

SPECIAL STUDIES

**The Development of Air Doctrine
in the Army Air Arm
1917-1941**

Thomas H. Greer

New Imprint by
Office of Air Force History
United States Air Force
Washington, D.C., 1985

Library of Congress Cataloging-in-Publication Data

Greer, Thomas H.

The development of air doctrine in the Army air arm, 1917-1941.

(Special studies)

Reprint. Originally published: Maxwell Air Force Base, Ala.: USAF Historical Division, Research Studies Institute, Air University, 1955. (USAF historical studies: no. 89)

Bibliography: p. 142

Includes index.

1. United States. Army—Aviation—History. 2. Aeronautics, Military—United States—History. 3. Air power. 4. Military art and science—United States—History—20th century. I. Title. II. Series: Special studies (United States. Air Force. Office of Air Force History)

UG633.G73 1986 358.4'00973 85-21378

ISBN 0-912799-25-0

This volume is a reprint of a September 1955 edition originally issued by the USAF Historical Division, Research Studies Institute, Air University.

FOREWORD

*T*his monograph recounts the development of air doctrine in the Army air arm from 1917 to 1941. It includes concepts, both strategic and tactical, that emerged during World War I and the period following, up to the entry of the United States into World War II. The study is based primarily on official Air Force records and upon interviews with officers of the air arm who have been especially associated with air doctrine. It was prepared for the USAF Historical Division by Dr. Thomas H. Greer, formerly a member of the Division and presently associate professor of humanities, Michigan State College. A number of changes in, and additions to, the original draft have been made by members of the Historical Division, notably Mr. Robert T. Finney and Dr. Albert F. Simpson. All such changes and additions have been based upon Historical Division studies and data not available to Dr. Greer when he prepared the basic draft. Both the original draft and the final version were edited by personnel of the Division.

Like other Historical Division studies, this history is subject to revision, and additional information or suggested corrections will be welcomed.

Contents

INTRODUCTION	vii
I THE AIR SERVICE IN WORLD WAR I, 1917-1918	1
Prewar Organization and Concepts	1
American Participation in World War I	3
General concepts of warfare and air employment	3
Over-all air operations, organization, and control	4
Pursuit aviation	7
Bombardment aviation	9
Attack aviation	12
Air plans during the armistice	12
II THE HEROIC AGE OF DOCTRINAL DEVELOPMENT, 1919-1926	14
Diverging Views of the Nature of War	14
The War Department view	14
Views of Air Service leaders	15
The Struggle for the Control of Airpower	20
Demands for complete separation	20
Arguments of the air crusaders	21
Rebuttal by the high command	22
Creation of the Army Air Corps (1926)	25
Evolving Doctrines of Air Employment	30
The general functions of military aviation	30
Argument with the Navy regarding coast defense	33
Pursuit aviation	36
Bombardment aviation	38
Attack aviation	39
Comparative summary of doctrines in 1926	40
III DEVELOPMENT OF THE AIR FORCE IDEA, 1926-1935	44
Development of the High-speed Bomber	44
Efforts to stimulate improved aircraft design	44
Successful development of two-engine bombers: the B-9 and B-10	45
The B-17 "Flying Fortress"	46
Trend of Doctrine at the Air Corps Tactical School	47
Concepts of the nature of war: influence of Mitchell and Douhet	48
The employment of airpower	52
Bombardment aviation; the precision doctrine and the escort problem	57
Pursuit aviation	60
Attack aviation	66

	The Impasse with the Navy Regarding Land-based Bombardment	67
	Establishment of the GHQ Air Force (1935)	70
IV	REFINEMENT AND SUBSTANTIATION OF THE LONG-RANGE BOMBARDMENT CONCEPT, 1935-1939	76
	Hemisphere Defense Policy as a Factor in Strategic Concepts and Air Doctrine	76
	Elaboration of Air Theory at the Air Corps Tactical School	77
	The nature of war and the employment of airpower	77
	Bombardment aviation	80
	Pursuit aviation	83
	Attack aviation	87
	The Crucial Fight for Production and Development of the Long-range Bomber	89
	Bomber program related to coast defense	89
	Andrews presses for exclusive procurement of four-engine bombers	91
	Air Corps demands for unlimited development of the bomber	93
	The General Staff blocks the way	94
	President Roosevelt removes the block	100
	The Influence of Foreign Wars upon American Air Doctrine	101
	China	102
	Ethiopia	102
	Spain	102
	Munich	103
	Adjustments in Air Organization	103
V	PREPARATION OF AIR DOCTRINE FOR WORLD WAR II, 1939-1941	107
	General Influence of the European War upon the Theory and Position of Airpower	107
	Tactical Lessons from the Air War Abroad	108
	Final Shaping of Air Doctrines on the Eve of American Involvement	110
	Purpose and nature of warfare	110
	The role and employment of airpower in war	111
	Bombardment aviation	115
	Pursuit aviation	120
	Attack and light bombardment aviation	121
	Blueprint for action: AWPD/1	123
	Establishment of Army Air Forces (1941)	126
VI	CONCLUSIONS	128
	FOOTNOTES	131
	BIBLIOGRAPHICAL NOTE	142
	APPENDIX	
	1. Organizational Charts	144
	2. Redesignations of the Army Air Arm, 1907-1942	149
	INDEX	151

INTRODUCTION

When the debacle at Pearl Harbor thrust the United States into a war for survival, the nation marshalled its forces on land and sea and in the air. And although land, sea, and air forces all played vital roles in securing the triumph, the part of the air arm was unique. For the first time in the history of war, airpower was employed as a major striking force, drastically altering the course and nature of the struggle and decisively influencing the outcome.

