Pinpointing Devastation: American Air Campaign Planning before Pearl Harbor*

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At exactly three o'clock in the morning on 17 January 1991, Air Force Major Gregory A. Feest released a 2000-pound laser-guided bomb from his F-117 stealth fighter and began directing it towards a command post in the city of Baghdad.¹ The Allied air campaign against Iraq had begun. Detailed planning for that remarkably successful air war had started shortly after Saddam Hussein's August 1990 invasion of Kuwait, with much of the work being done in a remote office known as "Checkmate" in the Pentagon basement. Yet the true roots of the conceptual design for the Desert Storm air campaign are spread much deeper than the Pentagon's bowels. They extend to the Chateau de Chamarrandes near Chaumont, France, in late 1917; to the stucco and brick classrooms of Maxwell Field's Air Corps Tactical School in the 1930s; and to the sweltering penthouse of the old Munitions Building in Washington, D.C., in August 1941.

Those underpinnings reveal a profound uniformity of thought about the decisiveness of air power. The men who molded American air strategy in the decades before Pearl Harbor were convinced that strategic bombing, precisely aimed at a nation's economic "vital centers," could

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destroy its war-making capability and will to resist. World War II provided that theory with a stern test. Still, despite the difficulties involved in conducting “precision” bombing, most air leaders emerged from the conflict believing that the ordeal had vindicated the prewar planning. The notion that vital centers were vulnerable to a precisely delivered air attack endured, and became a cornerstone of official Air Force doctrine once the new service began committing its principles to paper in the early 1950s. By 1991 the semantics had changed slightly, but the idea remained the same. The four-phase plan for the Persian Gulf air war, stressing the destruction of Iraqi “centers of gravity” through unrelenting precision bombing, was the logical outgrowth of the planning process that preceded World War II.

The earliest example of American planning for an “independent” air campaign—that is, one having objectives distinct from those sought by land and sea forces—was a proposal for “strategical” bombing completed by Lieutenant Colonel Edgar Staley Gorrell and his staff on 28 November 1917. That plan called for an “around the clock” air offensive against German commercial centers and lines of communication “to wreck the points aimed at and cut off the necessary supplies without which the armies in the field cannot exist.”2 General John J. Pershing, Commander in Chief, American Expeditionary Forces (AEF), approved Gorrell’s plan “in full” on 5 January 1918.3 Although aircraft production difficulties prevented all but the most meager implementation of the Gorrell scheme,4 the ideas contained in it persisted. His arguments would reappear twenty-four years later in planning for another air campaign against Germany.

The genesis of Gorrell’s plan was a 6 May 1917 request by the commander of the French Northeast Army Group, who saw America’s entry into World War I as an opportunity to obtain material support as


4. At the time of the Armistice, the Air Service possessed only one night-bombing squadron, consisting of obsolete DH-4 and FE-2 aircraft. It had flown its first mission on 9 November 1918. American day bomber operations had begun on 12 June 1918, but all day-bombing missions occurred against targets in France, and most of the missions were “tactical”—designed to support troops on the battlefield. See I. B. Holley, Ideas and Weapons (New Haven, Conn.: Yale University Press, 1953; reprint ed., Washington: Office of Air Force History, 1983), 157–58; Bruce C. Hopper, “American Day Bombardment in World War I,” Air Power Historian 4 (April 1957): 87–97. Holley outlines the various reasons for the production failure in Chapters 3 and 8.
well as manpower. The commander asked the French Minister of War for an initial American force of roughly forty-three hundred aircraft, plus an additional two thousand replacement airplanes per month, to support a projected Allied offensive in the spring of 1918. Major William "Billy" Mitchell, who had been on the Western Front reviewing Allied aviation units since April, claimed that he collaborated on the request, which was matched by a similar appeal from the General Staff of the French Army. These solicitations became the basis for a formal request to Washington by French Premier Alexandre Ribot on 23 May.

As a result of the "Ribot cable," Congress quickly approved a 640 million dollar aircraft production program—a massive amount of funding, considering that the Signal Corps' aviation branch had possessed only six aircraft in 1912. Inexplicably, the Ribot cable did not mention what types of aircraft the United States should produce. To determine those requirements, Secretary of War Newton D. Baker sent Air Service major and former U.S. Steel lawyer Raynal C. Bolling to Europe with a team of military and civilian engineers in June 1917. One member of this group was Captain Gorrell, a 1912 West Point graduate who had flown with the 1st Aero Squadron in Pershing's Mexican Punitive Expedition, and who had recently completed a Master's degree in science from the Massachusetts Institute of Technology.

In thirty-five days, Bolling's group visited Britain, France, and Italy. General David Henderson, Britain's Director-General of Military Aeronautics, suggested that the Americans concentrate exclusively on bomber production and not try to develop a balanced force of fighters, bombers, and observation aircraft. Henderson's remarks may have been triggered by the first attack on London by German Gotha bombers a fortnight before the Bolling Mission arrived. In two minutes, the Gothas had dropped nearly two tons of bombs, killing 162 people and injuring 432. The bombers had attacked in daylight and with impunity; none fell to antiaircraft fire or fighters.

In Italy, members of the Bolling Mission observed bombing operations from the "giving" rather than the "receiving" end. The Italians had begun a long-range air campaign against targets in Austria, and were, at the time, the only Allied nation conducting strategic bombing. Their air offensive, sporting as many as 250 Caproni bombers in a single

6. Ibid.; Holley, Ideas and Weapons, 42.
raid, impressed the Americans. Bolling’s group was also impressed by the man who had molded the Italian bomber force, the designer and theorist Gianni Caproni. Gorrell in particular was inspired by Caproni’s vision of air power, which paralleled the thoughts of Giulio Douhet, Caproni’s close friend and confidant. Caproni maintained that for bombing to be effective it had to be “systematic, thorough, and consistent.” This assertion would become a cornerstone of Gorrell’s plan.

On 15 August 1917, Bolling submitted his initial report to Washington. In it, he called for the production of training aircraft, aircraft to support American troops in the field, and “aircraft in excess of the tactical requirements of the Army in France.” Bolling recommended that the United States build as many airplanes as possible. He believed that the number of airplanes needed to support the ground forces depended on the size of the Army and would vary in proportion to it. Combat aircraft in excess of those required for Army support could conduct “independent” air operations, such as night raids on Germany. Bolling suggested a precise apportionment of aircraft types for this independent force: 37.5 percent of its aircraft should be fighters capable of escorting bombers, 25 percent should be day bombers, and the remainder should be Caproni night bombers. He found the prospects of a night air offensive especially appealing, and noted that if night bombing were conducted “on a sufficiently great scale and kept up continuously for a sufficient time, there seems good reason to believe that it might determine the whole outcome of military operations.” In the United States, however, Bolling’s “third-place mention of the strategic force was apparently taken to mean that it was third in order of relative importance.” American officials did not include bombers in the immediate manufacturing program, and Pershing did not initially endorse an independent bombing force.

