The Birth of American Airpower in World War I

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Although the Wright Brothers invented the airplane, the birth of American airpower did not take place until the United States entered the First World War. When Congress declared war on 6 April 1917, the American air arm was nothing more than a small branch of the Signal Corps, and it was far behind the air forces of the warring European nations. The "Great War," then in its third year, had prompted the development of large air services with specialized aircraft for the missions of observation, bombardment, and pursuit. On the battlefield, machine guns kept infantry on each side pinned down. They sought safety in trenches but were still vulnerable to indirect fire from artillery that caused even more casualties through concussion, shrapnel, and poison gas. Consequently, each side came to realize the importance of gaining command of the air. Air superiority provided the means for observing the enemy and directing accurate artillery fire on enemy trench lines and the depth of his formations. Thus, many believed that a "decision in the air" was required before a decision on the ground could be won.

In contrast to the European air forces, an American combat aviation arm did not exist. The Army possessed only 26 qualified aviators in the Aviation Section of the Signal Corps.[1] Their assignment to the Signal Corps can be traced back to the Civil War when the Union linked observation balloons, the telegraph, and signal flags to provide intelligence on Confederate activity.[2] As America entered World War I, the Aviation Section was equipped with a meager number of unarmed and obsolete airplanes. Some of the pilots had seen active service as pilots during the Mexican Punitive Expedition in 1916. The single squadron that accompanied this expedition, commanded by Maj Benjamin Foulois, consisted of eight aircraft—unarmed, underpowered, and unreliable. Consequently, the squadron proved useless for its observa-

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tion mission and wound up serving as a courier service—a mission that reflected the Signal Corps' ownership of the Aviation Section.[3]

How did the United States create airpower upon the Great War? The complete story is beyond the scope of this article, but an important part of the story can be told through the contributions of three key architects of American airpower: Raynal Bolling, Benjamin Foulois, and Billy Mitchell. These fathers of American airpower mobilized a combat aviation arm on a par with the other branches of the Army. They harnessed public enthusiasm for airpower, developed the mobilization plans that turned recruits into aviation units, procured the airplanes, learned the operational art from the Airman's perspective, and provided a vision that inspired the future emergence of an independent air force and an airpower second to none.

Air-mindedness

The paucity of American military aviation in 1916 stands in stark contrast to the country's enthusiasm for airpower. Within months of America's declaration of war, Congress passed an appropriation of $640 million, the largest appropriation in its history, to build a mighty air force. Headlines such as "GREATEST OF AERIAL FLEETS TO CRUSH THE TEUTONS" appeared in American newspapers.[4] This unprecedented commitment of national treasure and enthusiasm for airpower is clear evidence that air-mindedness existed in America even at this early date.

Air-mindedness was stronger in civilian society than in the military. Just a few years before even Billy Mitchell, America's future prophet and martyr for an independent air force, had testified in Congress *against* aviation's independence from the Signal Corps.[5] More to the point, resistance within the upper echelons of the Army to such a large appropriation for aviation was so strong that the Secretary of War, Newton Baker, bypassed the Army general staff when he took the proposed legislation to Congress.[6] The public's enthusiasm for airpower manifested itself in a Congress that exhibited an almost messianic faith in the airplane's ability to deliver victory as reflected in newspaper headlines.[7]

Air-mindedness owed much to civic organizations, especially the Aero Club of America, which drew its leadership from the captains of industry.[8] The Aero Club was a federation of aviation clubs from across America that sponsored flying exhibitions, issued pilots' licenses, and promoted a nascent aviation industry.[9] Promoters of aviation envisioned growth of an aircraft industry as revolutionary as the automobile industry, which was then transforming American society. The efficiencies achieved by Henry Ford's assembly line had only recently brought automobile prices within reach of the average American, and sales were skyrocketing. In contrast, aircraft production was so small that airplanes were made in shops instead of factories, but hopes for the future were high. The Aero Club was a powerful lobby and had been largely respon-

sible for legislation establishing the Aviation Section of the Signal Corps in 1914. The Club also lobbied for the establishment of aviation units in the National Guard. Bolling organized one of these units in New York.[10]

Raynal Bolling

A Harvard-educated lawyer and aviation enthusiast, Bolling served on several of the Aero Club's executive committees, including those dealing with law, government affairs, and military aviation. He would become one of the key architects of American airpower. Many readers will recognize Bolling as the name of the USAF base near the Pentagon in Washington, DC. He merited this honor for his role in creating American airpower during the "Great War." He was also the senior US Airman killed in action during the war. Bolling's part in the birth of American airpower exemplifies how the National Guard and Reserve played an important role in the formation of an American air force—a prologue to today's total force.

