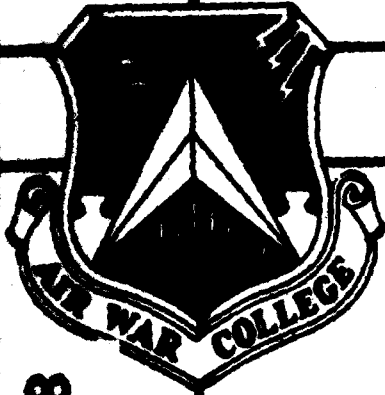


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RESEARCH REPORT

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STRATEGIC BOMBARDMENT: THE LEGACY
OF THE AIR CORPS TACTICAL SCHOOL

By LIEUTENANT COLONEL ARNOLD M. BERRY

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MAXWELL AIR FORCE BASE, ALABAMA

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STRATEGIC BOMBARDMENT: THE LEGACY OF
THE AIR CORPS TACTICAL SCHOOL

by

Arnold M. Berry
Lieutenant Colonel, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY
IN
FULFILLMENT OF THE RESEARCH
REQUIREMENT

Thesis Advisor: Lieutenant Colonel Joseph E. Ryan

MAXWELL AIR FORCE BASE, ALABAMA

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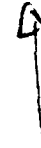
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ABSTRACT

TITLE: Strategic Bombardment: The Legacy of the Air Corps
Tactical School

AUTHOR: Arnold M. Berry, Lieutenant Colonel, USAF

→ This is a historical study of the contributions to the development of strategic bombardment in American airpower by the Air Corps Tactical School. The study follows strategic thought from the foundation laid by Brigadier General William Mitchell through its reinterpretation and doctrinal refinement at the school. Additional insight is gained by examining the development of the industrial web targeting concept and the impacts of the school on developing the force structure for World War II. The simultaneous development of the necessary doctrine, the industrial web concept, and the technological capability of the B-17 were the keys to success in World War II. Inferences are drawn for current and future Air Force planners.



BIOGRAPHICAL SKETCH

Lieutenant Colonel Arnold M. Berry (B.S.C., University of Alabama, M.S., Air Force Institute of Technology) is a career missileer with twelve years experience in the Strategic Air Command. His assignments also include duties as a weapons controller and space systems operations officer. He served two tours at Headquarters Strategic Air Command and two field tours including a squadron command, and duty as Assistant Deputy Commander for Maintenance in a Minuteman III wing. He is a distinguished graduate of the Army Command and General Staff College and has completed correspondence studies from the National Defense University. Lieutenant Colonel Berry is a graduate of the Air War College, class of 1987.

CHAPTER I

INTRODUCTION

Strategic bombardment emerged from World War II as the preeminent form of aerial warfare. In its newly acquired capacity, recently proven in the crucible of war, it dominated the development of air power and of the entire military establishment well into the nuclear age.

This advanced position of strategic bombing in 1946 was in sharp contrast to its role at the end of the previous war. As World War I closed, pursuit reigned as the king of air warfare. This conception was popularized by famous pursuit squadrons such as the Lafayette Escadrille which had become the 103rd Pursuit Squadron, and the 94th Pursuit, "Hat-in-the-Ring", Squadron. These famous squadrons boasted of pilots like Rickenbacker, Luke, and Lufberry who epitomized the glamour and heroics of the then high technology flying machines. By comparison, the pilots of the lumbering DeHavilland DH-4s were almost unknown.¹

Beyond the fact that bombardment was in second place, the overall environment further stifled the development of any air doctrine or force structure. In 1920, General Pershing publicly stated, with Secretary of War Baker's concurrence: "An air force acting independently can of its own accord neither win a war at the present time nor, so far as we can tell, at any time in the future." In the same year

the Director of the Air Service was quoted as saying: "Not a dollar is available for the purchase of new airplanes."²

What allowed strategic bombing to rise from second place in an unpopular and destitute Air Service to its place of preeminence? A common but incomplete theory says it was the influence of men like Brigadier General William A. Mitchell with the indirect influence of Giulio Douhet and Sir Hugh Trenchard. Without diminishing their contributions which were unique and revolutionary, it can be shown that Mitchell did lay the foundation and that he was influenced by Trenchard. However, it can also be shown that the majority of the doctrine and force structure that allowed an allied victory in World War II while based on Mitchell's concepts, were refined and popularized after his court martial and departure from the scene.³

The central focus of this study is based on the premise that it was the Air Corps Tactical School (ACTS) that bridged the gap between Mitchell's foundation and the doctrinal and force structure establishment that emerged from World War II. The primary objective of this study will be to examine the role of the ACTS in accomplishing this feat. To accomplish this purpose, it will be necessary to examine the Mitchell era including the indirect influences of Trenchard, the establishment and doctrinal teachings of the ACTS, and the impact made by the school on the force structure decisions prior to World War II. Finally, conclusions

will be drawn from the facts in hopes of making a significant contribution to the development of future doctrine and force structure.