Billy Mitchell had no intention of allowing the strategic bombing notion to wither, much less die. In May, he had met British Major General Hugh Trenchard, Commander of the Royal Flying Corps. Trenchard’s belief in an “air offensive” to destroy the German army’s

11. J. L. Boone Atkinson, “Italian Influence on the Origins of the American Concept of Strategic Bombardment,” Air Power Historian 4 (July 1957): 142. At the time of the Bolling Mission, Douhet was serving a prison term for his outspoken denunciation of Italian military leadership.
12. Quoted in Holley, Ideas and Weapons, 55.
14. Ibid., 133.
15. Ibid., 132.
"means of supply, subsistence, and replacements" struck a responsive chord in the American major. Soon after the June arrival of Pershing and his staff in France, Mitchell proposed organizing American air forces into two categories—one supporting the ground forces, the other conducting "strategical operations against enemy aircraft and enemy material, at a distance from the actual line." This "independent mission," he insisted, could have "a greater influence on the ultimate decision of the war than any other arm."

Pershing's failure to approve the proposal caused Mitchell to redouble his efforts. Appointed Chief of the Air Service, he asked AEF Intelligence in August 1917 to provide information on strategic targets in Germany. He also created a staff that would explore the possibilities of bombing Germany in more detail. To direct the Air Service's Technical Section, Mitchell picked the twenty-six-year-old Gorrell, who had just completed his work with the Bolling Mission. Gorrell's job would be to determine Air Service requirements, including the various types of aircraft needed. In trying to estimate the correct number of bombers, he would consider the prospects of strategic bombing, and, ultimately, produce America's first plan for a strategic air campaign. He would develop this plan in relative splendor, for Mitchell chose the Chateau de Chamarandes, a magnificent hunting lodge built by Louis XV, as his headquarters. Located within a mile of Pershing's headquarters at Chaumont, the chateau provided both living quarters and office space. It continued to serve as Air Service headquarters after Mitchell moved on in October to become Air Service Commander in the Zone of the Advance.

Assisting Gorrell in his endeavor were Majors Harold Fowler and Millard F. Harmon. Fowler had flown with the Royal Flying Corps before America's entry into World War I, while Harmon had served as an Air Service pilot in the Philippines before the war. Gorrell also received a large measure of support from two individuals uniquely qualified to help develop an air campaign plan—Wing Commander Spencer Grey of the Royal Naval Air Service, and Gianni Caproni. Grey, a liaison officer attached to Air Service Headquarters, had participated in raids against German inland targets from the RNAS base at Dunkerque, and had worked to develop a 1,650-pound bomb. Gorrell

considered him the "world's greatest authority on air bombing" and relied heavily on his expertise. Caproni, who continued to design bombers, met frequently with Gorrell in the autumn of 1917. Besides providing Gorrell with a list of Germany's major industrial targets, Caproni also sent him an English-text copy of a new book, *Let Us Kill the War; Let Us Aim at the Heart of the Enemy*, by the Italian journalist Nino Salveneschi. The book was a compilation of Caproni's major thoughts on how air warfare could achieve an independent victory in World War I, and Gorrell embraced its message enthusiastically. "I have read with great interest your book entitled 'Let us Kill the War; Let us Aim at the Heart of the Enemy', which you so kindly gave me," he wrote to Caproni on 31 October. "May I ask you to let me have half a dozen copies of this book and I will guarantee to spread the gospel in all directions."

By the end of November, Gorrell had incorporated Grey's expertise and Caproni's gospel into an air campaign plan for an American bomber force. The plan also reflected Mitchell's ideas, gleaned largely from Trenchard, about air power's potential to destroy the German army's means to fight. Gorrell noted: "There are a few certain indispensable targets without which Germany cannot carry on the war." The German army, he asserted, could be likened to a drill, whose point could continue to bore only if the shank—the German national effort—remained durable. Four target groups were essential to keeping the shank strong: the industries surrounding Dusseldorf, Cologne, Mannheim, and the Saar. If those vital industries and their transportation links were destroyed, the drill would become impotent. "German shells are being fired at Allied troops and positions over a large area of the Front," he observed, "but the manufacture of these shells and bombs is dependent upon the output of a few specific, well-known factories turning out the chemicals for them. . . . If the chemical factories can be blown up, the shell and bomb output will cease, to a greater or lesser degree, dependent upon the damage done these chemical plants." The belief that the essence of an enemy nation's war-making capability consisted of certain key components linking together its industrial complex was the crux of Gorrell's proposal. It would also serve as the foundation of America's air campaign plan for the Second World War.

23. Letter, Major E. S. Gorrell to Signor Jean Caproni, 31 October 1917, AFHRA, file number 168.661-83.
25. Ibid., 142-43.
Gorrell estimated that between three thousand and six thousand American bombers would be required to wreck German war-making capacity, provided that the force received adequate logistical support and aircrew training.26 This armada would concentrate on destroying a particular group of targets completely before assaulting a different target group. The continuous, systematic nature of the air offensive would overwhelm German defenses while it unnerved workers and prevented them from making repairs. Yet the Germans, Gorrell warned, also realized the potential of strategic bombing, and could be expected to launch a similar large-scale effort against the Allies. Thus, the sooner the American campaign began, the better. "This is not a phantom nor a dream," he wrote in October, "but is a huge reality capable of being carried out with success if the United States will only carry on a sufficiently large campaign for next year, and manufacture the types of airplanes that lend themselves to this campaign, instead of building pursuit planes already out of date here in Europe."27

Brigadier General Benjamin Foulois, who became Chief of the AEF Air Service in November, approved Gorrell's plan in December and sent it to General Pershing. Foulois also placed Gorrell—now a lieutenant colonel—in charge of Strategical Aviation in the Zone of the Advance. Persuaded that an independent bombing force would not deprive him of air support for American ground troops, Pershing approved the plan in early January. Gorrell then moved up to Pershing's staff as the Air Service's G-3 (War Plans) representative to oversee the plan's implementation, but he remained attuned to Pershing's concern that the Air Service might neglect American armies. To assuage this fear, Gorrell pointedly included the following statement in the first paragraph of his written analysis of his plan for Pershing's staff: "The Air Service is an integral part of a homogeneous team, no portion of which, working by itself, can alone decisively defeat the enemy."28

As Gorrell worked to implement his scheme at AEF Headquarters, Lieutenant Colonel Ambrose Monell took over in late January as Chief of Strategical Aviation in the Zone of the Advance. An ex-president of the International Nickel Company, Monell was assisted in his new endeavor by Gorrell's former compatriots Fowler and Grey. Meanwhile, Gorrell helped create an Office of Air Intelligence in the G-2 (Intelligence) Section of the AEF staff. This division contained a "bomb target unit," described by historian Thomas Greer as the "prototype of the organizations which played such an important role in the strategic

27. Quoted in ibid.
operations of World War II.”29 The unit produced target maps, antiaircraft defense maps, maps of key German railroads and industries, and objective folders.

