little or nothing about tanks, so, on 19 November, the two officers were ordered to report for two weeks of instruction at the French Light Tank Training Center at Chamlieu near Paris to prepare them for their duties.²⁷

During the first week at Chamlieu, Patton had time to become thoroughly acquainted with the Renault tank. He drove the vehicle, noting its ease of handling and surprising comfort in contrast to the heavier British tanks. Although noisy, it could move at the pace of a running man, had a remarkably short turning radius, bucked and reared like a horse, and could easily bulldoze small trees. All of this greatly pleased Patton, the cavalryman. The vehicle's only major drawback was visibility. When "buttoned up" (driving with all the hatches closed), the driver had only three small slits through which to observe the terrain in front of him. The gunner's visibility from the turret was little better.²⁸

In addition to driving tanks, Patton fired their guns, observed a maneuver, worked on tactical problems, toured the repair shops and tank park, and spent long hours discussing how best to employ tanks in combat.

Braine joined Patton at Chamlieu on Tuesday, 27 November, for the second week of training. Patton thought this training was even more interesting than that conducted during the first week. Besides watching more maneuver training, Patton observed proficiency testing of drivers and gunners, translated lesson plans, saw tanks chained together in pairs for crossing wide, deep trenches, and was allowed to drive a Renault up and down steep banks. He also met several times with General J. E. Estienne, commander of the French tank forces, to discuss tank matters.²⁹

On 20 November, while Patton was at Chamlieu, the British launched a major offensive at Cambrai. At 6 a.m., Major General Hugh Elles kicked off the attack with a force of 350 heavy tanks. They took the Germans completely by surprise, while a prearranged barrage fired by some 1,000 British guns added further to their confusion. The results of the attack were stunning: In just twelve hours the British advanced 10,000 yards from a base 13,000 yards wide, shattering two German divisions to their front and capturing 4,000 men and more than 100 guns. All this against a loss of just 4,000 casualties in the British 3rd and 4th Corps, which conducted the attack. This compares with the Third Battle of Ypres, which required three months and appalling casualties to effect a similar advance.³⁰

Cambrai helped to silence many of the tanks' critics, whose numbers had been growing, and vindicated the theories of Colonel John F. C. Fuller, the British Tank Corps' Operations Officer.

Patton left Chamlieu on 1 December bound for Paris and the Renault Tank Works at Billancourt. While en route, he stopped at Albert with

Colonel Frank Parker to meet with Fuller. The trio discussed the attack on Cambrai, tank doctrine, and tactics.³¹

On 3 December, Patton and Braine toured the Renault factory. They were able to examine the light tank's design and construction and, during the course of their tour, recommended four minor improvements to the tank that the French later adopted. Their suggestions included a self-starter; a double-cased, felt-lined fuel tank that would prevent leakage if holed by enemy fire; an interchangeable mount so that each tank could carry either a 37mm gun or a machine-gun; and a bulkhead between the crew compartment and the engine to protect the crew from fire.³²

Patton was impressed during his tour of the Renault facility with the "great difficulty" the French tankers had in getting the manufacturer to cooperate. He perceived that American builders might be equally recalcitrant and, in his subsequent report on light tanks, included a veiled warning indirectly calling for officers charged with tank procurement to take a hard line when dealing with their civilian counterparts.³³

Following their two-week orientation with the French, Patton and Braine returned to GHQ at Chaumont and reported their findings orally to Colonel Eltinge, who was still temporarily in charge of the tank project for the AEF. They then set to work drafting a detailed report. In a letter to his wife on 5 December, Patton observed that his report was important "as no one knows any thing about the subject except me. I am certainly in on the ground floor. If they [the tanks] are a success I may have the chance I have always been looking for."³⁴

Patton's double-spaced, fifty-eight-page report was submitted on 12 December 1917. Later, when organizing his files, he penciled on the envelope containing the paper: "Original Tank Report. The Basis of the U.S. Tank Corps. Very Important. GSP."³⁵ Indeed it was. It served as the foundation for subsequent tank developments in the AEF, and at least one of his recommendations (a proposal that tanks be organized in platoons of five tanks, with three platoons to a company and three tank companies to a battalion) survived as part of American tank organization until the early 1980s.

The report is divided into four sections, including a detailed mechanical description of the Renault light tank, recommendations for the organization of tank units, a discussion of tank tactics and doctrinal theory, and proposed methods for the conduct of drill and instruction.

Patton described the light tank as a self-propelled armored vehicle capable of delivering predetermined firepower on the battlefield whenever needed. It had to be able to overcome all terrain obstacles in its path, provide maximum protection to both crew and engine, and be armed in order to accomplish this mission. He further specified that the vehicle must be easily manufactured in large numbers, have a power-to-weight ratio proportionate to the potential of its engine and traction, and be transportable to training or battle areas by either rail or truck.³⁶

The Renault tank met all of these needs. It protected the crew from rifle and machine-gun fire as well as the shrapnel produced by near misses from artillery fire. To protect a light tank from direct artil-

lery hits would have required armor plating so thick as to make the tank's weight prohibitive, Patton said. The Renault's ability to maneuver on the battlefield with great agility combined with its small size (16 feet, 5 inches in length; 5 feet, 8 inches in width; and 7 feet, 6 1/2 inches in height) to make it difficult to spot, and thus reduced its vulnerability to large-caliber enemy guns.

The Renault's high degree of mobility was provided by its two caterpillar-type tracks mounted on the sides of the tank on frames called longerons. The track ran endlessly around two large wheels, one of which propelled the track with power supplied by the engine, while the other maintained proper tension and assisted the track's return. The vehicle's five-ton weight drove the lower portion of the track into the ground, thus providing traction. This weight was supported by a system of small rollers on the back of the lower part of the track. The axles of these rollers were attached to a pair of rockers, called front and rear chariots, which were mounted inside the lower frame of the longeron. Power was supplied by an eighteen-horsepower, four-cylinder, monobloc, L-head motor which allowed the tank to attain a maximum speed of about seven miles per hour.

Armament consisted of either an 8mm machine-gun or a 37mm gun mounted in a manually-operated turret that permitted the gunner to engage targets through the full 360 degrees of the compass.

The remainder of this portion of Patton's report becomes highly technical and includes detailed specifications and mathematical formulas. There is little doubt that Lieutenant Braine contributed significantly to this section. Patton also described a number of proposed

changes to improve the tank's performance, including, in addition to the four mentioned earlier, a hand accelerator, raising the vision slots for both the gunner and driver in order to accommodate the taller Americans, providing an adjustable strap at the back of the driver's seat to increase comfort, employing a speaking tube for crew communication, placing a grease cup in the tail of the tank for greasing the bearings of the main clutch shifting fork, using a stronger fan belt, equipping the tank with an electric trouble light and long cord, placing corrugated mats on the floor of the gunner's tower, substituting a pump-driven water circulating system for the existing thermo-siphon, providing an external lock for the door of the engine compartment, designing leather helmets for the crew similar to the type worn by football players or aviators, making track links of armor plate, devising a means to ensure a constant flow of gasoline to the carburetor, simplifying and strengthening the tow hooks, providing a stronger wire rope, equipping each tank with a chain at least two and one-half yards long with a ring at each end for coupling, eliminating the steps and foot rest on the front of the tank, repositioning all of the driver's foot pedals, and others. In each case, Patton provided ample justification for his recommendations.

In Attachment B, Patton addressed the subject of light tank battalion organization. He proposed that platoons consist of an officer and fifteen enlisted men and five tanks—one equipped with a three-inch gun, two with six-pounder guns, and two with machine guns.

According to Patton, companies should have three platoons and a company headquarters element. The headquarters would have two officers

and fifty-one enlisted men, including a first sergeant, supply sergeant, mess sergeant, signal (communications) sergeant, a clerk, ten drivers, twenty privates, a mechanic, two motorcyclists, ten chauffeurs, and three cooks. In addition to the fifteen tanks in the platoons, he suggested that the company have a tank equipped for signals, a tank for the company commander, eight supply tanks (which could also be employed for training or in reserve), five ammunition trucks, two trucks to carry petroleum and lubricants, a truck and trailer for baggage, a kitchen truck with trailer, an automobile, and two motorcycles. This plan would give each tank company five officers, ninety-six enlisted men, twenty-five tanks, and twelve wheeled vehicles.³⁷

Battalions should consist of three tank companies, a headquarters section, and a repair unit. The headquarters and repair elements would have a combined total of three officers and forty-three enlisted men, including a major to command the battalion and two lieutenants to serve as the adjutant and quartermaster. Two additional tanks would be provided for the battalion headquarters (one for the battalion commander and one for signals), plus three trucks, an automobile, and two motorcycles. The aggregate for the battalion would be 18 officers and 331 enlisted men, 77 tanks, and 42 wheeled vehicles.

Patton further proposed that all of the supply trucks operate under battalion control to provide increased flexibility, and that the company mechanics assemble periodically at battalion level to assist with major repair jobs.

He also thought that the French repair and salvage system, which incorporated repair units at company and battalion level and in the rear

echelons, could be improved upon by establishing a large repair shop at some permanent or semipermanent location. Badly damaged tanks or wheeled vehicles or engines in need of complete overhaul could be transported to this center for repair.

Finally, Patton proposed that each battalion have an attached carrier company equipped with either seventy-seven trucks each capable of carrying a tank in its bed or pulling one by trailer, or twenty-seven specially-designed heavy trucks each capable of carrying one tank and pulling another by trailer. He noted that the heavier vehicles would have to be limited to travel on only the best roads, and concluded that the best solution would be a mix of both vehicle types. The basic principle in his mind was that adequate mobility would have to be balanced against cost and tonnage factors.

The remainder of this section of his report is devoted to a carefully thought-out, detailed listing of the tools, spare parts, and special equipment that would have to be carried on each vehicle.

Patton opened his discussion on tactical matters with a brief history of tanks and lessons learned from their battlefield employment by the British and French. The critical part of this section is, however, his own recommendation for the employment of light tanks. He argued that the light tank should be seen as a "heavily armored infantry soldier" with "greater destructive and resistant powers," and not as artillery or an independent combat arm. Patton said the main purpose of light tanks was to assist the infantry in breaking through the enemy's forward positions. Once this task was accomplished, the tanks could then "assume the role of pursuit cavalry and 'ride the enemy to death.'"

This latter possibility led him to recommend that the light tanks be deployed in depth and maintain a substantial reserve force.³⁰

Patton envisioned several missions for the tanks in their infantry support role. First, they must clear wire obstacles for the advancing doughboys. Second, they would have to employ their weapons in a manner that would prevent the enemy's infantry from manning the trench parapets after the preparatory artillery barrage lifted. Third, they would be required to suppress enemy machine-guns and trench cannon. Fourth, the tanks would be required to assist the infantry in mopping up the objective by masking strong points and blockhouses with fire and smoke bombs, remaining on the objective until the infantry had consolidated their gains. Fifth, tanks would guard against enemy counterattack by patrolling throughout the sector between the most advanced infantry positions and the rear of friendly artillery fires. Finally acting on their own initiative, the assault tanks (joined by their supporting elements and possibly the reserve) would press on to exploit the attack, seeking "every opportunity to become pursuit cavalry."³¹

To accomplish these tasks, Patton contended that the tanks must be deployed in depth, with their sectors of attack corresponding with those of the infantry. He thought that his proposed organization would ideally suit this plan, allowing one tank platoon to accompany each attacking infantry company and a tank company to support each infantry battalion.

To prevent the misuse of tanks when both light and heavy tanks were employed in the same sector, Patton suggested that the division commander exercise tactical control "because of the danger that the

commander of whichever group was the senior might use the tanks of the other variety to the advancement of his own tanks and the disadvantage of the other."⁴⁰

Patton recognized the importance of reconnaissance and recommended that company commanders and platoon leaders be given the opportunity to view from the air the terrain over which they would be required to maneuver. He also proposed that leaders be required to physically walk the routes from their assembly areas to the line of departure by day and night in order to ensure their timely arrival at zero hour. This, he said, would prevent losses to enemy artillery fire should the tanks arrive too early and be forced to remain stationary.

Patton concluded with the observation that while heavy tanks were more independent and should thus precede light tanks in the attack—especially when no artillery preparation was employed—capitalizing on their superior ability to cut wire, light tanks held an advantage in mobility because they could be easily transported by truck or trailer while the heavy tanks could only be moved by rail.

Subsequent operations proved Patton's theories to be at least partially correct. Employed organizationally and tactically almost exactly as he had proposed, the light tanks had a difficult time keeping pace with the infantry during the St. Mihiel offensive because of poor ground conditions and the rapidity of the German retreat. They were, however, a valuable asset in support of the Meuse-Argonne offensive. His ideas on battlefield mobility were never tested because the AEF lacked sufficient trucks to transport the light tank force. Instead, the tanks had to be moved by rail to both the St. Mihiel and Meuse-

Argonne sectors, then under their own power during operations. This meant conducting long road marches to link up with units at the front, contributing to a high rate of mechanical failure as the tanks were forced to conduct extended operations without the benefit of overhaul.