CHAPTER II

MITCHELL LAYS THE FOUNDATION

In 1917, Major William Mitchell was the first Army aviator to arrive in Europe and for a time was the senior Air Service Officer on the continent.¹ When General Pershing arrived in France, he selected Mitchell to be his Aviation Officer and recommended a promotion.² This event was significant in two ways. First, there was the promotion which led ultimately to the rank of Brigadier General. Perhaps even more important, was the establishment of aviation under the new Aviation Officer of the American Expeditionary Force (AEF). It was a separate entity from the Signal Corps which officially controlled aviation at the time. General Pershing acted on a precedent set by President Wilson's decision to support a separate air service; but, one that would not be officially embodied in law for several years.³

Almost immediately, Mitchell proposed two distinctive types of aerial forces for the AEF. The first consisted of squadrons attached to the ground units at army, corps, and division levels. They would operate under the control of ground commanders and would be used as needed to support the ground campaign. The second type were to be "... large aeronautical groups for strategic operations against enemy aircraft and enemy materiel at a distance from the actual line." General Pershing never accepted the independent

strategic group concept; but, he directed the formation of squadrons to support the ground forces. Even though Mitchell would later become sceptical on the matter, it appears to have accepted his argument as valid. However, he never abandoned the concept, and he did not alter his thinking.⁶

Lieutenant Colonel Edgar S. Gossell, the Chief of the Strategic Aviation Branch of the Air Service in France also recommended bombing German commercial centers and communications to strangle the German field armies. He believed the key to ending the stalemate on the western front was to destroy the industries that supported the enemy armies.⁷

Douhet, to whom so much has been ascribed, was developing his own theories during this period. He first published his thoughts advocating an independent and strategic air arm in 1921.⁸ It is fair to say they may have been developing their concepts in parallel and even though there may have been some contact, Douhet does not appear to have directly influenced Mitchell's thinking.

Conversely, Major General Hugh Trenchard of the British Royal Flying Corps (RFC) had a profound impact on Mitchell. They first met at the RFC General's Headquarters in May, 1917.⁹ Trenchard believed in the capabilities of bombardment and advocated widespread attacks designed to crush civilian morale. The British attitude was influenced by public demand for retaliation against the German raids which

had bombed England as early as 1915. In response, they organized an Independent Bombing Force.⁹ It was in this environment, rich in bomber thought and advocacy, that Mitchell developed his personal doctrines.

In September, as the Air Service expanded in France, Pershing brought in Brigadier General William L. Kenly to be its Chief, and expressing confidence in Colonel Mitchell picked him as the senior tactical commander with the title: Air Service Commander, Zone of Advance.⁷ When things did not progress as Pershing expected he replaced Kenly with temporary Brigadier General Benjamin Foulois who brought his staff along. Confusion and conflict ensued partly because Mitchell had been senior to Foulois before the latter's temporary promotion and they disagreed on how to run the air campaign.¹⁰ Another problem was that Foulois' staff was inexperienced; many were civilians appointed to military rank only months earlier. General Pershing noted that they were: "... good men running around in circles." Mitchell merely called them "carpetbaggers."¹¹

Mitchell, or rather Pershing's faith in Mitchell, prevailed and Brigadier General Patrick M. Mason, an engineer and West Point classmate of Pershing replaced Foulois. Pershing intended to make Foulois the Chief of Air Service, First Army; however, at Foulois' own suggestion he became Patrick's deputy and the prize went to Mitchell.¹²

From this vantage point, Mitchell took command of the

First Air Brigade formed in June, 1918 from the U. S. First Pursuit and First Observation groups and several French units. Although initially outnumbered, they launched strikes against German airfields to divert some of the enemy pursuit to their protection and away from the front.¹³ In August, General Patrick placed all American air units under the Air Service, First Army with Mitchell as commander. The new boss quickly organized his forces into three wings: pursuit, observation, and bombardment.¹⁴

In the St. Mihiel Campaign, Mitchell used the 700 American aircraft under his command and drew upon allied forces for an equal number. They achieved air superiority over the battlefield aiding in the ground victory, and General Patrick recommended Mitchell for his star.¹⁵

Later that fall in the Meuse-Argonne Offensive, General Mitchell coordinated British and French air strikes against troop concentrations and coordinated the largest joint bombing mission of the war. This one campaign dropped 79 tons of bombs which was over half the total tonnage of the war.¹⁶

In his position as the premier air combat commander, Mitchell published what may have been the first doctrinal statement for air forces: "General Principles Underlying the Use of the Air Service in the Zone of Advance, AEF." In it he stated that the mission of the air arm was to help the other arms in their missions and made the first distinctions between "tactical" and "strategic" air forces.¹⁷