Despite the extensive planning, Gorrell’s proposal did not bear fruit. General Foulois had agreed in December 1917 that American bombers could fly with the British until American numbers increased sufficiently to allow separate bombing operations. However, the creation of the British Independent Force in June 1918, which received its orders from the British Air Ministry rather than from Supreme Allied Commander Ferdinand Foch, caused Pershing to veto further joint ventures by the few American day bombardment squadrons that had arrived at the front. Pershing remained concerned that Air Service leaders might overlook what he considered to be their primary mission—supporting the Army. His Chief of Staff, Major General James W. McAndrew, stated: “All [Air Service officers] must be warned against any idea of independence and all must know from the beginning that every force must be closely coalescent with those of the remainder of the Air Service and those of the Ground Army.”30 The Strategical Aviation Branch changed its name in June 1918 to the General Headquarters Air Service Reserve to reflect this concern of the AEF Commander. But in the final analysis, the key reason that the United States could not mount an air offensive against Germany was industrial inefficiency. America’s failure to gear its industry to bomber production foredoomed the Gorrell plan. The inability to agree on a single type of bomber (Caproni versus Handley Page) and the conflicting numerical requirements provided to the Joint Army-Navy Technical Board resulted in no American-made night bombers ever reaching the front.31

By the summer of 1918, Gorrell’s scheme for a massive American air offensive had atrophied. Colonel Monell had, in Gorrell’s words, worked on developing a strategic air force for only “a month or so,”32 and Major Fowler left Air Service Headquarters to command the American air units operating with the British. Discouraged by the production deficiencies and convinced that an American strategic bombing campaign would never materialize, Wing Commander Grey returned to a British assignment. Monell succeeded during his tenure as Chief of the Strategical Section/General Headquarters Air Service Reserve only in selecting prospective airfields for his phantom force.33

29. Greer, Development of Air Doctrine, 10.
33. Ibid., 155-56.
Yet the failure to implement Gorrell's proposal did not lessen the value of his effort. The air power principles articulated in his scheme were, like the theories of Douhet, Mitchell, and Trenchard, untested assertions that could be proven only through an extensive trial by fire. In the meantime, they could be argued, refined, and espoused by a generation of American air officers seeking service autonomy and certain of strategic bombing's independent ability to win a war. Billy Mitchell, by far the most vocal proponent of Air Service independence, did not hesitate to insist that bombing could have single-handedly achieved victory. "I was sure that if the war lasted, air power would decide it," he concluded. While those officers sharing Mitchell's conviction in the immediate aftermath of World War I also endorsed the ideas contained in Gorrell's plan, they usually did so by spouting similar views rather than by specific reference. Gorrell left the Air Service in March 1920 to try his hand as a corporate executive, ultimately serving for six years as director and president of the Stutz Motor Car Company. Meanwhile, his proposal "was allowed to gather dust in the War Department Archives during the peace-time years" until an enterprising officer resurrected it in 1935. That individual was Captain Laurence S. Kuter, a new instructor in the Air Tactics and Strategy branch of the Air Corps Tactical School at Maxwell Field, Alabama—and destined to become one of the four principal architects of the 1941 air war plan AWPD-1.

Kuter later deemed Gorrell's plan "the earliest, clearest, and least known statement of the American conception of the employment of air power." He was determined to make it familiar to students at the Air Corps Tactical School. The school provided an intense, year-long, air power–focused curriculum to the Air Corps' top mid-level officers, and would graduate 261 of the 320 generals serving in the Army Air Forces at the end of World War II. Kuter devoted an entire lecture at the school to analyzing Gorrell's plan, emphasizing to students in no uncertain terms that Gorrell's proposal corresponded to current Air Corps Tactical School theory. He stated:

This plan of Colonel Gorrell's is taken from 18-year old files of the War Department. It was approved by General Foulois. It was

36. Ibid.
37. Robert T. Finney, History of the Air Corps Tactical School, 1920–1940 (Maxwell Air Force Base, Ala.: Air University, 1955), 25. Of the three-star generals in the Army Air Forces at the end of the war, eleven of thirteen were Tactical School graduates, and three four-star generals—Joseph McNarney, George Kenney, and Carl Spaatz—graduated from the school.
approved by General Pershing. And it is the current schoolroom theory of the employment of air forces. No principle or doctrine in the Confidential Air Force Text that is being written today was missed in that plan. We may return to our steel desks considerably refreshed by the knowledge that our school plans and our theories are not only supported by, but identical with the plans of the level-headed commanders in the field when the grim realities of actual war demanded effective employment.\textsuperscript{38}

Gorrell’s plan did indeed mesh well with the Air Corps Tactical School’s view of strategic bombing. His belief in the efficacy of concentrated, systematic attacks on the key nodes of an enemy’s industrial establishment paralleled the Tactical School’s “industrial web theory.” That theory, jointly developed by an array of brilliant young officer-instructors, was the essence of a uniquely American philosophy of strategic bombing. Its main points were: (1) In “modern warfare,” the military, political, economic, and social facets of a nation’s existence were so “closely and absolutely interdependent” that interruption of this delicate balance could suffice to defeat an enemy state; (2) strategic bombing, precisely aimed at these “vital centers” of an enemy’s industrial complex, could wreck the fragile equilibrium and hence destroy the enemy state’s war-making capability; and (3) such destruction would also wreck the enemy nation’s capacity to sustain normal day-to-day life, which would in turn destroy the will of its populace to fight.\textsuperscript{39} With the development of the Norden bombsight in 1931 and the Boeing B-17 bomber in 1935, Tactical School instructors believed that they now possessed the means to validate their precision bombing theory.

In contrast to Douhet and Trenchard, instructors at the Tactical School stressed attacking a nation’s industrial apparatus rather than its civilian work force. Captain Harold Lee George, who would direct the AWPD-1 planning team in August 1941, stated in a 1934 lecture: “It is possible that a moral collapse brought about by disturbances in this close-knit web may be sufficient to force an enemy to surrender, but the real target is industry itself, not national morale.”\textsuperscript{40} Major Muir S. Fairchild elaborated in 1938: “The direct attack of civilian populations

\textsuperscript{40} Quoted in ibid., 52.
is most repugnant to our humanitarian principles, and certainly it is a method of warfare that we would adopt only with great reluctance and regret. . . . Furthermore, aside from the psychological effects on the workers, this attack does not directly injure the war making capacity of the nation.” He instead advocated attacks against an enemy’s “National Economic Structure,” and exhorted his students to find those targets whose destruction would produce industrial collapse.41