In the final section of his report, Patton formulated a plan "recommended as best suited for the quick production" of sufficient numbers of tank personnel to man the proposed force. To carry out his plan, he advocated the establishment of separate tank centers and schools for the light and heavy tanks, with the schools' commandants also acting as the center commanders.⁴¹

Working on the assumption that tanks would be made quickly available in sufficient numbers, Patton proposed that enough officers and men be recruited and shipped to each tank center to fill a company plus provide for one or two additional instructors. These men should, he thought, have either experience driving automobiles or motorcycles, or mechanical skills derived from work as blacksmiths, foundry hands, plumbers, or gasfitters.

Upon arrival at the center, the men would undergo a four-week training program. They in turn would act as instructors for a second company arriving at the beginning of the fifth week. Within two months these two companies could then train an additional two to four more, "giving a total of six companies or two battalions instructed at the end of three months."⁴²

Patton claimed that this system, in addition to turning out fully-trained units, would give the fledgling tankers the opportunity to practice the principles just learned. It would also enhance unit cohe-

siveness by allowing the officers and men to become accustomed "to each other and to each other's methods."⁴³

His second proposal was more realistic, assuming as it did that men and not machines would be available in quantity for training. For such a program he recommended that as many officers and noncommissioned officers as possible be recruited and sent to the centers. They would be trained under the same system, but with six men assigned to each vehicle. At the end of the four-week training cycle, if sufficient tanks were not yet available to create companies, Patton proposed that graduates be sent to other schools—such as those for machine-guns or small cannon—holding over only the best qualified to serve as assistant instructors for the next batch of students arriving at the tank center. While less efficient than the unit training proposal, this plan was eventually employed because of the difficulty the Tank Corps experienced obtaining vehicles.

Patton had been less than thrilled by the performance of Reserve officers called up to help fill the ranks of the rapidly expanding Army. Because of this, he recommended that "at least one regular officer per company [be detailed] to enforce discipline, as it is a well-known fact that working with machines has a very disastrous effect upon discipline. It seems to run out of men as the oil soaks into them."⁴⁴

Patton also proposed that soldiers who showed marked mechanical ability be given additional training in repair and salvage so they might later be employed as mechanics in battalion repair shops.

The program of instruction Patton described stressed driving skills and marksmanship training, beginning with the basics and making

the training progressively more difficult. Routine crew maintenance procedures would also be emphasized. Lectures would be devoted to the theory of gasoline engines and other vehicle systems; the tactics, history, and employment of the tank in combat; drill; and signalling techniques. Students would be required to demonstrate their ability to maneuver the tank, fire its weapons, and respond to visual signals during a comprehensive examination administered at the end of the course.

Patton noted that the proposed course was far from all-inclusive. Subjects such as map reading, intelligence gathering, and camouflage were not included in his proposal because he thought these skills could best be taught after the men joined their units.

Finally, to save time, Patton suggested that the course could be shortened to three weeks for selected officers and men, who could then receive training in the omitted subjects during the fourth week or in the evening.

When he finished, Patton was pleased with his efforts. He wrote his wife two days after submitting the report, noting that he had been required to account for "all conceivable conditions" and plan to the minutest details, providing "a list of tools and spare parts down to and including extra wire and string," and the numbers and ranks of soldiers in units. He had, he wrote, accomplished all that with "nothing to base it on but a general knowledge of soldiering." In a self-congratulatory mood, he added that he did not "think many men could have combined the exact mechanical knowledge with the general Tactical and organizational knowledge to do it. But I think I did a good job. Infact I surprised my self and hope others will think as well of it as I do"

Others did. His work was so thorough, his proposals so well-reasoned, that the majority of them were enacted. He had ample opportunity to put them to the test as commander of the first tank center to be established--the light tank center and school at Langres. The relative ease with which he was able to recruit and train a full brigade of tank troops for combat in less than five months bears witness to the soundness of his ideas.

Rumors began circulating in early December 1917 that Colonel Samuel D. Rockenbach, a cavalry officer detailed to the Quartermaster Corps, would soon be appointed to command both the light and heavy tanks in the AEF. Patton, who had grown somewhat discouraged in the face of the awesome task awaiting him, told his wife, "I hope I can make a success of this business but starting with nothing is hard. After we get a little nucleus it will go easier. Now I feel helpless and almost beaten but I will make a go of it or bust Rockenbach or no."⁴⁶

Similar thoughts must have crossed the mind of Colonel Rockenbach the morning of 22 December 1917 when he reported to Colonel Eltinge at GHQ and announced that he had received orders appointing him chief of the Tank Corps. Eltinge, who had been supervising tank matters for Pershing's staff to that point, "pulled open the lowest drawer of his desk, took out a bundle of papers, [handed them to Rockenbach] and said, 'Here's all we know about Tanks, go after them.'"⁴⁷

ENDNOTES

1. Martin Blumenson, The Patton Papers, 1885-1940 (Boston: Houghton Mifflin Co., 1972), 437; Timothy K. Nenninger, "The World War I Experience," Armor, 78:1 (January-February 1969), 47.
2. Rockenbach, "Tank Corps Operations," 1.
3. Brigadier General Samuel D. Rockenbach, "The Tank Corps: A Talk to the General Staff," 24 September 1919, USAMHI, 1; Nenninger, "The WWI Experience," 47.
4. Rockenbach, "Tank Corps Operations," 2.
5. Ibid., 3.
6. Ibid.
7. Cable No. 159-S, para. 15, 14 September 1917, included as an enclosure to Lieutenant Colonel Robert L. Collins, "Report on the Development of the Tank Corps," undated, Modern Military Records Division, Record Group 120, Entry 22, Folder 387, National Archives, Washington, D.C. (hereafter NA).
8. Ibid.
9. Ibid.
10. Rockenbach, "The Tank Corps," 4.
11. Rockenbach, "Tank Corps Operations," 2.
12. Majors James A. Drain and Herbert W. Alden, "Report of Investigations by Majors Drain and Alden," 10 November 1917, included as an enclosure to Major R. E. Carlson, "Memorandum on the Development of Tanks," 16 March 1921, USAMHI, 10.
13. Ibid., 11.
14. Ibid., 7-8.
15. Ibid., 2.
16. Ibid., 8.

17. Ibid., 9.
18. Rockenbach, "Tank Corps Operations," 2.
19. Letter, George S. Patton, Jr., to Beatrice Ayer Patton, 19 September 1917, as quoted in Blumenson, Patton Papers, 423. Following Blumenson's example, I have elected not to use [sic] to identify Patton's misspellings or punctuation and grammatical errors. In some instances I have altered punctuation or grammar to clarify a passage for the reader. Patton was a notoriously poor speller, and his writings include numerous grammatical errors.
20. Undated Patton diary entry as quoted *ibid.*, 426.
21. Letter, Captain George S. Patton, Jr., to Commander in Chief, AEF, through Headquarters Commandant, AEF, 3 October 1917, subject: Command in the Tank Service, as quoted *ibid.*, 427.
22. Ibid.
23. Letter, George S. Patton, Jr., to Beatrice Ayer Patton, 9 October 1917, as quoted *ibid.*, 428-429; Patton diary entry, 3 November 1917, as quoted *ibid.*, 432.
24. Patton diary entry, 4 November 1917, as quoted *ibid.*, 432.
25. Captain George S. Patton, Jr., report, "Subject: Light Tanks," 12 December 1917, George S. Patton, Jr., Collection, Patton Chronological File, 11-12 December 1917, Library of Congress, Washington, D.C. (hereafter Patton Collection); Colonel George S. Patton, Jr., "History of the 304th (1st) Brigade Tank Corps," undated, Patton Writings, Box 49, Military Writings 1918-20 File, Patton Collection, 1.
26. Captain Elgin Braine, "Personal Experience Report," 22 December 1918, Patton Military Papers, Box 47, Personal Experience Reports of Tank Operations—1918 File, Patton Collection.
27. Patton, "304th Brigade History," 1; Patton, "Light Tanks," 1.
28. Blumenson, Patton Papers, 444.
29. Ibid., 445.
30. Jones et al., The Fighting Tanks, 21, 25.
31. Blumenson, Patton Papers, 446.
32. Patton, "Light Tanks," 1; Rockenbach, "Tank Corps Operations," 4.
33. Patton, "Light Tanks," 1.

34. Blumenson, Patton Papers, 447.
35. Patton, "Light Tanks," 1.
36. Ibid., "Attachment A, Mechanical."
37. Ibid., "Attachment B, Organization."
38. Ibid., "Attachment C, Tactical."
39. Ibid.
40. Ibid.
41. Ibid., "Attachment D, Instruction."
42. Ibid.
43. Ibid.
44. Ibid.
45. Letter, George S. Patton, Jr., to Beatrice Ayer Patton, 14 December 1917, as quoted in Blumenson, Patton Papers, 457.
46. Ibid., 457-458.
47. Rockenbach, "The Tank Corps," 3.

CHAPTER II

THE LIGHT TANKS: FROM LANGRES TO ST. MIHIEL

On Christmas Eve 1917 the AEF Tank Corps was a woeful force, indeed, consisting as it did of just three officers: Colonel Rockenbach, Captain Patton, and First Lieutenant Braine. The task facing them was monumental. They would be required to adapt a new piece of machinery for use on the battlefield, work out designs and arrange for production, establish Tables of Organization and Equipment for tank units that would be suited to the existing organization of the United States Army, work out tactics suitable for the employment of tanks, establish needed coordination measures to ensure cooperation among the various combat arms, recruit sufficient officers and men to man the force, and devise a detailed training program designed to turn out tank crews and units ready for combat.

Patton had high hopes that Rockenbach would be able to chart a straight course for the Tank Corps, although he had misgivings as to how their personal relationship would develop. The day he reported to Rockenbach for duty, Patton wrote his wife:

The whole Tank program is in a mess now as about three departments are trying to run it but Col Rockenbach will I hope straiten that out if he does nothing else. I guess he does not care a whole lot for me but my theory that if you do your best no one can hurt you will be put to the proof.'

Patton need not have feared about the relationship. Although

neither officer developed a quick liking for the other initially, at forty-seven, sixteen years Patton's senior, Rockenbach brought a wealth of experience and maturity to his post as commander of the tank force and principal tank adviser to General Pershing. Hardly an original thinker, even-tempered, lacking a sense of humor, and displaying a tendency to fixed, narrow opinions, Rockenbach was able to balance Patton's headstrong enthusiasm and channel his creativity.

Recognizing that their future success depended on their ability to work together, Patton and Rockenbach were able to cooperate in the interests of the war effort and their own personal ambitions. The pair shared family roots in Virginia, and both had attended the Virginia Military Institute (Patton in 1903-1904 before going on to West Point; Rockenbach graduating in 1889). They soon discovered that their personality and character strengths were complementary. While never becoming a close friend, Rockenbach eventually became one of Patton's admirers and strongest supporters—though Patton always remained uncomfortable with his superior."

Patton's first task as director of the Light Tank School at Langres was to find a suitable location in the area at which to establish the school. Patton found what he thought was the perfect place while scouting the Langres vicinity with Lieutenant Braine in late December. The site was at Bourg, some five miles south of Langres on the Dijon road. It was a rising piece of ground in the Bois d'Amour, and was flanked by two good roads and a railroad. Billeting could be conveniently obtained in Bourg and the neighboring villages of St. Geosmes and Brennes, and, if necessary, in Langres.

Rockenbach approved Patton's proposal to obtain the land on 29 December and returned to GHQ in Chaumont to requisition it. Braine accompanied him, with the mission of securing buildings for classrooms, offices, and billets.³

In early January 1918 Patton escorted Rockenbach to the French tank training center at Chamlieu and the British Tank Corps headquarters at Bernecourt. During the trip, designed to acquaint Rockenbach with British and French tank tactics, equipment, and training, the pair met with General J. E. Estienne of the French tank service, Major General Hugh Elles of the British Royal Tank Corps, and Colonel John F. C. Fuller, Elles' chief of staff.⁴

The first increment of officers to be assigned to the Tank Corps arrived on 8 January. These men (Second Lieutenants John D. Rice, Fred C. Winters, Robert T. Archer, Thomas D. Foley, Math L. English, Dan J. Sweeney, William H. Williams, Marion A. Friend, Edward A. Redmon, and Gus Struyk) all were commissioned from the enlisted ranks and had been made available by the Coast Artillery Corps. Because the tank school site still had not been approved, Braine escorted the officers to Langres, where half were sent to the 37mm gun school and half to the machine-gun course. Two days later, Lieutenants Redmon and Friend were ordered to be discharged for medical reasons. They left on 15 January.⁵

Word was received during this period that the French did not want to give up the ground Patton sought for his tank school. They proposed the selection of an alternate site. This infuriated Patton, who, in a fit of pique, called them "the d—— fools."