General Mitchell emerged from the war as a recognized leader and the most experienced air commander. He retained his Brigadier rank even though it was only temporary, first as Director of Military Astronautics and later by filling a statutory position as Assistant Chief of the Air Service when it was legally established in 1920, based on the model Pershing used earlier in France. Others, including his old antagonist Foulis reverted to company grades.¹⁶

American airpower made significant advancements in a relatively short time span between 1917-1918; however, the post war years yielded stunning setbacks to its development. Later, General Henry H. Arnold theorized that the rapid growth of airpower had been predicated on a combination of a critical state of international relations and a favorable state of aviation technology. He believed such conditions existed just prior to the 1918 Armistice and that they would not reappear for a decade.¹⁷ Such was the environment to which Mitchell, his doctrines, and accomplishments returned.

In 1921, while testifying before Congress, an increasingly outspoken Mitchell openly challenged the Navy to a live bombing test. Under Congressional pressure the Navy gave in and agreed to allow the tests against captured German warships. Mitchell organized the First Provisional Air Brigade at Langley Field, himself in command, to conduct the tests. The brigade absorbed the personnel of the Air Service Field Officers' Course midway through their first

year of operation. The commandant, Major Thomas DeWitt Milling, became Chief of Staff of the First Brigade. This was the same Milling who had served under Mitchell both in France and in Washington after the war.²⁰

The initial tests against small ships and a cruiser were successful using 600 pound bombs, but, the Navy was assured that the battleship Ostfriesland was unsinkable by aircraft so they stood by to finish the job by naval gunfire, once airpower had failed. On 21 July, using new 2000 pound bombs made available earlier than previously thought possible by the ordnance corps, the Brigade attacked the Juggernaut. The manufacture of the bombs had been delayed because the TNT required about ten days to cool once it was poured. The production was accelerated by cooling the bomb cases in ice prior to pouring. The battleship sank in 100 fathoms before an astonished crowd of previously smug naval officers and a now jubilant press.²¹

The tests ultimately included the sinking of three surplus American battleships, one later in 1921 and two others in 1924. Of course this did nothing to promote Mitchell as a friend of the Navy. He set the barb further in 1924 when he predicted the future use of seacraft as auxiliaries to aircraft. Later, a series of articles appeared in the Saturday Evening Post criticizing the Navy. Secretary of the Navy Wilbur complained so vehemently to Secretary Weeks, of the War Department, that Mitchell was not reappointed to

the statutory brigadier general position as Assistant Chief of the Air Service. He was exiled to San Antonio in his permanent rank of Colonel.²²

Henry H. Arnold, who considered himself a friend of Mitchell, later remarked that Mitchell's agitation for air-power had a greater effect on its development in the Navy than it ever had in the Army. He noted that many senior Army officers "set their mouths together, drew more into their shells, and if anything, took an even narrower point of view of aviation."²³

The end of the Mitchell Era began in the summer of 1925 after two Navy accidents. One was the loss of a huge dirigible in an Ohio tornado, during a hurriedly improvised tour of the midwest. The other was the crash of a seaplane on a demonstration flight from California to Hawaii. The criticism from his Texas exile was so sharp that he was charged with "Conduct of a nature to bring discredit upon the military service."²⁴ Following conviction in December, 1925, Mitchell resigned in January, 1926.

CHAPTER III

DEVELOPMENT OF STRATEGIC DOCTRINE

The Air Corps Tactical School (ACTS) was originally formed at Langley Field, Virginia on 1 November 1920 as the Air Service School.¹ It was one of 11 technical and professional schools authorized by the War Department on February 25, 1920, for training personnel of the Air Service. The schools included: two Air Service Pilot Schools (flying training) at Carlstrom Field near Arcadia, Florida and March Field adjacent to Riverside, California, Air Service Pursuit School, Air Service Observation School which also included a course for communications personnel, Air Service Mechanics School for enlisted men, Air Service Bombardment School, Air Service Engineering School, two Balloon Schools including enlisted mechanic courses, and an Airship School. The original Air Service School at Langley included: an Airship School, enlisted courses in aerial photography and balloon mechanics and the Field Officers' Course.²

During its first year of operation, the Field Officers' Course was redesignated the Air Service Field Officers' School, even though only a few of its students were actually of field grade. The Chief of the Air Service reminded the Commandant, in 1921, that even though the school had been established for field grade officers, junior officers would continue to be assigned.³ This policy was apparently due to

a general lack of field grade officers throughout the Air Service.