To illustrate a modern nation’s vulnerability to a well-conceived air offensive, Fairchild offered the example of “the greatest industrial nation in the world”—the United States.42 He noted that without adequate raw materials and the power to drive machinery, the American industrial complex could not function. Even in peacetime, a precarious balance held the system together; a strike in a small factory producing door latches for automobiles had halted production in many automobile factories across the country. The demands of war strained that balance to the utmost, as could be seen from the failure of American industry to provide more than token support to the Allied cause in 1917–18. Fairchild asserted that the key elements of American production were 11,842 “critical” factories, almost half of which were located in New York, Pennsylvania, and Massachusetts. The factories in those three states were “a concentrated objective which one might not suspect existed in this great continental industrialized nation of ours.” Their destruction, or that of the transportation or power systems linking them, would “apply tremendous pressure to our civilian population while at the same time seriously impairing [sic] our ability and capacity to wage war.”43

The message of Fairchild’s lecture was twofold: all modern states were vulnerable to air attack, but to determine how they were vulnerable took time. “If there is any one point that the study of air attack on the National Economic Structure impresses upon us,” he insisted, “it is that the objectives to be attacked in this type of an air offensive are not to be selected on the morning of the attack. . . . Only by a careful analysis—by a painstaking investigation, will it be possible to select the line of action that will most efficiently and effectively accomplish our purpose, and provide the correct employment of the air force during war. It is a study for the economist—the statistician—the technical expert—rather than for the soldier.”44

42. Ibid., 8.
43. Ibid., 24.
44. Ibid., 10.
Despite Fairchild's admonition, it was indeed a soldier who began to analyze the "industrial web" of Nazi Germany, America's likely enemy in the late 1930s. The soldier was also a fighter pilot, and he was a fighter pilot with a bent for numbers and technical detail—Captain Haywood S. "Possum" Hansell. Hansell's scoop-shaped nose and pointed chin had earned him the nickname as a child, and the label had stuck. The red-haired son of an Army surgeon had graduated from Georgia Tech in 1924 and entered the Air Corps four years later. After earning his wings, he demonstrated his considerable skill as a fighter pilot during performances with Captain Claire Chennault's "Three Men on a Flying Trapeze" in the early 1930s. As a first lieutenant instructor at the Air Corps Tactical School from 1935 to 1938, however, he embraced the school's notion of strategic bombing and became an articulate spokesman for it. In 1940, with the looming prospect of American involvement in the war in Europe, Major General Henry H. "Hap" Arnold tapped him to work in the newly created office of Strategic Air Intelligence in Washington. Hansell gathered information about the economic structure and air forces of potential enemies, receiving minimal help—and even active resistance—from individuals in the War Department's intelligence office.45 Frustrated, he turned to specialists from the civilian community who had recently entered the military in the wake of Hitler's aggression.

Hansell relied on "the services of a Ph.D. in industrial economics and an expert in oil" to pinpoint the vital links connecting the German war machine.46 He also benefitted from the suggestion of Major Malcolm Moss, a former international businessman who had traveled extensively. Moss knew that American banks had provided the Germans with most of the capital to construct their electric power system, and thought that those banks might possess drawings and specifications of the German facilities. The hunch proved correct, and also yielded diagrams of oil refineries. Using those materials, as well as information from scientific journals, the advice of his experts, and his own detailed knowledge of production requirements, Hansell prepared target folders for the German electric power and petroleum systems.

In the summer of 1941, as a result of the "ABC" discussions between British and American military staffs at the start of the year, Hansell visited Royal Air Force intelligence offices in Great Britain. There, he exchanged information on German targets. He found that his studies on oil and electric power were superior to the RAF's, but that the British

information on transportation, aircraft production, and Luftwaffe organization eclipsed his own findings. The British allowed him to take copies of their reports, and Hansell eagerly did so. He departed in mid-July with a collection of target folders weighing almost a ton, which he crammed into an American bomber.

Upon returning to Washington, he found himself assigned to General Arnold's staff as a member of Lieutenant Colonel Harold Lee George's new Air War Plans Division, which had responsibility for constructing a prospective air campaign. On 9 July, while Hansell was still in Britain, President Franklin Roosevelt had sent a letter to the Secretaries of War and the Navy requesting their estimate of production requirements should the United States fight the Axis. The President had earlier conveyed strong signals that he would endorse strategic bombing if war came. In the aftermath of the 1938 Munich crisis, he had called for an American air force of ten thousand planes with the capacity to produce another ten thousand each year; in May 1940, he jumped the yearly production goal to fifty thousand after the German blitzkrieg began rolling through France; and in May 1941 he directed an increase in heavy bomber production to five hundred per month.47 George viewed Roosevelt's July request to the service secretaries as an opportunity to guarantee the independent employment of air power in a potential conflict. He asked Arnold—who had become Chief of the Army Air Forces when the Air Corps changed its name in June—to obtain permission for the Air War Plans Division to draft the air portion of the plan. Arnold agreed that the time was ripe to make a bid for the independent application of air power. He convinced Brigadier General Leonard T. Gerow, chief of the Army's War Plans Division, that George's office was the best suited to determine Army Air Forces requirements.

The significance of Arnold's action was not lost on those around him. "We realized instinctively that a major milestone had been reached," Hansell recollected. "Suddenly, without anywhere near the opposition we expected, we found ourselves able to plan our own future. How well we would plan and what success we would have in getting that plan past the Army General Staff remained a matter of uncertainty, but for the moment one of our fondest dreams had been realized."48 On Monday, 4 August, Lieutenant Colonel George informed his officers that they


would develop a plan for a prospective air war against Germany and Japan—and that they would complete the plan in nine days.

To guide the effort, George assembled an extraordinary group of talented men. Lieutenant Colonels Orvil Anderson, Max F. Schneider, and Arthur W. Vanaman, and Majors Hoyt S. Vandenberg and Samuel E. Anderson were among the individuals who worked on developing the plan's eighteen separate tabs.49 Yet the responsibility for the most important of those tabs, analyzing such topics as “Bombardment Operations against Germany” and “Bombardment Aviation Required for Hemispheric Defense,” went to George himself and the three men whom he handpicked to guide the plan’s development: Lieutenant Colonel Kenneth N. Walker, Major Haywood Hansell, and Major Laurence Kuter. George, Walker, Hansell, and Kuter knew each other well. All had taught at the Air Corps Tactical School, and all were stalwart disciples of the school's strategic bombing theory. “We had one valuable asset going for us,” Hansell recalled. “We embraced a common concept of air warfare and we spoke a common language.”50

Arnold had asked George to come to Washington from Langley in early July to establish the Air War Plans Division. At age forty-eight, George possessed a wealth of “bombing expertise”: he had flown with the 163d Day Bombardment Squadron in France during World War I, bombed the Ostfriesland during Billy Mitchell’s “battleship tests” in July 1921, served as a bomber test pilot at Aberdeen Proving Ground, directed the Tactical School’s Department of Air Tactics and Strategy, and commanded the 2d Bomb Group, America’s first B-17 outfit. He also possessed a law degree from George Washington University and had won a national competition in typing and shorthand. On 10 July—the day after the President had sent his request to the Secretary of War—George notified Arnold that the Air War Plans Division was open for business. It contained a grand total of four people.51