American airpower was the product of men and machines—and something more. Like every other kind of military force it depended basically upon ideas—ideas both of practicable and of potential employment. But unlike the time-honored forces of land and sea, the air force had neither traditions nor theories developed over long centuries of experience. Fighting on land dates back to the dawn of human society; fighting on water must be nearly as ancient. Through the tortuous history of warfare, men had time—lots of it—to devise the weapons, tactics, and strategy of surface combat. Air warfare, on the other hand, came with dramatic suddenness. It presented, within an incredibly short time, awesome and revolutionary weapons of destruction. Man's imagination was staggered, or should have been, by the possibilities of this new medium, and he strove to envision its optimum use for defense and offense. Here, indeed, was a challenge to the power of man to think and plan—and the stakes were high in terms of national power and survival. The importance of this new medium as seen in the long view of history, has been forcefully put by a contemporary military observer, Major George Fielding Eliot:

The history of civilized mankind shows us but three . . . revolutionary military inventions, or discoveries: discipline, gunpowder, and the airplane . . . The airplane, for the first time in the long and bloody history of human conflict, has given to warfare the means of striking, not only at the army or navy of the opponent, but directly at the seat and source of his power—at his citizenry, at his capital city, at his industrial, commercial, and political centers—without first having to overthrow the armed forces with which he seeks to protect them.¹

The story of the development of air doctrine is the story of an unprecedented intellectual achievement. It involves bold flights of imagination, stern logic, and new patterns of thought. It was achieved, as most new ideas are achieved, in the face of fierce opposition compounded of inertia, vested interest, and rigid thinking. But when the crucial test came in 1941, America had the makings of airpower—both the men and machines and a carefully developed doctrine which could readily be translated into a plan of military action. That the doctrine was sound is affirmed by the results of America's air war.

But air doctrine is a dynamic thing, and the ideas of 1941 will not serve the needs of the present and future. We must keep searching for and developing ideas in order to keep pace with the continuous technological and strategic changes. In that important task we can receive inspiration and guidance by examining the doctrinal steps and missteps of the air arm during its formative period, 1917-1941.

THE AIR SERVICE IN WORLD WAR I, 1917-1918

As a preparation for the major role it was to play in World War II, the American air arm found its experience in the first World War was brief and limited. That war had an important bearing, however, upon the development of air doctrine in the interval between wars, because it was the only actual combat test to which American airmen and equipment had been put. Theories and practice maneuvers might be worked out in the light of later trends in technology and methods of warfare, but one fact always remained: the only battle test up to 1941 had been the action in World War I. Naturally, the conclusions drawn from that action gave initial direction to thought about the employment of airpower and continued during the following years to exercise a substantial, though declining, influence upon it.

PREWAR ORGANIZATION AND CONCEPTS

The American air arm was an infant in almost every respect when it was called upon to meet the challenge of World War I. Established by military order as the Aviation Section of the Signal Corps in August 1907,* it had not achieved statutory recognition as such until July 1914, shortly before the outbreak of war in Europe.¹ Before and after that time there was agitation to raise the air arm to the status of a separate branch of the Army, but this movement did not meet with success until June 1920.² In the prewar years and during the conflict itself, American airpower was the "baby" of the Signal Corps.

The question of the proper place and organization of the air arm was, in fact, the most discussed problem relating to military aviation during the prewar years. Before 1914 little was heard of types of planes and

tactics, but a great row had already started concerning organization. The subject of this argument was, of course, a matter of military doctrine; for organization relates to the control and purposes of any military component. The intimate connection between concepts of the use of aviation and the manner of its organization may clearly be seen in the early debates upon the issue.

One might have suspected that agitation to make aviation a separate branch would have begun among the airmen themselves. It was from the outside, however, that such proposals were first made. Rep. James Hay, chairman of the House Committee on Military Affairs, in February 1913 proposed a bill which would have created a separate Air Corps as one of the line components of the Army. But legislative hearings and correspondence relating to the bill showed that most military men, including flyers, were opposed to it at the time. Assistant Secretary of War Henry S. Breckenridge saw military aviation as "merely an added means of communication, observation and reconnaissance," which "ought to be coordinated with and subordinated to the general service of information and not erected into an independent and uncoordinated service." Breckenridge emphasized the point that aviation was still in its infancy, that it was destined for a long time to be an auxiliary of the line, and that its immediate future would therefore best be handled by the Signal Corps.³ Col. George P. Scriven, Acting Chief Signal Officer, upheld this view. He also stressed the fact that the Signal Corps had the technical information and qualified personnel to handle aviation needs—in his view aviators were young men without the requisite scientific knowledge and mature judgment.⁴

*See Appendix 1.