Strack and Ludwig speculated that Brigadier General Mitchell promoted the establishment of the school as an adjunct to his now famous First Provisional Air Brigade which conducted the battleship bombing demonstrations.⁴ General Mitchell's Chief of Staff at the Provisional Brigade was Major Thomas DeWitt Milling who also performed double duty as the Air Service Officer in Charge of the ASTS and who was a graduate of the class of 1920-21.⁵

However, there is little evidence to show the school was established specifically with the battleship demonstrations in mind or that Mitchell was ultimately responsible for its establishment. What appears more likely is that General Mason Patrick, the non-flying Air Service Chief and proponent of a separate air branch, promoted the formation of the school.⁶

Even though the school was a part of the official Army establishment, its ideas and teachings were not always in agreement with official policy. Many of the views held and taught there were significantly different from official doctrines. Therefore, the term: "doctrine", in relation to the school, will refer to the prevalent views, concepts, and accepted teachings of the school and should be recognized as separate from official Army doctrine of the era.

The ACTS inherited the concepts published by General

Mitchell in "Notes on the Multi-Motored Bombardment Group, Day and Night," and it was used extensively as a basis of instruction.⁷ However the primacy of strategic bombing was not yet firmly established within the school.

The school was open for the 1920-21 academic year but was utilized to form the First Provisional Brigade for the bomber tests. The tests disrupted the first year and prevented proper preparation for the second year as well. These early faculty and students gained the experience of flying with the Brigade and learning the lessons of bombing first hand. His "Notes on the Multi-Motored Bombardment Group, Day and Night," were written between the 1921 and 1924 tests and were incorporated into the curriculum by the men who had participated in the tests.

The turning point in the development of doctrine occurred between the end of the tests and the move of the school to Maxwell Field in 1931. It was the faculty and students at Maxwell who emerged to develop the doctrine employed successfully in World War II.⁸

As late as 1926, the Bombardment text of the ACTS advocated operations in support of or in conjunction with large forces of ground troops rather than independent air operations.⁹ However, another 1926 text: "Employment of Combined Air Force," indicated a significant change in thinking. Major Oscar Westover was the commandant and was a proponent of an air arm equal to the Army and Navy. Pursuit aviation

was seen as establishing local air superiority since command of the air was "temporary and fleeting." Bombardment was to cooperate with air and ground forces by giving direct support in tactical operations and indirect support through strategic operations.¹⁰

This text also indicated it was futile to attempt to stop air attacks by aerial combat alone and that once airborne an attack was virtually impossible to stop.¹¹ One of the students that year was Captain George C. Kenney, an attack aviation proponent, who joined the faculty the next year.¹²

In 1928 the school began a revision of its curriculum and texts under a new commandant, Lt. Col. C. C. Culver. He proposed a fundamental doctrine to be used as the basis of all courses. It advocated the Army as the principal component of the military with the air and naval forces in support. His paper went on to say that the air component always supports the ground forces. This complied with official Army policy and doctrine; but, General Fechet the Air Corps Chief disagreed stating:

The objective of war is to overcome the enemy's will to resist, and the defeat of his army, his fleet, or the occupation of his territory is merely a means to this end and none of them is the true objective. At present the Air Force provides the only means for such an accomplishment.¹³

Captain Robert Olds completed the course the same year and joined the faculty. The following year, Lieutenant Kenneth Walker graduated and joined Olds in the Bombardment Section. Olds had assisted Mitchell earlier and Walker was an experienced bomber pilot.¹⁴

In 1929, the ACTS Assistant Commandant, Major Walter H. Frank served as the Chief Umpire at the Air Corps maneuvers in Ohio. The bombardment formations were so successful that Frank reported: "A well organized, well planned, and well flown air force attack will constitute an offensive that can not be stopped." By 1930 the theorem had been incorporated into a text: "The Air Force," with an added phrase: "...un-supported by pursuit."¹⁵ This was the rallying cry picked up by Walker and later attributed to him by many of his students.

In 1931, Olds and Walker revised the doctrine to predict that control of the air, which had been considered fleeting and temporary, could be attained throughout a combat theater by destroying the hostile air force in the air, on its airdromes, at depots, and in the factories.¹⁶

Even with such strong bomber advocates, the balance still was not irreversibly tipped in favor of bombardment. A pursuit advocate, and an influential one, joined the faculty; he was Captain, later Major, Claire Chennault. In 1932 the argument heated up around the central issue of whether or not bombers could penetrate without pursuit. The

debate continued between Olds and Walker on one side and Chennault and later Vandenberg on the other.¹⁷ When Olds departed, Captain Harold George took up the slack and they continued.