George divided his “staff” into a “Projects Group” and a “War Plans Group,” placing his good friend Ken Walker in charge of the “Plans” subdivision. Walker had taught George at the Tactical School in 1931–32 and recommended that George remain at Maxwell as an instructor following graduation. A quick-tempered chain-smoker from Cerrillos, New Mexico, Walker had barely missed combat in World War I, earning his wings nine days before the war ended. Prior to joining the Tactical School faculty, he had served as operations officer of the 2d Bomb


School faculty, he had served as operations officer of the 2d Bomb Group at Langley, where he developed formation tactics for bombers. After Maxwell, he attended the Army Command and General Staff School, and then had flying assignments in California and Hawaii. He began work for George convinced that bombing could independently win a war, and certain of "the virtual invincibility of a properly executed bomber offensive." 52 George considered him "one of the most brilliant and far-sighted officers in the United States Army." 53

Providing stark contrast to the nervous intensity of Ken Walker was the restrained Larry Kuter, the last to join George's inner circle of planners. A 1927 West Pointer who sported a Clark Gable mustache, Kuter had been responsible for the emphasis placed on Gorrell's plan in the Air Corps Tactical School curriculum. He also possessed considerable experience in bombers. He had followed Walker as operations officer for the 2d Bomb Group before graduating first in his class (which included Hansell) as a Tactical School student. After teaching at Maxwell, he became the sole Air Corps officer assigned to the G-3 (Operations and Training) Section of the Army's General Staff. There he worked on tripling the size of the Air Corps into a fifty-five-hundred-plane force adequate to defend the Western hemisphere. Walker deemed Kuter's expertise essential to designing a viable plan for a potential air war with the Axis. He persuaded Brigadier General Carl "Tooey" Spaatz, Arnold's Chief of Staff, to request Kuter's temporary release from the Army's General Staff. 54 Spaatz obtained approval, and Kuter reported for duty to the Air War Plans Division on 4 August—the date George notified his staff of their nine-day deadline.

George and his staff accomplished their marathon planning session in the recently constructed penthouse on top of the eighth wing of the old Munitions Building, located on Constitution Avenue between the Washington Monument and Lincoln Memorial. Hastily constructed during World War I as a temporary facility, the three-story, steel and concrete structure contained cramped offices separated by numerous partitions and concrete pillars. The daytime temperature in Washington that August hovered near 90, and the penthouse absorbed the heat. 55 Oscillating fans did little to relieve the oppressive conditions. Hansell later described the penthouse as "intolerably hot," and recalled that "literally, when you put your hand down on your desk, your papers would stick to it." 56 Despite the heat, the short deadline kept George

52. Gaston, Planning the American Air War, 74.
53. Hansell, Air Plan, 4.
54. Ibid., 67.
55. Gaston, Planning the American Air War, 22.
56. Quoted in ibid., 21–22.
and his staff working in the penthouse until nearly midnight every
night, and on two evenings they did not go home. The heat and the
long hours frayed nerves and led to angry confrontations. On one
occasion, Walker railed at George that he could no longer work with
Hansell, precipitating a similar outburst from Hansell. George managed
to smooth the ruffled feathers, and throughout the nine-day ordeal he
worked to promote harmony through a mixture of humor, aplomb, and
dogged determination.

According to President Roosevelt's directive, George and his staff
were to determine Army Air Forces requirements that would guide
American industry if war occurred between the United States and the
Axis powers. The only restriction given George was that his proposal
to conform to Rainbow 5, the overall war plan agreed to by the
British and American staffs during the "ABC" discussions in May 1941.
Rainbow 5 designated Germany as the major Axis threat, and stated
that Anglo-American efforts would focus on defeating Germany first
while maintaining a strategic defensive against Japan in the Pacific.
Like Gorrell in 1917, George realized that he could not estimate the
number of aircraft needed without first determining how air power
would be used. In that regard, he faced a dilemma. Although he and his
staff were convinced that strategic bombing could independently defeat
Germany, they also had to submit a plan that was palatable to Army
Chief of Staff George Marshall. Just as Pershing had expressed concern
over the airmen's emphasis on independent air operations in World
War I, Marshall was likely to reject a plan making no reference to air
support for the ground forces. Accordingly, George listed the American
air mission as: "To wage a sustained air offensive against German
military power, supplemented by air offensives against other regions
under enemy control which contribute toward that power; to support a
final offensive, if it becomes necessary to invade the continent; in
addition, to conduct effective air operations in connection with Hemi-
sphere Defense and a strategic defensive in the Far East." 59

By stating that an invasion of Europe might not be required, George
acknowledged the planners' faith that strategic bombing would obviate
the need for it. Yet George also acknowledged that air power would be
available to guarantee its success if the need arose. Almost a decade
earlier, as a Tactical School instructor, he had told his students: "Whether
air power can, by and of itself, accomplish the whole object of war is
certainly an academic question; but that the air phase of a future war

57. Ibid., 16.
58. Ibid., 58.
59. "AWPD-1: Munitions Requirements of the Army Air Forces," 12 August
1941, Tab No. 1, 1, AFHRA file number 145.82-1. Emphasis added.
between major powers will be the decisive phase seems to be accepted as more and more plausible as each year passes."60 George's careful delineation of objectives enabled him to design a proposal that would put the Tactical School's strategic bombing theory to the test. If the test proved successful, the air offensive would yield victory—and serve as a vindication for an independent service.

Having determined that strategic bombing would be the essence of America's air effort, George and his planners worked to identify those parts of Germany's "industrial web" that contributed the most to Hitler's war effort. Hansell's studies while assigned to the Strategic Air Intelligence office were invaluable in this endeavor. Using them, planners concluded that the electric power, transportation, and oil production systems were the key components of the German economy. They decided that those systems could be wrecked by destroying 124 vital targets—50 electric-power plants, 15 marshalling yards, 17 bridges, 17 inland waterway facilities, and 27 petroleum and synthetic oil plants.61 This bombing would not only destroy German war-making capability, but would also destroy the "means of livelihood of the German people."62 George's group noted that civilians might also be attacked directly once their morale had weakened due to sustained suffering and a lack of faith in Germany's ability to win the war. "However, if these conditions do not exist," the planners cautioned, "then area bombing of cities may actually stiffen the resistance of the population, especially if the attacks are weak and sporadic."63 If the industrial web theory proved correct, German morale could be expected to crack without the targeting of residential districts.

