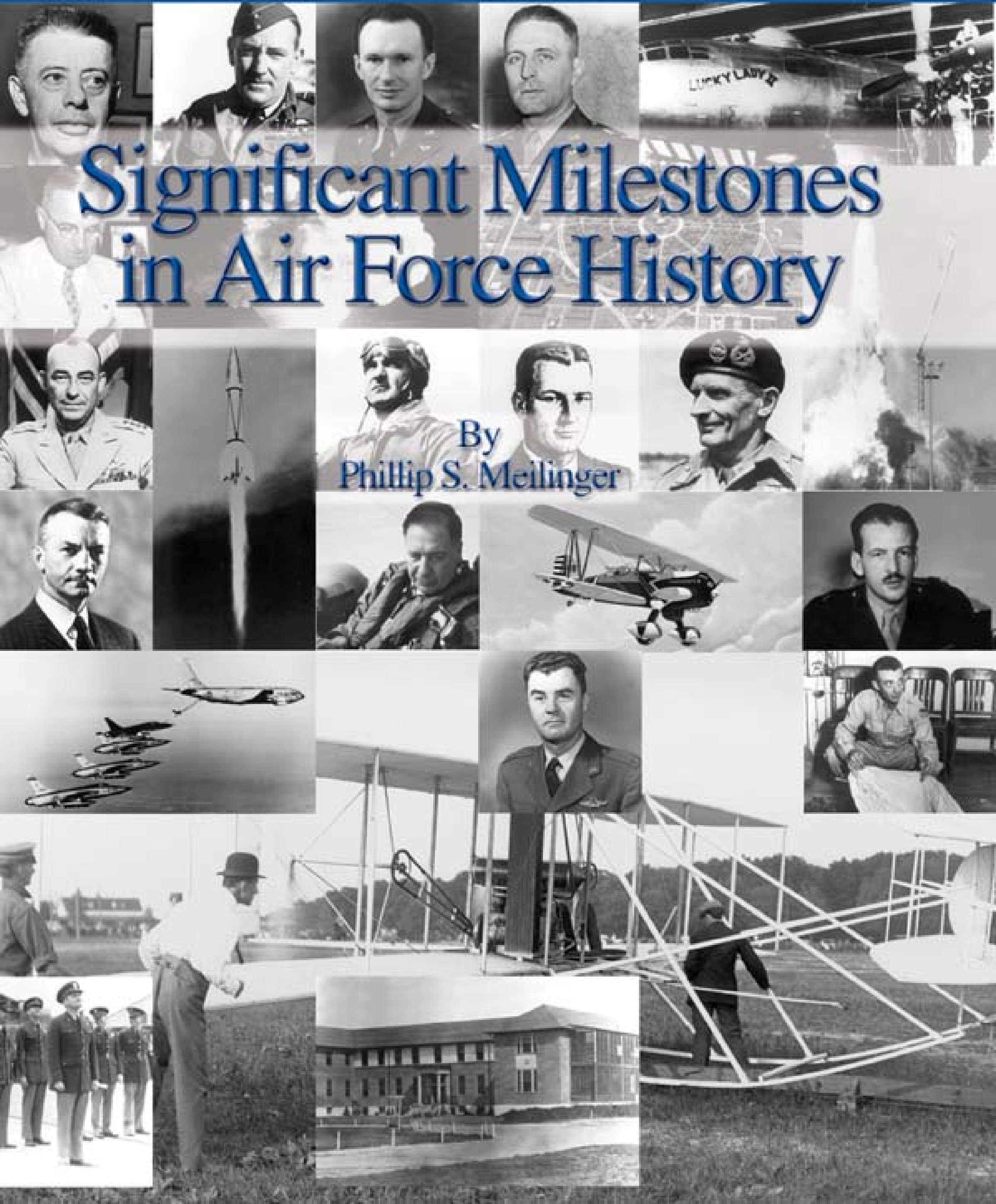
Air Force Centennial of Flight
Commemorative Edition

Significant Milestones in Air Force History

By
Phillip S. Meilinger



The United States Air Force Centennial of Flight Office
Presents

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Introduction

The concept of flight has fascinated man for millennia. The minds of the ancients invented winged gods and goddesses who lived in the heavens or who traversed it in chariots of gold. The restless brilliance of Leonardo da Vinci designed a flying machine five centuries ago; but his vision, as well as those of many who followed, relied on the muscle power of man to make it work. That would not be enough. A mechanical engine would be necessary. Flight would have to be a byproduct of the industrial revolution.

In the meantime, man turned to an alternative means of reaching into the sky—balloons. The first balloon ascent occurred in Paris in 1783—the same year the United States gained its independence from Britain, ratified, coincidentally, by a treaty signed in Paris. Over the next century and a half, balloons and their more steerable brethren, dirigibles or rigid airships, were designed and flown in various countries worldwide.

But the notion of heavier-than-air flight in a winged vehicle would not go away. Throughout the latter half of the nineteenth century a number of aviation pioneers studied the problem of flight from an increasingly scientific viewpoint. All recognized that two primary problems needed to be overcome—power and directional control. Someone would have to build an engine that was both powerful enough and light enough to lift an airplane and its pilot into the air and sustain it.

The internal combustion engine was the obvious solution, but early motors that were made for automobiles and dirigibles were too heavy—they delivered too little horsepower for their weight. Related to this issue was the need for a suitable airscrew, or propeller, to attach to the engine that would propel the craft through the air. The second problem, controlling an airplane in flight, seemed even more difficult.

Both of these problems were solved by two hard-working and taciturn bicycle mechanics from Dayton, Ohio. (Their bicycle shop has since been restored and moved to Greenfield Village near Detroit). Orville and Wilbur Wright, sons of a minister, designed and built their own gasoline engine that was not a spectacular device, but adequate for their purpose. It weighed about 200 pounds and delivered 12 horsepower. Just enough.

Also important, the brothers designed and built their own propellers. Their solution to the directional control issue was more ingenious. Learning from the flight of birds, the brothers saw that birds made subtle changes in their wingtips, bending them up or down slightly, and this allowed them to turn quickly and gracefully. The Wrights therefore rigged up a series of cables and pulleys that connected the wings of their craft to levers where the aviator would lie (later sit). When manipulating the levers, the pilot would actually twist the shape of the wings themselves—much like a bird alters the shape of its wings—allowing the craft to turn. This "wing warping" method was soon replaced by more practical devices—movable rudders and ailerons. The latter consisted of a separate airfoil usually attached to the outer portion of a wing: but the basic principle the Wrights invented was sound.

On Dec. 17, 1903, at Kitty Hawk, North Carolina, the Wright brothers made history's first powered flight in a heavier-than-air machine that incorporated their two scientific breakthroughs. Their invention, the airplane, changed the world.

As the centennial of their momentous achievement approaches, the United States Air Force has established the Centennial of Flight Office, whose mission is to celebrate airpower and the Wright brothers' historic event. One of their projects is this pamphlet series, which will trace the most significant people, events, technologies and ideas in the history of the United States Air Force.

The goal of the series is to *educate*, *motivate* and *entertain* the reader—to teach him or her about airpower; and, if they aren't careful, to enjoy themselves while doing so.

Devising a set of criteria for inclusion into such a series has not been easy. Many significant items could be included, but space constraints demanded a winnowing process. As a consequence, we have decided upon the following as the general criteria for all pamphlets:

- The focus will be on U.S. Air Force people, places, technologies and events, although there may be minor exceptions.

- Emphasis will be on military rather than commercial or private aviation. Exceptions may include, however, individuals who either had a foot in both camps or whose influence dramatically affected military aviation.

- Many entries will be eligible in more than one category. Our intent will be to look at the pamphlets in totality to include a broad range of entries, thus giving the reader an overview of Air Force airpower history, without focusing too heavily on any particular time period.

Contents

Our First Military Aeroplane, The Wright Flyer, 1909

Man had dreamed of flying for centuries, but it was not until Dec. 17, 1903 that Orville and Wilbur Wright, bicycle mechanics from Dayton, Ohio, achieved the feat of powered, controlled flight. It would be nearly three years before anyone else in the world was able to duplicate the achievement. Even so, few knew of the brothers' flights, partly due to their extreme secretiveness; they feared unscrupulous competitors would steal their ideas. As a result, little publicity attended the Wright brothers and their airplane. But word got out.

In late 1904, the French government contacted the Wrights regarding the possibility of buying one of their airplanes. Being good patriots, the brothers decided to approach their own government first and offer them the new invention. In January 1905, they wrote their congressman about their accomplishments and asked that he pass them on to the War Department. Perhaps the Army would be interested in buying one of their machines? (Note how quickly the airplane was considered a potential military weapon). Later that month, the Army replied with a form letter stating there were no funds for sponsoring research into such activities. Nine months later, the Wrights tried again, this time writing directly to the Secretary of War (in today's parlance, the Secretary of the Army). Again, they received another form letter saying'"no thanks;" there was no money for experimentation on wild ideas. Realizing they were failing to communicate, the Wrights wrote back, stressing that they did not want any research funds—their airplane already worked! They merely were asking if the Army was interested in buying one before they were forced to take their business elsewhere. The conservative Army hierarchy was unmoved, replying, "The Board does not care to formulate any requirements for a flying machine."

Time passed and the Wright Brothers explored the European connection while also continuing to refine their machine and its engine. In the spring of 1907, the Aero Club of America intervened and went directly to President Theodore Roosevelt with news of the Wrights and their remarkable invention. Roosevelt told his Secretary of War, William Taft, to look into it. This time the Army expressed some interest, but complained that they had no funds to buy such a machine even if it did work as advertised. Fortunately, industrious officials in the Aeronautical Division of the Army's Signal Corps found money and wrote a "specification" asking for interested parties to submit designs for a flying machine. The machine must attain 40 mph in level flight, be controllable in any direction, carry one passenger for a duration of at least one hour and 125 miles, and be sufficiently compact for transportation in an Army wagon. (The law prohibited the Army from simply extending a contract to the Wrights; the offer had to be open to all, and a competition would be necessary to determine the winning entry).