Bolling initially rose to fame as the chief lawyer for US Steel. At that time, US Steel was the largest corporation in America and vitally important to any war effort. He helped defend the nation's largest steel company from being broken up by President Theodore Roosevelt—"Teddy the Trust Buster."[11] He was also a member of the New York National Guard. "The Guard was a hotbed of early interest in aviation, and there were many efforts to form Guard aero units in various states. The most prominent was in New York."[12] Bolling's interest in aviation, combined with financial support from the Aero Club of America, led to his founding of the 1st Aero Company (1st AC) of the New York National Guard in 1915.[13]

Bolling's command expanded to become the 1st Reserve Aero Squadron after the passage of the National Defense Act of 1916, which originated the nation's air reserve.[14] Bolling's squadron was among the first aviation units sent to France in the summer of 1917. It was the core organization that built and expanded into a huge American aviation training center at Issoudun, France. His second in command, Capt James Miller, took charge of the squadron after Bolling left and became the first commander at Issoudun. Another member of this squadron was Quentin Roosevelt, President Roosevelt's youngest son. Miller and Roosevelt later became pilots in the 1st Pursuit Group, an ancestor of today's 1st Fighter Wing. Both men were killed in air-to-air combat with the Germans.[15]

Bolling did not accompany his squadron to France because he was called to Washington to help plan the creation of a wartime air force. His aviation expertise, contacts with industry, and knowledge of the law made him an especially valuable asset in crafting legislation to create American airpower. He and Major Foulois drafted the bill that would become the $640 million appropriation.[16] Foulois had also

only recently come to Washington. He was the most experienced of the 26 qualified aviators in the regular Army.

After the passage of the historic aviation bill, Foulois and Bolling focused on the next major problem: how to translate the huge appropriation into a practical plan to man, train, organize, and equip an American air force. The United States was unprepared for war and a strict policy of neutrality had minimized contact with the European allies. An air force needed modern combat aircraft, well-trained pilots, mechanics and support personnel, and a host of other items to create combat-ready squadrons. Bolling was sent to Europe to figure out what types of airplanes America should build. Foulois concentrated on the establishment of mobilization and training centers across the country, where recruits were transformed into aero squadrons. The largest was at Kelly Field near San Antonio, Texas.

Benjamin Foulois, Father of the Air Force

If a single person can be called the father of the American air force, Foulois deserves that title. He flew with Orville Wright in 1909 on the Army's acceptance tests for its first airplane. He took Army No. 1 to Fort Sam Houston, Texas, and amazingly, taught himself to fly it, just as he had been ordered. One could argue that he learned to fly through distance learning because Wright provided him advice through an exchange of letters. Later, Foulois helped organize the Army's 1st Provisional Aero Company, and he commanded the 1st AS (not to be confused with Bolling's 1st Reserve Aero Squadron) during the Mexican Punitive Expedition.

Foulois's command on the expedition represented America's first employment of airpower on a major expedition. Although his squadron was incapable of adequately accomplishing its reconnaissance mission due to the inferiority of its airplanes, valuable lessons were learned that he put to use in developing the mobilization plan that gave birth to American airpower.[17] One of his most important insights from the Mexican Punitive Expedition concerned the ideal organization for an aero squadron. His design became the basic fighting unit upon which American airpower was built. He returned to Signal Corps headquarters in Washington after the expedition and put his plan into effect.