Although many flyers resented this sort of reference to them, they appeared virtually unanimous in their opposition to the Hay bill. Outspoken were such future leaders of American airpower as Benjamin D. Foulois, Henry H. Arnold, and William Mitchell. Lieutenant Foulois thought it was too early for a separate Air Corps, but conceded that separation was only a matter of time. Lieutenant Arnold felt that since the Signal Corps was doing all it could for aviation, the situation was satisfactory. Captain Mitchell went so far as to assert that creation of a separate branch would retard the development of aviation as a branch of reconnaissance. In fact, there is only one officer on record in favor of the Hay bill. He was Capt. Paul Beck, who insisted that aviation was not logically a part of the Signal Corps since of its four functions, reconnaissance, fire control, aggressive action, and transportation, only one pertained to signals. He disagreed with the contention that separation should be postponed, charging that the longer the Signal Corps controlled aeronautics, the smaller would be the possibility that aviation would ever come into its own.⁵

The attitude of Captain Beck toward control by the Signal Corps foreshadowed a widening rift between the aviators and their nonflying military superiors. This personnel friction was at least as important as theoretical differences in bringing about eventual separation of the air arm from the Signal Corps. The basis for the difficulty seemed to lie in the special restrictions placed on flying officers with respect to age and marital status. The aviators resented such treatment and also chafed under what they regarded as the apathetic attitude of the Chief Signal Officer and the General Staff toward military aviation. The "high brass," for its part, found the aviators too outspoken and too indifferent toward conventional military customs. As the Chief Signal Officer, Brig. Gen. George P. Scriven, explained in February 1916, the trouble stemmed from the "aviation officers . . . unbalanced as to grades, young in years and service, and deficient in discipline and the proper knowledge of the customs of the

service and the duties of an officer." Scriven imputed further that there was deliberate motive behind the friction which had been created. Behind their "unmilitary, insubordinate, and disloyal acts," he charged, was a burning ambition to set up a new and independent organization for aviation.⁶

The growing personal bitterness and the rising demand for separation of the air arm from the Signal Corps compelled the attention of Secretary of War Newton D. Baker, who in April 1916 directed the General Staff to launch a thorough investigation of the matter. At the same time he took special notice of the impatient attitude of the youthful aviators toward their nonflying superiors. Baker contended that what was needed was not a separate service, not a new corps but a new man in command—a man of mature and severe judgment, who could restrain with discipline the exuberance of youth.⁷ Secretary Baker apparently had such a man in mind, for in February of the following year he appointed Brig. Gen. George O. Squier to replace General Scriven as Chief Signal Officer.⁸

The change in commanding generals represented no solution to the underlying problem. Secretary Baker himself admitted, in the same month in which he ordered the investigation of military aeronautics, that the experience of World War I showed that the air arm was no mere auxiliary service. Aviation was capable of action as an offensive arm, in addition to its function of scouting, carrying messages, and controlling gunfire. In the near future, he predicted, the United States would add armored and armed planes to its air fleet, and this development required the creation of a new fighting arm. Specifically, the time had come for a change in the relation of the Aviation Section to the Army. But Secretary Baker made no move for immediate change, and the initiative once more was left to Congress. In March 1916 Representative Charles Lieb of Indiana had already gone beyond earlier proposals for a separate aviation branch of the Army, by introducing the first of a long series of bills providing for a wholly autonomous Department of Aviation.⁹

The acrimonious debate over organization between old-line ground officers and the impatient flyers reflected an equally sharp divergence of view with respect to the functions of military aviation. Since, before the United States entrance into World War I, American airpower was hardly more than a wish, these differences could not assume very concrete form and were, indeed, more speculative than factual. The ground officer point of view, related to the actual planes and operations of the Aviation Section before 1917, saw military flying as an extension of the traditional means of communication and observation. As one veteran infantry officer put it thirty-five years later, "We first discovered that airplanes could go faster and higher than horses. They took over reconnaissance from the cavalry."¹⁰

The flying officer, on the other hand, looked beyond the machines at hand toward the potentialities of airpower. For example, between 1910 and 1914 aviators conducted a number of experiments designed to develop the military value of the airplane. Lt. Paul Beck early experimented with dropping bombs from an aircraft, and by October 1911 the first American bombsight and bomb dropping device, invented by Riley E. Scott, had been tested; Lt. Jacob E. Fickel experimented with firing a rifle at a ground target from an airplane, and Capt. Charles DeF. Chandler and Lt. Thomas DeW. Milling went a step farther by firing a Lewis machine gun from a plane; aerial photographs were taken; and two-way radio telegraphy between an airplane and the ground was demonstrated by Lts. H. A. Dargue and J. O. Mauborgne. Speaking also some thirty-five years later, General Milling asserted that the pioneer flyers had seen the true role of aviation even while their equipment was still in the "egg crate" stage. Milling held that almost from the beginning the airplane was seen not only as a means of observation and liaison, but as a striking arm against forces in the field and supporting facilities to the rear. "Our doctrine," said Milling, one of the earliest men to fly for the Army, "has been consistent since 1913, within the limits of our equipment."¹¹

AMERICAN PARTICIPATION IN WORLD WAR I

General concepts of warfare and air employment

When America joined the war against the Central Powers in 1917, the divergent points of view between the ground and air leaders were carried from the field of theory to the field of action. This transfer tended to strengthen the influence of the ground officers, because the war had to be fought with available, not potential weapons, and because the battle on the Western front had already become frozen in a complex pattern of ground operations. For the most part, American forces had to fit into that pattern; they had neither the manpower nor the equipment to alter the fundamental nature of the struggle. It was a struggle of infantry, trenches, and artillery; of attack and counterattack; of attrition and reinforcement. It is no wonder that the high command regarded air operations as an adjunct to the mighty ground forces which had been committed to the mortal and decisive combat.