The Army received 41 responses to their specification; most were frivolous. One hopeful individual assured the Army he could build such an airplane, but they would have to spring him from jail first. Besides the Wrights, two other bidders looked promising, but they eventually dropped out of the running. The Wrights were alone, so if their airplane could indeed meet the requirements and demonstrate it before a Board of Examiners at Ft. Myer, Virginia, they would be paid $25,000 for their machine.

The "Wright Flyer" was delivered to Ft. Myer on Aug. 20, 1908. After several days to unpack, assemble and ground test the machine, the craft was not ready for flight until Sept. 3. Orville was at the controls—Wilbur was in France flying another one of their planes—and the "Flyer" was airborne for a scant one minute and eleven seconds on its first hop. Over the next several weeks, however, Orville flew on dozens of occasions, setting numerous world records for duration—on Sept. 11, he stayed aloft for one hour, ten minutes and twenty-four seconds. Orville also carried passengers; the first was Army Lt. Frank Lahm.

Orville, like his brother, was extremely careful and conscientious. He never flew unless he was convinced the plane was in perfect working order and the weather, especially the wind, satisfactory. Even so, on Sept. 17, disaster struck. On that afternoon, Orville Wright took off with Lt. Thomas Selfridge as his passenger. At an altitude of 150 feet, one of the propellers struck a bracing cable and snapped it. The tail end broke and the aircraft crashed. Selfridge was killed—the first fatality in America's history of powered flight—and Orville spent seven weeks in the hospital. The tests were postponed.

The following June, the Wrights had rebuilt their machine, made some improvements, and were ready to fly again. Upon returning to Ft. Myer, they were even more grim and uncommunicative than usual. They ignored reporters and onlookers begging for interviews or conversation. Orville, perhaps because he liked to finish what he started, insisted on doing all the flying for the new trials. After a month of "warm up flights," the official trials began again on July 27. Orville took off with Lt. Lahm as his passenger and flew for one hour and twelve minutes—one major requirement was fulfilled. At the same time, they performed a number of "figure 8s" to

The Wright Brothers with the Military Flyer at Ft. Myer in 1909 demonstrate the aircraft's maneuverability. Scratch requirement number two. On July 30, they went for the speed trials. Orville selected Lt. Ben Foulois as the passenger. The young officer was delighted, and was certain his military bearing and serious mien were the reason for this honor. Later he learned that it was merely his small size and weight—126 pounds dripping wet—that made him the best choice. Foulois eagerly slung two stopwatches around his neck, strapped a compass on one leg and a barometer on the other, stuffed a map into his belt, and climbed into his seat.

Taking off from the Ft. Myer parade field, the "Flyer" headed south to where the Masonic Temple now stands in Alexandria, turned around and climbed to a record 400 feet, and then went into a gradual descent to pick up speed for the sprint back to Ft. Myer. They crossed the finish line at a blistering 42 mph. President Taft was on hand to congratulate the brothers for their astonishing achievement. The Army had just bought themselves an airplane.

Over the next century the airplane would revolutionize war, but even at the beginning there were those who foresaw that things had changed dramatically and irreversibly. Alexander Graham Bell, inventor of the telephone, said simply that the airplane made armies "an impertinence" and battleships "so much junk." Time would test his judgments.

The Opening of the Air Corps Tactical School, 1920

A collection of airplanes is not airpower. For a country to possess true airpower it must have not only first-rate military aircraft, but also an industrial infrastructure to develop and manufacture the aircraft and their power plants. Airpower also includes the commercial aviation structure of airfields, navigation aids, weather reporting/forecasting facilities, airway network, and a pool of trained pilots and mechanics to support them. Finally, airpower requires ideas—ideas on how aircraft should best be employed in war. This intellectual framework, generally referred to by the military as—"doctrine," is essential to utilizing a weapon system effectively and efficiently.

Following the World War, the Air Service realized it needed to establish a formal process for writing and refining airpower doctrine and then educating its personnel so they understood that doctrine. Often, those actually using a given weapon in the field devise the best tactics and procedures for employing it. These individuals are the ones who must actually make things work on a day-to-day basis. On the other hand, operators are usually ill suited to envision the use of a weapon in the broadest sense simply because they are too close to it. Such broad thinking on strategy or on warfare in a general sense usually is best left to those who are able to think, write and argue—and have the time set aside to do so. Air Service leaders realized this, and as a consequence, pushed the Army to establish an Air Service Tactical School at Langley Field, Virginia. This was in fact done in August 1920, and the mission of the Tactical School was to formulate a doctrine of airpower employment, and then to teach that doctrine to a select group of officers each year. Over time, the ideas taught at the school would permeate the entire Air Service officer corps. Virtually every senior American air commander of World War II had attended the Tactical School, and many had taught there, including six who reached four-star rank.

For the first decade of its existence, the Air Corps Tactical School (ACTS as it was known after 1926 when the Air Service became the Air Corps) focused on fairly mundane administrative matters and staff work, as well as on the use of airpower to support ground commanders. Partly, this conservatism was due to an Army hierarchy that constrained the airmen from straying too far a field doctrinally, and partly because the aircraft available at the time were still slow, fragile and little improved from what had been used in the war. By the end of the decade, however, things began to change.

A dedicated and vocal group of officers began populating the faculty at ACTS, now located at Maxwell Field in Alabama. These officers, intellectual descendents of Billy Mitchell, believed that airpower offered far more capability than merely being used to support ground forces. At the same time, new aircraft were emerging that enjoyed important technological advances: metal construction, cantilever wings, retractable landing gear, enclosed cockpits, and improved streamlining. These new aircraft, the Martin B-10 and Boeing B-9, also sported more powerful engines for increased speed and load-carrying capacity. More importantly, the Boeing B-17 made its maiden flight in 1935. As—"Hap" Arnold said, "This was airpower you could put your hands on."

The mid 1930s were the golden age of ACTS. It was during this period that the doctrine of high altitude, daylight, precision, formation bombing of industrial targets took firm root in the Air Corps. The instructors studied the industrial and economic systems and networks that made up a modern nation and then sought ways to break those systems. Students ran war games against the industrial northeastern United States, speculating on what would happen if bombers were to hit electrical power plants, bridges, rail yards, docks and key factories. They concluded that such massive air attacks would cause near paralysis to the entire region. Assuming that potential enemy nations would be similarly affected, ACTS predicted that strategic bombing attacks could neither be halted nor endured by a country—if those attacks were heavy and persistent.

The Air Corps Tactical School at Langley Field, 1930

The airmen realized that in truth, it was not necessary to destroy a nation's entire industrial infrastructure. With each system or network there were key nodes or bottlenecks that bore a disproportionate share of that system's load. In theory, if these nodes were destroyed, the effects would cascade throughout the entire system.

The instructors at ACTS came to this conclusion, what was termed the "industrial web theory," when one day they learned that all the aircraft on base were grounded. It seems one of the planes had lost an engine due to the failure of a propeller governing spring. Upon inspection of other aircraft, it was determined that other springs were faulty as well. Yet, there were no spare parts available. The factory in Ohio that made the springs for the Air Corps had been flooded by recent rains and was out of commission temporarily. The officers at ACTS realized the significance of this event. If an enemy wanted to neutralize the air defenses of the U.S., it was not necessary to fight a great aerial battle or destroy a host of airfields; rather, they merely needed to destroy a single factory in Ohio.

This was simplistic thinking, but the principle behind the industrial web had great implications. Although this theory was attempted to some extent during World War II and found wanting, air planners today still seek targets causing repercussions throughout the industrial system, with the least effort and risk to the attacker.

There were certainly many problems with the theories devised at ACTS. The German and Japanese economies were not mirror images of the U.S. economy, and they proved far stronger than anyone expected. Moreover, the bombers were not as invincible as airmen thought—although it must be noted that one officer at ACTS, a fighter pilot named Claire Chennault, had been warning of this probability for several years. Fast and nimble fighter aircraft, aided by radar and a centralized command network, proved very serious obstacles to the bombers. Moreover, ground defenses, antiaircraft artillery (AAA or "flak"), proved even more deadly to the bombers. Even so, the theories of ACTS grew into the doctrine of the AAF, and this provided the polestar that led the airmen to ultimate victory in World War II.

Today, the Air University, still located at Maxwell AFB in Alabama, is the direct descendent of the illustrious Air Corps Tactical School. Like its predecessor, Air University serves as the intellectual center of the Air Force.

The Air Corps Act of 1926

When the U.S. Army bought its first airplane in 1909, it assigned it to the Aeronautical Division of the Signal Corps. At the time, that made a great deal of sense, as the aircraft of that period were considered to be most suitable for reconnaissance, observation and communications missions.

By the time of America's entry into World War I in April 1917, aircraft had progressed dramatically. Germany had begun conducting long-range bombing missions against Britain, aircraft were patrolling the coast and attacking ships, fighters ("pursuits" as they were called then) dueled for air superiority, and attack planes strafed and bombed front line positions. As a result, the Army elevated the status of its air arm in Europe into an Air Service.

After the Armistice and Treaty of Versailles, however, the Air Service fell on hard times. Funds were scarce throughout the Army, and aviation took more than its share of the cuts. It was at this time that radicals within the Air Service, led by Brig. Gen. William "Billy" Mitchell, began lobbying for more autonomy within the Army, perhaps even independence. Their arguments were partly philosophical and partly bureaucratic. Philosophically, airmen strongly believed that the airplane had revolutionized war. The traditional way of making war on land, where armies fought other armies over the possession of territory, led to a vicious and bloody stalemate in the World War. Aircraft could fly over those armies and strike directly at the heart of an enemy nation.