The major designed a squadron consisting of 150 men, not counting pilots. In most cases, pilots were not assigned to the squadron until after they had completed basic training and deployed to France. By organizing a standard service aero squadron, Foulois incorporated the idea of interchangeability regarding organizational structure. This system of standardization simplified mobilization because only one type of airplane squadron, the 150-man squadron, needed to be initially organized. After squadrons had been organized and received basic training at Kelly Field, they deployed to Europe as soon as transportation was available. The concept of a standard

service aero squadron was an elegant but simple solution to the problem of building an Air Service in which the initial stages of organization took place in the United States, and the final stages were completed in Europe.

Gen John J. Pershing, commander of the American Expeditionary Forces (AEF), decided to conduct the final organization, training and equipping of the Air Service in France. This was necessary because the Americans were so far behind the Europeans in military aviation. It was a key strategic decision perfectly suited to the strategy of the French and British, who needed to build American partnership capacity to help win the war. The AEF assembled in France in the rear of the French Army, which had been at war for more than three years by the time US fighting units began arriving. French advisors helped train and equip all types of American combat units for frontline duty. In the case of aviation, most of the advanced pilot training for the Americans took place under French Air Service instructors, who usually could not speak English.

To facilitate interoperability, Pershing decided to copy French Army organizational structures. This influence persists, most obviously reflected in today's numerical designation for staff organizations (A-1 for personnel, A-2 for intelligence, A-3 for operations, etc.). It is also why the USAF's organizational hierarchy goes from squadron to group to wing, unlike the British system, which goes from squadron to wing to group.

Another of the commanding general's decisions was even more significant for the birth of American airpower. He decided that the AEF needed an Air Service separate from the Signal Corps. The American air force took its first step towards independence in 1917 in France when it became the AEF Air Service. As one historian noted, "In making aviation a service branch, like the infantry or cavalry, Pershing had duplicated the existing Royal Flying Corps organization."[18] It would take another year before the Air Service won independence from the Signal Corps in the United States. President Woodrow Wilson ordered the War Department to establish the US Army Air Service on 20 May 1918.[19]

The final manning, training, and equipping of squadrons took place in France at organization and training centers. Pilots, aircraft, vehicles, tools, and a host of other equipment were joined at these centers to form combat-ready squadrons. Depending on the type of aircraft and trained pilots assigned, the standard service aero squadron would be transformed into an observation, pursuit, or bombardment squadron. Once the disparate parts came together in the center, the squadron and group commanders would establish standard operating procedures and conduct collective training. This included formation flying and familiarization flights to just short of the frontlines, usually defined by the friendly balloon line. When final preparations had been completed, and the squadron was combat-ready, it deployed to a frontline airfield to begin

operations.[20] The aircraft sent to the squadrons at these organization and training centers were results of the work of Raynal Bolling.

Bolling Mission

Bolling led a group of officers, technicians, and other experts (more than 100 personnel) on what became known as the "Bolling Mission" to Europe to determine what types of airplanes America should manufacture. They met with aviation officials in Britain, France, and Italy. Because of these meetings, Bolling realized that US aviation technology was so far behind that it would be necessary, at least initially, to rely upon the European allies for airplanes. At this point in aviation history the airplane reflected an immature technology, and unlike today, improvements were inexpensive and rapid. Also, the proximity of European aircraft designers and their factories to the battle area gave them a distinct advantage in turning out improved models based on combat experience.

As it turned out, American industry had so much difficulty producing acceptable warplanes that most of the AEF's airplanes came from foreign sources. It was a scandalous failure for the nascent American aircraft industry, especially given the huge aviation bill passed by Congress. This disgrace resulted in a series of Congressional investigations after the war. Accordingly, it is no surprise that France, which had the largest aviation industry in the world, supplied 80 percent of the AEF's airplanes.[21]

Bolling's aircraft purchases were of great consequence. As one historian noted, "The Bolling Commission actually played one of the most important roles in the war."[22] This is because the numbers and types of aircraft that he recommended for production in the United States as well as those purchased from the Allies would shape the air strategy regarding the weight of effort for air superiority, observation, and bombardment.[23] The contract he negotiated with the French, known as the 30 August Agreement in 1917, called for 875 training planes and 5,000 service-type aircraft. Since the war would be over in a little more than 14 months, these early decisions had a significant impact. In the event, however, French manufacturers were unable to deliver on time, resulting in aircraft purchases from the Britain and Italy. The following table illustrates the sources of frontline Air Service aircraft:

Source	*Number of Aircraft*	*Representative Types*
France	4,791	Nieuport 28, SPAD XIII, Breguet 14, Salmson 2A2
Britain	261	Sopwith Camel, SE-5
Italy	19	Caproni Bomber
US	1,216	DH-4

Table 1. Sources of aircraft for the American Expeditionary Force Air Service in France. [24]

General Pershing was so impressed with Bolling that he retained him in France, promoted him to colonel, and appointed him as chief of the Air Service's line of communications. In addition to aircraft procurement, Bolling was responsible for logistics, reception of aviation units, and pilot training. The other main part of the Air Service was called the Zone Advance, where the training and organization centers were located. Colonel Mitchell was in charge of it.[25]

Billy Mitchell

When Mitchell arrived in France, he was one of the senior officers in the Aviation Section of the Signal Corps, but not yet a qualified aviator.[26] He was one of the rising stars of the Signal Corps, having been the youngest officer appointed to the Army's new general staff. One of his responsibilities before the United States entered the conflict was briefing the president and members of Congress on the developments in the European war. He became the deputy officer in charge of the Aviation Section to help "instill old fashioned discipline" in the section after a scandal occurred at the Signal Corps Aviation School in San Diego, California. During this period, he developed a rocky relationship with Foulois, who eventually replaced Mitchell when he left Washington for France shortly before the declaration of war. Mitchell's job was to observe how airpower was being in employed in the war. He was one of the first members of the Aviation Section to arrive in France, just four days after the United States declared war on Germany.[27] Timing is everything, and Mitchell's was perfect.

Mitchell was well-suited for the job as an official observer because he spoke French, and the assignment provided an ideal stepping-stone to air command. He toured the front, took detailed notes, and learned about air strategy, tactics, and organization through repetitive visits with the French and British air commanders and their units.[28] Most important, Mitchell's job required him to systematically record, reflect on, and analyze what he had seen. "I was a different breed of cat from any of the others they had seen," he wrote in his hotel room at Chalons after visiting a French pursuit group headquarters. "Deep into the night they could hear my typewriter clicking as I wrote up my notes."[29]

Mitchell would become the AEF Air Service's senior operational commander, and he mastered the operational art from the Airman's perspective, most famously demonstrated in his orchestration of airpower for the Saint-Mihiel offensive, the largest coalition air operation of the war. His success provides a case study in learning and adapting.[30] Being an official observer required him to reflect on what he saw and clarify his thoughts through the process of writing reports. He continued this practice even when he was no longer an official observer, keeping a journal throughout the war. Daily writing supercharged his learning and disciplined his reflection. His sys-

tematic and disciplined approach to learning helps explain why a relative newcomer to aviation like Mitchell surpassed the more experienced Army aviators like Foulois to become the senior operational air commander. Foulois taught himself to fly; Mitchell taught himself the operational art from the airman's perspective.

During his period as air commander of the Zone of Advance, Mitchell did not command much of anything because squadrons had yet to arrive at the organization and training centers. Instead, he served mainly as a senior planner. Significantly, he developed the tables of organization for pursuit, observation, and bombardment squadrons using the 150-man aero squadron as his basic building block. He modified the French model discussed earlier, however, by following the British example of an 18-plane, three-flight squadron. This demonstrates how the AEF Air Service borrowed ideas from both the British and French. A similar synthesis would take place in the development air tactics.

Pershing had originally requested that Foulois accompany him to France to command the AEF's Air Service. The challenges of mobilizing an American air force, however, kept him stateside. By November 1917 mobilization was well underway, enabling Foulois to leave Washington. He arrived in France wearing the rank of brigadier general to assume command of the AEF's Air Service.