During the course of World War I American aviators saw the possibilities of a different kind of war and a more effective use of airpower. The great majority of those flyers, however, held junior rank in the Army, and their voices carried little weight in the superior councils of war. So long as air warfare was controlled by ground officers, there was slight chance that airplanes could be used for other than direct ground support. Gen. John J. Pershing, commander of the AEF, summed up the situation in his memoirs many years afterward. He referred to the tendency of the fliers to attach "too much importance" to missions behind enemy lines for the purpose of interrupting communications. Pershing asserted that "this was of secondary importance during the battle, as aviators were then expected to assist our ground troops. In other words, they were to drive off hostile airplanes and procure for the infantry and artillery information concerning the enemy's movements." Best results were not obtained, he concluded, until aviators were required to

serve a while with the infantry in order to get its point of view; coordination of effort was also improved by assigning selected ground officers to fly missions with pilots. The general admitted that the primary aim of military aviation was control of the air, but the ultimate objective remained traditional: "Once in command of the air," Pershing wrote, "the enemy's artillery and ground troops became the object of their attacks."¹²

When air officers expressed the view that the true objective of war might be the enemy's national will and productive capacity, rather than armies in the field, they were sharply corrected by their military superiors. When late in the war the Air Service, in cooperation with the British, undertook preparations for independent bombing missions, the high command took fearful and suspicious notice. Maj. Gen. J. W. McAndrew, Pershing's chief of staff, accordingly admonished Maj. Gen. Mason M. Patrick, chief of Air Service. He approved in principle the proposal for cooperation with the British, but he insisted that the bombardment units must in any case remain an integral part of the AEF. McAndrew emphasized that it was especially important that the higher officers in bombardment be impressed with the necessity for concentration of effort in each arm and for the coordination of all efforts toward a common tactical end. He directed that these officers be warned against any idea of independence, and that they be taught from the beginning that their efforts must be closely linked with operations of the ground army. It should be thoroughly understood, McAndrew concluded, that whenever ground operations reached a crucial point, his headquarters would designate the regions to be bombed. Selection of targets during that time would depend solely upon their importance to actual and projected ground operations.¹³

While individual air officers had strong opinions about what they might do if given adequate support and equipment, they did not go into the war with any substantial doctrine of airpower. General Arnold later

admitted frankly that in 1917 the American air arm

had no theories of aerial combat, or of any air operations except armed reconnaissance. Despite Billy Mitchell's eagerness to blow up Germany, we hadn't a single bomber. Such things as formation flying, a new German development appearing on the Western front that spring, were unknown to us. . . . Our first projected task was to provide every two ground divisions with one squadron of aerial reconnaissance and one balloon company. For the moment, a complete lack of combat experience had left American aviation behind.¹⁴

By way of contrast, General Arnold pointed out that, when the United States entered World War II, the air arm "had some solid theories of its own, even if they had been tested only in peacetime and by observation on the battle fronts abroad."¹⁵ In 1917 there were notions of airpower, but no coherent formulation. And even those notions, although they included the concept of independent striking forces, were geared to the primary idea of aiding the field armies.¹⁶

Overall air operations, organization, and control

The actual extent of America's air participation in World War I is worth noting. The number of personnel engaged overseas rose from a negligible quantity in 1917 to a substantial figure by 11 November 1918: 6,861 Air Service officers and 51,229 men. Forty-five squadrons were serving with the various field armies, and to these units at the time of the armistice were assigned 767 pilots and 740 airplanes. The combat record of the Air Service, AEF, included 781 enemy craft shot down, 150 bombing raids, and a total weight of 275,000 pounds of bombs dropped.* In addition to this record, American flyers performed thousands of individual missions in close support of infantry, on reconnaissance, and for adjustment of artillery fire.¹⁷

Organized as integral parts of the larger ground units—divisions, corps, armies, and the GHQ Reserve—all air elements overseas were therefore commanded, in the full sense

*This figure may be compared with the 20,000,000 pounds dropped during the single "Big Week" (20-25 February 1944) of World War II. (See *The Army Air Forces in World War II*, III [Chicago, 1951], 43.)

of the word, by the leaders of those units. Although the subordinate Air Service commanders might suggest missions and were responsible for execution of designated air operations, final decision rested with the higher unit commanders, who invariably were ground officers. Even air units in the GHQ Reserve were thought of, not as an independent striking force, but as a pool for reinforcement of corps and army aviation, as required by the tactical situation.¹⁸ This organization reflected the ground officers' view of the function of the air arm as auxiliary to the land battle.

The air leaders, who were convinced of the need to employ air units as a concentrated force, opposed the permanent assignment of units to the various ground commands. They favored the greatest possible concentration of air striking forces, under direct control of an air officer, for whatever missions might be required by superior authority. It was the Germans who first effectively demonstrated what massed airpower could do. During their great offensive of March 1918, they concentrated some 300 aircraft for direct support of the ground advance. After careful preparation and detailed practice maneuvers behind their own lines, the German attack planes were thrown against Allied positions in the opening days of the assault. Control of the air having been quickly gained, they were able to harass the movement of troops with virtually no interference. The tide of advantage was not reversed until the Allies, in turn, concentrated a large number of planes in the sector and by relentless counter-air action regained control. According to American observers, the Allies in this case had demonstrated two fundamentally correct principles: concentration of force and the priority of counter-air action.¹⁹