This was a totally different way of viewing war that airmen understood, but soldiers, presumably, did not. Airmen feared that if soldiers continued to control airpower they would use it merely as another weapon in support of the land campaign. Airpower's unique ability to conduct strategic attacks would be wasted.

In addition, the U.S. Army was dominated by a seniority system that saw time-in-grade as the determining factor in who was promoted. Because aviation was so new, very few airmen had the opportunity to advance to senior rank. As late as January 1939, of the 68 "generals of the line" in the Army, not one was from the Air Corps. As a result, virtually all of the senior generals of the Army were men who served in the infantry, cavalry or artillery. Yet, it was these "ground" officers who commanded the units to which aircraft were assigned; they determined which officers were sent to the branch schools—a stepping-stone for command in the army—and they approved the doctrine of how airpower should be employed. In late 1919, for example, the Chief of the Air Service, the infantryman Maj. Gen. Charles T. Menoher, stated, "not a dollar is available for the purchase of new aircraft." The Army had other priorities.

A variety of commissions and boards were convened in the 1920s to examine whether or not the Air Service should be granted independence from the Army. Most concluded that such a move was premature. Nonetheless, some change was deemed necessary, especially after Billy Mitchell's court-martial in late 1925 had raised public awareness of air issues. As a consequence, Congress passed the Air Corps Act of 1926.

The Air Corps Act did several positive things for airpower. First, and most obviously, it raised the status of the air arm to a full combat "branch" of the Army—a corps—equal, in theory if not reality, to the infantry, cavalry and artillery. The Act also called for a new position, an Assistant Secretary of War for Air to aid in "fostering military aeronautics." For the first time a high-ranking civilian in the War Department would serve as a spokesman for air interests. Other provisions of the Act were also significant. Two new brigadier generals were authorized for the Air Corps, making a total of three. More importantly, two of these three had to be airmen. (However, these positions were "temporary." When an officer left the general officer position, he reverted to his "permanent" rank, usually one or two grades lower). Each division on the War Department Staff would also have an air section composed of air officers. Previously, although airmen may have been assigned to these prestigious staff posts, there was no requirement for such representation. Finally, the Act required that all Air Corps flying units be commanded by flying officers; indeed, it stipulated that at least 90 percent of all Air Corps officers be flyers.

As important as these administrative moves were, however, an even more significant aspect of the Air Corps Act was its call for a five-year plan to greatly increase the size and capability of Army airpower.

In 1926 the Air Corps had barely 900 officers and 8,750 enlisted personnel. The Act authorized a buildup to 1,650 officers and 15,000 enlisted, while also calling for increased pay for mechanics. As for aircraft, the Air Corps had a total of 1,254 airplanes in 1926; Congress proposed a buildup to 1,800. Such a buildup would cost money. Unfortunately, the funds were never appropriated to fully carry out the Act's provisions due to the economizing tendencies of the Coolidge and Hoover administrations. Moreover, Army leaders were loath to give the money and personnel mandated by Congress. During the

Curtiss P–6E, painting by Luther Gore, Air Force Art Collection five-year plan, the Air Corps requested $260 million but received only $147 million. The Stock Market crash in October 1929 dashed all hopes of a continued buildup.

Nonetheless, the Air Corps had certainly improved by 1932. Although short of the goals set by the Air Corps Act, the numbers had grown to 1,250 officers and over 13,000 enlisted. The number of aircraft also increased; moreover, a hot new fighter, the Boeing P-12, joined the inventory. In addition, necessary facilities were added to the Air Corps infrastructure, such as beautiful Randolph Field near San Antonio, Texas, that became the primary pilot training base.

Overall, the Air Corps Act was a major stepping stone in the advancement of American airpower. The Army, grudgingly, was forced to show more respect to airmen and allow them to serve in key command and staff positions, but it also increased friction between the new Air Corps and ground officers. The Act also gave airmen more autonomy to plan their own destiny and to begin formulating a doctrine of airpower employment. Finally, the Air Corps Act increased the size of the air arm, while also improving its quality. As the country descended into the Great Depression, these proved to be important considerations. It was not what airmen desired or thought necessary for the country's security, but it was a significant step forward.

Randolph Field, Texas in 1939, "The West Point of the Air"

Establishing the GHQ Air Force, 1935

The Air Corps Act of 1926 was a step forward for American airpower, but there was still a long path ahead. The Air Corps was divided into two basic types of aviation. The "air service" consisted of observation aircraft that conducted visual and photo reconnaissance, artillery spotting, and combat patrols for the ground forces. Its mission was defensive, to assist the ground commander in his operations. "Air force" aviation consisted of the bulk of the combat aircraft of the Air Corps—the bombers, fighters and attack planes that would carry out offensive operations. The fighters would ensure air superiority; the bombers would strike targets within the theater and perhaps deep in enemy territory; and the attack planes would conduct low-level strikes on enemy troop formations and positions. Generally, around 80 percent of the Air Corps consisted of "air force" assets.

However, these air force assets were neither centrally located nor controlled. Instead, combat units were parceled out to the overseas possessions and to the various geographically located Army corps areas in the U.S. In all cases, the combat air units were under the control of local ground commanders. There were no provisions for the air force assets from one corps to join together with those of another corps to conduct a large, strategic air attack. In fact, the Chief of the Air Corps was not technically even a commander in the sense that he had no direct authority over his units in the field.

Airmen disliked this organizational concept because it violated the principle of unity of command. It also denied airpower one of its great strengths—the flexibility of aircraft based in different locations to converge over a single distant target. In this view, range was a key factor in determining the level at which a weapon should be controlled. Artillery, for example, had a range of twenty to thirty miles; therefore, it made sense to centralize its control at a brigade or division level so that it could support the entire division whenever and wherever the division commander thought appropriate. In short, centralized control of long-range weapons permitted its concentration over a wide area, giving it far greater impact than if it were dispersed to individual tactical units. This was the model used to some extent by all Allied nations, including the American Expeditionary Force in World War I, where army corps were left with some defensive pursuit squadrons, but most of the pursuit and bombardment were "pooled" at the Army level to conduct offensive operations.

Using such a model, airmen similarly argued for the centralized control of airpower above the corps level. Fuel was added to the fire as a result of yet another commission that met in 1934, headed by the former Secretary of War Newton Baker, to study the issue of American airpower. It agreed with much of the airmen's thinking regarding centralized control, although it stopped short of advocating a separate service. Army maneuvers in 1931 and 1933 had tested a concept where all the air force assets were centralized under an air commander who reported directly to the theater commander. The results were

Maj. Gen. Frank Andrews and the GHQ Air Force Staff, 1935 excellent, and this, combined with the recommendations of the Baker Board, prompted the Army Chief of Staff, Gen. Douglas MacArthur, to establish a General Headquarters Air Force (GHQ Air Force). During peace, the GHQ Air Force would report to him directly. When deployed overseas in time of war, it would report to the theater commander. It took some time to work out the operational details, but the new organization was formally established on March 1, 1935.

For commander of the GHQ Air Force, MacArthur chose Lt. Col. Frank Andrews, who was immediately promoted to temporary brigadier general. Andrews set up his headquarters at Langley Field, Virginia. (This building today houses the headquarters of Air Combat Command).

Andrews took command of all Air Corps "air force" units in the U.S. The observation squadrons (the "air service" assets) remained assigned to the individual corps commanders. In addition to the combat units, the GHQ Air Force also took over a number of service squadrons to support and maintain this air force. Andrews organized his forces into three wings—one on the west coast, one on the east and the third in Louisiana. Altogether, the air force consisted of nine combat groups or thirty squadrons. He then reorganized the flying units themselves by making them self-contained squadrons with their own maintenance, supply and administration. This allowed them to deploy more quickly to a crisis area. This in turn led Andrews to push for a large number of promotions for air personnel, who had been held back in the Army's system. As a result, group commanders, for example, would have the rank (normally lieutenant colonel) commensurate with their responsibility. As a result of this initiative, hundreds of officers were quickly promoted and became more equal to Army officers in the other branches who had similar rank and responsibility.

The GHQ Air Force was a major breakthrough organizationally, administratively and philosophically. This last was perhaps the most significant because it signaled the Army's recognition that airpower had far more potential in war than merely serving as an arm for tactical support of ground forces. The air force could conduct long-range air operations independent of the ground forces, subject to the approval of the theater commander. It could conduct strategic air warfare.

The Martin B–10, the Air Corps' first all-metal, monoplane bomber

Problems still remained. In 1935 the front-line bomber was the Martin B-10. This was an all-metal monoplane with retractable landing gear and enclosed cockpits, a major technological advance over the ungainly biplane bombers it replaced. Unfortunately, it was still not enough. In order to conduct a true strategic bombing campaign the air force needed something far larger with greater range and a greater bomb load. The answer would be the Boeing B-17, which made its maiden flight in 1935, but would not be procured in quantity for another five years.

In addition, the air force needed a doctrine for employing its new bomber assets most effectively. That doctrine was then being formulated at the Air Corps Tactical School at Maxwell Field. The GHQ Air Force was a compromise. In fact, Billy Mitchell labeled the whole idea a "fraud" designed to keep airpower in an inferior position within the Army. True, airmen did not gain the independence they thought was necessary, but they were given more latitude to organize, plan and train for major combat operations. The combination of organization (the GHQ Air Force), doctrine, and the B-17 would be the weapon for waging strategic air warfare that America took into World War II.

Formation of the Army Air Forces, 1941-42

When the United States went to war in December 1941, debate over whether or not we should become involved in the affairs of "the old country" evaporated overnight. Military buildup, the draft, and mobilization of industry for war were no longer contentious political issues, and all began in earnest.

There were also a host of lessons to learn from the war that had been on going in Europe for two years. There were stark differences in the way this war was being conducted compared to the First World War. Blitzkrieg, rather than stalemate, characterized military operations. France, which had stood implacable for four years in the previous war, fell in a mere six weeks to a fast-moving German military machine.