Foulois brought his staff and reassigned both Bolling and Mitchell to new jobs, removing them from key positions in the headquarters and replacing them with handpicked officers who had accompanied him across the Atlantic. Mitchell was greatly embittered with this treatment: "A more incompetent lot of air warriors had never arrived in the zone of active military operations since the war began. . . The competent men, who had learned their duties in the face of the enemy, were displaced and their positions taken by these carpetbaggers."[31]

Foulois's dismissal of Bolling and Mitchell was a colossal error. It further poisoned the poor relationship that had developed between them. More to the point, the veteran from the Mexican Punitive Expedition failed to transition from tactical to senior leadership, where building consensus with other senior leaders and peers is so important. In effect, his reassignment of Mitchell and Bolling decapitated the Air Service at a critical time when recently acquired institutional knowledge was more important than ever. The mobilization assembly line that began at Kelly Field was just then beginning to surge aero squadrons into France.

Foulois appointed Bolling as liaison officer to the Royal Air Force. Bolling became the senior Airman killed in the war when his car was ambushed by a German patrol while he was attempting to visit elements of two American aero squadrons that were attached to the British. The Germans had just launched their long anticipated spring offensive, and the front line had dissolved in that sector. Bolling was the most knowledgeable officer on aircraft procurement. His loss contributed to the unhinging of the Foulois regime.

Foulois assigned Mitchell to be the chief of Air Service, I Corps.[32] Though a personal setback, this "demotion" removed Mitchell just as a tsunami of administrative and logistical issues arrived at the doorstep of his successor. American aero squadrons were beginning to arrive in the Zone of Advance at various organization and training centers (pursuit, bombardment, observation), where they received their aircraft and equipment and were made combat ready before being assigned to the front.[33] In contrast, when Mitchell arrived at the recently created I Corps headquarters, it did not yet have operational control of any American combat units. He joined a headquarters whose staff was itself undergoing organization and training. As before, he did not command much of anything but was perfectly situated to continue learning.

Like the other members of the staff, Mitchell conducted a study of his area of responsibility undistracted by the daily grind of command. This time he focused on the enemy: the organization, aircraft, and operations of the German air force.[34] Thus, by the spring of 1918, Mitchell had spent a year in France, developed plans for the tactical organization of the Air Service, and conducted in-depth studies of both the friendly and opposing air forces. He knew more about these subjects than any other senior American officer.

Mitchell also polished his flying skills. He arrived in France without the wings of an aviator, but the limited responsibilities of successive jobs enabled him to build on the flying lessons he began in the states. By then he had become an accomplished pilot, even learning to fly America's first fighter, the French-made Nieuport 28, which was a difficult plane to handle because of the gyroscopic effect created by its rotary engine. In May 1918 he led a six-plane exhibition flight of 94th Aero Squadron's Nieuport 28s during an awards ceremony in which the commanding general of the French Eighth Army presented the *Croix de Guerre* to several officers of the 94th, including Eddie Rickenbacker, in recognition of their first victories against the Germans.[35]

In contrast, many of the experienced prewar Army aviators, such as Foulois and Col Robert Van Horn, who had replaced Mitchell as commander of the Zone of Advance, were so overwhelmed with the workload of building the Air Service that they simply could not devote time to learning to fly the latest combat aircraft. They could never lead by example as Mitchell did.

While at Toul, Mitchell anticipated the establishment of an Army headquarters that would be needed to control multiple corps as American doughboys poured into France. He established a provisional air headquarters for First Army. As happened before to Mitchell in the Zone of Advance, however, he was removed from this position just as the First Army was nearing activation.

The deteriorating state of affairs in the Air Service, exacerbated by the earlier decapitation of its senior leadership, resulted in Pershing dismissing Foulois. His re-

placement, engineer officer Maj Gen Mason Patrick, remembered Pershing describing the Foulois regime as "good men running around in circles."[36] As the dominoes fell, Foulois arrived at the provisional air headquarters for the First Army and told Mitchell, "There's no use beating around the bush, Billy, I'm here to take over your office, your files, and your job. You are relieved as of this moment."[37]

First Battles

Yet again this setback would ironically provide Mitchell the opportunity to further his study of air warfare, gain experience in a major coalition air operation, and surpass Foulois as the most important American air leader to emerge from World War I. By the end of May, Germany's last great offensive, launched in March, had reached Château-Thierry only 40 miles from Paris. The resulting panic led to the piecemeal commitment of Soldiers and Marines to reinforce Sixth French Army, which was reeling back from the German onslaught. Marines fought one of their most famous battles at Belleau Wood, and the Army's 3rd Infantry Division won the moniker "Rock of the Marne" for its stalwart defense along that river.