Initially, George and Walker had difficulty countering Chennault's arguments because they only had the 1930s vintage bombers to use in their examples. It was the arrival of the B-9s, B-10s, and the B-12s that vaulted bomber technology past fighters.¹⁸ Walker and George believed bombers could get through and even if pursuit achieved superiority it could do little more. Therefore, they proposed bombardment was the basic arm of aviation.¹⁹

Later, George and Walker converted young 1st Lt. Haywood S. "Possum" Hansel to their side.²⁰ When he arrived at the school, Hansel was probably second only to Chennault in his knowledge of pursuit tactics.²¹ He had previously served under Chennault in the "Men on the Flying Trapeze," an aerial demonstration team stationed at Langley while the ACTS was still there.²² Hansel had worked with Walker in applying statistical measures to bombing requirements before he attended the school and by the time he graduated he was a true convert. He joined the faculty and along with Walker and a classmate, Laurence Kuter, continued to expand on the strategic bombardment doctrine.²³

The pursuit advocates were said to be outnumbered on the ground and outmaneuvered in the air; and, Chennault was

said to be a less articulate speaker than his opponents.²⁴ Chennault continued as an instructor after his tour of duty was up by remaining on in post duties. The balance was irreversibly tipped when he retired in 1937. The balance was so much in the favor of the bomber advocates that shortly thereafter, Lt. Col. Millard Harman, himself a believer in bombardment, complained he was "icked" at the lack of prestige accorded to pursuit.²⁵

Between 1933 and 1935, the capstone of bombardment doctrinal concepts was laid by Majors Donald Wilson and Muir Fairchild. Wilson was an instructor and Chief of the Air Force Section from 1931 to 1934 and later Director of the Department of Air Tactics and Strategy between 1936 and 1940.²⁶ During the 1933-34 academic year, Wilson began lecturing on the effects of bombing industrial targets, laying the foundations for the development of the concept.²⁷ Major Fairchild was one of his students in 1934-35.²⁸ Fairchild remained at the school as a faculty member and became an advocate of targeting the industrial web. In the 1935-36 school year, Fairchild delivered a lecture titled: "Air Power and the City," arguing that accurately placed bombs from just 18 aircraft could disrupt a major city like New York.²⁹ Apparently, his arguments were based on the devastating results of a 1935 power outage in the city and knowledge of the electrical distribution system.³⁰

Other instructors and students joined the effort and

studied other industries. One noted the disruption of aircraft production in California that was caused by a flood in Pittsburgh.³¹ The school examined the U. S. petroleum, steel and electric industries; however, most emphasis was placed on electrical systems. In one study of the northeast electrical grids, they surmised that the national economy could be stretched to the breaking point by destroying 48 key targets.³²

From a doctrinal point of view, the ACTS had reinterpreted the views expressed and demonstrated by General Mitchell. Of greater importance, they added numerous refinements and expanded the strategy and tactics to include attacks not only against an enemy's military forces but to his industries supporting them. A summary of the prevailing doctrines as expressed by General Hansell are presented in the Appendix.

CHAPTER IV
CONTRIBUTIONS TO FORCE STRUCTURE

During the 1920s observation aircraft purchases had outstripped both bombers and pursuit. Several factors affected the direction of these procurements. The first was cost. Observation planes were less complex and therefore less costly. A more important factor was the problem of defining the requirements for pursuit and bomber prototypes.¹ Actually this was a two pronged problem based on technology and differences of opinion among the advocates of the aircraft. In these areas the ACTS and its graduates, including ex-faculty, had some influence.

As previously stated, the bomber advocates were more influential and articulate than their pursuit counterparts. But, articulation and influence do not overcome technological barriers. Only when the B-10 and B-12 overcame the major barriers was progress possible. Mitchell had used Martin MB-2s, capable of 600 miles range at 100 miles per hour to sink the Ostfriesland. The Keystone B-3, last of the biplane bombers, was faster at 121 miles per hour but had a range of only 510 miles.²

In 1928, an ACTS graduate of the 1926 class, Major Hugh Knerr was commander of the 2nd Bombardment Group at Langley Field.³ His group was equipped with two squadrons of Keystones and one of Martin MB-2s. In maneuvers they proved

inadequate for modern warfare particularly in their survivability.⁴ He proposed two types of multi-engined bombers. The first was a short range day bomber with great speed and firepower to protect itself. The second was a long range night bomber capable of carrying heavy loads. Using darkness to aid defense it could sacrifice some speed and defensive firepower.⁵

General Fechet reviewed the proposal and ordered the Materiel Command to procure a single aircraft to accomplish both missions and perform observation as well.⁶ This may have been an attempt to obtain the bomber by attaching it to the more politically popular mission. The resulting designs were the Douglas B-7 and the Fokker B-8. Both were short range and had limited loads. The B-8 did offer one contribution because its engine nacelles were built into the wings providing increased performance and reduced drag.⁷

In March, 1930 the ACTS repeated the call for two bombardment weapon systems; but, they redefined the terminology from "day" and "night" saying that the more correct designations should be "light" and "heavy" bombers. They specified bombloads of 1,200 and 2,000 pounds respectively. These concepts were adopted by the GHQ Air Force during the 1930s to refine the specifications for future bombers.⁸