More importantly, airpower was also playing a far more significant role than many had expected. It was quickly realized, for example, that air superiority was absolutely crucial to the success of military operations—on land, at sea or in the air. Because the Royal Air Force controlled the skies over its homeland and the English Channel, its victory in the Battle of Britain meant that no German invasion could take place. Conversely, when the British were not able to wrest control of the skies over Norway from the Luftwaffe in 1940, the Royal Navy had to withdraw, as did the Allied ground forces attempting to operate there. And of course, Pearl Harbor showed what airpower could do to a supposedly unsinkable fleet.

The U.S. Army Air Corps was pitifully small when war clouds began gathering over Europe in 1939, having only 1,700 aircraft of all types, most of which were clearly outclassed by European designs, and some 1,600 officers and 18,000 enlisted personnel. During the interwar years the air arm had received on average a mere 18 percent of the Army's budget, and the effects of that neglect were obvious.

Expansion was imperative, but it took time and money to build the factories and train the skilled workers before any aircraft could be produced. By mid-1940 the Air Corps was projecting a force of 4,000 combat planes and some 200,000 people; a year later, those numbers had nearly doubled. Even so, it was clear that such a force would still be inadequate by European standards. In 1941, a mere 373 strategic bombers (B-17s and B-24s) joined the Air Corps inventory.

The Air Corps was also ill prepared organizationally to meet the demands of modern war. The GHQ Air Force had been a significant step forward, but problems remained. As late as 1939, the Army's airpower, already woefully small, was still divided between two power centers. The Chief of the Air Corps, Maj. Gen. Oscar Westover (and Maj. Gen. "Hap" Arnold after September 1938) was in charge of recruitment, individual training, research and development, procurement, supply and administration. The GHQ Air Force commander, Maj. Gen. Frank Andrews, reported to the Army Chief of Staff, not Westover, and he controlled the Air Corps combat aircraft and their personnel. Lines of responsibility between these two officers, each dependent on the other but with no authority over the other, were unclear.

Maj. Gen. Oscar Westover, Chief of the U.S. Army Air Corps, 1935

The situation improved somewhat when Maj. Gen. "Hap" Arnold was placed in the chain of command above the GHQ Air Force, while also assuming the title of Deputy Chief of Staff for Air. This arrangement improved the situation, but was still insufficient—it was not always clear just who was in charge of what. As a result, in the Army to ensure unity of command of air assets. The resulting organization, termed the Army Air Forces (AAF) became official in June 1941.

By the middle of 1942, the AAF was placed on a par with the Army Ground Forces and the Army Services Forces. However, because Arnold—whose new title was Commanding General of the AAF—retained his position as Deputy Chief of Staff, he was actually primus inter pares among the three branches. This seniority was highlighted when the Combined Chiefs of Staff (CCS) were formed in 1942 consisting of the heads of the British and American military services. Because the Royal Air Force was a separate service and its head was therefore a member of the CCS, Arnold was designated to sit as the U.S. counterpart, even though he was technically only a deputy. In essence, throughout the war Arnold was treated as an equal of the other chiefs at the grand strategic level of war even though strictly speaking he and the AAF were still subordinate to the Army Chief, Gen. George Marshall. Arnold's authority and prominence were enhanced when he was promoted to five-star rank in December 1944—the only American airman ever to achieve that rank.

Gen. Joseph T. McNarney

Internally, Arnold had almost total control over all aspects of training, procurement, doctrine, personnel selection, and administration within the AAF. He greatly expanded his own staff along the War Department model, thus having functional divisions such as Personnel, Intelligence, Operations, Logistics, and Plans that mirrored their Army counterparts. At the same time, air officers continued to serve on the War Department staff, thus giving the AAF even greater influence. In 1942, for example, Lt. Gen. Joseph McNarney was selected by Marshall as his primary deputy, and Maj. Gen. Clayton Bissell was the Army's G-2.

Although Arnold had no actual command authority over air commanders in the field—they reported directly to their theater commander—his personal influence with these commanders remained enormous. In essence, the AAF was given almost total autonomy within the Army and was thus able for first time to have the dominant say in determining its own destiny. Airmen still wore the army uniform, but they were rapidly moving farther away from their ground roots.

AWPD-1, August 1941

In August 1941, the United States was not yet at war, but President Roosevelt believed it prudent to plan for war in the event our involvement became unavoidable. The War Department General Staff therefore began drawing up plans for a war that assumed Germany would be the main enemy, and included Britain as our main ally.

Gen. "Hap" Arnold, the commanding general of the newly formed Army Air Forces (AAF), asked if his own planners could prepare the air annex to the war plan. Ordinarily, the Army's Plans Division (composed of a mix of army officers from several branches), had this responsibility. Arnold argued that it was only logical that air planners be tasked to write an air plan. His request was granted.

To write this annex, Arnold turned to four of his brightest young staff officers: Lt. Col.'s Hal George and Ken Walker, and Maj.s Haywood "Possum" Hansell and Larry Kuter. This was an interesting quartet. All four of these officers had been instructors in the Air Force or Bombardment Sections at the Air Corps Tactical School at Maxwell Field, Alabama. In fact, all four had played key roles in formulating the doctrine of high altitude, daylight, formation, precision bombing of an enemy's industrial centers. (Note: there were two officers named Hal George in the AAF at the time. To distinguish between them, one was called "Bomber George"—the head of the Air Plans Division—and the other was "Fighter George"). Now they were being tasked to put their ideas into practice.

Things did not always go smoothly. The Munitions Building where they worked was oppressively hot and tempers flared. Hansell and Walker, two of the more volatile members of the planning team, engaged in shouting matches that threatened to become more serious. (Hansell's nickname of "Possum" was not a result of a sleepy personality; rather, he looked like one). But the work was accomplished, and over the next nine days these four men, with the assistance of others on Arnold's staff, drew up what was to be the blueprint for the air plan to defeat Hitler—AWPD-1.

These officers faced an enormous task, under a tight deadline. They approached it by relying on their own limited experiences, their beliefs in the effectiveness of strategic bombing (which had yet been put to a serious test), and their academic studies at Maxwell.

Their first task was to gather information on the German economy to determine what made it tick. Once they understood how the enemy economy worked, it would be easier to figure out how to break it. Hansell had recently been assigned to the intelligence section of the Air Staff and in that capacity had traveled to Britain to observe the RAF's bombing campaign against Germany. The British were certainly helpful and shared much critical and sensitive information. The reservoir of knowledge Hansell gained in these duties was to prove extremely useful. In addition, the planners turned to American industrialists and bankers for assistance in understanding the U.S. economy, assuming that the operation of modern industrialized societies were similar. If they understood, for example, how the electrical power grid in the U.S. operated, they believed they would have a good idea on how the German power grid worked as well.

The air officers also knew that many of Germany's factories had been financed or built by American banks and companies. As a result, they were able to obtain detailed blueprints of many of Germany's most important industrial facilities from patriotic sources on Wall Street.

The planners then sorted and prioritized this data to produce a list of the 154 most important targets in Germany. Using the studies from their own experiments at Maxwell regarding bombing accuracy, the weight of ordnance needed to destroy a variety of structures, and projected loss rates in planes and crews, they were able to estimate how many aircraft of all types would be needed to conduct such a war. They included bombers, fighters, transports and trainers, as well as the number of personnel to fly, maintain and support such an air force. The numbers they arrived at seemed enormous: over 68,000

 
 

The AWPD-1 Planners: Maj. Harold George, Lt. Col. Ken Walker, Lt. Col. Haywood Hansell and Maj. Laurence S. Kuter aircraft, more than 100,000 pilots and over 2 million total personnel. Considering that the AAF had ordered only some 300 heavy bombers for all of 1941, the vision and audacity of these four planners can be better appreciated. Even so, AWPD-1, which excluded operations against Japan and Italy, significantly underestimated the numbers of aircraft that would be needed for World War II. By the end of the war, the AAF had purchased over 230,000 planes, of which nearly 35,000 were strategic bombers.

As for targets, the planners recognized that the AAF's first priority was to gain air superiority over Germany. Without it, a bomber offensive would be long and bloody. As a consequence, they listed the German air force and its factories as the "intermediate objective of overriding importance." While the air superiority campaign was on going, however, the bombers would also be attacking the vital centers of the German economy. In order of priority these target systems were electricity, transportation (specifically the railroads), oil, and the morale of the German population.

AWPD-1 was completed and briefed up the chain of command and approved by the Secretary of War, Henry Stimson, on Sept. 11, 1941. Soon after, a near-disaster struck. An exact copy of the plan was published in the newspapers, causing a major uproar. After all, the U.S. was still at peace, so why was it making plans for a war on Germany? Fortunately, that storm passed.

The blueprint laid out in AWPD-1 was an excellent starting point, although the priority assigned to specific target systems would fluctuate during the war. In one of its more prescient statements, the plan warned that long-range escort fighters might be necessary to ensure the safety of the bomber forces. This would prove all too true. There were, however, other errors in the planners' thinking—German industry and morale were far tougher and more resilient than anticipated, and bombing accuracy under fire and in poor weather was much poorer than expected. Nonetheless, AWPD-1—a direct descendent of the ideas formulated at the Air Corps Tactical School—remained a surprisingly accurate forecast of the U.S. strategic bombing effort against Germany in World War II.

FM 100-20, "Command and Employment of Air Power" July 1943

The proper role of airpower in war was a thorny subject in the U.S. Army prior to World War II. Ground officers tended to see the air weapon as a useful, even necessary, tool to help them gain their tactical objectives. As a consequence, they insisted on controlling those air assets themselves, and apportioning them out to various ground commanders for their specific use.