After observing these initial battles, one of Pershing's colonels observing the action sent a strongly worded report back to AEF headquarters: "I recommend that an observation and a pursuit squadron of aero planes be sent here to work with this division at [the] first opportunity. The Germans have control of the air and embarrass our movements and dispositions."[38] Consequently, Pershing ordered American aviation to the Marne sector along with the 1st Corps headquarters, which provided the overall command for additional American units reinforcing the French.

Despite their previous falling out (but also getting Mitchell away from the First Army sector), Foulois put Mitchell in command of 1st Air Brigade, a new organization created to accompany US reinforcements to the beleaguered Sixth French Army. Mitchell's command consisted of 1st Pursuit Group (1st PG) and 1st Observation Group. The lines of authority were unclear. The 1st PG received its operations orders from the chief of the Air Service of Sixth Army, which was in overall command of the sector. That was logical because the American pursuit group replaced Sixth Army's former pursuit group, which had been practically shot out of the sky. The 1st Observation Group (1st OG), which directly supported 1st Corps with reconnaissance and artillery adjustment, took its orders from the corps.[39]

These unclear command relationships created a difficult conundrum for Mitchell's subordinates, who sometimes received orders from multiple headquarters. The 1st PG operations officer, Philip Roosevelt, explained, "I had to spend a lot of time seeming to obey their orders while really making my own dispositions. . . . All our orders really came from the French—which [Mitchell] approved."[40] To be sure, the Army was still working out the nuances of command relationships between the pursuit and

observation groups and the armies and corps they supported. This was made more difficult while fighting under French command. Today, we would call Mitchell a COMAFFOR (commander of Air Force forces) who had OPCON (operational control) of the US 1st PG and OG. He was supporting a French CFACC (combined force air component commander) who had TACON (tactical control) of the 1st PG, while the 1st (US) Corps had TACON of the 1st OG. But these sorts of command relationships had yet to be created.[41]

Nevertheless, Mitchell's presence enabled him to organize a tactical headquarters, which he located adjacent to the air headquarters of Sixth French Army just as it was preparing to conduct the largest combined air operation of the war up to that time. The Marne campaign served as his postgraduate education in aerial warfare.

Major Air Operations

Anticipating a renewal of the German offensive, Allied Commander in Chief Gen Ferdinand Foch assembled a large air force as a strategic reserve. It consisted of the French Air Division, the Royal Air Force 9th Brigade, and US 1st PG. The French Air Division was the largest single aviation unit of the war. Its two brigades represented some 370 fighters and 230 bombers. The RAF's 9th Brigade provided an additional nine squadrons of offensive airpower. Added to that were the four squadrons of the US 1st PG.

With his brigade headquarters collocated with the French Sixth Army air headquarters, Mitchell learned how to integrate multinational airpower in a large operation. Once the battle began on July 15, 1918, the combined forces established air superiority and attacked German crossing sites along the Marne. Air operations helped defeat the German army in the most decisive battle of the war, known as the Second Battle of the Marne. Afterwards, the Allies seized the initiative and never lost it. Germany would be defeated a few months later.

Meanwhile, Pershing finally activated the First Army and was preparing for the Saint-Mihiel offensive. The stakes were high because the United States had yet to demonstrate the ability to campaign on the European battlefield. Realizing that Mitchell was his best and most experienced air commander, Pershing returned him to the position of chief of Air Service of First Army, replacing Foulois, who, to his credit, supported the decision and took a new job that focused on training and logistics.

First Army's mission was to reduce the Saint-Mihiel salient, a large bulge in Allied lines that had existed since the early days of the war. Foch was eager for Pershing to finish this attack quickly because he wanted the Americans to concentrate their main effort in the Meuse-Argonne sector, joining the French and British for the

final offensives. Accordingly, he reinforced Pershing with troops and enablers, especially artillery and aviation.