Meeting to discuss the issue with a French colonel, Patton told

him "that if he would do a little more to help" they might be able to get along better. He also suggested to the officer that "the reason the war was lasting so long was that [the French] were too afraid of civilians." The colonel responded to this tirade with the observation that the ground would be of little value to the Americans because they would be unable to conduct live-fire gunnery training. Patton told him just to get him the ground and he "would attend to that, for I fully intend to shoot French or no French."⁴

After submitting a renewed request for the ground at Bourg, Patton spent two days working with Braine on spare parts requirements for the tanks, observing "it takes a lot of stuff to kill a German."⁷

Patton waited until spare parts lists were typed, then delivered them personally to Rockenbach in Chaumont on the 15th. His report consisted of twenty-four pages of detailed tables listing the material needs for a light tank battalion and its supporting repair unit—right down to the number of screws and bolts that should be kept on hand. Patton and Braine having done the stubby pencil work, it would be up to Rockenbach to use his seasoned staff skills to get what was needed.⁸

In addition to helping Patton with the spare parts requirements, Braine had acquired office space, coordinated with other AEF schools to train newly-arrived tankers, organized a program of instruction for a mechanical course, and obtained a broken-down Atlas truck and surplus tools from the Quartermaster Corps for training purposes.⁹

On 18 January a second contingent of eleven Coast Artillery officers arrived in Langres (Second Lieutenants Edmund N. Hebert, Harry G.

Borlund, Courtney H. Barnard, Ellis Baldwin, Ernest A. Higgins, Thomas C. Brown, Henry F. Alderson, Robert J. Dunn, Robert C. Llewellyn, Theodore J. Sledge, and Harry W. Bolan). Like their predecessors, these officers had also been commissioned from the enlisted ranks. Braine sent all but Lieutenant Brown off to the machine-gun and small cannon courses. Patton had selected Brown to serve as adjutant of the tank school and busied him with the task of organizing a headquarters.¹⁰

Patton's frustrations over the land acquisition issue were finally relieved on 17 January when, after consultation with officers at the French Mission, he was able to secure an agreement giving him the ground he wanted at Bourg and permission to establish firing ranges.¹¹

Two infantry officers, First Lieutenant Loyall F. Sewall and Second Lieutenant Horace C. Nelms, reported for duty on 24 January after having served at the front in the Toul sector with the 1st Infantry Division's 18th Infantry Regiment. They were given duties to perform in Langres until the 29th, when the other officers completed their gunnery training. They then embarked together on a course of instruction that included a special ten-day map-making and reading class taught at the Army School of the Line; lectures on the use of camouflage, gas defense, and aerial photo reconnaissance; and mechanical training on the engine and transmission of the Atlas truck conducted by Lieutenants Braine, Baldwin, and Winters.¹²

While his officers were receiving this training, Patton worked on a lecture he delivered to the General Staff at Chaumont on 23 January, smoothed over a bureaucratic blunder that almost resulted in the Americans' disapproving acceptance of the land he had worked so hard to get

from the French, and giving tours of the new tank school grounds to senior American officers and a pair of visiting French officers from the tank center at Martigny-les-Bains.¹³ He also busied himself with paperwork, disciplinary matters, and fretting over another problem—the lack of tanks:

Unless I get some Tanks soon I will go crazy for I have done nothing of any use since november and it is getting on my nerves.

I cussed a reserve officer for saluting me with his hands in his pockets to day and he said that he demanded to be treated like an officer. I almost hit him but compromised by taking him to the General [probably Major General James W. McAndrew, commandant of the Army Schools] who cussed him good. Some of these new officers are the end of the limit. I bet the Tank Corps will have discipline if nothing else.¹⁴

Patton's emphasis on discipline was far from popular with his officers, and he told his wife that "I am getting a hell of a reputation for a skunk. . . . I expect some of them [reserve officers] would like to poison me. I will have to eat [only] eggs like Louis XI."¹⁵

With the acquisition of the land near Bourg approved, Patton knew it would be a matter of weeks before enlisted men began arriving to fill the ranks of the training companies. With this in mind, he published his first directive for school personnel. Dated 27 January, the document specifies rules for appearance and deportment, with particular attention being devoted to the proper rendering of the hand salute. In it, Patton instructed officers to obtain leather and brass polish and use it to keep shoes, belts, leggings, boots, belt buckles, and other metal accouterments "brightly shined." He also ordered them to use gasoline or some other cleaning material to keep their uniforms free of spots or stains. Hair was to be kept short enough so that the officers

and men of the tank school would "look like soldiers and not like poets." Finally, Patton told the officers that he would hold them personally responsible for the appearance and actions of their men.¹⁶

Much of Patton's fixation on matters of discipline, appearance, and deportment may have stemmed from the fact that he had little else to occupy him during this period. He noted in a letter to his wife that it was difficult for him to keep everyone busy while they awaited the arrival of their first tanks. Although pleased by a compliment paid him by Major General Andrews, who told Colonel Hugh A. Drum that Patton "was taking hold better than any man he had," he still was not personally satisfied:

. . . If I ever do feel that I am earning my pay I may really begin to get some where. I sort of wish I had gotten a battalion of infantry then I could have seen some results where as it is all so far in the future that one can't see it but in the minds eye.¹⁷

At the end of January Patton secured permission from Rockenbach to detach Lieutenant Braine and send him to the United States to act as the liaison between the Tank Corps in France and manufacturers tasked with building light tanks in America. Patton considered this a major accomplishment as he still found his working relationship with Rockenbach less than congenial. He noted in his diary that getting Rockenbach to agree to the transfer "was hard but finally he took the hook like a fish."¹⁸ He also told his wife that he thought the Tank Corps' chief was "the most contrary old cuss I ever worked with. As soon as you suggest anything he opposes but after about an hours argument comes round and proposes the same thing him self. So in the long run I get my way, but at a great waste of breath."¹⁹

On the day Braine departed for Paris, 1 February, Patton unveiled an innovation he had worked out to train his crews for combat despite the lack of vehicles—dismounted drills. These drills were designed to conform to the Infantry Drill Regulations, yet accustom the crews to the various signalling methods they would employ while maneuvering their tanks in combat formations.²⁰

The drills Patton described were to be initiated upon commands transmitted visually (using flags), by touch (tank commander to driver), orally, with a claxton (horn), or by the example of leaders. For example, to bring his platoon into a line formation, a platoon leader would move a red flag several times from right to left and left to right in a vertical plane. To halt, he would first press the top of his driver's head, indicating that the driver should stop. The other vehicle commanders, seeing the platoon leader and his driver halt, would take that as their cue to do likewise.

Although the specific drills and signals have changed with the years, tank units in the United States Army today still employ the technique to practice platoon and company battle drills when funding constraints restrict the amount of time they can spend maneuvering their tanks.

In addition to training, Patton put his officers to work preparing barracks and workshops and installing water lines in anticipation of the arrival of the first draft of enlisted volunteers from other AEF units. While much of this work was accomplished with materials obtained through proper channels, some "midnight requisitions" were needed. Patton recalled that six buildings mysteriously "sprang up in the night like

mushrooms." They looked suspiciously like French barracks, but had been "freely daubed with serial numbers . . . backed with [a] large obtrusive U.S. A still closer examination would have revealed places where other numbers had been removed with a plane. But why be inquisitive."²¹

Ever rank-conscious, Patton learned from a visiting West Point classmate that he had been promoted to major on 15 December. This did not constitute official notice, but after considerable internal debate, Patton decided to pin on the insignia of the higher grade²² and instructed his adjutant to prepare correspondence with a signature block reading "G.S. Patton, Jr.; Maj. of Cav.; Commanding."²³ In reality, however, his date of rank as major was 26 January, and orders would not arrive in France for another month and a half.

On Sunday, 17 February 1918, Lieutenant Colonel F. B. Hennessey and First Lieutenant Will G. Robinson arrived with a replacement draft of 200 men from artillery units in the 42nd Infantry Division.²⁴ These men would become the nucleus of Patton's light tank brigade. Included in their ranks was Sergeant Major George B. Heilner, who recalled that they were initially billeted in St. Geosmes, then moved to Bourg on the 22nd to begin training. Hennessey, because of his seniority, was returned to his unit.²⁵

With the arrival of the men, Patton was able to organize two companies under the command of Lieutenants Williams and English. Platoon leaders were also assigned and officers appointed to teach classes in mechanics, driving, weapons, and athletics.²⁶

The training day during this initial phase of unit training began at 8:20 a.m. with thirty minutes of close order drill. This was fol-

lowed by a half hour of athletics; a half hour of platoon signal drill; a thirty-minute lecture on subjects such as guard duty, military courtesy, posting sentinels, and challenging; and a half hour of platoon machine foot drill. In the afternoon all officers (except the duty officer) and ten noncommissioned officers (NCOs) from each company received forty-five minutes of pistol instruction, conducted forty minutes of company-level machine foot drills, and underwent mechanical training for an hour and a half. The enlisted men performed housekeeping and other chores during this period.²⁷

Reflecting on this training regimen in a letter to his wife, Patton noted that he thought it would "keep them fairly on the go for a while till we get the tanks. It is absolutely necessary to do so as there is nothing else to amuse them" He abhorred the idea of laxness, and added that he thought "our chief fault as an army has been that of taking things too easily. When the days get longer I can work them more which will be a help to them."²⁸

The pressure to train tankers was mounting, and Patton rebelled at a proposal by Rockenbach calling for a total of forty trained light tank companies by 30 June. The schedule was predicated on the shipment of a total of 930 tanks during that period.

Patton outlined his concerns in a detailed memo to Rockenbach on 2 March. Chief among them was his expectation that the fledgling supply system would fail. "You know what happened in the case of our trucks," he wrote. "Bodies landed in one place. Chassis another and both were useless. No spare parts at all. Tanks would be an even worse case [because the quartermasters would not know what to do with them]."²⁹

To alleviate this problem, Patton suggested paring the number of companies to be trained to twenty-eight, and recommended that an officer from the Tank Corps "with rank and experience" be detailed to act as Rockenbach's representative in the United States to coordinate the shipment of men and tanks.

Rockenbach disapproved this plan, much to Patton's dismay. Someone in the War Department must have been thinking along the same lines, however, because on 5 March the Secretary of War appointed Lieutenant Colonel Ira C. Welborn to serve as director of the Tank Service in the United States.³⁰

With the arrival of the enlisted men, Patton began actively recruiting additional officers for the Tank Corps. Among those he selected were First Lieutenants Harry H. Semmes and Newell P. Weed, both of whom reported for duty in early March. Weed recalled that they were required to take a "test of suitability" which consisted of an examination on gas engines. Weed said they prepared for the test by reading a small book "issued by some oil company." Both passed, though neither knew "a magneto from a carburetor."³¹

The light tank school was able to obtain two Hotchkiss 8mm machine-guns and two 37mm cannons from the Army Schools at Langres, and Patton immediately introduced instruction on these weapons into the schedule after 1 March.

Patton also designed a course on "Visual Training." This incorporated instruction on both ground and air observation techniques, and he was able to supplement it with aerial photographs of the Bourg area obtained from the Signal Corps. Patton also instructed Sergeant Major

Heilner to use the photos to update the maps of the area for the map reading classes.³²

While making his rounds of the other Army schools, Patton encountered Captain Sereno E. Brett, an instructor in the Infantry Specialists School who was an expert with the 37mm cannon. Brett was anxious to join the tanks and impressed Patton. Unable to secure his release from the school's commandant, Patton petitioned Rockenbach to request the services of this "invaluable" officer as that was the only way the transfer would be approved.³³ Rockenbach concurred, and Brett, who was to play a major role in subsequent events, reported for duty on 28 March to serve as Patton's senior instructor.³⁴

Personnel and training affairs all were in order, but "a Tank Corps without tanks is quite as exciting as a dance without girls."³⁵ The picture brightened considerably on 23 March when ten Renaults, long ago promised by the French, arrived by train at Bourg. Patton arranged with the railroad to move the train opposite the Bois d'Amour, where he had previously ordered unloading platforms constructed. He assisted personally with the operation, leading nine of the most experienced drivers on a mile-long journey from the rail line to the tank park.³⁶

Patton recalled later that:

. . . The french were much impressed as they said it would take us 15 hours and we did it in just three.

It was a beautiful moonlight night and ideal for the purpose. When the procession of ten started across the fields I was delighted as I have been living on hopes for the last four months.

They certainly are saucy looking little fellows and very active. Just like insects from under a wooden log in the forest.

No one but me had ever driven one so I had to back them all off the train but then I put some men on them and they went along all right. I took one through some heavey

woods this morning and it just ate up the brush like nothing.