General Mitchell was one of the strongest exponents of those two principles, and as Air Service commander, First Army, he was able to put them into practice in France, where his work at St.-Mihiel and the Argonne were landmarks in the development of airpower and the doctrine of employment. Mitchell's writings contain full accounts of the preparation and execution of

air action in those battles; in both instances he was able to concentrate units from various ground commands into a powerful unified force. The first action, at St.-Mihiel in September 1918, was part of Pershing's plan to eliminate a German salient so that a subsequent drive might be launched against the enemy's pivot (the Meuse-Argonne line). The American First Army was assigned the ground task, and Mitchell was given responsibility for gaining the necessary air control. Although the air operation was controlled by him and the staff of the Air Service of the First Army, Mitchell reported directly to Pershing (in nearby headquarters) and commanded an air force much larger than that of the First Army alone—he had requested and had received the greatest aeronautical contingent ever furnished to a single command up to that time. Obtaining such strength had not been easy, for he had to meet the resistance of ground commanders who wanted the air units elsewhere. As Mitchell put it, "As is usual under these conditions, every objection has to be overcome, and every reason has to be advanced as to the necessity for such things as distinguished from the concentration of maximum force in another place."²⁰

Marshall Foch, as well as Pershing, approved Mitchell's recommendations, which involved French, British, Italian, and American air units. Some 1,500 aircraft of various types were brought under his direction—corps and army observation, army artillery, pursuit, day and night bombardment, and reconnaissance. The logistical and communications problem presented by this mighty array was unprecedented, but the job was done, and operational plans were drawn up by Mitchell's staff. The plan was both simple and significant as a forerunner of the means for control and employment ultimately adopted for American tactical aviation. It assigned to the troops only what aviation they needed for their own operations—corps observation squadrons with protecting pursuit. All the rest, which constituted the great bulk of the total, was put in a central mass, which was assigned to independent counter-air action

until air supremacy was obtained. On the day of the St.-Mihiel attack Mitchell posed a brigade of mixed bombardment and pursuit elements on either side of the German salient. The brigades, 500 planes each, alternated in striking the salient, driving off and destroying enemy planes, and attacking all possible surface targets in the salient. The concentration of force gave the Americans virtually complete protection from German air interference.²¹

After the smashing success at St.-Mihiel, Mitchell prepared to participate in the still larger ground operation of the Meuse-Argonne. In this offensive the Americans were in the position of attacking from, rather than against a salient, but the same tactic of air concentration was applicable. Mitchell's plan was to concentrate the mass of his bombers and pursuit on the main axis of ground advance; by so doing, he would help clear the way and at the same time protect the main body of troops. As the artillery preparation began on the night before the assault, Mitchell launched his counter-air action. Night bombers were sent out against enemy airdromes, rail stations, supply depots, and communication centers. At dawn all of his aviation was in the air, the bombers striking straight ahead at enemy ground elements. The Germans, according to Mitchell, tried to force dispersion of the Allied pursuit force by attacking balloons all along the front. Mitchell, however, stuck to his principle of concentration and followed a plan of employing two pursuit groups and one bomber group in concert against a given point. Each group nominally had 100 planes, of which about 60 were operational at any given time. These heavy attacks forced the enemy air to fight, and in these engagements the Allies enjoyed the advantage until the Germans developed strength in the area and greatly outnumbered the Allies. Even then, Mitchell reported, the system of concentration enabled the Allied units to inflict much more damage than they received.²² Mitchell's tactics succeeded in breaking up enemy air formations and thereby gave general protection to the American troops.

In the long battle, which dragged on for

47 days, the Allied air force also registered successes against enemy troop formations. On one outstanding occasion Mitchell concentrated the units of his command, plus the bombardment aviation of the French Air Division (which had been in reserve), for attack upon a large enemy force preparing to make a counter move. The armada proceeded to the target area at 15,000 feet, and although it was met by all available enemy units, resistance to the force proved futile. The Allied formations lost no planes, while destroying 12 of the enemy. They dropped 39 tons of bombs, which, when added to 30 tons dropped elsewhere by other units, established a one-day record for the first World War. The planned German assault did not get off, and Mitchell declared, ". . . it was indeed the dawn of the day when great air forces will be capable of definitely effecting a ground decision on the field of battle."²³

Mitchell's experience and success in controlling support forces during the World War were the basis for his generalizations regarding the proper organization of what was later to be called tactical aviation. He believed that, for any given operation, available air units should be placed under the control of an Air Service commander. This air officer, having received the over-all plan of an operation from the superior command, would proceed to draw an appropriate air plan which would include provisions for concentration of units, liaison, signals, and the actual attack operation. The air plan would be coordinated with G-3 and G-2 of the Army staffs and would then be submitted for approval to the commanding general. Having been approved, the plan would serve as guide for the plans of each subdivision of aviation; those plans would then be put into effect by field orders "in the usual form" as military operations progressed.²⁴

In describing the organization and control of military aviation, Mitchell emphasized that it should be handled essentially as an offensive combat arm. The extraordinary flexibility of airpower, due to its great speed, was held up as the special feature to be utilized. And, wrote Mitchell,

"Like any other military operations, concentration of force at the vital point is what counts." He recognized that this fact was not always appreciated by the ground troops. Since crucial air combat was often fought beyond the front lines to keep the main enemy air away from Allied troops, when individual hostile planes occasionally broke through the screen and zoomed over the lines, the ground forces gained the impression of having been abandoned, whereas the reverse was actually true. Mitchell insisted that concentration of force be maintained in spite of such criticisms and urged proper indoctrination of the troops in order to avoid unfriendly feeling between ground and air services.²⁵ The views of Mitchell regarding flexibility of airpower, concentration of force, and control of aviation by air officers were to continue as leading doctrinal principles of the air leaders in the period after 1918.