The French, British, and even Italians provided air units to reinforce the American Air Service's 28 squadrons. The total force numbered 701 pursuit planes, 366 observation planes, 323 day bombers, and 91 night bombers adding up to 1,481 aircraft for the largest air operation of the war.[42] In contrast to the Allied defensive battle on the Marne, Mitchell's plan supported an offensive operation and therefore took an entirely different approach. While American combat aviation operated within 3 miles of the front, Mitchell ordered the French Air Division to attack 12 to 20 miles behind enemy lines. By pressing the attack, he kept his enemy off balance and on the defensive, unable to interfere with the First Army offensive.[43]

Saint-Mihiel occupies a special place in airpower history, not only because it was the largest single air operation of the war. The concentration of coalition air forces did its part in helping Pershing to wipe out the salient and achieve a successful inauguration of American arms in continental warfare. Mitchell's example provided a vision for unity of command that would inspire airmen long after he passed from the scene. His continued command for the upcoming Meuse-Argonne offensive was a foregone conclusion. Just before the end of the war, Pershing made Mitchell chief of the Air Service for an Army group that would command First and Second US Armies.

By the end of the war, the US air arm had grown from a handful of men with obsolete airplanes to a combat arm of the line. The AEF Air Service consisted of 14 groups—seven observation, five pursuit, and two bombardment.[44] Yet, the AEF Air Service represented only 40 percent of the total American air arm. Including what had been created in the United States, the Air Service had grown to more than 190,000 men and 11,000 aircraft.[45]

Though a separate service would not be created until 1947, America began embracing airpower long before the birth of the United States Air Force. As we have seen, the foundations for a total force—consisting of National Guard, Reserve, and Active air forces—had been established from the beginning. Although the US airplane production failed shamefully, the war helped launch an aviation industry that would grow to be second to none. The experiences gained by American Airmen stimulated a variety of visions about how airpower would change the character of future war, and Billy Mitchell emerged as the leading American theorist and foremost advocate for a separate Air Force and Department of Defense. Moreover, an era of air-mindedness unfolded because the advances in aviation technology stimulated by the war further inflamed the imagination and enthusiasm of the public. The birth of US airpower in the Great War would transform the American way of war.

Notes

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2. Hennessy, *Army Air Arm*, 5.
3. Herbert Malloy Mason, Jr., *The Great Pursuit: Pershing's Expedition to Destroy Pancho Villa* (New York: Smithmark Publishers, Inc., 1995), 103–109; John S. D. Eisenhower, *Intervention: The United States and the Mexican Revolution, 1913–1917* (New York: W. W. Norton, 1993), 254–257, 276.
4. Benjamin Foulois, *From the Wright Brothers to the Astronauts: The Memoirs of Major General Benjamin D. Foulois* (New York: McGraw-Hill, 1960), 150.
5. Alfred Hurley, *Billy Mitchell: Crusader for Air Power* (Indiana University Press, 1964), 17.
6. Foulois, *From the Wright Brothers*, 146.
7. Joseph J. Corn, *The Winged Gospel: America's Romance with Aviation, 1900–1950* (New York: Oxford University Press, 1983), vii–viii.
8. Charles J. Gross, *The Air National Guard and the American Military Tradition* (Washington, DC: Historical Services Division, National Guard Bureau, 1995), 28.
9. Today known as the National Aeronautic Association. The Aero Club of America helped bring the Wright Brothers invention to the attention of President Roosevelt. See Foulois, 53.
10. Gross, *The Air National Guard*, 28.
11. "Bolling Won Fame as a Young Lawyer," *New York Times*, 16 April 1916, 1.
12. Gross, *The Air National Guard,* 26.
13. James J. Hudson, *Hostile Skies: A Combat History of the American Air Service in World War I* (New York: Syracuse University Press, 1968), 13; Gross, *The Air National Guard,* 30.
14. Gerald T. Cantwell, *Citizen Airmen: A History of the Air Force Reserve, 1946–1994* (Honolulu: University Press of the Pacific, 1997), 5.
15. Bert Frandsen, *Hat in the Ring: The Birth of American Air Power in the Great War (Washington DC: Smithsonian Books, 2003)* 22–24; 31.
16. Henry Greenleaf Pearson, *A Businessman in Uniform: Raynal Cawthorne Bolling* (New York: Duffield and Company, 1923), 109; Foulois, *From the Wright Brothers*, 143–147.
17. Pearson, *Businessman in Uniform*, 60–65, 70, 87; Hennessy, *Army Air Arm*, 175.
18. Alfred F. Hurley, *Billy Mitchell: Crusader for Air Power* (Indiana University Press, 1964), 30.
19. Walter J. Boyne, ed., *Air Warfare: An International Encyclopedia* 2:" United States Air Force: Organizational History," by George M. Watson, Jr., 643.
20. Herbert Frandsen, "The First Pursuit Group in the Great War: Leadership, Technology, and the Birth of American Combat Aviation (PhD diss., Auburn University, 2001), 49–52.
21. For production in the US the Bolling mission selected the British DH-4 for observation and day bombing; British Bristol and French SPAD as fighters, and the Italian Caproni as a long-range night-bomber. Irving B. Holley, *Ideas and Weapons: Exploitation of the Aerial Weapons by the United States during World War I; A Study in the Relationship of Technological Advance, Military Doctrine, and the Development of Weapons* (Yale University Press, 1953; reprint Washington DC: Office of Air Force History, 1983), 59–60;
22. Hudson, *Hostile Skies,* 14.
23. Major R. C. Bolling to Chief Signal Officer of the Army, Washington, DC., Subject: Report of Aeronautical Commission, 15 August 1917, 7–8, Gorrell, series A, 16; "Agreement of French Government dated Aug. 30, 1917," 3, Gorrell, Series I, 28. Also see Pearson, *A Businessman in Uniform*, 146; Hudson, *Hostile Skies*, 22.