Tomorrow they will all be oiled up and we will start active business making drivers on Tuesday. It will be fine haveing something to work with as up to now I have had one old truck [the Atlas] . . . and had to teach all about driving with it³⁷

Sufficient progress had been made with the truck, however, that a program of tank driving instruction was initiated the day after the tanks arrived. Ten men who had shown "marked ability" were initially trained to serve as instructors, then details were selected from each of the companies to undergo training.³⁸ Patton's goal was to qualify ninety-six men and three officers as both drivers and gunners within three weeks.³⁹

By 26 March Patton was able to observe that training was going "full blast" and that he finally felt like he was accomplishing something. Although he had nowhere near the number of tanks needed (or promised to him), the ten he had were "much better than none." He was also impressed by the speed with which his soldiers were learning to drive the tanks, and noted that he thought Americans could be taught the techniques "50% faster than the French."⁴⁰

To make mechanical training even more effective, Patton asked Rockenbach to provide the tank school with a number of visual aids, including a complete light tank engine cut to show the working internal parts such as valves, pistons, and the cam shaft; a carburetor cut to show the working of the float, needle valve, and jets; a clutch cut to show the working of its internal parts; and other mechanical assemblies.⁴¹

By the end of March Patton had a sizable force at Bourg, and, with

the prospect of even larger replacement drafts due in, he was forced to seek additional space for housing and training them. He found it in Brennes, a small neighboring town located within twenty minutes' marching time of a proposed railroad siding in the Bois St.-George-le-Gros.⁴²

On 5 April ninety men arrived and were organized into Company C under the command of Second Lieutenant Sledge. Additional replacements began arriving at the rate of about ten per day as units responded to an AEF directive authorizing the transfer of "suitable" volunteers to the Tank Corps. Patton's task of going to units in search of qualified officers was made easier by an order for all officer applicants to report to Bourg for screening. "As only about one-third of those applying were accepted, a very good lot were obtained."⁴³

Following the approval in late March of a revised Table of Organization for the AEF Tank Corps calling for five battalions of heavy tanks, twenty battalions of light tanks, and the necessary headquarters elements, repair and salvage companies, depot companies, training centers, and replacement companies, Rockenbach issued an order providing for numerical designations for the various units.⁴⁴ Light tank battalions were to be numbered 1-40, and heavy battalions 41-50 in order of organization. Companies would be designated A, B, and C. Tank Centers were to be numbered 1st, 2nd, and so on as they were formed. Repair and salvage companies would be allocated to each center and would take the numerical designation of their respective centers, while training and replacement companies for light tanks would be numbered 1st, 2nd, and so on, and for heavy tanks, 41st, 42nd, and so on.⁴⁵

Patton, who had only recently received written confirmation of his promotion to major, was notified on 1 April that he had been confirmed as a lieutenant colonel.

By mid-April the level of training of the officers and men at the 1st Tank Center had reached a point at which Patton thought he could begin conducting maneuvers. On the 16th he initiated the first of a series of simulated combat exercises, maneuvers, and practice movements for which he personally wrote and supervised the preparation of field orders, instructions, movement directives, and other details designed to encompass a wide variety of problems and combat situations.⁴⁶

One of the highlights of this period was a tank demonstration performed for the officers of the General Staff College on Monday, 22 April.⁴⁷ The demonstration featured Patton's ten light tanks in support of a composite battalion of infantrymen from the Army Schools at Langres. Two battalions of artillery also participated. Patton was especially pleased because the demonstration provided not only an excellent training vehicle for his own men, but a chance to impress the students and faculty at the staff college. He later wrote that he thought the maneuver played an important role "in convincing a great number of the staff officers who witnessed it, of the efficiency of the light tank."⁴⁸

The 1st Light Tank Battalion was organized on 28 April with Patton in command. Company A was given to Captain Joseph W. Viner, a cavalryman who had joined the Tank Corps the previous month after arriving in France following an abbreviated tour as a mathematics instructor at West Point. Brett took over Company B, and a third Regular Army officer, a

Captain Herman, was given command of Company C.¹²

In addition to realistic, demanding training, Patton stressed strict discipline and the maintenance of a high level of morale. At one point, recalled Second Lieutenant Will G. Robinson, Patton, inspired by soldiers of the 82nd Infantry Division he had seen sporting shoulder patches, challenged the officers of the tank center to design one. "I want you officers to devote one evening to something constructive," Robinson later quoted Patton. "I want a shoulder insignia. We claim to have the firepower of artillery, the mobility of cavalry, and the ability to hold ground of the infantry, so whatever you come up with it must have red, yellow, and blue in it."¹³

Robinson and his roommate spent the rest of the evening with crayons "I had liberated in front of the fire place" figuring out a design. They decided on a "pyramid of power, but had a hell of a time" dividing it into the three colors. They finally drew three lines terminating in the center. The next morning, Patton adopted their design and gave Robinson a \$100 bill and sent him into Langres to get as many patches made as possible by Retreat. Robinson bought felt in the three colors and went to a hat and cap shop to have the patches sewn. He returned to camp with about 300 patches and time to spare. "Patton was tickled about it. If there was anything he wanted, it was to make the Tank Corps tougher than the Marines and more spectacular than the Matterhorn. That triangle was the first step."¹⁴

The triangular patch of the AEF Tank Corps was later embellished upon, adding an endless track, a cannon, and a lightning bolt superimposed over the three colors, and remains the shoulder patch used to

denote armored divisions.

Patton sought to further differentiate his tankers from other soldiers by designing a special brassard and collar ornament for the Tank Corps.⁵²

If other officers might have thought Patton was promoting the Tank Corps as an independent arm or sought to usurp infantry missions, he allayed their fears in a lecture to officers at the School of the Line by reminding them that "tanks in common with all other auxiliary arms are but a means of aiding infantry, on whom the fate of battle ever rests, to drive their bayonets into the bellies of the enemy."⁵³

Patton met with each group of newly-assigned officers and enlisted men and exhorted them on the need for strict discipline. Discipline, as Patton described it, was "instant, cheerful and automatic obedience."⁵⁴ He likened the discipline required of soldiers to that exhibited by players on a football team. He compared officers to quarterbacks and the enlisted men to the other players on the team, noting that their obedience must be instant and without thought because while failure on the football field might result in the loss of a few yards, the "lack of discipline in war means death or defeat, which is worse than death. The prize for a game is nothing. The prize for this war is the greatest of all prizes—Freedom."⁵⁵

After dismissing the enlisted men, Patton told the officers that everything they had just heard him tell the soldiers "applies in treble force to yourselves." He was especially critical of the democratic approach he had heard officers take when issuing orders. Continuing the football analogy, he told them:

. . . Do you ever hear the quarter-back of a football team say "Please give me your attention gentlemen, the signal which I am about to call is—." You never did. There is nothing harsh in the brief words of command, no more than there is impoliteness in the brief wording of a telegram. Commands express your desire in the quickest and most emphatic language possible.³⁴

Finally, he told the officers that a well-developed sense of duty and discipline were inseparable, and challenged them to develop their own sense of duty to the level exhibited by a thoroughbred horse. "You must develop the thoroughbred's sense of duty, otherwise you had better never have been born to wear the uniform you will inevitably disgrace." Duty, in Patton's view, was a privilege, and he told his officers they had better acquire a like frame of mind, for "to wear the uniform of an officer in the United States Army in any other frame of mind is to live a lie."³⁵

The positive effect of Patton's exhortations is attested to by Private First Class Melvin Winget, a driver and gunner who served in Company C, 345th Tank Battalion. Winget recalled that the level of discipline in his unit was exceptionally high and that "we had officers to be proud of." He described Patton as "gruf," but "behind us one hundred percent."³⁶

Corporal Earl T. Carroll, who arrived at Bourg with the 328th Tank Battalion in September 1918, shared Winget's assessment of discipline in the AEF Tank Corps. He wrote later that when a soldier served under Patton or officers he trained he "got it." Shortly after his arrival at Bourg, Carroll recalled, Patton told the men in his unit, "Why you God damned sons of bitches, do you think the Marines are tough? Well you just wait until I get through with you. Being tough will save lives."³⁷

By May Patton was sufficiently satisfied with the operation of his tank center and school that he took the opportunity to go to the front with several of his officers to observe French tank operations. Early in the month he sent Brett and three other officers to the Montdidier sector for ten days. On the 24th, Patton and seven officers visited the same sector, returning on 2 June.⁶⁰

While at the front, Patton was able to meet with tankers from a French Schneider-equipped battalion who had supported the American 1st Infantry Division's attack at Cantigny. He learned the details of the battle from them and was impressed by the fact that not a single tank had been hit by German artillery fire. Colonel Edward King, the 1st Division's chief of staff, discussed the operation with Patton from the Americans' perspective, and a Captain Johnson, who commanded the assault infantry working with the tanks, was "most enthusiastic" about the performance of the machines in battle.⁶¹

The French came through with an additional shipment of fifteen Renaults in May, allowing Patton to step up the pace of combat training.⁶²

On 6 June, Patton had sufficient officers and men on hand to organize a second light tank battalion and create a larger staff. First Lieutenant Harry E. Gibbs became Patton's chief of staff, First Lieutenant Edmund M. Hebert the adjutant, First Lieutenant Maurice Knowles the reconnaissance officer, and First Lieutenant Robinson the supply officer. Patton turned over command of the 1st Light Tank Battalion to Captain Viner, who also served as the tank school's Chief Instructor. Company A was given to Captain Ranulf Compton, Company B to Captain

Newell P. Weed, and Company C to Captain Math L. Eng'ish. Brett became commander of the 2nd Light Tank Battalion, with Captains Harry H. Semmes, William H. Williams, and Courtney H. Barnard taking command of Companies A, B, and C, respectively. Captain Ellis Baldwin was given command of the 301st Repair and Salvage Company, which serviced and repaired the center's tanks and wheeled vehicles.⁴³

In June the tank school at Bourg implemented a nine-week program of instruction featuring thirteen courses. These included infantry drill, gas engines, tank driving, military intelligence, machine-gun, 37mm gun or six-pounder cannon, athletics and recreation, special advanced tank training, other specialty training, battle practice, inspections, field work, and lectures.⁴⁴

Five hours per week were allocated for infantry drill during the first through eighth weeks. This training included "School of [the] Soldier"; squad, company, and battalion drill in both close and extended order; inspections and ceremonies; and marches and field training.

One hundred hours were allocated for gas engine and driver training. This was further broken down into twenty hours each during the first and second weeks, and fifteen hours per week during the third through sixth. Instruction was given on carburetor, magneto, clutch, transmission, engine, and differential theory and operation; conduct of minor repairs; and routine maintenance procedures. Tank foot drills and actual driving under increasingly difficult conditions were also included.

Fifty hours of instruction were provided in military intelligence subjects, with ten hours allocated during the first and second weeks.

and five hours per week during the third through eighth. Subjects covered included visibility of targets, range estimation, target designation, military topography, map reading and compass use, patrolling, messages, scouting, liaison work, signalling, and use of field telephones and pigeons.

Twenty hours (ten each during the third and fourth week) were devoted to machine-gun training. In addition to learning the nomenclature and functioning of the 8mm Hotchkiss machine-gun's various parts, tankers learned to assemble and disassemble the weapon and perform maintenance and minor repairs. Live firing was conducted both dismounted and from tanks. A similar block of instruction was allocated for the 37mm gun and six-pounder cannon during the fifth and sixth weeks of training.

Ever conscious of the soldier's need for physical fitness, Patton saw to it that at least one hour per day was set aside for that purpose while the troops were in garrison.

During the seventh and eighth weeks, companies spent fifteen hours per week conducting simulated battlefield exercises covering all phases of tank training. An additional ten hours per week during the seventh and eighth weeks were allocated for the conduct of anti-gas drills, use of grenades and pistols, camouflage, and compass work.

Saturdays were devoted to inspections and ceremonies, marches, care of equipment, and personal and camp hygiene.

The highlight of the training program was a week-long "battle practice" conducted at the end. During this exercise the tankers conducted operations "under battle conditions . . . living under fighting

conditions and making the preparation, participating in, and exploiting the success of a battle against a represented enemy."⁵

Colonel Rockenbach's system for numbering units in the AEF Tank Corps was revised on 8 June after word was received that the War Department had come up with a different scheme. This required renumbering the units in France. The 1st Tank Center thus became the 311th Tank Center, and the 1st and 2nd Light Tank Battalions were redesignated as the 326th and 327th Tank Battalions, respectively."⁶

At about this same time Brett moved his 327th Tank Battalion to Brennes, and Patton made arrangements for himself, Brett, Viner, and Gibbs to take the General Staff course at Langres.

Before departing, Patton initiated night combat training. His tankers responded readily to the challenge. One company impressed him by completing a night march of more than six miles in less than three hours without deviating from the designated route."⁷

Rockenbach, who grew concerned when it became apparent in June that no American-built tanks would be available in quantity before 1919, prompted General Pershing to secure a promise from the French to equip Patton's two battalions with Renaults. It was the Tank Corps chief's intent to get at least one of his light battalions into combat when the AEF launched its planned offensive against the German St. Mihiel salient sometime in late August."⁸

This news did little to bolster the aggressive Patton's sagging morale. He again regretted that he did not seek an infantry assignment the previous fall. "The regiment I had a chance to join has been at it now for five months," he wrote in a letter to his wife. "Of course [I]

have done a lot but I keep dreading lest the war should finish before I can really do any fighting." Nevertheless, he still held out hope. He was certain that if the war would just last long enough for him to get into combat with his tanks it would "work out greatly to my advantage[. But the unknown is always full of terrors and I wake up at night in a sweat fearing that the d— show is over."69

The lack of tanks (and thus training opportunity) was also beginning to affect the morale of the men. Second Lieutenant Lester W. Atwood (at the time serving as First Sergeant of Company A, 327th Tank Battalion) recalled that, after his unit moved to Brennes, "a parabola of the morale of the company, if such a thing could be depicted, would show somewhat of a declining curve during those summer months. Much fatigue [housekeeping-type duties] was the order of the day and this became more or less tiresome."70

Patton continued to attend to his duties as 311th Tank Center commander and commandant of the tank school during the months of July and August while he attended the General Staff course.