Airmen, on the other hand, saw aircraft as an inherently strategic weapon that should be used not only to assist ground operations, but to operate at the strategic level of war as well. They, therefore, favored a centralized system in which a single airman would control theater air assets. Some would be designated for use in strategic air operations, and others for tactical cooperation. The GHQ Air Force, established in 1935, was a compromise between these two positions, but it did not fully resolve the problem. War would make their differences very apparent.

The experience of both the British and the U.S. in the North Africa campaign of 1942-43 brought matters to a head. Airpower was not viewed as having been overly responsive or flexible in that campaign. In one case, Maj. Gen. George Patton complained that airpower was simply not responsive, and an allied air commander, Air Vice Marshal Arthur "Mary" Coningham, retorted that the American troops failed not because of insufficient air support, but because they were simply not battle-worthy. Before the men could escalate their words to blows, cooler heads prevailed and the men made peace. Even so, it was soon apparent after six months of combat experience, reinforced by contact with British forces that had been at war far longer, that change was necessary. Somewhat surprisingly, it was the view of the airmen that tended to dominate. Gen. Bernard Montgomery, the British commander in the campaign, wrote for example:

Nothing could be more fatal to successful results than to dissipate the air resources into small packets placed under command of army formation commanders, with each packet working on its own plan. The soldier must not expect, or wish, to exercise direct control over air striking forces.

The U.S. experience echoed Montgomery's observations, so the War Department directed that a new doctrine manual be written. The task was given to two airmen and an armor officer, and their product was War Department FM 100-20, "Command and Employment of Air Power," published in July 1943.

Gen. Bernard Montgomery and Air Vice-Marshal Arthur Coningham: the air-ground team that served as the example for American forces in North Africa

FM 100-20 began by stating in bold capital letters: "LAND POWER AND AIR POWER ARE CO-EQUAL AND INTERDEPENDENT FORCES; NEITHER IS AN AUXILIARY OF THE OTHER." The manual then stated that flexibility was airpower's greatest asset, and that success could only be assured if airpower was centralized and controlled by the air commander. It directed a command arrangement in which the theater commander exercised authority through two component commanders—one for air forces and one for ground forces. The manual warned that the theater commander should not attach air units to ground commanders except in rare cases. Thus, in the first two pages of the new manual, one of the main areas of contention—who should control air assets— was addressed and decided in terms that favored airmen. Perhaps in an attempt to soften the message, the manual then stated that because air and ground operations were interdependent, joint planning and joint training were absolutely essential to success.

The basic tasks of airpower were listed as the destruction of hostile air forces; denying the establishment of hostile airbases; operations against land and sea forces; offensive air operations against an enemy's sources of military and economic strength; serving in joint task forces; and operating in conjunction with or in lieu of naval forces. It is important to note that then, as now, both airmen and soldiers saw the attainment of air superiority as the first priority.

The manual described strategic air operations as those aimed to defeat the enemy nation by striking at its' "vital centers." An airman would control strategic air forces, but the selection of their objectives would be the responsibility of the theater commander. Thus, in certain circumstances, strategic air forces could be used to achieve tactical objectives. This occurred on several occasions during the remainder of the war.

When discussing the role of tactical air forces, the manual listed three functions in order of priority. The first was to gain and maintain air superiority over the theater. This was an intensive and continuous process that required both offensive actions against the enemy's air force and aviation infrastructure, as well as strong air defenses. The second was to isolate the battlefield by preventing the movement of hostile troops and supplies—in today's parlance, "air interdiction". The third priority was the destruction of selected objectives in the battle area; generally, in the immediate front of friendly ground forces. Today this is termed "close air support".

Air and ground officers alike saw FM 100-20 as a "declaration of independence" by the air arm. Although the Army hierarchy, including the Chief of Staff, Gen. George C. Marshall approved the manual, most ground officers thought it went too far. They feared it would result in a decrease in the amount of tactical air assets committed to the ground battle. Conversely, many airmen felt the manual did not go far enough and objected to the statement of interdependency—strategic air operations, they believed, could be conducted separately, and indeed simultaneously, with tactical air operations as well as with operations on the ground. In addition, some airmen rejected the designation of strategic and tactical air forces. There were, after all, no such things as strategic and tactical armies and navies. Airpower was "indivisible," and to divide it arbitrarily into separate forces would result in a loss of flexibility—airpower's greatest attribute.

Subsequent events would give fodder to both views. Despite its controversial nature, FM 100-20 remained official Army doctrine for the remainder of the war. Seen in the broader context, FM 100-20 was a major stepping stone to an independent Air Force.

Hiroshima, August 1945

Theoretically, it had been known for decades that splitting the atom (fission) would release enormous power—far greater than any explosive ever invented. In the 1930s the theories of nuclear fission began to take more definite shape as scientists in Germany, the U.S. and elsewhere began experiments that revealed the secrets of the atom.

In early 1939, it was apparent that war was coming in Europe. It was also apparent to a group of scientists in America, some of whom had recently fled from Nazi domination, that Germany was working towards an atomic bomb. This was a frightening possibility. As a consequence, a number of these scientists, led by Albert Einstein— himself a Jew who had emigrated to the U.S. from Germany— wrote to President Roosevelt warning him of the peril represented by German research. The U.S. must beat the Nazis to the atomic bomb, but it would take immediate action and vast funds to do so. In October 1939, one month after war erupted in Europe, FDR directed the Army to study the matter.

For the next five years the Army managed what was codenamed "The Manhattan Project" to explore the possibilities of nuclear fission and the feasibility of building an atomic bomb. This project was the most secretive and also the most costly weapon development program of the war. Later, however, it was discovered that it was not secretive enough, as spies working for the Soviet Union infiltrated the program and passed crucial information to Moscow. The size of the Manhattan Project was enormous, requiring not only secretive laboratories, but also mining operations to obtain the required uranium and plutonium, "heavy water" plants, even vast amounts of silver to produce the required electrical coils. (When the Army asked the Treasury Department for silver, the Under Secretary wanted to know how much. When the reply was "about fifteen thousand tons," a visibly shaken Daniel Bell replied, "I would have you know that when we speak of silver we speak in terms of ounces").

The Army got its silver, as well as most everything else it asked for, and research and production moved forward quickly. On Dec. 2, 1942, a team of scientists led by Nobel Prize winner Enrico Fermi, huddled in a secret lab beneath the bleachers of the football stadium at the University of Chicago and produced the world's first self-sustaining nuclear reaction. A year later, scientists in Los Alamos, New Mexico, under the leadership of J. Robert Oppenheimer, began working out how to make an actual weapon from Fermi's achievement. On July 16, 1945, the first atomic device was detonated at Trinity Site in the New Mexico desert. The blast was seen as far away as Albuquerque and El Paso and entailed the now familiar ball of fire and mushroom cloud. One observer described the blast as' "unprecedented, magnificent, beautiful, stupendous and terrifying."

President Harry Truman, who had succeeded FDR, was in Potsdam, Germany, discussing the postwar settlement of Germany with Soviet Premier Joseph Stalin and British Prime Minister Clement Atlee when he learned of Trinity. According to Truman, there was never any question in his mind that he would use the atomic bomb against Japan. (Germany had already surrendered two months earlier). The issue now became one of delivery and the appropriate target.

The bomb could only be carried in the largest bomber then in existence, the B-29. Even so, the bombers had to be specially modified and the crews specially trained to handle the new weapon. In the summer of 1944, Gen. "Hap" Arnold chose Col. Paul Tibbets, a superb pilot with a distinguished combat record, to head the group that would deliver the bomb. After training in the U.S., Tibbets moved his unit, the 509th Bomb Group, to the island of Tinian in the Marianas chain. After undergoing normal theater orientation, the 509th flew a number of combat missions against Japan, utilizing large conventional bombs that resembled the atomic bombs in size and shape. (These bombs were fat and painted bright orange and thus were nicknamed "pumpkins.")

The target question involved several factors. President Truman and his advisers decided to hit an actual military target, rather than attempt a demonstration, such as exploding a bomb off the coast of

Col. Paul Tibbets, commander of the 509th Bomb Group

Tokyo. There were too few bombs available to waste on empty space. It was also feared that since the actual bomb had not yet been tested—Trinity was a huge, static device tested under laboratory conditions—the psychological and political harm of announcing a demonstration only to have the bomb fail to detonate was too great a risk. This concern was not trivial. Even the head of the Joint Chiefs of Staff, Admiral William Leahy (who fancied himself an ordnance expert), predicted failure. In addition, military planners and scientists wanted a target that had been largely untouched until then, so that it would be easier to determine the actual effects of the atomic blast. Secretary of War Henry Stimson then crossed Kyoto off the target list because of its historical and cultural significance. After weighing all these factors, the name that came out on top was Hiroshima—Japan's eighth largest city, a large seaport, headquarters of the Second Army, and a major war industry center.

In late July, President Truman warned the Japanese again that they must surrender or face terrible consequences. He was ignored. On Aug. 2, Tibbets was given signed orders to drop the bomb. He decided to fly the mission himself, and the Enola Gay (his aircraft named after his mother), took off from Tinian at 2:45 a.m. on Aug. 6, 1945. The flight en route was uneventful, and at 8:15 a.m., the bomb exploded above Hiroshima at an altitude of 1,900 feet—to maximize the blast effect. The bomb, codenamed "Little Boy," was a uranium bomb, and it detonated with the equivalent force of 12,500 tons of TNT—a load equivalent to over 3,000 B-29s carrying conventional bombs. One observer wrote that the bomb exploded "with a blinding flash in the sky and a great rush of air and a loud rumble of noise that extended for many miles around the city; the first blast was followed

The atomic bomb over Hiroshima

by the sounds of falling buildings and of growing fires, and a great cloud of dust and smoke began to cast a pall of darkness over the city." Virtually everything within a one-mile radius of the blast was totally destroyed.