24. Holley, *Ideas, and Weapons*, 131; John Morrow, *The Great War in the Air Military Aviation from 1909 to 1921* (Washington: Smithsonian Institution Press, 1993), 338.

25. Hurley, *Billy Mitchell*, 32.

26. The section on Mitchell borrows from the author's article, "Adapting and Learning: Billy Mitchell in World War I," *Joint Force Quarterly* 72, 1st Quarter 2014, 96–101.

27. Hurley, *Billy Mitchell*, 22.

28. James J. Cooke, *Billy Mitchell* (Boulder, Colorado: Lynn Rienner, 2002), 51.

29. William Mitchell, *Memoirs of World War I: From Start to Finish of Our Greatest War* (New York: Random House, 1928), 26.

30. Mitchell's published memoir probably represents his diary to a remarkable degree with little editing. Ibid, vi.

31. Mitchell, *Memoirs of World War I*, 165–166.

32. Ibid, 178.

33. Frandsen, *Hat in the Ring*, 8.

34. Mitchell, *Memoirs of World War I*, 179.

35. Ninety-Fourth Aero Squadron Alert Log, National Air and Space Museum Archives, file 1247, 216.

36. Mason Patrick, *The United States in the Air* (New York: Doubleday, Doran and Co., 1928), 16.

37. Foulois, *From the Wright Brothers to the Astronauts*, 172.

38. Col. Walter S. Grant to [Col. Fox] Connor, June 15, 1918, in *United States Army in the World War* (Washington, DC: U.S. Army Center of Military History, 1988), IV–490.

39. Frandsen, *Hat in the Ring*, 150.

40. Roosevelt to Father, July 8, 1918, Philip J. Roosevelt papers, family collection of Philip J. Roosevelt II, Chappaqua, New York.

41. Thanks to Lt Col Jim Burlingame, USAF (Ret.), LeMay Center Doctrine Division, Maxwell AFB for clarification on contemporary command and control relationships.

42. Patrick, *United States in the Air*, 27.

43. First Army Air Service, Operations Order 1, September 11, 1918, in *United States Army in the World War*, VIII (Washington, Government Printing Office, 1918), 216.

44. "Air Force History," Military.com, accessed 25 October 2017, http://www.military.com/air-force-birthday/air-force-history.html.

45. Lt Col Peter R. Faber, "Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower," 186, in Col. Phillip S Meilinger, ed., *Paths of Heaven: The Evolution of Airpower Theory* (Air University Press, 1997).