Pursuit aviation

The use of airplanes for liaison purposes and for close-support observation and reconnaissance was readily accepted by both air and ground officers during World War I. The doctrine supporting such employment was relatively simple and obvious; and though theory and practice developed harmoniously they became more or less static. Such was not the case with the other main branches of military aviation, pursuit, bombardment, and attack. In each of these the theory and practice were to prove dynamic and controversial. During World War I the greatest development took place in pursuit; the cocky little single-seater became the chief focus and symbol of airpower.

The Americans had little to do with originating or developing pursuit doctrine during World War I. The first American unit to go into action was the 94th Pursuit Squadron, Capt. Eddie Rickenbacker's famous "Hat-in-the-Ring" outfit. Since the 94th did not enter active combat operations until 14 April 1918,²⁶ it may be seen that the total American unit experience was something less than seven months when it was cut short by the armistice. For the most part, the Air Service took over and applied

the training methods and tactics which the Allies had developed in the course of the air battle with the Germans.

While the British are credited with being the first to mount guns on observer aircraft in the early months of the war, the Germans were the first to construct a purely combat type of plane. Anthony Fokker, after inventing a fixed machine gun synchronized to fire through the propeller, designed for the Germans a single-seater fighter, which eliminated the necessity for an observer-gunner and permitted the pilot himself to sight and fire by aiming his ship at the target. Thus in this ancestor of all pursuit planes the speed and maneuverability inherent in a single-seater were combined with the superior accuracy of fixed gunnery. When the Germans assigned their new Fokkers to the front lines in June and July of 1915, air combat was completely revolutionized. At the same time the Fokker pilots began flying in gangs, echeloned for their mutual protection, to originate pursuit formation tactics.²⁷

With their numerical superiority in airplanes suddenly neutralized by the superior performance and armament of the enemy pursuits, the Allies moved quickly to regain the qualitative advantage. In 1916 the French outmatched the Fokker with their Nieuport XXIII; this machine at 110 miles per hour could outrun any other on the front and was equipped with a free-firing Lewis gun mounted within the pilot's reach on the upper wing. The Nieuport XXIII remained the standard Allied fighter until late 1917. Meanwhile, mass pursuit action became common on both sides. By July 1917 Baron Richthofen was leading his famed "circus" against large units of Allied fighters. The forces involved in these swirling jousts were approximately of group size; the era of the individual pilot, fighting alone, was ended. The pattern for pursuit equipment, doctrine, and tactics thus became established before the end of World War I. It was accepted by the American Air Service and remained basically unchanged until the outbreak of World War II.²⁸

In their postwar appraisals of the air experience of World War I airmen agreed that

the first and foremost principle emerging from the war was that air supremacy was the primary aim of an air force. Because the first duty of pursuit was the destruction of hostile aircraft and because air superiority was considered prerequisite to all other operations it was held that pursuit was the most important element of the air force. Pursuit's ultimate success depended upon equipment, selection and training of pilots, numbers, organization, and tactics.²⁹

As to equipment, experience had shown the superiority of the high-powered, single-seater, which had the requisite characteristics of maximum speed and maneuverability. Although monoplanes, because of their higher speed and better visibility had been tried, the biplane for structural reasons was still safest and most reliable. It became standard during the war and remained so for 10 years thereafter. The successful pilots were those who displayed the most energy, resourcefulness, sound judgment, and offensive spirit. Certain physical characteristics were soon recognized as of special value. In addition to a generally sound and youthful physique, pilots required steady nerves, sharp eyesight, instinctive reactions, and excellent coordination. The record of World War I confirmed the importance of individual pilot differences: some 200 pilots on both sides destroyed a majority of all planes shot down. The leading aces revealed one outstanding trait in common: eagerness for combat.³⁰

Organization of pilots into flights, squadrons, and groups—securing at each level the optimum combination of controllability and concentrated force—proved an important element in the battle for air supremacy. Intimately associated with organization was the problem of combat tactics. It was fully realized by the end of the European war that victory would not be achieved by the exploits of individual aces acting on their own. Team work became the basis of all tactical developments, and this concept was carried up through the largest operational unit, the group. Pursuit formations were given special attention as the necessary basis of effective teamwork.³¹ Captain Claire L. Chennault, writing later (1933)

while an instructor in the Air Corps Tactical School, criticized details of the formation tactics of World War I, charging that they virtually ignored the principle of altitude, provided inadequate security and reserve force, and allowed the formation leader to lose command of his unit when he plunged into personal combat.³² After the war there was improvement in formation and command tactics, but teamwork remained paramount.