In late July he drew a mild rebuke from Lieutenant Colonel Daniel D. Pullen, Rockenbach's chief of staff, when he submitted a paper on tank tactics to GHQ AEF. Patton proposed that they abandon "the stereotyped formations heretofore thought essential." The Germans, he said, had repeatedly shown that it was possible to "break the enemy's initial crust of resistance" with a "sudden and violent" artillery barrage.71

Following this example, Patton said he thought tanks should be employed in conjunction with a bombardment similar to that used by the Germans, but making "copious use of smoke" to cover their assault. The

tanks should in turn be followed by infantry skirmishers, then infantry units in increasing density from front to rear. He recommended controlling the attack by progressively advancing the artillery barrage in increments of 200-400 yards or more, keeping up the fire on German defensive positions for thirty minutes to an hour, depending on the length of the jump. Because he envisioned the tanks operating for the most part in enemy territory, he suggested that heavy tanks be used to drag forward additional fuel supplies for the establishment of forward refuelling points. Patton indicated in the report that he had already taken steps to conduct experimental training in the use of these tactics at his tank center.⁷⁰

Pullen's response was succinct:

. . . I do not think this is the time to propose any [new] tactics for the Tank Corps. Our first job is to get Tanks and then the second job is to get some Tank fighting units in the line. After we get some Tank units . . . in the fight we will be in position to talk about Tank tactics, and after we have been in one or more shows we will . . . be able to state exactly what we want and I believe what we say at that time will be accepted, while at the present time a great deal of what we say will be looked upon as hot air.⁷¹

The impulsive Patton had the wisdom to accept Pullen's advice in the spirit in which it was offered, and turned his attention in the following weeks to subjects that would better prepare his men for battle using the accepted doctrine. During the first three weeks of August he composed and published at least four papers, including an update of his "Tank Drill Regulations (Provisional)," "Notes for the Guidance of Battalion and Company Reconnaissance Officers," "Tank Driving," and "Duties of the Platoon Leader."⁷² Each of these papers dealt with the various subjects in minute detail and reflected Patton's own inimitable style.

By mid-August Patton had 900 men and fifty fully-qualified officers at his tank center. They were all itching to get into the fight, but still had only twenty-five tanks on hand. To harden the men physically and to help keep up morale, Patton began requiring each company to run a little over half a mile in columns of squads before breakfast each morning.⁷⁵

As the long awaited day when an independent American army would go into combat against the Germans approached, Patton could look back with satisfaction on the work he had accomplished.

Starting with nothing, he had created a highly-trained, disciplined, and motivated light tank brigade. He and his officers had been required to design Tables of Organization and Equipment for the units, recruit the men to fill them, develop tactics and doctrine for their battlefield employment, and devise a training program that would ensure they would be capable of functioning in combat. All this was done. That it had not been done on the scale they had originally envisioned was due to the inability of civilian industry to provide them with the equipment they needed, not because of any failure on their part.

Finally, on the morning of 20 August, Patton received the word he had been anxiously awaiting. A note was delivered to him during a lecture at the General Staff College directing that he report "at once to the Chief of the Tank Corps accompanied by your Reconnaissance officer and equipped for field service."⁷⁶

It could mean only one thing—combat. More tanks must be on the way to Bourg, and with them the opportunity to lead his men into battle. Patton rushed to Bourg, flushed with excitement, where he appointed

Viner assistant commandant and turned over command of the center." He then set off for GHQ with First Lieutenant Knowles, his reconnaissance officer, to confer with Brigadier General Rockenbach, who had been promoted to that rank on 11 July.

ENDNOTES

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3. Colonel George S. Patton, Jr., "History of Army Tank School, A.E.F.," 22 November 1918, Modern Military Records Division, Record Group 120, Entry 22, Folder 229, NA, 1; Ibid., 467.
4. Blumenson, Patton Papers, 469.
5. Patton, "History of Tank School," 2.
6. Letter, George S. Patton, Jr., to Beatrice Ayer Patton, 10 January 1918, as quoted in Blumenson, Patton Papers, 470.
7. As quoted *ibid.*, 471
8. Ibid., 472.
9. Braine, "Personal Experience Report."
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11. Blumenson, Patton Papers, 473.
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15. Letter, George S. Patton, Jr., to Beatrice Ayer Patton, 14 January 1918, as quoted *ibid.*, 472.
16. Captain George S. Patton, Jr., "Memorandum No. 1," 27 January 1918, Patton Chronological Files, Box 9, 21-31 January 1918, Patton Collection.
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25. Second Lieutenant George B. Heilner, "Personal Experience Report," 14 December 1918, Patton Military Papers, Box 47, Personal Experience Reports of Tank Operations—1918, Patton Collection.

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27. Patton, "Memo for Adjutant."

28. Letter, George S. Patton, Jr., to Beatrice Ayer Patton, 23 February 1918, as quoted in Blumenson, Patton Papers, 491.

29. Major George S. Patton, Jr., "Memo to Col. S. D. Rockenbach," 2 March 1918, Patton Chronological Files, Box 9, 1-15 March 1918, Patton Collection.

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32. Memorandum, Major George S. Patton, Jr., to Major Daniel D. Pullen, 19 March 1918, Patton Chronological Files, Box 9, 16-24 March 1918, Patton Collection.

33. Memorandum, Major George S. Patton, Jr., to Chief, Tank Corps, 16 March 1918, Patton Chronological Files, Box 9, 16-24 March 1918, Patton Collection.

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37. Letter, George S. Patton, Jr., to Beatrice Ayer Patton, 24 March 1918, as quoted *ibid.*, 509.
38. Patton. "304th Brigade History." 5.
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40. Letter, George S. Patton, Jr., to Beatrice Ayer Patton, 26 March 1918, as quoted *ibid.*
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44. Rockenbach. "Tank Corps Operations." 6.
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CHAPTER III

THE HEAVY TANKS: A GATHERING AT WOOL

While Patton was busily preparing to open his light tank school at Langres in early 1918, concurrent efforts were underway to recruit and train officers and men to man heavy tanks. Because the British were the only allies employing heavy tanks, it was decided that the British Home Training Center at Wool, England, was the logical place to train the initial contingent of American heavy tankers for the AEF, and Rockenbach obtained the approval of the British and the AEF staff to establish an American training center as an annex to the British Tank School at neighboring Wareham.¹

Rockenbach cabled the War Department in early February with a request that fifty officers and 100 NCOs be selected and sent to England as soon as possible so they could be trained to serve as the cadre for a force he hoped would grow to five heavy tank battalions by July. He requested that the men to fill those battalions be recruited from units in the United States, and that the first battalion be shipped to England by 1 March, with the remainder to follow at a rate of one per month.²

Acting on Rockenbach's request, the Army activated the 65th Engineer Regiment at Camp Meade, Maryland, and issued a call for "high quality" volunteers for service with tanks. The type of men sought for duty in what some called "President Wilson's Slaughter Houses" were

those of a "daring and adventurous spirit. . . . unafraid in any dilemma," and who were "cool and calculating and willing to take the long chance."

Soldiers from all branches of the Army responded enthusiastically to the call. As many as 250 signed up in a single day at Camp Meade, and offices at Camp Devens, Massachusetts were deluged with applications. A single afternoon's roster of recruits at one New York headquarters included

. . . two gold miners, three Boer War veterans, three professional pugilists, six members of last year's varsity football team at Williams College, six former United States Marines, three men who had won the French Croix de Guerre, a filibuster, an Argentine cavalryman, a dancing master, a lion tamer, and forty men from the University of Chicago who had enlisted as an ambulance unit and then transferred."

By the end of February, enough men had been recruited to organize Companies A, B, and C of the 1st Separate Battalion, Heavy Tank Service, 65th Engineers, and D Company, 2d Battalion, Heavy Tank Service, 65th Engineers."

David A. Pyle was typical of those who volunteered. Pyle, then serving as a corporal with D Battery, 310th Field Artillery, was awaiting orders to attend Officer Candidate School when he heard that volunteers were being sought for duty with heavy tanks. He recalled having "considerable trouble" getting an interview at Camp Meade, but was finally accepted and assigned to A Company of the 1st Separate Battalion as company clerk."

The tankers at Camp Meade were kept busy with drill, physical training, hikes, and inspections while awaiting shipment to England. On 5 March 1918 they were detached from the Corps of Engineers and

assigned directly to the Tank Service. concurrent with Lieutenant Colonel Welborn's appointment as director of the Tank Service in the United States.¹⁰

In France, meanwhile, Rockenbach selected Lieutenant Colonel Conrad S. Babcock to command the 2nd Tank Center, to be established at Bovington Camp near Wool.¹¹ Patton and Rockenbach then departed for Wool on 5 March, where they spent a week conferring with the British, observing training at the British Tank School, and preparing for the arrival of the first heavy tank battalion from the United States.¹²

One of the officers who had been called to assist with the 1st Battalion station at Camp Meade was Captain Dwight D. Eisenhower. In mid-March, when word arrived that the battalion should begin preparation for overseas movement, Eisenhower was sent to New York to coordinate with port authorities. After two days of working his "head off" attending to the details involved with embarkation and shipment, Eisenhower returned to Meade where he found, much to his dismay, that he would not be going with the battalion.

"My chief said he was impressed by my 'organizational ability.' I was directed to take the remnants of the troops who would not be going overseas, and proceed to an old, abandoned campsite in Gettysburg, Pennsylvania, of all places."¹³ The men who accompanied Eisenhower were in D Company, 2d Battalion, which became the nucleus of the 302d Tank Battalion at Camp Colt.

The tankers of the 1st Battalion got their marching orders on 23 March and moved by train to Camp Menitt, New Jersey, then on to Hoboken, where they were ferried to New York City on the night of the 26th.

On the 27th they boarded the White Star liner Olympic, already crowded with 7,500 troops bound for France."

As the clerk for A Company, Corporal Pyle found his accommodations to be considerably better than those of his fellow soldiers. He joined his company executive officer, Second Lieutenant Hilliard, in the stateroom belonging to First Lieutenant John B. Franklin and was told they would "set up shop here" and that Pyle would be quartered with them for the voyage. He found out later the reason they had been provided such luxurious living quarters was that Franklin's father was president of the White Star Line. "I made the trip living high on the hog and was more or less ashamed of my good luck."

The Olympic made an uneventful crossing, arriving in Brest, France, shortly after dawn on 7 April. The day was spent unloading equipment and all of the troops except the men of the 1st Battalion. That night the Olympic slipped out of Brest under cover of darkness and headed for Southampton, England, arriving at dawn off Plymouth. "[We] had a submarine scare which called us all to stations, but after [much] destroyer activity and commotion we got our first view of the White Cliffs and Plymouth Harbor."