The results were the B-9 and B-10 from Boeing and Martin respectively. The YB-9, "Flying Pencil", could do 180 miles per hour at 6,000 feet, and carry 2,200 pounds of

bombs 990 miles. The Air Corps bought six. The B-10 was faster at over 200 miles per hour and became the pride of the Corps. A modified version, the B-12, performed extremely well against pursuit formations in the Air Corps maneuvers of 1934.⁷

The B-17 was first introduced in 1935 as a result of experiences with the discontinued B-9.¹⁰ Several ACTS alumni performed admirably in demonstrating its capabilities and those of bomber aviation in general. In May, 1937 GHQ Air Force directed their testing in maneuvers off the west coast. The basic test was a sea search against the battleship Utah. The Utah was deployed in an area 100 by 300 miles. The ship found cover under a fog bank and was 385 miles off the coast when it was found by B-17 crews using their Norden bombsights. The ship's commander, thinking they were safe under the fog had allowed his crew to remain topside. In the attack using water filled bombs, several crew members were injured. The skipper accepted responsibility for his mistake and radioed his congratulations for several direct hits.¹¹ The formation was led by Lt. Col. Olds formerly of the ACTS.¹² In 1938 three B-17s, again under Olds, intercepted the Italian liner Rex while it was still over 700 miles off the coast.¹³

After thorough testing of the B-17s, Olds recommended it as the standard bomber for the three bomb groups then proposed by GHQ Air Force for defense of the east and west

coasts and interior of the nation.¹⁴ The U. S. Army Air Corps had the best bombers in the world, it just had too few of them.¹⁵

The problem of expanding the numbers of planes, groups and people was a major task just prior to and just after the beginning of World war II. On July 9, 1941, President Roosevelt asked the Secretaries of War and Navy to prepare estimates of their wartime requirements needed to defeat our potential enemies.¹⁶ The War Department found this a difficult task since the President wanted a prompt answer. The only guidance was to follow RAINBOW 5, one of the pre-war plans aimed at defeating Germany, Italy, and Japan. The other RAINBOW plans were organized for the defeat of different potential enemies. The War Plans Division (WPD) of the Army suggested that several aviation officers be detailed to help prepare the air portions of the estimates. However, the head of the newly formed, 21 days old, Air War Plans Division (AWPD) was Lt. Col Harold George. George argued that this was exactly the type of contingency that the AWPD had been formed to meet and was opposed to detailing people to the WPD.¹⁷ He also argued the air staff should prepare the air part of the reply and was able to explain his ideas to General Spaatz. He believed the Army approach might be a simple airplane for airplane comparison against the enemy and argued that a deeper analysis was needed since bombers don't fight bombers directly.¹⁸

When he was summoned to General Arnold's office he was elated to learn the AWPD was to prepare the air annex. General Arnold, the Assistant Chief of the Air Corps, had seen the opportunity and convinced the WPD that allowing AWPD to work the air issues would free the WPD staff to concentrate on the ground requirements.

As earlier stated, Lt. Col. George's Air War Plans Division was only 21 days old when the requirement had come down, and he had only three relatively junior officers assigned. The four members who would supervise the overall planning effort were:

1. Lt. Col. Harold L. George, Chief of the AWPD, and a prior Director of the Department of Air Tactics and Strategy at the ACTS.

2. Lt. Col. Kenneth N. Walker, Chief of War Plans Group of the AWPD and a prior Instructor in Bombardment at the ACTS.

3. Major Laurence S. Kuter, borrowed for the duration of the project from G-3 and also previously an Instructor in Bombardment at the ACTS.

4. Major Haywood S. Hansel Jr., Chief of the European Branch of the War Plans Group, AWPD and of course a prior Instructor at the ACTS. 20

There was not much guidance other than the direction to follow RAINBOW S; and, there were few analytical models or

estimation techniques in existence for air forces. In Hansel's own account he said : "The best we could do was develop our own formulae, based on our critical experience at the Air Corps Tactical School, our belief in the potential of strategic bombardment, and our own experience." Since he personally had worked with Walker developing many of the statistical tools they had some qualitative advantage going for them.

The first problem they had to solve was how to balance their unabashed belief in strategic bombardment against prevailing thinking within the War Department. If they were too outspoken or failed to pay sufficient heed to the ground war they might fail and have the final product replaced with a hurried version from the WPD. Lt. Col. George decided the best approach was to plan for all out strategic warfare backed up with preparation for a later combined air-land invasion and subsequent air and land offensives.²² Following this concept, and working day and night, these four products of the ACTS produced the first comprehensive war plan for American air forces. They did their work well; it was accepted with only minor modifications by the War Department and then by President Roosevelt.²³

Their plan became commonly known as AWPD-1 and was an accurate projection of the forces needed to successfully prosecute World War II. They came remarkably close to the actual force structure developed during the war in terms of

aircraft, groups, and personnel. For a comparison see Figure 4-1.