Proper tactics for protection of friendly aircraft and friendly ground troops by pursuit was a subject of considerable discussion during the war and immediately thereafter. Most observation and bombardment crews deemed convoy or close protection by a flight of pursuit aircraft as the surest form of air security; as protection against hostile air attack many ground commanders desired an aerial barrage, in which friendly aircraft set up a "barrage" over friendly front lines to serve as a barrier to hostile aircraft. The Air Service, however, warned against these two defensive roles in which pursuit had been used in the war. Close protection was objected to on the grounds that it was "exchanging the shadow for the substance," for such employment deprived the pursuit airplane of its offensive capability, the advantage of surprise, and the ability to choose the most favorable time and place for air combat. Aerial barrages were opposed on the basis that, in addition to the defects of close protection, forces would be equally strong everywhere, and, therefore, equally weak everywhere; such employment of friendly pursuit would enable enemy airpower to concentrate and break through at any desired point. Moreover, it would be economically impossible for any nation to provide the number of planes that would be required to guarantee immunity of friendly territory from hostile attack. The Air Service soon decided that instead of being employed in close protection and aerial barrages pursuit would provide indirect protection by means of flexible offensive action, in which pilots could take full advantage of the elements of surprise, position, initiative, and aggressiveness. Given sufficient force, pursuit so used

there was room, too, for novel and experimental operations—some in connection with the ground battle and others quite apart from it. According to Mitchell's diary, General Pershing before the armistice approved his proposal to use parachute troops against the enemy. Mitchell undertook detailed plans for the operation, which involved the use of a large force of bombers, enough to drop a full division of infantry

behind the German lines at Metz. This anticipation of things to come was accompanied by other, more radical notions. Mitchell made plans for burning German fields and forests by means of incendiary bombs and for wiping out livestock with poison gas. "I was sure that if the war lasted, air power would decide it," concluded Mitchell some years later.⁵⁵

both bludgeon and rapier to drive home his points; he could be shocking, satirical, irreverent, or all of those together. He was, indeed, the gadfly of the General Staff and the hero of the Army's fliers. In the first half of the '20's, it looked like Mitchell "against the field." He was a one-man show for airpower, a formidable protagonist. He burned brilliantly and defiantly—and then, after overstepping the bounds of military propriety once too often, his official light was extinguished. But before he was forced out of the Army in 1926, "Billy" Mitchell made the nation air-conscious—and what is more, he planted the seeds of a new doctrine of war and airpower. That doctrine, in general terms, was to become the American air doctrine for World War II.

Mitchell's fellow officers were almost unanimous in their support of his military concepts.⁷ He was generally regarded as the American counterpart of the RAF's Trenchard and the Italian Douhet.⁸ His supporters often disagreed with Mitchell on details and generally admitted his tendency to exaggerate, but they regarded him as their champion and believed that his exaggerations were necessary in order to accomplish his general aim. Their principal difference with him was on the question of independent air organization; Col. Thomas DeW. Milling, for example, thought Mitchell's demands for separation of the Air Service were premature ("It was just a baby!").⁹ Mitchell was overly sanguine about the rapidity of aviation's progress, and "thus he alienated some of his supporters, and made himself vulnerable."¹⁰ Gen. Henry H. Arnold, writing about Mitchell many years later, was inclined to think that while his doctrines were basically sound, his tactics were not very shrewd. Rather than softening up the attitude of the War Department toward the new air theories, the net result of Mitchellism was to harden the high command more than ever against them.¹¹ Be that as it may, Mitchell's utterances were of the first importance in the evolution of air doctrine in the United States.

The "Fighting General" was not always consistent in his statements of military

theory. Occasionally during the early '20's, Mitchell subordinated air action, in more or less conventional fashion, to the ground battle. For example, at one time he wrote, "We must all remember that the ultimate defense of a country depends on its manpower. This means the infantry, with its auxiliaries, fighting on the ground as man to man; and everything, whether it be in the air or on the water, must be organized with a view to assisting this human force."¹² It can only be believed, however, that such statements were no more than a passing concession to authority or the customary point of view, because Mitchell far more often took a radical stand on the doctrine of war, a stand which was in conformity with the development of his thought. As early as April 1919, Mitchell boldly issued his concept of the nature of war. He declared that modern warfare included all the population of the nations engaged: men, women, and children. In sharp divergence from the view of Secretary of War Baker, who ruled out all attacks upon civilians, Mitchell insisted that, "The entire nation is, or should be, considered a combatant force." Pressing on, he went to the heart of the issue; with unflinching logic he argued that the best strategy often dictated destruction and killing at points distant from the ground or naval theater. The civilians attacked in such operations might include large numbers of women, children, and others not capable of bearing arms, but they were vastly more important as manufacturers of munitions than if they were carrying rifles in trenches.¹³ Thus Mitchell succinctly stated the argument that had no answer. The hard facts of technological warfare placed the production line at the front; in the course of World War II the restraining barriers of convention and humanitarian feeling were to collapse completely, and full, though painful, recognition was made of the reality of "total war."

Mitchell saw the new kind of war as being waged chiefly in and from the air. Stating the problem from a defensive point of view, he argued that protection against such attacks upon the interior of a nation could be provided only by an air force,

preferably one independent of control by ground or naval commands. Offensive strategic operations, likewise, were conceived as essentially independent actions. Mitchell, with typical hyperbole, declared in 1919 that the technical progress of aviation was advancing at such a pace that within 10 years an enemy winning mastery of the air could dictate its own peace terms anywhere in the United States. Airpower had already approached the point where it was more vital to national security than seapower; in the war of the future the sky would be the battlefield and production centers the target.¹⁴ Armies in the field and navies on the sea would be reduced to helpless superfluities.