At high tide, the Olympic steamed up the narrow channel to Southampton, where the men disembarked and formed up under a shed beside the London and Southampton Railroad tracks. Here they had their first encounter with a British soldier:

. . . a Scottish Sergeant Major came strutting down the platform with his colorful kilts and his swagger stick under his arm. When our men saw him they began to direct many remarks such as "She's going to sleep with me tonight," or "He's going to be my girl tonight." Of course this was enough to insult the King and Queen, so he dashed back and

demanded to know who was the bloody bugger who said that. About a dozen men broke rank[s] and the last I saw of him he was running off the end of the platform into the streets of Southampton with several officers trying to restore order and get the company back into line.¹⁵

The next day, 9 April, the battalion was taken by train to Wareham. During the three-mile march from the station to their new camp the tankers were greeted warmly by the townspeople, and, as they passed the village school, the headmaster led his students in "three hearty cheers" while one youngster proudly waved an upside-down American flag, oblivious to the fact that this was a signal for distress.¹⁶

The first week at Wareham was devoted primarily to orientation training. The men of the 1st Battalion learned the layout of the British Tank School and were told what they could expect during their training—"a very comprehensive program" involving all phases of tank operations from the theoretical to practical application of mechanical maintenance, tank driving and gunnery, reconnaissance, map and compass reading, gas warfare, signalling techniques, battle drills, etc. They also received their first cash payment in British currency. While the Americans initially found the English monetary system perplexing, their gambling activities quickly taught them the value of the British pound.¹⁷

Two things in particular caught the American's attention during their first week at Wareham: The presence of women from the British Women's Auxiliary Corps and the bedding they were provided consisted of three long boards supported by two small trestles on which lay a simple, straw-filled mattress.¹⁸

Training for the 1st Battalion's tankers began during their

second week at Wareham. Conducted by white-sweatered instructors from the British Tank School, it consisted mostly of bayonet drill, semaphore signalling, and "Physical Torture"—fitness training administered in "huge doses."¹⁹

This increased pace made the Americans painfully aware of the "woefully inadequate" British diet. Accustomed to hearty garrison rations back in the United States, they found "the regime of slum [a concoction the contents of which is not described], tea, cheese, bread, and occasionally as a great luxury, jam," to be far from filling. Even worse was the English mutton. The tankers, used to a steady diet of American beef, speculated that it was actually goat meat. In response to their heated complaints, the British maintained their menu was the same as "Tommy's." Nevertheless, food proved to be a continual source of irritation, and many men bought bread, eating it plain to satisfy their hunger. Others elected to raid the kitchen late at night in an effort to ease their pangs.²⁰

On 18 April, in response to Rockenbach's directive on Tank Corps unit designations, the 1st Battalion became the 41st Heavy Tank Battalion.²¹

Pyle and a number of other officers and NCOs, including First Lieutenant Carleton Reynell, who had been one of the first officers assigned to the battalion at Camp Meade, were selected early in the course to attend specialized instructor training, the object of which was to prepare them to establish a similar tank school at Camp Colt. Although this school was organized, it later proved necessary to retain those who graduated from the instructor course in England for duty at

Bovington, where they trained both British tankers and Americans of the 303rd Tank Battalion, which had been organized at Camp Colt in May and arrived at Wareham in August.²²

By 6 May, the first group of American tankers was ready to move on to more advanced training at Bovington. There they received classes on tank driving, compass use, employment of pigeons, camouflage, minor repairs, machine-guns, the six-pounder cannon, gas warfare, and mechanical training. Models showing the inner workings of the various automotive mechanisms were used along with plans and charts during the mechanical instruction.²³

The highlight of the training at Bovington was tank driving. The men were willing to endure long, hard days of marching and maintenance while waiting for their turn to take the controls of one of the twenty-six-foot Mark IVs. Two men, one on each side of the tank to operate the gears, were required in addition to the driver to make the armored behemoth move. Few things they had experienced could compare with

. . . the thrill of pulling a monster out of a deep trench, nose pointing to the sky with the engine's deafening roar, the acrid, never-to-be-forgotten smell of exploded gas, scorching oil and grease, and hot steel, the quick shutting down of the throttle, the gentle swing to earth, and then the triumphant roaring answer of the engine to the opening of the throttle and the more-the-merrier clanking of the track plates.²⁴

To further add to the realism of the training, their British instructors replicated the battlefield in "minute detail." Little was left to the imagination. "Shell holes" were blasted with mines, trenches identical to those they would encounter in France were dug, and other obstacles such as barbed wire were emplaced. Over these the tankers drilled and drilled again.²⁵

While this first group of tankers was tackling the advanced training at Bovington, Patton received a letter from Captain Ralph I. Sasse, a cavalry officer in the 1st Infantry Division, who sought duty with tanks. Sasse explained that he had made four applications for transfer, but had been denied each time because he "was needed here." He pleaded with Patton to provide any assistance he could to secure the "successful approval of my transfer." Patton was able to obtain Sasse's transfer to the Tank Corps, and Sasse would go on to command the only American heavy tank battalion to see combat during the war.²⁶

The 41st Heavy Tank Battalion became the 301st Tank Battalion on 8 June when the AEF Tank Corps was forced to change its unit designation system to bring it in line with the system inaugurated by the War Department in the United States. The 2nd Tank Center also changed its designation, becoming the 301st Tank Center.²⁷

Later in June, when it became apparent that delays in the production of Liberty aircraft engines would postpone production of the first joint American-British Mark VIII heavy tanks in France until at least 1 October,²⁸ Rockenbach coordinated with the British for tanks with which to equip the 301st Tank Battalion and others soon expected to arrive in England for training. The British, experiencing their own shortages of heavy tanks, agreed to provide only enough to equip the 301st, and then only if the battalion were attached to the British Expeditionary Forces when it deployed to France.²⁹

During more than two months of training under the watchful eyes of their allies, the Americans had made an impression on the British. It was not a good one. Pyle recalled that the British "called us Uncle

Sam's Rag Time Army, which pretty well presents my very own view." It was plainly evident that the high standards of discipline enforced by Patton at the light tank school in France were not required by his counterparts in England. This may account for why Pyle says the men of the 301st held their commander, Lieutenant Colonel Henry E. Mitchell, in such low esteem—although he says they considered Major Sasse and their other officers to be excellent.³⁰

In early July, after the British agreed to equip the 301st Tank Battalion, driver training was conducted on the more advanced Mark V tank at Sanford, about a mile east of Wareham. Unlike the Mark IV, the Mark V was easier to handle, requiring only one man to operate the vehicle. The level of gunnery training was also increased as tankers rotated through firing ranges at neighboring Hyde Heath and conducted live-fire battle runs from moving tanks at nearby Lulworth.³¹

The AEF staff, which learned from the experience of the 1st and 2nd Infantry Divisions at Soissons in mid-July that tanks would play an important role in future operations, authorized the Tank Corps to increase its paper strength. The new organization for the Tank Corps, approved later that month, called for an additional five heavy tank battalions. These, added to the five previously authorized heavy battalions and twenty light battalions, would be incorporated into ten tank brigades, each consisting of a separate headquarters, one heavy battalion, two light battalions, and a repair and salvage company.

Tank Corps troops were considered GHQ troops and were to be allocated to the field armies based on terrain and the nature of planned operations. An army's "slice" would consist of an Army Tank Corps

Headquarters, a tank training center, a Heavy Artillery Ordnance Mobile Repair Shop, and five tank brigades.⁵²

Advance elements of the 303rd Tank Battalion arrived in early August as the men of the 301st completed their training program and began to prepare for deployment to France. Rockenbach conducted an inspection tour of the 301st Tank Center on 8 August, closely followed by Brigadier Glasgow, commander of the British Tank Center. Both found all to be in order.⁵³

During the early weeks of August, as the 301st awaited movement orders, several wags, amused by Patton's efforts to make the tankers' appearance distinct from that of other soldiers in the AEF, developed their own idea of an "Official Uniform—Tank Corps." They envisioned an overseas cap with a green tassel dangling over the left eye; a shirt cut along the "same lines as those worn by [the] Chinese Labor Corps," with elbow-length sleeves and "Prince Albert swallow tails," and hasps and track pins in lieu of buttons; trousers made from olive drab tarpaulin, cut obliquely halfway between the knees and ankles, worn high enough "to slip arms through and drape from shoulders," and with a red stripe down the left leg and a yellow stripe down the right; pale blue field shoes featuring three-eighth inch bolts instead of hobnails and track plates instead of heels, were to be worn without socks; decorative devices included "colors on shoulders and diamond between shoulder blades," a six-by-eight-inch board to be suspended over the chest from the neck for the wear of medals, chevrons "worn on rear of left pants leg amidships," with corporal chevrons to be worn under an inverted tea cup and sergeant chevrons under clasped hands; privates only would be authorized to

carry canes; the regulation pistol belt would be worn, but every hole "shall have suspended from it useful articles, such as cork screws, can openers, button hooks, etc." The tank officer's uniform would be the same, except for decorative devices. Officers, most of whom had been commissioned from the enlisted ranks, would "wear a model Christmas tree suspended from their bar or bars showing the origin of their rank."³⁴

The men were also given time off to see some of England's sights. There were trips to London, Dorchester, and Bournemouth. Some of the tankers, including Pyle, dated local women, "like that saucy little Margarete Watkins, daughter of the Governor of Lloyd's bank in Wareham." Two of the companies based at Wareham and Bovington boasted "a number of talented actors and one producer from the American Theater." They put on a musical comedy in Bournemouth that drew a capacity crowd, and "Del Puienni . . . brought down the house" with his rendition of "On the Road to Mandalay."³⁵

The Tank Corps' situation by 20 August, when Patton got the word to report to Rockenbach at Chaumont to begin preparation for the St. Mihiel offensive, was far from ideal. Although authorized thirty battalions on paper, the Tank Corps had only three—the 326th and 327th Light Tank Battalions, and the 301st Heavy Tank Battalion—trained and ready for action. Worse yet, none of these units owned a single fighting tank. No additional light tank battalions had yet arrived in France, although four were en route from the United States, and only one other heavy tank battalion, the 303rd, was in England.³⁶

On 23 August the 301st embarked at Southampton and sailed for Le Havre, arriving early the next morning. At Le Havre the tankers boarded

"Forty-or-Eights," railcars designed to carry either forty men or eight horses, bound for the British tank center at Bernecourt. "Gee," said one tanker as he looked around his crowded car, "I wish I was a horse."

While the battalion was at Bernecourt, several officers and NCOs were sent to the front near Arras to gain experience with a Canadian tank unit. Two others, Sergeants Hiebard and Abbot of Company C, were killed by shell fire while advancing with British tanks at 2 a.m. on 1 September in the vicinity of Wancourt."

Lieutenant Reynell, who had been a mechanical instructor at the 301st Tank Center, attended the British reconnaissance course shortly before the battalion deployed to France. Upon arrival at Bernecourt he was relieved of his duties as the 301st Battalion reconnaissance officer and attached to the British 15th Tank Battalion.

During his stay with the 15th Reynell participated in three attacks against the "strongly fortified" town of Vaulx-Vrancourt, about three miles northeast of Bapaume. Working with the 15th's reconnaissance officer and deputy commander, Reynell watched the first two attacks reach their objectives, only to have the war-weary British infantry driven back by violent German counterattacks. At one point a British general told him, "I wish we had American or Australian infantry here to hold this place. Our men are too played out."

The remainder of the battalion moved to Erin on 30 August, where the crews were issued Mark V tanks by the British, then spent a week cleaning, oiling, and making minor repairs on the vehicles before entraining for Bihucourt on 6 September. They detrained the next morn-

ing at Achiet-le-Grand, about two miles east of Bapaume, and moved by road to Bihucourt. There they found a town that had been destroyed by shelling, so the troops had to be billeted in damp, muddy, rat-infested dugouts left behind by New Zealand soldiers who had moved up to the front. There were no washing facilities or furnishings, so the tankers used petrol cans for seats, wash pans, pillows, bed posts, cupboards, shelves, tables, and shaving mugs.¹²

While waiting for orders that would send them to the front they continued to perform maintenance on their tanks and conduct classes. The battalion was visited by several British officers who shared their experiences with the men. One of them described what it was like to be in a tank being hit by machine-gun fire. He said that as the bullets hit the hull, thin flakes of steel, called "splash," flew off inside the tank, getting into the faces and hands of the crew, stinging them. To soothe the pain and prevent infection, the crewmen were required to bathe the wounds with iodine. In addition, "simultaneously with the sound of impact and creation of the flakes, a blue flame is seen, and when a machine-gun plays up and down the joints" in search of a weak seam, the tank's interior "looks like a demonstration of cheap fireworks." It was hardly a thrilling prospect.¹³

The experiences of the heavy tankers as they trained for combat differed greatly from those of their light tank counterparts in France. The critical difference was that they were situated far from other AEF units and conducted the majority of their training under the watchful eyes of the British, frequently with British instructors, and always on British equipment. Because the decision was made to employ them in

combat under British control, there was little incentive for American officers in England to take as analytical an approach to tactics and doctrine or training as Patton was forced to in France. Their whole program was practically spoon-fed to them.

The danger in such a situation is that complacency may so overcome an officer's judgment that he may overlook obvious defects in theory or practice, especially when dealing with a new weapons system still in its infancy. Fortunately this was not the case with the heavy tank officers. They continually questioned the British and sought to adapt their ideas to American organization and tactical doctrine should the war last long enough for them to get into combat under the control of an American army commander. To this end, a steady dialogue was maintained via correspondence and visits to Rockenbach's headquarters.

In any case, there was little disagreement over the tactical employment of heavy tanks. Their mission was simple: To lead the infantry into the trenches and clear out barbed wire obstacles and enemy machine-gun nests as they were encountered. This was to be accomplished by attaching a single tank platoon to each assault infantry battalion in the first wave.

As September 1918 passed its mid-point, word filtered down to the men of the 301st that they would be joining the British Fourth Army in an attempt to breach the Hindenburg Line in the vicinity of San Quentin. This was welcome news, as they had been anxiously watching the exploits of their light tank brethren in the St. Mihiel offensive and were champing at the bit to get into the fight themselves.

On 21 September the battalion again moved to Achiet-le-Grand and

loaded onto trains for shipment to a new camp in the vicinity of Manancourt. Once there, they continued to prepare themselves and their machines for the ordeal that lay ahead."

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CHAPTER IV

TANK PRODUCTION: MADE THE AMERICAN WAY

While Rockenbach and Patton worked to establish a training base for the Tank Corps in France and England, other officers took the lead in setting up a production program that would provide them the tanks they needed. Unfortunately, their efforts would not be as successful.