In summary, the ACTS directly impacted force structure decisions through a number of its most capable graduates and former faculty members. While the school was not in the business of developing force structures it was in the business of developing air officers. Their influence was felt in the call for better weapon systems and in the operation of them to prove the capabilities of bombardment aviation. The long hours spent developing statistical estimation tools by Hansel and Walker were worth their weight in gold when the opportunity to prepare AWPD-1 came along.

	AWPD-1 Estimate	Actual Use
Personnel	2,164,916	2,400,000
Combat Groups	239	243
Aircraft	63,467	80,000

Figure 4-1
Analysis of AWPD-1 Estimates **

CHAPTER V CONCLUSIONS

The transformation of strategic bombardment from a secondary role in 1918 to the preeminent military arm in 1945 was due to the direct and indirect influences of a relatively small group of instructors and students from the Air Corps Tactical School. This broad conclusion is readily apparent in the doctrine and force structure contributions made by the school and its graduates.¹

It is clear the school did not originate the idea that bombardment was the superior form of airpower. Mitchell, also, cannot be fully credited with that. As previously stated, he was influenced in his thinking by Major General Trenchard. However, he must be given credit for being the primary and the most influential proponent of airpower, especially bombardment. As such, he laid the foundation for the development of strategic bombing through his demonstrations, teachings, and writings.²

General Mitchell's concepts were refined at the school and became workable doctrine, suitably adapted to emerging technology. Initially, it was men like Oscar Westover who openly advocated a separate air force when it was clearly not a popular concept in Army circles. Others, including Robert Olds and Kenneth Walker refined Mitchell's teachings. They tackled questions pertaining to enemy air forces and

concluded they should be attacked not only in the air, but also on their airdromes, at their depots and in the factories. They applied statistical and mathematical tools to the problems of bombing to verify, quantify, and prove their arguments.

The ACTS provided a crucible in which these concepts were tested; for, the bomber enthusiasts were not the only zealots. Chennault and his associates, by arguing against the bomber theories, forced a constant refinement and ensured only the most valid concepts would survive. Emerging technology also played a decisive role in bombardment's emergence. More accurately, technology matured at an appropriate time, precisely when it was needed to turn the tide in the ACTS debates. Credit must still be given to the men who recognized the emerging technology and used its presence to promote bombardment concepts.

The ACTS made another significant contribution to bombardment by providing a stream of high quality students, many of whom remained for faculty tours and carried on the bombardment cause. When stalwarts like Robert Olds moved out, they were replaced by others like Harold George and Maywood Mansell.

Mansell's conversion from being one of Chennault's most knowledgeable lieutenants to a strong advocate of the bombardment school of thought is a striking testimony to its validity. By contrast, the advocates of pursuit seemed to

fade after Chennault's departure. The resulting lack of pursuit influence proved a detriment to pursuit and bombardment. The resulting doctrines lacked the integration of pursuit to enhance the bombers' penetration of defenses and survivability. These deficiencies had to be corrected in the heat of war.

The ACTS developed the industrial grid concept which went beyond attacking military forces and their supporting industries. It addressed a nation's entire economic system and advocated its destruction or disruption. Admittedly, this concept had been proposed earlier in general terms, but, it was the ACTS who studied specific industries, assessing their overall contribution to national security, and their vulnerability to attack.

The ACTS led the call for better aircraft and weapons. Major Hugh Knerr's original call for new bombers, echoed by the school, led to the B-9 and B-10. ACTS alumni led or participated in the key tests that resulted in the procurement of the B-17. As previously stated, the Army Air Corps had the best bombers in the world; and, their presence was owed to the ACTS.

In the same way, the Army Air Corps had the best doctrine for employing those bombers, and they had developed the industrial web concept for targeting enemy industrial strength. Then, a group of four alumni successfully wove these three threads into the first comprehensive air war

plan, and set the pattern for the development of airpower through the war years. Again, the debt was to the ACTS. The combination of these three elements prior to our entry into World War II created the opportunity to apply strategic bombardment when hostilities began. Initially, bombardment was available, even if in limited quantities, for application when other forces still could not be brought to bear.

If the contribution of the ACTS to the development of strategic bombardment had to be reduced to one factor, it would be prepared minds. Prepared minds recognized the validity of Mitchell's teachings and the need to study and refine them. Prepared minds recognized the strategic potential of the industrial web concept. Prepared minds seized the opportunities to develop the strategic combat power needed to win the impending war. Prepared minds were the true and lasting legacy of the Air Corps Tactical School.