A second bomb, a more advanced plutonium design codenamed "Fat Man," was dropped on Nagasaki on Aug. 9. Japan surrendered five days later.

Debate still rages over whether the atomic bombs were necessary to force Japanese surrender, but it was not a serious question at the time. President Truman was adamant that he had no regrets over his decision—an invasion of Japan, already scheduled for November, would have cost hundreds of thousand of lives, on both sides. He was not willing to pay that price. Japanese leaders interviewed after the war agreed that the bombs had been the final straw that had broken their will. The enormous power of the atomic bombs had as much psychological effect as it did physical. Virtually everyone, whether military or civilian, believed that atomic weapons had fundamentally altered the conduct of war. There would have to be new strategies, new weapons, new organizations and new doctrine. Time would show that such thinking was not completely accurate.

It was July 26, 1947 and President Harry Truman was sitting aboard his aircraft, a special equipped Douglas C-54 named the "Sacred Cow," that was on the ramp at Andrews Field, Maryland. The heat was sweltering, and there was no air conditioning in those days. The President's beloved mother was ill, so he was about to fly back to Missouri to see her. But he wasn't ready to leave yet, so he sat in his usual double-breasted suit in the stifling heat and waited. He was expecting a courier to bring him a copy of very important legislation that he would sign into law. The legislation was the National Security Act that created the United States Air Force. It seemed appropriate that he sign this legislation aboard Air Force One.

Air Force Independence, September 18, 1947

The issue of Air Force independence was tied up with a broader issue termed "unification." For nearly two centuries there had been a War Department and a Navy Department. In Congress, there were separate committees for Army and Navy affairs. Generals and admirals seldom had much to do with each other, and frankly, the nature of war had been such that close cooperation was seldom necessary.

World War II changed everything. Global war against powerful enemies made it abundantly clear that the "coordination" loosely espoused by the Army and Navy was no longer adequate. A more unified command structure was essential. Moreover, both services had become utterly dependent on airpower to accomplish their assigned missions. Airpower was absorbing one-third of the Army's budget, and the aircraft carrier had become the backbone of the fleet, replacing the obsolescent battleship. Confusion over lines of command and responsibility was dangerous, so the advent of airpower was another reason to compel change. As a consequence, President Roosevelt directed the formation of the Joint Chiefs of Staff: the Chief of Staff to the President would be Admiral William Leahy; the Army Chief of Staff was Gen. George C. Marshall, the Chief of Naval Operations was Admiral Ernest King, and the Commanding General of the Army Air Forces was Gen. "Hap" Arnold. It was these men who formulated our military strategy during the war.

When the war ended, however, there were strong disagreements between the services over how things ought to continue. Airmen believed they had demonstrated the vital importance of airpower, so they wanted a separate service. The Army was willing to go along with this if it also meant unification of the three services under a single Department of Defense, along with a strong Joint Chiefs of

Staff. The Navy, on the other hand, made it clear they wished to return to prewar days—they had no desire for unification, and they especially did not want an independent Air Force.

Stalemate continued for over a year after the war until the President and Congress began to lose patience. Truman had come to office with strong feelings about the need for reorganization of the military. He was an advocate of unification and a separate Air Force, and he made these views known. As one observer noted, when former Assistant Secretary of Navy, President Roosevelt—whose Oval Office was littered with ship models—gave way to Harry Truman, former U.S. Army artillery officer, change was going to occur. Truman told the services to quit stalling and reach agreement or he'd reach it for them.

Maj. Gen. Lauris "Larry" Norstad of the AAF and Vice Adm. Forrest Sherman, two of the more brilliant officers in their respective services, sat down to hammer out an agreement that would be acceptable to all the services, Congress, and the President. After several months they presented a plan that was eventually accepted, with minimum alterations, by all parties. It became the National Security Act (NSA).

The NSA was a compromise. The Air Force did indeed become independent—the Navy could not prevent that. However, the underlying reason for the sailors' concern was the fear that such an Air Force would take control of naval air assets. Since 40 percent of the fleet was devoted to aviation, this would essentially scuttle the Navy. At the same time, the single Department of Defense with a Cabinet-level secretary was also feared because it might overpower the Navy. Finally, the Navy feared a Joint Chiefs of Staff organization, if it included a strong chairman who could compel agreement among the three services. The Navy feared it would be continually "ganged up on" and outvoted by the Army and Air Force. As a consequence, the NSA bent to naval will and included a proviso that naval aviation would remain part of the Navy. In addition, the act called for three service secretaries, all of whom would have Cabinet-level rank. There would also be a Secretary of Defense, but he would be an equal rather than a superior of the service secretaries. His job was to "coordinate"

President Truman with Gen. Carl Spaatz

their efforts. And finally, there would be no powerful chairman of the JCS; rather, there would be a Chief of Staff to the President—the position that Adm. Leahy had held during the war. Like the Secretary, this senior officer would merely try to coordinate, not direct. The Navy seemed mollified by this arrangement, especially when the first Secretary of Defense was announced as James Forrestal—then the Navy Secretary.

Forrestal quickly discovered, however, that the child he worked so hard to sire was in fact a monster. He had little control over the services, even though he was given responsibility for them. Arguments—some petty, some serious—continued, but Forrestal could do little about them. Increasingly, he became depressed and morose and in March 1949 he committed suicide. Several months later the NSA was amended to correct many of the deficiencies that had become so apparent: the service secretaries were downgraded and no longer sat in the President's Cabinet. Instead, the Secretary of Defense was placed over them, and he became the President's chief advisor on military affairs. In addition, a Chairman of the Joint Chiefs of Staff was created who became a statutory advisor to the National Security Council. This basic format has existed ever since—although the chairman has achieved far more authority, especially since the Goldwater-Nichols Act of 1986.

James Forrestal,
The First Secretary of Defense

After three decades of agitation and a major war, the Air Force had achieved status as a separate service. The first Air Force Secretary was Stuart Symington, and the first Chief was Gen. Carl Spaatz. Many things still needed to be sorted out, ranging from transfers of administrative personnel from the Army, to writing a basic airpower doctrine manual, to the design of a new blue uniform to replace the Army green, to the establishment of an Air Force Academy that, like West Point and Annapolis, would commission regular officers directly into the service. Some of these steps took weeks, while others would take years.

The NSA that President Truman signed on that hot summer day in July became law on Sept. 18, 1947—the birthday of the United States Air Force.

The Flight of the “Luck Lady II,” 1949

Range is one of an aircraft’s most important characteristics and is directly related to load-carrying capacity. An aircraft can carry only a certain amount of weight, and that weight may be composed of either cargo—bombs, supplies or personnel—or fuel. There is usually a tradeoff between these two aspects of weight. Planes carrying a full bomb load will be able to carry that much less fuel and vice versa.

It became obvious early on in flight that an air refueling capability would be an excellent way to extend an aircraft’s range, while at the same time allowing it to carry a heavy bomb or cargo load. Alexander de Seversky, a Russian fighter pilot and ace in the First World War, recalled that he realized in 1917 how such an air refueling capability would also have benefited fighter planes by permitting them to escort the bombers to and from their targets. Seversky emigrated to the U.S. after the Russian Revolution and began working for the U.S. Air Service as an engineer. One of his inventions was an air refueling system that he had conceived during the war. This invention, which consisted of a hose from one aircraft that could be captured and inserted into the fuel tank of another aircraft below and behind it, was used successfully by Air Service aircraft in 1923. Although a great idea, theoretically, there were practical and technical limitations to such a device.

In 1929, the Air Corps used air refueling to keep the “Question Mark” airborne above San Diego for over six days, but this too was seen as more of stunt than a practical capability. (Of note, three crewmembers aboard the “Question Mark” eventually rose to high positions in the AAF, and later Air Force: Gen. Carl Spaatz was the first Chief of Staff of the Air Force; Maj. Gen. Ira Eaker commanded the Eighth Air Force and then the Mediterranean Allied Air Forces during the war; and Lt. Gen. Elwood “Pete” Quesada commanded the IX Tactical Air Command at the time of D-Day and Tactical Air Command after the war).

Everything had changed dramatically by the end of World War II. The advent of nuclear weapons and the onset of the Cold War with the Soviet Union made long-range bombers essential to ensure deterrence. Overseas bases were certainly an option, but fears that such bases would be vulnerable to either a Soviet preemptive strike or political pressures from host countries made it necessary to find a workable and effective way to conduct air refueling.

By 1949 the Air Force had the answer. In late February, the Air Force planned a mission that involved sending a strategic bomber all the way around the world, non-stop, via air refueling. The bomber was a Boeing B-50—essentially a B-29 on steroids—by the name of "Lucky Lady II." The refuelers would be modified B-29s, and twelve of them were pre-positioned around the globe. The refueling apparatus used was an adaptation of a British design (the "flying boom" used on current KC-135s had not yet been invented).

"Lucky Lady II" after its historic flight around the world

On the morning of Feb. 26,1949 "Lucky Lady II" took off from Carswell AFB outside Houston and headed east. Although the guns were still installed, they carried no ammunition, and instead of bombs, the plane carried extra internal fuel tanks. It also carried an augmented crew of fourteen led by Capt. James Gallagher; this allowed the crew to take shifts sleeping and flying. Over the next 94 hours and 23, 452 miles, the plane droned on. Over the Azores it completed its first air refueling; then again over Saudi Arabia, the Philippines and finally over Hawaii. Upon landing back at Carswell at 9:22 a.m. March 2, the "Lucky Lady II" still had over seven hours of fuel on board.

On hand to meet the record-breaking aircraft and its crew were Air Force Secretary Stuart Symington and the Chief of Staff, Gen. Hoyt Vandenberg. Defense Secretary James Forrestal sent his congratulations. Also on hand were the plane's crew chiefs. To a great extent, they were the people who really made the flight possible. TSgt Ed Rogers was especially proud and delighted, simply muttering over and over, "what a crack outfit." Maintenance necessary after the flight was minimal—virtually everything worked flawlessly during the four-day flight. The Lady did, however, need a bath. After all the time in the air she had picked up a coat of oil coming off the engines that made her a bit of a mess, although Sergeant Rogers thought she looked just beautiful.