George and his planners realized that the destruction of Germany's industrial apparatus would be no easy task. German air defenses were formidable, causing the group to list "neutralization of the German Air Force" as an "intermediate objective, whose accomplishment may be essential to the accomplishment of the principal objectives."64 Without achieving what Douhet called "command of the air," the ability to wreck German war-making capacity remained problematic; moreover, the invasion of France could not occur unless the Allies first obtained air superiority. George's planners deemed that air supremacy through attrition was unlikely. Many industrial targets lay beyond the range of escort fighters, requiring bomber squadrons to rely on Walker's formation tactics as they fought their way across Germany. "We knew that defensive

60. Quoted in Hansell, Air Plan, 34.
61. "AWPD-1," Tab 1, 3-7.
62. Ibid., 2.
63. Ibid., 7.
64. Ibid., 2.
firepower in the air would not suffice to defeat the Luftwaffe," Hansell recalled.65 Neither would attacking German air bases, which were well dispersed and heavily defended. As a result, planners decided to attack the Luftwaffe before it left the assembly line. They designated eighteen aircraft factories, six aluminum plants, and six magnesium plants as essential to aircraft production, and added them to the list of vital centers earmarked for destruction.

Until negated, German air defenses were certain to hamper bombing accuracy, and accurate bombing was essential to wreck Germany's industrial web. Marginal weather also threatened to disrupt the precision bombing effort. Based on weather studies that Hansell had obtained from the British, George's group estimated that an average of only five days a month would be suitable for daylight operations over the Reich.66 The best weather occurred between April and September. The prospect of stiff defenses and poor flying conditions, combined with George's own experience from Aberdeen Proving Ground, caused planners to predict that raids on Germany would be 2.25 times more inaccurate than peacetime practice bombing.67 George demanded that bombers had to attack each target in sufficient force to achieve a 90 percent probability of destroying it—the same percentage deemed acceptable in similar problems at the Air Corps Tactical School.68 In addition—as Gorrell had pointed out in 1917—bombers would have to attack many targets more than once to prevent the Germans from repairing the damage. The planners anticipated that the Germans could repair most targets other than electric power facilities within two to four weeks; power plants would take longer to restore.69

George's group next calculated the number of bombers required to guarantee a 90 percent level of destruction to the 154 key targets selected, given the expected accuracy and the need for repeated attacks. They determined that eleven hundred bombers were necessary to ensure a 90 percent probability of destroying a single 100-foot by 100-foot target under combat conditions.70 A like number of aircraft would have to return to that target in two weeks to keep it out of action. Planners quickly realized that an enormous number of bombers would be needed to destroy Hitler's war machine through the constant pounding that they believed was necessary. George thought that to dismantle German industry would require at least six months of non-stop bombing,

66. Ibid., 86.
67. Ibid.
and planners anticipated an April-September offensive to coincide with the most favorable flying weather. Given weather, maintenance, and crew rest limitations, they estimated that a Bomb Group containing seventy aircraft could send thirty-six of its bombers against Germany eight times a month.71 Thus, to wreck the 154 key targets in a six-month span would require ninety-eight Bomb Groups—or 6,860 bombers—at the start of the offensive.

These bombers would consist of: ten groups of B-25s and B-26s, twenty groups of B-17s and B-24s, twenty-four groups of B-29s, and forty-four groups of B-36s. Planners noted that the ideal type of bomber for the offensive was the B-29; B-25 and B-26 "medium bombers" would suffice "only because they were available."72 The vast numbers would swamp airfields in Great Britain, which would serve as home base for the B-17s, B-24s, B-25s, and B-26s. B-29s would operate against Germany from Northern Ireland and the Middle East. The B-36, a proposed behemoth with a four-thousand-mile range, could fly from Newfoundland, Greenland, Africa, India, or the northeastern United States. George's staff anticipated that each group engaged in combat would lose 20 percent of its aircraft (and 15 percent of its flying personnel) per month, which could create a requirement for an additional 1,272 bombers.73

Although the estimate of bombers needed to assault Germany dwarfed previous aircraft projections for the entire Army Air Forces,74 those bombers were by no means the only airplanes envisioned by George and his planners. The massive air offensive against the Third Reich would require escort fighters, fighters to defend air bases, and support aircraft. Moreover, substantial numbers of fighters and bombers were needed to defend the Western Hemisphere, and the teeth of the strategic defensive in the Pacific would consist of B-29s and B-32s operating from bases in Alaska, Siberia, and the Philippines. All told, George's group calculated that 239 groups and 108 observation squadrons were necessary to defeat the Axis—a grand total of 63,467 airplanes. If the United States began fighting, as anticipated, in the spring of 1942, planners thought that the nation would be hard pressed to produce such an armada before the end of 1943.75 Still, they believed that a land invasion of Germany in less than three years was unlikely, which would

71. Ibid., 57.
73. Gaston, Planning the American Air War, 25.
74. In July 1941, Arnold's staff had projected fifty-four combat groups, containing four thousand bombers and fighters and 218,800 men. See Craven and Cate, eds., Army Air Forces in World War II, 1: 105.
75. Futrell, Ideas, Concepts, Doctrine, 1: 110-11. The B-36 groups were unlikely to be fully operational before 1945.
give air power a chance to achieve an independent victory.\(^76\) A limited air offensive would start as soon as America entered the war, and the six-month aerial pounding of the Reich would occur from April to September 1944. Kuter, charged with estimating manpower requirements, determined that by the start of the offensive the Army Air Forces would have expanded from its authorized limit of 152,000 men in August 1941 to 2,164,916. The latter figure would give the Army's air arm a half million more men than were in the entire Army at the end of 1941.\(^77\)

On the afternoon of 12 August 1941, an exhausted Hal George delivered a copy of "AWPD-1: Munitions Requirements of the Army Air Forces" to the Army War Plans Office. The plan's appearance reflected the rushed nature of the project. "It was not an impressive looking document," Hansell remembered. "The pages were typed and mimeographed. Corrections were made in ink. The charts were black and white, hastily prepared and crudely pasted together."\(^78\) Nevertheless, despite sweltering conditions and flaring tempers, George's group had completed their task on schedule.

Next came the job of persuading civilian and military leaders that the proposal was sound. George had submitted the plan to the Army War Plans Office without having it approved by Hap Arnold, who was attending the Argentia Conference in Placentia Bay, but he knew that Arnold would have no qualms in endorsing it. Sterner challenges were on the horizon. In the following month, the planners briefed AWPD-1 to Robert Lovett, Assistant Secretary of War for Air; General George Marshall, Army Chief of Staff; and Henry Stimson, Secretary of War. Lovett received the briefing on 13 August, accompanied by General Gerow from the Army War Plans Division and General Spaatz. A World War I Navy pilot and an outspoken air power advocate, Lovett avidly supported the proposal. Arnold heard the briefing with General Marshall on 30 August. The Army Chief of Staff said nothing until after the presentation was over and discussion had ceased. Then he commented that the plan had merit, and the next day he scrawled "Okay, G. C. M." on the cover of the copy that he received.\(^79\) George's staff culminated their "selling" of AWPD-1 on the afternoon of 11 September and the morning of the 12th, when George, Walker, and Kuter briefed Secretary of War Stimson in his office in the Munitions Building. Stimson accepted the plan as "a matter-of-fact statement of the air forces required to

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\(^{76}\) "AWPD-1," Tab 1, 2. The plan stated: "If the air offensive is successful, a land offensive may not be necessary."