As previously noted, Majors James A. Drain and Herbert W. Alden, mechanical engineers detailed by the Chief of Ordnance in Washington to conduct a fact-finding mission on tanks in the fall of 1917, determined that the fastest way to equip the AEF Tank Corps would be to license American firms to build the Renault light tank. They also determined that none of the existing heavy tank designs were satisfactory, and recommended that the British and Americans work out a new design and enter into an agreement to jointly produce it. This could best be accomplished, they said, if the United States provided the engines and other automotive parts, and England the armor plate, weapons, and ammunition. To speed up the process, they further recommended that an assembly plant be established in France, preferably at a coastal site near a major port and rail center.¹

Providing labor for such a joint venture did not appear to be a problem to them. Because the work of assembling the components was well ordered and skilled, they were able to obtain a tentative agreement of a

the British to provide Chinese workers. Whatever foremen or other skilled laborers were required could come from England or the United States, with necessary training to be provided in British assembly plants.²

Pershing approved their recommendations in mid-November 1917, and Drain was appointed to represent the United States on the Inter-Allied Tank Commission created that month.³

Drain's first task was to meet with his British and French counterparts and work out a mutually agreeable heavy tank design. Working closely with the British, Drain was able to come up with a working concept. The French, while supportive, showed no interest in participating in the project, choosing instead to rely on their existing tank designs.⁴

General Tasker H. Bliss cabled the War Department at Pershing's request on 6 December seeking approval for the production of 1,500 Mark VIII Liberty tanks by 1 October 1918. If approved, the project would require the United States to provide 1,500 Liberty twelve-cylinder aircraft engines (from which the tank's name was derived), starters, clutches, radiators, fans and piping, silencers, electric lighting, dynamos and batteries, propeller shafts, transmissions, brake systems, and suspension components.

The British would provide the tank's armor plate, structural members, track shoes, guns and mounts, ammunition racks, and ammunition. Bliss further stipulated that the British promised to allocate the steel required to produce their components, but expected "complete guarantees" that the United States would replace the high grade steel used for the

tank's armor."

Drain, working closely with British tank experts, was able to complete work on the tank's design specifications later that month. A wooden model was built, complete in every detail, and presented, along with the plans, to Rockenbach and the AEF's Chief Ordnance officer in Paris on 26 December for approval."

The design called for a vehicle thirty-three feet long, twelve feet wide, and nine feet ten inches high. Weight was estimated at thirty-five tons. The tank's armor was to be of sufficient thickness to protect the crew and internal components from all small arms bullets, including armor piercing. The Liberty engine was expected to provide a power-to-weight ratio of ten horsepower per ton and a top speed of six miles per hour. Armament would consist of seven machine-guns and two six-pounder cannon."

After receiving their blessing on the project, Drain and his British counterpart on the tank commission selected Neuvy-Pailloux near Chateauroux as the site for the assembly plant."

The War Department sent word on 17 January 1918 that an initial shipment of Liberty engines for the Mark VIII would arrive in France in April, and possibly as early as March." Armed with this information, the Inter-Allied Tank Commission hammered out a detailed agreement covering all the points specified in Bliss' 5 December 1917 cable. This document was signed by Walter Hines Page for the United States, and Arthur James Balfour for Great Britain, on 22 January."

The first indication that there would be problems in the heavy tank program came a month later when the War Department notified the AEF

that the initial shipment of 200 Liberty engines would not arrive until May. An additional 300 engines were promised each month thereafter.¹¹

It was not to be. The Signal Corps, proponent for the fledgling Air Service, was siphoning away Liberty engines as fast as they came off the production line. On 29 April, General Peyton C. March, the Army Chief of Staff, notified Pershing that the best he could hope for was enough engines and other components to complete 365 Mark VIIIs for the AEF by the end of August, followed by an additional sixty tanks per month. To make matters worse, the French, who had initially said they weren't interested in the heavy tank project, demanded that the clause providing for shipment of the first 600 tanks to the Americans be dropped and that an allocation agreement be worked out between the three governments. March wanted to know if deliveries to the AEF were cut to the numbers cited, would a production rate of an additional 135 tanks in August, 240 per month over the next three months, and 40 in December be enough to satisfy the British and French?¹²

That question became irrelevant when, on 29 June, the War Department informed Pershing that the number of engines available for tanks had again been cut. It now appeared that the best the AEF could hope for would be 100 engines by 1 October, an additional 100 that month and in November, 125 in December, and 175 in January 1919.¹³ It was this last cable that led to Rockenbach's decision to beg for enough tanks from the British to equip the heavy tank battalions then training, or scheduled to train that summer, in England.

Efforts to obtain Liberty engines and other components from the United States during the remainder of the summer and early fall of 1918

proved fruitless. On 27 November Pershing finally cabled the War Department to report that the British and French no longer desired to participate in the program. Construction of the assembly plant at Neuvy-Pailloux, which had progressed at a snail's pace because of the delays, was suspended on the eve of its completion. "No tanks will be assembled in France," Pershing stated tersely. "Project terminated and assets will be liquidated."

The attempt to produce an American-built copy of the Renault light tank for the AEF was slightly more successful, but infinitely more frustrating for the officers involved in the project.

Officers from the Ordnance Department met with representatives of the Renault Works in late 1917 to work out an agreement for production of the company's light tank in the United States. A bargain was struck, and the French promised to provide detailed plans as well as two production models of the vehicle for shipment to America.

Little work was accomplished on the project, however, until Lieutenant Braine was ordered to report to Lieutenant Colonel Drain in Paris in January 1918. On the 29th, Rockenbach, on Patton's recommendation, decided to send Braine back to the United States to act as the AEF Tank Corps' liaison with the light tank production effort there. Although the French had promised two copies of the Renault for shipment to America along with the tank's plans, all Braine was able to secure from the company was a turret, a 37mm cannon, and gun mounts.

Braine, plans in hand, was able to book passage for himself and the equipment on the U.S.S. Appleg, "an old German freighter that had been interned on the island of Haiti," and left from St. Nazaire on 12

February.¹⁵

Upon arrival in New York on 13 March, Braine encountered the first of a series of bureaucratic obstacles that would plague the light tank production effort throughout the remainder of 1918. After obtaining permission to load his equipment onto a tug for transfer to a dock, Braine spent most of the day searching for a berth that would accept his cargo. "After much running around and telephoning," he wrote later. "I got permission to [transfer the cargo to] the Ordnance Dock at Governor's Island." There were several times when it looked like his mission would end in failure as the precious shipment "almost landed in the bottom of the bay."¹⁶

Braine wired the Chief of Ordnance in Washington to announce his arrival and received instructions to report to Lieutenant Colonel Alden, who had returned there from France to supervise tank production for the Ordnance Department. He left that same night and, after briefing Alden on the purpose of his mission and leaving blueprints for the 37mm gun with him, returned to New York the evening of the 14th with instructions to ship the 37mm gun he had brought from France to Washington and take the rest of his equipment and mechanical drawings to the Maxwell Motor Company in Dayton, Ohio.¹⁷

Although the War Department had asked for civilian manufacturers to bid for the rights to construct the Renault light tank, several companies confused the issue by responding with design proposals of their own. The Ford Motor Company produced designs for a three-ton, two-man tank and a seven-and-one-half-ton, three-man model. The Endicott-Johnson Company, a shoe manufacturing firm, financed a flame-throwing tank

design, and the Pioneer Tractor Company designed and built a tank made from iron pipe and plumbing fittings.¹⁰

While these firms continued to press on with their work, thanks in large part to a lack of coordination in the Ordnance Department, the Maxwell Motor Company and several other firms were contracted to produce 4,440 light tanks based on the Renault design.¹²

Confusion over the design of the turret for the Renault tank was one of the main reasons for the project's initial delay. Working independently of each other, Alden's office in Washington and officers in the Ordnance Department's Engineering Office in Dayton were preparing separate plans for the construction of the turret. The Ordnance Department finally cabled the Engineering Office in Dayton to cease further work on the turret and wait for the plans from Washington.¹³

All of this was unknown to Rockenbach and Patton in France. They were operating on the assumption that the first shipment of 100 light tanks would arrive in April, followed by 600 per month beginning in May. The only problem they were aware of concerned armament for the tanks. The War Department had asked Pershing to secure 2,400 Hotchkiss machine-guns from the British and 1,600 37mm guns from the French with which to arm the tanks when they arrived in France.¹⁴

Braine had been notified of this before leaving for the United States, and was considerably dismayed when he found that not so much as a single "line [had been] drawn on paper before the first week in January."¹⁵

Following his initial meeting with Ordnance officers in the Engineering Bureau in Dayton, Braine was ordered to report to Colonel

Lucian B. Moody in the Ordnance Department in Washington. There a battle was fought over which section would have his services. After considerable debate he was finally attached to Colonel Moody's office, which was in charge of the Ordnance Mobilization Program for tanks and artillery, and instructed to devote whatever time he could spare to the other departments involved in design of the light tank.

Despite the optimistic report sent to France in February, Braine found that little actual work had been accomplished. No tools, spare parts, or other supporting equipment had been ordered. Nor had work on the gun's design been begun after he left the blueprints with Alden. Although not consulted, Braine insisted that the 37mm gun and mounts he had brought back from France be put into production. His recommendation was overruled by Lieutenant Colonel Earl McFarland, director of the Ordnance Department Engineering Division's Machine-Gun and Small Arms Section, who said they would use a modified version of the American 37mm field gun, for which they would design a special armor with a splash-proof mask to protect the crew. It took three and a half months to complete the design, which was found to be unsatisfactory."

Problems were also encountered with machine-guns for the light tanks. Braine reported that the Ordnance Department was able to locate 7,206 Marlin-Rockwell aircraft machine-guns in Fairfield, Ohio. Someone suggested that the guns could be modified for use on tanks simply by equipping them with pistol grips, and, as with the 37mm guns, designing a special splash-proof mask for the turret. Because the guns belonged to the Signal Corps, the Engineering Division sent a memorandum authorizing that the guns be purchased from that branch and the required modifications

fications be made by the company.

Although he was not consulted, Braine, in response to a cable from Washington, took special pains to see that the guns were shipped to the company's plant. Three times he received word that the modifications had been made, only to find that no work had been accomplished. The company finally agreed to modify fifty guns by a specified date. Again the Marlin-Rockwell people failed to comply, this time offering the excuse that the Ordnance Department had failed to order the work in writing.

Braine then turned to the Ordnance Department's Supply and Procurement Division, where he was informed that no contract had been let for the project as an agreement on price could not be reached. In addition, he was told that the Requirements Division had asked that the guns be delivered over a period spanning both 1918 and 1919. Braine met personally with the head of the Requirements Division and persuaded him to authorize purchase of all the guns in 1918. The head of the Requirements Division then instructed Braine to write a letter to the Procurement Division explaining the reasons for the change so the matter could be settled.

Braine dictated a letter for the Requirements Division director's signature on 1 June. After initialing it, he left it with the Division's assistant director and departed for Dayton. When he returned to Washington later that month, Braine found that the guns still had not been shipped. Investigating why, he discovered that the assistant director had now signed the letter and then left it on his desk without taking further action.

Another example of how bureaucracy thwarted the light tank production effort can be found in the specifications for the speedometer. Braine had specifically requested that the speedometers be calibrated to read in kilometers per hour. Someone in the Ordnance Department had decided that the instrument should record speed in miles per hour and that the odometer should read in miles and tenths of miles.

Production of the speedometers was delayed when the Stewart-Warner Company, faced with conflicting requirements, cabled to ask how the instruments should be built. A compromise was finally reached, with the speedometers being made to record speed in miles per hour and distance in kilometers and meters."¹¹

Braine complained bitterly about the lack of cooperation he received from the various sections of the Ordnance Department. He wrote later that he was rarely informed of telephone calls made to him, and that all of his mail, both official and personal, was opened before he received it. Furthermore, he was instructed not to write or cable his superiors in France. His Ordnance Department supervisors "emphatically informed me that [the] people in France were fully advised as to the progress and situation at all times."¹²

But Patton and Rockenbach were not kept informed. They remained blissfully unaware of the bureaucratic nightmare Braine had encountered in the United States, and did not awaken to the reality of the situation until a cable was received at AIF headquarters on 29 June informing them that only twelve light tanks could be delivered by 1 September. An additional 100 tanks were promised by 1 October, with deliveries to increase until they reached a peak of 500 tanks per month.¹³ It was

this cable that led to the decision to seek enough Renaults from the French to equip Patton's two trained light tank battalions in time for the St. Mihiel offensive.