The crew was tired and hungry but otherwise in high spirits. Capt. Gallagher, the pilot, was in a bit of hot water at home, however. Because the entire flight was a secret until it was almost complete, he had not been able to tell his wife. He simply left for work one day and didn't come back. The squadron told her he was flying on a mission and not to worry, but could say no more. She therefore headed for New Orleans where they had made plans to attend the Mardi Gras, expecting him to meet her there when he got home. He didn't show up. When he called to explain she demanded to know where he'd been: "Oh, I just flew around the world."

Secretary Symington compared the significance of the flight to that of Kitty Hawk and the "Spirit of St. Louis," saying it was "an epochal event." Senator Millard Tydings, Chairman of the Armed Services Committee, asserted that the mission demonstrated "the increasing importance of air power to national defense." Gen. Curtis LeMay, the commander in chief of Strategic Air Command, was more blunt. The Air Force could now take off from the U.S. and drop an atomic bomb any place in the world. A clever reporter then asked if air refueling could also be used to extend the range of escort fighters as well. LeMay said there was no reason why not.

Tanker refuelingan F–105, 1965

No reason indeed. Air refueling was soon extended to fighter planes, and in the Vietnam War F-4s and F-105s were air refueled to and from their missions over the North—tactical fighters had become strategic bombers. Today, virtually all Air Force combat aircraft are air refuelable, including airlifters, reconnaissance aircraft and radar surveillance planes. This has generated the need for the largest fleet of air tankers in the world—nearly 600 planes, and is about three-quarters of the world's total capability. It is this capability that puts the "global" in the Air Force slogan, "Global Reach, Global Power."

The Decision to Build the Hydrogen Bomb, 1950

When the U.S. ended World War II with the two atomic blasts over Japan, they enjoyed a monopoly of this awesome new weapon. All realized, however, that this monopoly would not last forever. At some point, our erstwhile ally and now Cold War adversary, the Soviet Union, would undoubtedly get the bomb. Estimates on how long that would take varied, even among the experts. In 1946, the Air Force briefed the President that they expected a date of 1949 for "Red Atom Day," but by 1949 it had pushed that date back to 1951. The CIA predicted 1953, and Vannevar Bush, the President's scientific advisor, stated confidently in 1949 that it would take the backward Soviets at least another decade to build an atomic bomb.

Nonetheless, just to be prepared, the Air Force had begun a highly classified upper-air sampling program as early as 1947. High flying aircraft and balloons carrying special sensors would periodically test the air, looking for traces of elements that could only occur as the result of an atomic blast. (In July 1947 one of these balloons crashed in Roswell, NM. Because of the highly secret nature of the sampling mission and technology, the Air Force quickly gathered up the pieces of the wreckage and announced that it was merely a "weather balloon." That story was not believed by most, and ever since Roswell has been hailed by UFO believers as the site of an alien flying saucer crash that was covered up by the Air Force).

"Weather Balloon" Wreckage after the Roswell Incident, 1947

On the morning of Sept. 3, 1949, an Air Force WB-29 sampling aircraft registered an unusually high concentration of radioactivity over the north Pacific. Later that day, other aircraft began reporting the same phenomena. The data was rushed to Washington, D.C. for analysis, and two weeks later the Air Force Chief, Gen. Hoyt Vandenberg, briefed President Truman that the Soviets had indeed exploded an atomic bomb sometime in late August. Worse, the bomb was an advanced plutonium device that was six times larger than the first U.S. detonation. What was to be done?

First, Vandenberg wrote a sobering memorandum to the other Chiefs noting that the air defenses of the U.S. had been neglected since the war because it was not believed there was a serious threat to the continental U.S. Now there was such a threat, and U.S. air defenses had to be upgraded, quickly. In addition, war plans had to be modified, and the growth of our atomic stockpile had to be increased. At that time there were barely a hundred bombs in the U.S. arsenal. Of even greater importance, the new thermonuclear weapon, the hydrogen bomb that existed only in theory, had to be addressed.

The theory of the hydrogen bomb had been discussed since the 1920s when scientists described the evolution of the sun as a continuous series of massive explosions caused by the conversion of hydrogen into helium. These explosions resulted from the fusion of atomic nuclei that released incredible power, but only tremendous pressure could cause such fusion. Ironically, the fission of atomic nuclei could provide that pressure—in other words, an atomic bomb, which resulted from the fission of atomic nuclei, could serve as a trigger to detonate a fusion, or thermonuclear, bomb. These bombs could be thousands of times more powerful than atomic bombs.

There was, however, strong opposition to the hydrogen bomb in the scientific community. Many of those who had worked on the original Manhattan Project, including J. Robert Oppenheimer, began to oppose the production and use of such weapons now thinking they were immoral. Eventually, Oppenheimer was considered such a security risk because of his strong views opposing nuclear development, he was stripped of his security clearance.

On the other hand, the military strongly supported the development of such weapons, arguing that if the U.S. failed to develop them, the Soviets most certainly would—and that was a frightening scenario. Such fears were given credence when in January 1950 the atomic scientist Klaus Fuchs confessed to being a Soviet spy. Fuchs had worked at Los Alamos during the war, while also being involved in early thermonuclear experimentation as well. When caught, he confessed proudly that his efforts had saved his Soviet masters years of work. His exposure then led to the arrest of his controllers, Julius and Ethel Rosenberg, who had managed a number of other Soviet agents in the U.S.

President Truman leaned towards development of the hydrogen bomb, but was concerned that there were dissenters in his administration. He therefore summoned his Secretary of State, Dean Acheson, Secretary of Defense, Louis Johnson, and the Chairman of the Atomic Energy Commission, David Lilienthal to his office in January 1950. Johnson had always been the most hawkish, once stating emphatically: "There is but one nation in the world tonight that would start a war that would engulf the world and bring the United States into war…. We want a military establishment sufficient to deter that aggressor [the Soviet Union] and sufficient to kick the hell out of her if she doesn't stay deterred." Acheson tended to agree, while Lilienthal was opposed. The President sided with the majority and ordered development.

Secretary of Defense Louis Johnson, left

The world's first thermonuclear detonation occurred on Nov. 1, 1952. The blast, codenamed "Mike," was measured at 10.4 megatons and, essentially, evaporated the Pacific island of Elugelab. (Whereas atomic bombs were measured in terms of thousands of tons of TNT—kilotons—thermonuclear bombs were measured in—millions of tons of TNT—megatons.) This device, however, like the first atomic blast

The first hydrogen bomb

in 1945, was essentially a laboratory experiment, not an operational weapon. The first actual hydrogen bomb was detonated on March 1, 1954 with a yield of 14 megatons.

The power of the new bomb, combined with its relative cost effectiveness and efficiency in the use of scarce radioactive materials, made nuclear weapons useful to all the services, and soon the Army and Navy “went nuclear.” Over the next two decades tens of thousands of nuclear bombs, artillery shells, and missile warheads would be built, but the Strategic Air Command was the main nuclear strike force of the U.S. with its bomber and missile force. For many years thereafter it “sat alert” and even had aircraft constantly airborne—just in case. The SAC mission during the height of the Cold War remained what the Defense Secretary said it was in 1949—to deter an aggressor and to render a blistering beating if he didn’t stay deterred.

America's First ICBM Launch, December 17, 1957

Rockets had been toyed with for centuries; as early as the twelfth century the Chinese had used them as fireworks during celebrations. By the Napoleonic era, rockets had become weapons of war, and the U.S. had used them, sparingly, in both the Mexican and Civil Wars. Yet, their use was still limited due to their unreliability, cost and inaccuracy. It was not until the twentieth century that scientists began to take rocketry seriously. In the U.S., the pioneer of rocket science was Robert H. Goddard. His launch of the world's first liquid-fueled rocket on March 16,1926 at Auburn, Massachusetts, heralded a new era.

Goddard continued his work, and other U.S. scientists such as Theodore von Kármán at Cal Tech experimented with rockets and their propulsion and guidance systems over the next two decades. It was Germany, however, who seemed to take the greatest interest in this new science and who made the greatest technological leaps. Part of this interest in rocket experimentation existed because the Versailles Treaty that ended the First World War did not prohibit rockets. The development and acquisition of airplanes and other weapons of war had been severely restricted by that treaty, so Germany's best scientists looked to other fields to expand their knowledge.

At Peenemünde on the Baltic coast these scientists and engineers made tremendous advances, developing the world's first practical cruise missile, the V-1 "buzz bomb." More importantly, they also built the world's first operational ballistic missile weapon, the V-2. (A missile is, essentially, a guided rocket). The prototype of the V-2 was launched in October 1942. Two years later, in September 1944, they began falling on Allied targets. The V-2 was 46 feet tall and 5 feet in diameter. The 14-ton weapon could deliver a 1,650-pound warhead a distance of two hundred miles. In all, some 3,700 V-2s


The German V-2 Rocket

were launched by Germany, about 1,100 of which fell on England. The V-2s caused widespread fear among the Allies because the missile impacted with no warning and could not be stopped once launched.. It was not until the launching sites were continuously bombed and then overrun by ground forces that the menace was finally eradicated.

Both the U.S. and the Soviet Union, years behind the Germans in missile research, rushed to grab as many of these weapons, research facilities and even the scientists as quickly as possible. In fact, in a highly classified operation termed "Paperclip," U.S. intelligence agents quietly moved a number of Germany's leading scientists into the U.S. where they could continue their research. Led by Wehrner von Braun, who had been the head of research at Peenemünde, the team, reinforced by the best U.S. experts on the subject, labored to build even larger and more powerful rockets and missiles. (Of note, the infamous Scud missiles of the Persian Gulf War in 1991 were direct descendents of the V-2—being about the same size, range and payload, although a bit more accurate).