\(^{77}\) Gaston, *Planning the American Air War*, 42.

\(^{78}\) Hansell, "USAAF Plans," viii.

defeat the Axis.” Yet he noted that the enormous number of men and planes that would be required to implement the scheme “depended entirely upon the nation being in a war spirit or at war.”

With the Japanese attack on Pearl Harbor in December, America acquired the martial spirit that Stimson thought necessary to spur the large-scale production of combat aircraft. The turmoil created by Pearl Harbor canceled a scheduled briefing on AWPD-1 to the President, and Hansell later termed the lost opportunity “a cruel disappointment” because he believed that it prevented bombing advocate Roosevelt from fully understanding the value of a concentrated air offensive. Yet the seemingly inevitable march towards war in the late summer of 1941, with the Japanese defying Roosevelt’s oil embargo as they advanced across China, and the Germans threatening Atlantic sea lanes while they plowed towards Moscow, was likely a key reason that both Marshall and Stimson endorsed AWPD-1 without complaint. As historian Michael Sherry has observed, “Strategy, then, along with Roosevelt’s wishes about how to fight the war, made the War Department amenable to a vision of air war that would have seemed repugnant and fanciful a few years earlier.”

Marshall was not a man to put parochial concerns ahead of sound strategy. Although he demanded air support for ground forces, he was not opposed to the concept of strategic bombing. Through association with airmen such as Arnold and Major General Frank Andrews, Marshall had gained a healthy respect for air power’s potential. Andrews bore a large measure of responsibility for shaping Marshall’s views. Marshall had served as chief of staff for Andrews’s father-in-law, Major General Henry T. Allen, and had first met Andrews, the Commander of the General Headquarters Air Force, in August 1938. Marshall left the encounter tremendously impressed by the bomber pilot and his pitch for Air Corps autonomy. After becoming Acting Chief of Staff of the Army in July 1939, Marshall made Andrews his Assistant Chief of Staff for Training and Operations—the first time ever that an airman had become one of the top four assistant chiefs. Marshall would continue

82. Sherry, Rise of American Air Power, 100. Official Army Air Forces historians Wesley Frank Craven and James Lea Cate offer this explanation: “Perhaps its [AWPD-1’s] ready acceptance was partly due to the pressure of time in meeting the President’s directive, for irrespective of the intrinsic merits of AWPD-1, the views expressed therein were not wholly consistent with those of the War Department.” See Craven and Cate, eds., Army Air Forces in World War II, 1:146.
to back Andrews’s career until its tragic conclusion in a B-24 crash during World War II. In the autumn of 1941, Andrews’s air power convictions helped to assure that the Army Chief of Staff would endorse AWPD-1. Marshall realized that, if war came in early 1942, the invasion of Europe could not occur immediately, and Germany could not go unseathed during the buildup for the ground offensive. If strategic bombing could topple Hitler and eliminate the need for a risky amphibious assault, Marshall was willing to give it a try.

Marshall's approval of AWPD-1 on the eve of Pearl Harbor guaranteed that the Army Air Forces would use it as a blueprint once war began. That blueprint was not perfect, but many of its flaws could be seen only in retrospect. For instance, George and his planners concluded that German industry was running at full bore in the wake of the assault on the Soviet Union. They believed that the taut nature of the German economy would increase its vulnerability to a precisely aimed air offensive, because no reserve capacity would be available to make up for the damage caused by bombing. This assumption proved false. As historian Eric Larrabee has noted: “Two myths coincided. Everyone knew that Germans are efficient and everyone knew that dictatorships are efficient; therefore, if Hitler says Germany is totally mobilized for war, Germany must be totally mobilized for war.”84 The view that Germany had fully mobilized was also due to mirror-imaging. The planners, especially Kuter, were acutely aware of America’s failure to flex its economic muscle in World War I. They believed that American industry would not allow them to wage total war for two years, and they knew that the Germans were already waging war on a global scale. The logical conclusion was that German factories must be producing at peak capacity. In fact, they would not do so until after Stalingrad.

The planners also had difficulty in predicting the nature of the war they would face in other theaters. They allocated too many aircraft for defense of the Western Hemisphere, and devoted scant attention to air needs in the Pacific. “The allowances for defensive measures in the Far East were skimpy, to say the least,” Hansell later observed. “It was presumed that the U.S. Navy would be the primary agency for this requirement.”85 While working in the Strategic Air Intelligence section, Hansell had tried to identify Japanese vital centers, but the attempt proved fruitless. “The Japanese had established and maintained a curtain of secrecy that we found absolutely impenetrable. There were not even any recent maps available,” he recalled.86 The lack of information on

86. Hansell, Air Plan, 50.
Japanese production capabilities would plague air leaders throughout the war, and Hansell would learn that frustration firsthand as commander of XXI Bomber Command in late 1944.

Yet the greatest flaw in AWPD-1 was not the absence of data, but the preponderance of it. The plan reflected the "American propensity to see war as an engineering science," observed military theorist and retired Air Force Lieutenant Colonel Barry Watts.87 With the precision of a lead bombardier operating his Norden bombsight on a cloudless day over an undefended target, George and his planners cranked their Monroe calculators to yield the exact number of bombers needed to destroy German war-making capability in a six-month air campaign. But the skies would often be cloudy, the flak thick, the fighters relentless, and the targets dispersed. Although planners tried to allow for this "friction"—Clausewitz's term for the factors distinguishing real war from war on paper—they failed to give it adequate heed. The belief that German industry contained no slack, and the uncertain evaluation of Japan's internal economic structure, reflected a view of war that was more abstract than concrete.

The same can be said about the meager provision for fighters to escort bombers to German targets. The planners allocated twenty-one groups of fighters to support the ninety-eight Bomb Groups that would attack Germany, and called for the development of only thirteen experimental escorts. (Lieutenant Colonel Clayton Bissell, an airman assigned to the Army's War Plans Division, pointed out to George after the plan's completion the incongruity of requesting 3,740 B-36s that had not left the drawing board while simultaneously asking for just thirteen proposed escorts.88) Unescorted bombers proved incapable of winning air superiority through attacks on aircraft factories and air bases. The Allies did not obtain the control of the sky needed to launch the Normandy invasion until early spring 1944, when the combination of hurriedly developed long-range fighters and bombers serving as "bait" decimated the Luftwaffe's already depleted pilot force.89

The planners' conviction that bombing could collapse civilian morale by wrecking a fragile economic web rather than by directly targeting the populace was also a reflection of faith. Pinpointing vital centers proved enormously difficult in practice. Technological limitations

combined with friction to dilute the "precision" aspect of precision daylight bombing. To maintain air pressure on Germany during overcast winter weather, American air leaders turned to radar to locate targets through clouds, and radar bombing was anything but accurate. Eighth Air Force operations analysts estimated that on the twenty-seven radar bombing missions between the end of September 1943 and January 1944, only five percent of the bombs dropped fell within one mile of the aiming point. 90 Radar bombing accuracy did not significantly improve for the duration of the war. 91

To the German civilian, the rationale behind such raids mattered little, for in terms of results they mirrored the Royal Air Force's area attacks. Even when key industrial links were destroyed with a minimum of civilian casualties, the impact on German morale was ambiguous. As the war progressed, the demands of unconditional surrender, the desire to end the war quickly, and the hope that air power's performance would justify air force autonomy eclipsed some of the qualms displayed at the Air Corps Tactical School about attacking targets that would cause large numbers of civilian deaths. Historian Ronald Schaffer further asserts that the "plenitude of resources" available to air commanders in the closing stages of the European war, and American racism and desire for revenge in the Pacific, helped prod air leaders to condone indiscriminate assaults on cities. 92 The exact motives behind the raids during the war's last year likely differed for each individual involved in the decision-making process. What can be said with certainty is that the moral dilemma about bombing civilians loomed large throughout the American air campaigns in both Europe and the Pacific, and could not be resolved by applying mechanistic solutions.