APPENDIX

DOCTRINE DEVELOPED AT THE AIR CORPS TACTICAL SCHOOL

The doctrines developed at the Air Corps Tactical School were summarized by Major General Hansell under five categories of American air power as follows:

1. Strategic offensive air warfare, including (1) the disruption of the enemy capability to wage war and the breakdown of the enemy will to resist. This would be achieved by selection and destruction of the industrial systems which produced the means to wage war and to sustain the life of a modern, industrialized nation. (2) the destruction of the enemy air forces if they constituted a threat to our own nation, to our military forces, or to the success of our air offensive.
2. Air support of ground forces in the attainment of their immediate goals, including the provision of local air superiority.
3. Air support of sea forces or, in the absence of such sea forces, performance of certain functions of sea power.
4. National air defense against enemy air forces threatening our own sources of national power; and
5. Air operations against surface invasions threatening our shores.

Source: The Air Plan That Defeated Hitler, by Major General Haywood S. Hansell, Jr., pages 40-42.

NOTES

CHAPTER I : pages 1-3.

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2. Ibid., p. 29.

3. Paret, Peter, (editor), Makers of Modern Strategy: From Machiavelli to the Nuclear Age, Princeton University Press, Princeton, New Jersey, 1966, p. 633.

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1. Goldberg, pp. 20-21.

2. Futtrell, Robert F., Ideas, Concepts, Doctrines: A History of Basic Thinking in the United States Air Force, 1907-1967, Aerospace Studies Institute, Air University, Maxwell AFB, Alabama, 1971, p. 12.

3. Ibid.

4. Goldberg, p. 21.

5. Ibid., pp. 30-31.

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8. From "Magna Carta' of British Air Power," printed in Emme, pp. 33-37.

9. Futtrell, p. 12.

10. Ibid.

11. Goldberg p. 22 and Futtrell p. 12.

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16. Ibid.
17. Futtrell, p. 12.
18. Ibid., and Shiner, John Frederick, "The Army Air Corps Transition General Benjamin D. Foulois and the Air Corps, 1931-1935," Volume I, Ohio State University Dissertation, reprinted by Xerox University Microfilms, Ann Arbor, Michigan, 1975, p. 23 and notes on p. 61.
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21. Burlingame, Roger, General Billy Mitchell, Champion of Air Defense, Greenwood Press, Westport, Connecticut, 1979, pp. 1-12.
22. Ibid., pp. 140-142.
23. Futtrell, p. 29.
24. Coop, p. 47.

CHAPTER III : pages 11-18.

1. Finney, pp. 6-7 and Strack, p.27.
2. Finney, p. 5 and notes on p. 44.

3. Ibid., p. 7.
4. Strack, p. 27.
5. Futtrell, pp. 20-21 and Finney, pp. 53,56.
6. Futtrell, pp. 26,28.
7. Brigadier General Laurence Kuter, quoted in Finney, p. 27
8. Holley, I. B. Jr., "An Enduring Challenge: The Problem of Air Force Doctrine," The Hasmon Memorial Lectures in Military History, Number 16, USAF Academy, Colorado, 1974.
9. Finney, p. 29.
10. Pages 1-10 of the text are summarized in Futtrell, p. 32.
11. Finney, p. 31.
12. Ibid., pp. 53,67.
13. Futtrell, p. 32.
14. Ibid.
15. Ibid., p. 33.
16. Ibid.
17. Hansel, Haywood S. Jr., Major General USAF (Retired), The Air Plan That Defeated Hitler, Higgins-McArthur/Longino & Porter Inc., Atlanta, Georgia, 1972, p. 11-13.
18. Ibid., p. 18.
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28. Finney, pp. 72-73.
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30. Fabyanic, p. 39.
31. Ibid., p. 40.
32. Ibid., pp. 40-41.

CHAPTER IV : pages 19-25.

1. Tate, James P., "The Army and Its Air Corps: A Study of the Evolution of Army Policy Towards Aviation, 1918-1941," Doctoral Dissertation, Indiana University, reprinted by Xerox University Microfilms, Ann Arbor, Michigan, 1976, pp. 204-206.
2. Ibid., p. 205.
3. Finney, p. 67.
4. Knerr's diary quoted in Tate, p. 206.
5. Tate, p. 206.
6. Ibid., p. 207.
7. Ibid.
8. Ibid.
9. Ibid.
10. Goldberg, p. 45.
11. Tate, pp. 220-221.
12. Futtrell, pp. 42-43.
13. Goldberg, p. 43.

14. Futtrell, p. 43.
15. Tate, p. 212.
16. Mansel, p. 61.
17. Ibid., p. 64.
18. Ibid.
19. Ibid., p. 66.
20. Ibid., pp. 66-70.
21. Ibid., p. 69.
22. Ibid., p. 75.
23. Strack, p. 78.
24. Goldberg, p. 48 and Strack, p. 78.

CHAPTER V : pages 26-29.

1. The term "graduates" is used here to include both students and faculty members who assigned to the ACTS.
2. The bombing demonstrations, coupled with Mitchell's personal teachings to members of the 1st Provisional Brigade, coupled with written material such as: Notes on the Multi-Motored Bombardment Group, Day and Night, constituted the foundation for future development of strategic bombing concepts.

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