The Soviets, who had garnered their share of German scientists at the end of the war, worked feverishly on missile technology as well and were initially more successful. When the Soviets put the world's first artificial satellite into orbit on Oct. 4, 1957, the U.S. was stunned, embarrassed and energized.

In truth, the U.S./German team had been far from idle. Working from the basic V-2 design, they made slow but steady progress in the decade after World War II. The Air Force was most interested in putting a nuclear warhead atop such a guided missile, and it therefore became the lead agency for ballistic missile research. In 1954, Brig. Gen. Bernard Schriever had taken command of the Air Force's Western Development Division (later the Ballistic Missile Division). The following year, President Eisenhower declared that building an operational intercontinental ballistic missile (ICBM) to carry nuclear warheads was his number one priority.

The technology was frustratingly difficult, and it was obvious the "race to space" between the U.S. and the Soviet Union would go down to the wire. In January 1957 the first "Thor" missile launch failed. So did the next three. Finally, in September 1957, "Thor"—an intermediate range ballistic missile (IRBM)—made it off the launch pad and 1,300 miles downrange. The success from the September test was short-lived, however, as the test conducted in October 1957 also failed. At the same time, ground controllers destroyed America's first ICBM, "Atlas," shortly after its first launch. The second attempt in September was destroyed as well. The following month "Sputnik" went into orbit; its steady "beep" sounding a deafening warning to American ears.

On Dec. 17, 1957, the 54th anniversary of the Wright brothers' first powered flight, the Air Force was ready to try again with its third "Atlas" launch attempt.

Hopes were high as the seventy foot, ninety-ton missile sat in its gantry at Cape Canaveral, Florida. Dozens of people began parking their cars and lining up on the beach to watch the launch scheduled for that morning. Delays began as technological glitches were found and corrected and the weather threatened to deteriorate. But at 10:25 a.m. streaks of vapor vented from "Atlas," indicating that loading of the highly volatile liquid oxygen was taking place. This went on for two hours and then suddenly stopped. At 12:38 p.m. a cloud of white steam blossomed around the missile as the engines were ignited. Slowly, the missile lifted off "like a molten nugget of pure gold." The crowds on the beach as well as inside mission control began to cheer, and kept cheering as the missile continued to accelerate up and out of sight.


Atlas Launch

President Eisenhower was in Europe at the time and passed news of the successful launch to his NATO allies. The response from Europe was immediate and exuberant. West Germany, Britain, France, Turkey, Norway and others all expressed their pleasure. The launch of “Sputnik” had put them into a funk, and the “Atlas” test was a welcome tonic. Not surprisingly, the Soviet news agency Tass, which had quickly, fully and gleefully reported every U.S. launch failure up to that time, neglected to report the successful “Atlas” launch.

An operational ICBM sitting on alert with nuclear weapon atop was still two years distant. But everyone around the world realized that warfare had changed dramatically and irreversibly as a result of the events in the fall of 1957. The world had entered the Space Age.

Achieving Unity of Air Command–the JFACC

Besides the Air Force, the Army, Navy and Marines also have sizable air arms. (In fact, behind China and Russia, the next three largest air arms in the world belong to the U.S. Air Force, Navy and Army , with the Marines falling later in the top ten. We are indeed an airpower nation). When the U.S. fights in a coalition, it generally means the air forces of other nations will be engaged as well. For decades, the crucial question regarding air operations centered around command and control—who would ensure all air assets were combined most effectively to maximize effectiveness, while at the same time minimizing risk and the danger of fratricide (shooting down friendly aircraft).

In World War II, it was standard practice to appoint air commanders who reported to the theater commander and who controlled all air assets, regardless of service or country, within a given theater. These air component commanders had varying degrees of authority and support, but the concept worked most effectively in the Southwest Pacific where Gen. Douglas MacArthur gave Gen. George Kenney great authority to manage the air assets of the U.S. Army Air Force, Navy, Marines, and Australians. Unfortunately, this model was not followed afterward. In the Korean War, MacArthur gave his new air commander, Lt. Gen. George Stratemeyer, only limited "coordination control" over naval and marine air assets; this was insufficient and led to numerous problems and inefficiency. Things got even worse in Vietnam.

During the Vietnam War, the theater commander was Commander in Chief, Pacific Command (CINCPAC), an admiral whose headquarters was in Hawaii. However, a sub-theater commander resided in Saigon; this was an Army general who was given wide latitude by CINCPAC to run the war in South Vietnam. Working for this general was a more senior airman, commander of Seventh Air

Force who also was located in Saigon, and who controlled U.S. Air Force assets in the South. However, the Seventh Air Force commander had no control over naval air assets operating from carriers off the coast against targets in North and South Vietnam. These carrier aircraft were controlled by CINCPAC. Seventh Air Force also had little or no control over the numerous Marine Corps air assets based in South Vietnam, or the even more numerous Army helicopter fleet. Worse, the B-52s that operated out of Guam and Thailand, although Air Force assets, did not fall under Seventh Air Force control, but instead remained under the command of Strategic Air Command, headquartered near Omaha, Nebraska. Thirteenth Air Force controlled Air Force aircraft in Thailand—a major staging area for air operations against North Vietnam. And of course, the South Vietnamese Air Force followed the orders of none of the above. When strike aircraft went to North Vietnam, separation was maintained by instituting the highly inefficient "route pack" system. North Vietnam was divided into geographic areas, or route packages—some were apportioned to the Air Force and some to the Navy. There was little coordination between the two air arms, and the piecemeal application of airpower made both services highly vulnerable to enemy defenses. This was no way to run a war, and entailed an enormous degree of confusion, inefficiency and ineffectiveness.

Yet, militaries tend to learn more from their defeats than their victories, so all the services began looking at the command and control of airpower in the aftermath of the Vietnam War. The path was rocky.

The purposes and doctrines of the services regarding the use of airpower are significantly different and reflect their individual views of war. The Navy sees its air assets primarily for fleet defense and for the attack of enemy installations near the coast—they seldom engage in close air support or strategic bombing. The Marines blend their airpower with ground teams that train together continuously. These air assets are most often used for close air support, substituting for the lack of heavy artillery in Marine ground units. Army helicopters are also used almost exclusively in air-ground combined arms teams close to the front lines. The Air Force, on the other hand, considers itself a "full service air force" that conducts not only tactical support and air superiority, but also airlift, air refueling, strategic attack, space operations and electronic warfare. This tends to give it a broader view of air operations than that of the other air arms. This global view, combined with the Air Force's significantly greater size, raises fears in the other U.S. services that their air arms will be absorbed and misused if the Air Force is put in charge.

Nonetheless, the defeat in Vietnam, combined with the increasing dominance of airpower in all military operations, made it increasingly clear that unity of command was essential. There needed to be a single commander who could control all air assets, as well as select appropriate targets, schedule and coordinate all support activities, prepare the daily air tasking order for the theater, and allocate scarce air resources such as electronic jammers, tankers, and air warning aircraft. In 1986, this step was finally taken when the position of the Joint Force Air Component Commander (JFACC) was established in joint doctrine. The JFACC's responsibilities were listed as including, but not limited to, the planning, coordination, allocation and tasking of all air sorties within the theater. The JFACC need not be an Air Force officer—if the Navy provides the preponderance of air assets in a given campaign, then the JFACC will normally be a naval aviator. The essential point is that unity of command of air assets by an airman is assured. This functional organizational model for the control of airpower replaced the unsuccessful geographic and service models of Korea and Vietnam.

The JFACC system was first tested in combat in the Persian Gulf War of 1991 when Air Force Lt. Gen. Chuck Horner was named the air commander of Coalition forces. The timing was appropriate. Not only were extensive air assets from all the U.S. services involved, so were the air arms of sixteen other countries. The presence of many diverse aircraft from countries that had not all worked closely together in the past, made it absolutely essential for a JFACC not only to effectively direct the entire air effort, but also protect against fratricide. Thus, Horner was also named Airspace Control Authority, Area Air Defense Commander and Coordinating Authority for Interdiction. His highly complex air campaign consisted of as many as three thousand sorties each day for six weeks. It was coherent and focused, seized the initiative, eliminated the Iraqi air force as a serious threat within days, and paralyzed the Iraqi economy by shutting down the electrical power, dropping bridges over the Tigris River and destroying most television and radio stations. At the same time, the Iraqi troops along the front lines were severely mauled by airpower and largely cut off from re-supply before coalition ground operations even began.

Intelligence reports revealed that all of the Iraqi front-line divisions had been depleted to below 50 percent strength before the ground offensive even began. The air campaign of Desert Storm was the most successful in history and much of that success was due to the JFACC.

As a consequence, the JFACC is now the standard organization for our military forces. It worked extremely well, again, over Bosnia, Kosovo and Afghanistan. Unity of Command is a time-honored principle of war, but surprisingly, soldiers, sailors, marines and airmen have observed this principle more in the breech than in the main regarding air assets. The formal establishment of a JFACC to solve a problem so apparent in Korea and Vietnam was overdue but essential. The results have shown this to be a wise move.

Gen. Charles Horner—JFACC in Desert Storm

About the Author

Phillip S. Meilinger is currently the deputy director of the AEROSPACENTER for Science Applications International Corporation in McLean, Virginia. A retired colonel and veteran of thirty years active service in the U.S. Air Force, he was a command pilot, staff officer and educator. Meilinger flew C–130s and HC–130s in Europe and the Pacific, and also served on the Air Staff in the Pentagon. He earned a Ph.D. in military history from the University of Michigan and has taught at the Air Force Academy, School of Advanced Airpower Studies, and Naval War College. He is the author of four books and over 50 articles on airpower theory and practice.

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