AWPD-1 displayed an abstract view of war because George, Walker, Hansell, and Kuter had committed themselves to proving the Air Corps Tactical School's untested theory of strategic bombing. They laid the groundwork for an independent air campaign that, once accomplished, would present a strong argument for air force autonomy. Hap Arnold shared their faith that high altitude, daylight precision bombing could destroy a nation's war-making capacity—and he also passionately desired an independent air force. He did all that he could to transform their vision of AWPD-1 into reality.

In the final analysis, George and his planners proved remarkably

91. Ibid., 294.
prescient and remarkably fortunate. Their estimate of 6,860 bombers to assault Germany compared very favorably to the 7,177 American bombers in the European theater in March 1945. All told, they predicted that the Army Air Forces would need 239 Combat Groups, 63,647 aircraft, and 2,164,916 personnel; actual numbers were 243 Combat Groups, almost 80,000 aircraft, and some 2,400,000 men and women. Their projected timing for the “all-out” air offensive against Germany, April-September 1944, closely paralleled the September 1944–April 1945 brunt of the Combined Bomber Offensive, during which allied air forces dropped 60 percent of the total bomb tonnage that fell on Germany. The intensive assault against the Reich could have begun sooner but for the diversion of many bombers to support ground campaigns in North Africa and Normandy. By the time the massive pounding began, Hitler had finally geared up the German economy to wage total war, and its overtaxed industrial complex—combined with significant losses to its resource base and work force—made it particularly susceptible to attacks against oil and transportation.

The proposed offensive against electric power never occurred. Wartime analysts deemed its destruction would have had a meager impact on the German war effort. Hansell later disagreed with that assessment and quoted Albert Speer, Hitler’s Minister of Armaments, on the value of the electric power system: “The destruction of the power plants would be the most radical measure as it would at once lead to a breakdown of all industry and public life. Destruction of fifty-six targets would produce this effect.” Yet as Alfred Mierzejewski has cogently argued in The Collapse of the German War Economy, 1944–1945, coal, not electric power, was the key ingredient of Hitler’s war machine, and the destruction of railroad marshalling yards prevented coal from reaching the factories. This effect of the final assault against German transportation was fortuitous rather than intentional. Thus, Mierzejewski concludes,

it may be contended that strategic bombing can make a significant contribution to victory in war. But it is not a substitute for a balanced strategy encompassing every component of a nation’s military power. It is peculiarly reliant on accurate intelligence, sensibly interpreted. Above all, strategic bombing is not a cheap, easy, or quick avenue to success. It involves a major investment of national resources to build a force powerful enough to be effective. To be successful, strategic bombing requires simultan-

93. Gaston, Planning the American Air War, 108.
eons and repeated strikes against a small number of indispensable sectors of the enemy economy after air superiority has been won.96

After the war, American air leaders realized that their application of air power had not been without flaws, but they also emerged from the conflict believing that their fundamental concept of air power had been proven correct. The emphasis on strategic bombing remained, and comments such as Speer's further justified the industrial web theory as the cornerstone of the American approach to strategic bombing. Seemingly validated, the tenets of AWPD-1 became a blueprint for future air campaigns. The individuals who developed that plan were brilliant men, operating under a severe time constraint, and their vision adequately guided the Army Air Forces in World War II. Yet a key reason for the success of AWPD-1 was that, in the main, the Axis powers and the war they fought conformed to the Air Corps Tactical School's notion of modern warfare. The next enemy would not be so accommodating.

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A tapestry of American air campaign planning before Pearl Harbor depicts recurring images. Air planners from Gorrell to George tried to determine the best way to use the air weapon, and all chose to stress air power's premier "independent" application—strategic bombing—rather than focusing on support for land and sea forces. This emphasis on strategic bombing was shaped to some degree by the desire to create an independent Air Force, but also stemmed from the sincere conviction that air power could single-handedly achieve victory by destroying an enemy's war-making capability and will to resist. Having concluded that a nation could not fight if its economic fabric were shredded, and believing that air power, pinpointed against the economic web, could cut the key threads binding together the enemy state, air planners searched for the proper threads to attack. Based on their view of "modern" war, they determined that production centers and their means of distribution were the essence of war-making capability, and that the destruction of those links would also wreck the will of the enemy populace to keep fighting. Accordingly, George and his planners focused on destroying industry, while also stressing that air superiority was a prerequisite for a successful air offensive.

Pinpointing Devastation

In advocating strategic bombing, air planners first had to show that their proposals would not neglect the air needs of Army or Navy commanders, who were often skeptical of air power's ability to achieve victory alone. Gorrell had to convince Pershing that the plan for bombing Germany would not deny air support to ground forces, and AWPD-1 stated that air power would support an invasion of Europe if such an invasion were necessary. Many airmen viewed the obligation to demonstrate that they would support their sister services as genuflection. Yet air planners could not ignore the concerns of the theater commander or Chief of Staff, who had to consider the possibility that independently applied air power might not prove decisive. That airmen received the green light to conduct strategic bombing was a tribute to the vision of Army generals like Pershing and Marshall, who cast off their parochial shackles to concentrate on the goal of victory.

In the end, individuals, as well as ideas, were the indispensable elements of American air campaign planning before Pearl Harbor. Although concepts such as the industrial web theory helped guide planning, the men who translated those ideas into workable designs on paper, and who convinced others to back their proposals, provided an essential impetus that launched the American air assault on Nazi Germany. The unique backgrounds of George, Walker, Hansell, Kuter, and countless other planners contributed directly to the conduct of America's World War II air offensives. The contributions of those individuals were not lost on Air Force Colonel John Warden and his ad hoc Checkmate team as they developed the concept of operations for the Desert Storm air campaign. On the eve of the air assault against Baghdad, a visitor searching for Warden's planners would have walked past piles of discarded desks and chairs littering a hallway in the Pentagon's basement until arriving at a door marked: "USAF Air War Plans Division, 1941-1991."