After spending several months traveling back and forth between Dayton and Washington, "averaging twenty-two nights a month on a sleeper," Braine learned that Colonel Welborn had been appointed director of the Tank Corps in the United States. He announced his intent to visit with Welborn, but was advised not to by Colonel Moody and Brigadier General John H. Rice, chief of the Engineering Division. Eventually, however, he had the opportunity to contact Welborn's office, "and when Colonel [William H.] Clopton arrived [he] was of great assistance to me in having someone to go to and tell my troubles."²¹

One of Braine's major complaints was the lack of personnel involved with the project. In the late spring of 1918 he finally obtained permission to recruit twenty-five officers from the Tank Corps to assist with the work. Unfortunately, before he could go to Camp Colt in Pennsylvania to select these men, Braine was ordered back to Dayton. The task fell on other officers from the Ordnance Department, who "did not get the proper men for the job."²²

In Dayton, Braine

... followed up [with] the Signal Corps with reference to the wireless apparatus, interphones, splash-proof face guards, steel helmets, and had experiments tried with triplex glass for eye slits, which proved successful. There were five or six interphone manufacturers with whom I took this matter up, and any number of equipment manufacturers [for] face guards, leather helmets, steel helmets, etc., but it was impossible to get anyone to make a decision on any of these matters."²³

The fact that so many independent contractors were involved in

construction of the Renault tanks also contributed to production delays. One firm was tasked with providing engines and half of the transmission components, another company had the responsibility for suspension parts, and a third was assigned to assemble the tanks, obtaining the required major assemblies from the subcontractors. In addition, separate corporations were contracted to supply the tools, magnetos, armor plate, radiators, and other parts, all of which "would necessitate a Philadelphia lawyer to keep track" of them.

Although frequent meetings were held, Braine said they usually hindered rather than helped the effort because "one manufacturer would see that the other man was not very far ahead, so he would see no occasion to hurry," and all would then contribute to further delay of the project."

Conflicting lines of authority amongst various government agencies also came into play. Braine cited as an example a contractor with an order for a steel pin requiring a certain percentage of carbon. The contractor told the Engineering Division that he could begin work if he could use steel with a little less than the required carbon, which was readily available. He was advised he could do this. However, to do so, he first had to submit a new drawing to a government inspector working for a different division. When the material was not passed by the inspector, the District Chief refused to approve the account, which meant the contractor was not paid—even though he had received prior approval to use the other material from the Ordnance Department's Engineering Division."

Braine encountered similar problems in his effort to obtain tools

for the tanks. After he drew up a list of the required tools, Braine was advised that he would need to have a draftsman prepare drawings of them so they could be purchased from private contractors. Once this work was accomplished, Braine took the drawings to Washington, where he was told that they had not been done on the proper form. After the drawings were redrawn on the required form, officers in the Procurement Division told Braine he would have to substitute standard Ordnance tools wherever possible. Braine went through the Ordnance tool catalogs and, after identifying all those which could be substituted, placed his order. Several weeks later he was informed that most of the Ordnance tools were out of date and that he would have to resubmit his original drawings for competitive bidding by private contractors. This meant an additional month-and-a-half delay."

In the early summer of 1918, thanks to the efforts of a friend in the New York City Recruiting Office, Braine was able to contact indirectly Benedict Crowell, the Assistant Secretary of War. Crowell, who Braine said took a personal interest in tank production, spent five days investigating his charges. At about this same time, Lieutenant Colonel Drain returned from Paris and, after reviewing the situation, played a key role in securing the appointment of L. J. Harwerds as the civilian head of tank production, a move that Braine had earlier recommended. Harwerds' appointment, according to Braine, contributed significantly to breaking up the bureaucratic logjam."

While Braine battled with the bureaucrats in Washington and Dayton in an effort to speed up production of the Renault tank, the Ford Motor Company pressed on with its own light tank design. A number of officers

in the Ordnance Department were impressed with the Ford model, and especially with Ford's promise to quickly mass produce the vehicle.

Braine was invited to Detroit in the late spring of 1918 to see a prototype model of the three-ton, two-man tank. He was not impressed. The Ford people were unable to get the engine, a complicated affair that consisted of two standard Ford motors hooked up in tandem, to start. In addition, the tank lacked a tail piece, which Braine had learned from his experience in France was needed for trench-crossing operations. He later learned that the Ordnance Department notified his superiors in France that he approved of the design, "which was not so."

On 9 August, the Ordnance Department cabled Pershing a glowing report that extolled the virtues of the Ford tank. The cable highlighted the fact that the machine's thirty-six horsepower engine developed eleven horsepower per ton, the highest power-to-weight ratio yet for a tank, and that it could attain a top speed of ten miles per hour. Ordnance officers thought the tank was at least as good as the Renault and, best of all, it could be produced in one-fifth the man-hours required to build its competitor.

The cable also informed Pershing that a sample Ford tank had been shipped to France on 7 August and would be in the hands of the AEF's Chief Ordnance Officer by the end of the month."

On 8 November, after Tank Corps officers had had a chance to test the Ford vehicle, Pershing cabled a recommendation to the War Department that the Ford be built for use as a light artillery tractor as it did not have "sufficient value as a Tank to justify its production for that purpose except as an emergency substitute." Pershing then demanded that

production of the Renault "be pushed and that no interference with its production be permitted" as his tank experts considered it to meet the minimum size and power requirements for a light tank."

By early fall the Renault production line finally began to move, and the first light tanks began rolling off in October. Braine, anxious to get back to France, encountered resistance to his departure from the Ordnance Department, so he turned to Colonel Welborn, who issued orders for his return that same month.

On 20 November, almost nine months to the day after he left France on the U.S.S. Apples, and nine days after the Armistice was signed, two American-built Renaults arrived at Bourg. Eight more light tanks followed in early December, bringing to ten the total delivered to the AEF.

The failure of the Ordnance Department and American industry to provide tanks for the AEF Tank Corps was not an isolated instance. Similar failures were encountered in the production of trucks, airplanes, artillery, and small arms for the AEF.

More than ten years later, in a letter to the Chief of Cavalry, the assistant director of the Army Industrial College wrote, after reading Braine's report, that it was

. . . a fine example of [our] lack of industrial planning and a horrible commentary on our preparedness when we entered the last war. The records of our branches are full of this sort of data—unfortunately not as forcibly stated in many cases. It is on data of this sort that we are getting the details of things we must plan to avoid in our next war

ENDNOTES

1. Drain and Alden, "Report on Investigations," 6.
2. Ibid., 7.
3. Rockenbach, "Tank Corps Operations," 2.
4. Ibid., 2-3.
5. Cable, General Tasker Bliss to Army Chief of Staff, 6 December 1917, included as enclosure to Collins, "Development of the Tank Corps."
6. Collins, "Development of the Tank Corps."
7. Rockenbach, "Tank Corps Operations," 4-5.
8. Ibid., 4.
9. Cable No. 652-R, 17 January 1918, included as enclosure to Collins, "Development of the Tank Corps."
10. "Agreement Between the British and U.S. Governments for the Production of Tanks," 22 January 1918, *ibid.*
11. Cable No. 816-R, 22 February 1918, *ibid.*
12. Cable No. 1201-R, 29 April 1918, *ibid.*
13. Cable No. 1636-R, 29 June 1918, *ibid.*
14. Cable No. 1929-S, 27 November 1918, *ibid.*
15. Braine, "Personal Experience Report."
16. Ibid.
17. Letter, Lieutenant Elgin Braine to Lieutenant Colonel George S. Patton, Jr., 28 March 1918, Patton Chronological Files, Box 9, 25-30 March 1918, Patton Collection.
18. Mildred Gillie, Forging the Thunderbolt (Harrisburg, Pa.: Military Service Publishing Co., 1947), 9.
19. Cable No. 1233-R, 3 May 1918, included as enclosure to Collins, "Development of the Tank Corps."

20. Braine, "Personal Experience Report."
21. Cable No. 722-R, 1 February 1918, included as enclosure to Collins, "Development of the Tank Corps."
22. Braine, "Personal Experience Report."
23. Ibid.
24. Ibid.
25. Ibid.
26. Ibid.
27. Cable No. 1568-R, 20 June 1918, included as enclosure to Collins, "Development of the Tank Corps."
28. Braine, "Personal Experience Report."
29. Ibid.
30. Ibid.
31. Ibid.
32. Ibid.
33. Ibid.
34. Ibid.; Collins, "Development of the Tank Corps."
35. Braine, "Personal Experience Report."
36. Cable No. 1828-R, 9 August 1918, included as enclosure to Collins, "Development of the Tank Corps."
37. Cable No. 1879-S, 8 November 1918, *ibid.*
38. Letter, Colonel Irving J. Carr to Major General H. B. Crosby, 23 April 1929, Patton Military Papers, Box 47, Personal Experience Reports of Tank Operations—1918, Patton Collection.

CONCLUSIONS

The experiences of the American Expeditionary Forces Tank Corps from its creation to the eve of the St. Mihiel offensive in September 1918 provide valuable lessons for soldiers and civilians charged with the responsibility for developing and fielding modern weapons systems.

Although America developed the technology that led to the creation of the tank, it owes a debt to the British, whose frustrating experiences in the trenches in France provided the impetus to seek a means to restore mobility to the battlefield by mating the caterpillar tractor with a protective armor shell.

Nevertheless, even with the basic design work accomplished for them, AEF planners still had a difficult task to perform. They had to examine the capabilities of the tank, allied tank tactics and doctrine, and methods of tank production, then determine how to adapt the new war machine to American organization and tactics and how to gear up a production effort that would meet those needs.

Brigadier General Rockenbach, Lieutenant Colonels Alden, Drain, and Patton, Captain Braine, and a host of other officers and men met that challenge. Their success resulted in the creation of a battle-ready Tank Corps that contributed significantly to the accomplishments of the AEF in the St. Mihiel and Meuse Argonne offensives in the late summer and early autumn of 1918.

Rockenbach, the seasoned staff officer, provided the tact and

skill needed to bring to fruition the plans developed by the brilliant but tempestuous Patton. Patton, on his part, working with Braine and other officers, carefully prepared detailed Tables of Organization and Equipment, adapted British and French tank tactics and doctrine to mesh with those of the United States Army, and developed a training program that allowed him to field two highly-trained light tank battalions in less than five months—despite the lack of vehicles with which to train.

No facet of the problem was left to chance. Organizational details were worked out down to the lowest level—from the number and ranks of officers needed to command and supervise various unit functions down to the numbers of cooks, drivers, mechanics, and gunners it would take to man, fight, and sustain the combat units. Equipment requirements were also determined. The numbers and types of tanks, supporting vehicles, tools, and spare parts needed by a Tank Corps consisting of ten combat brigades, each with one heavy and two light tank battalions, were established.

Similar questions must be addressed by today's planners. How many men will be needed to operate a weapons system? How many more will be needed to keep it operational on the battlefield? What types of units and how many will be required to ensure the organizations employing the system will be adequately supplied with food, fuel, and repair parts? Will the system require special equipment to support it? If so, how much and of what type?

In recent years, especially after America's experience in Vietnam, much criticism has been focused on the "tooth-to-tail ratio"—the number of combat troops versus the number of personnel required to support

them. Critics argue that too few men were actually in the field in Vietnam, while the number of troops employed to sustain them was disproportionately large. While that criticism may be valid in the case of the Vietnam war, recent trends suggest that the Army may be overreacting. As weapons systems become more and more complex, employing sophisticated automated fire control and other high-technology systems, they become far less manpower intensive at the user level. Conversely, more and more troops are needed to maintain, resupply, and repair these weapons systems. The decision to organize the majority of the Army's combat support and combat service support units in the Army Reserve, while cost effective in peacetime, may severely handicap the ability of the active force to sustain itself in a "come as you are" war.

Providing the necessary training for the men who joined the AEF Tank Corps was another problem facing Patton and his fellow officers. Detailed programs of instruction were worked out covering a multitude of subjects from mechanics to map reading. Everything a tank crewman or officer needed to know to accomplish his battlefield mission was taught in the AEF's two tank schools. Special attention was devoted to developing a close working relationship with French and British tank experts to facilitate this effort.

Today's planners must also address this problem. Careful thought must be given to the skills that will be required by personnel tasked with operating, maintaining, and sustaining a new weapons system. What tasks can be taught in existing military schools? Can training for the new system be packaged in such a way that it can be given to soldiers serving in a unit when it transitions to the new system, or must they be

rotated through a special school? What special facilities or training aids will be needed? These are just a few of the questions that must be addressed.

While AEF planners were successful in organizing and training the Tank Corps, officers involved with procurement and production back in the United States failed miserably. This was beyond the control of the planners in the AEF Tank Corps. Every effort was made to provide the Ordnance Department with assistance to speed up the production process. The account of Braine's experiences dealing with the Ordnance Department and civilian manufacturers is particularly enlightening. To ensure success in future endeavors, central control over production of a weapons system is essential, as is streamlining the bureaucratic process.

It took the "Arsenal of Democracy" nearly a year to produce ten Renault light tanks for the AEF—and that while working with an existing design. Today, America's convoluted defense research, development, and procurement system requires a decade or more to bring a new weapons system from the drawing board to production.

The attempt made by officers in the Ordnance Department to keep Braine from communicating with his superiors, thus keeping them in the dark with respect to the lack of progress being made with production, is especially distressing. Compare that to recent attempts by procurement personnel working in concert with civilian manufacturers to conceal real or alleged design flaws in such systems as the Bradley Infantry/Cavalry Fighting Vehicle, the Sgt. York Division Air Defense Gun, the Aquila Remotely Piloted Vehicle, the MX missile, and others.

The question we must ask ourselves today, given the layered

bureaucracies with overlapping lines of authority or special interests that exist in the Department of Defense and individual service weapons procurement agencies, is: Are we any better off than we were in 1918? America's survival may well depend on the answer.

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