Except for this full-blast charge against the prevailing concept of war, Mitchell's writings in the immediate postwar period were generally of a more moderate nature. One reference to the infantry as the basic element in war has already been noted above. Again, while testifying before a congressional committee in January 1921, Mitchell declared unequivocally,

I do not consider that the air force is to be considered as in any sense supplanting the Army. You have always got to come down to manpower as the ultimate thing, but we do believe that the air force will control all communications and that it will have great effect on land troops, and a decisive one against a Navy.¹⁵

But while giving considerable attention to the support of surface forces in the early years of his writing, Mitchell shifted steadily toward a preoccupation with the concept of total war by air.¹⁶ By the year of his court-martial, 1925, he was ready to reveal his views to the general public. In his popular book, *Winged Defense*, Mitchell asserted that victory in war required destruction of the enemy's power to make war—the factories, communications, food products, even the farms, fuel, oil, and places where people lived and carried on their daily lives. Pulling no punches, Mitchell went on to state, "Not only must these things be rendered incapable of supplying the armed forces but the people's desire to renew the combat at a later date must be discouraged."¹⁷ Modern war, in other words, was

aimed at not only the armed combatant in the field, but also at the factory, the home, and the nerve fibre of the civilian.

In the new kind of warfare described by Mitchell, the tedious and expensive process of wearing down the opposing surface forces would no longer be necessary. Aircraft could fly right over armies and navies into the heart of the enemy country. Once control of the air was secured, the objective of interior destruction could be achieved in an "incredibly short time." Thus, Mitchell concluded cheerfully, the months and years of ground fighting, with its toll of millions of lives, would be eliminated in the future.¹⁸ It is hardly necessary to observe that Mitchell was only half right in his forecast, when it is judged by the course of World War II. Aircraft were, indeed, to fly into the heart of the nations engaged and to deal untold damage to critical civilian areas. Mitchell greatly underestimated, however, the powers of air defense and the task of destroying a nation's living structure. He may also have been mistaken in believing that air war would eliminate surface war; certainly, in World War II the armadas of the sky simply added their toll of property and lives to the toll taken by the forces below, although it must be remembered that if airmen had been allowed to conduct an all-out strategic air war instead of having to devote most of their efforts to support of surface engagements the war might have proved the soundness of Mitchell's views. If he was in error, however, the mistake was probably one of timing rather than direction; with the vastly multiplied power of atomic or hydrogen warheads, propelled by long-range guided missiles, another major war might well be decided by airborne weapons alone.

If Mitchell's ideas were later to seem exaggerated or naive, they were no more so than those of contemporaries across the sea. As a matter of fact, there is considerable evidence that the views of certain foreign writers were influential in American aviation circles during this period, while Mitchell himself was appreciated abroad far more than at home. A British writer, Brig. Gen. P. R. C. Groves, was often quoted in speeches and articles by U.S. air officers

including General Patrick. Groves' article in the *Atlantic Monthly* for February 1924 closely paralleled Mitchell's concept of the new kind of war:

Clearly the nature of air power renders it the perfect instrument for diplomatic pressure. It is also the key weapon of war The increase in the range, carrying capacity, speed, and general efficiency of aircraft, together with the actual growth in their number and the potentialities of production, implies that on the outbreak of war between any of the principal European Powers whole fleets of aircraft will be available for offensive purposes. Each side will at once strike at the heart and nerve centers of its opponent: at his dockyards, arsenals, munitions factories, mobilization centers, and at those nerve ganglia of national morale—the great cities.*¹⁹

Another Briton whose views were respected in the American Air Service was Capt. Basil H. Liddell-Hart. Author of several books on military affairs, Liddell-Hart in 1925 produced a particularly significant study on the nature of war. This slender volume, carrying the intriguing title of *Paris: Or the Future of War*, followed the basic line of argument in Groves and Mitchell. It began with a philosophical denial of the possibility of peace in the world; until the nature of man was changed, he would make war. At the same time Liddell-Hart condemned the terrible sacrifice of blood and money in World War I. He blamed this waste on a false doctrine of war—the doctrine of Napoleon and Clausewitz, which saw enemy armies as the objective in war. The author pleaded for acceptance of the "real objective" of war: to permit a nation to live in prosperity and security. When this peace and happiness was threatened from without, the military effort should aim to alter the will of the enemy by the most direct means, and by a means which would least disturb the future prosperity and security of the nation. Ground warfare of the old-fashioned type, with its vast destruction of men and property, defeated the true end for which war was fought. Liddell-Hart insisted that the enemy's will could be conquered by a

method shrewder than frontal assault—one that would strike the vulnerable points of the enemy's armor. Referring to the classic example of the Trojan warrior Paris, who struck his shaft into the vulnerable heel of Achilles, he called for direct action against the hostile population. Such action might include a food blockade, disintegration of the economic system, or disruption of the normal activities of civilized life.²⁰

Captain Liddell-Hart asserted that the best way of subjecting the enemy's will was so to disturb (or threaten to disturb) the normal life of a people that they would prefer the lesser evil of surrendering their policy. He discounted the possibility of a "fight to the death" by the civilian population. Normal men, he asserted, would not continue a struggle after it was seen to be hopeless; they would surrender to *force majeure*. These last lines revealed the Achilles' heel in Liddell-Hart's own thesis, a weakness which was also to appear in the air war theories developed later at the Air Corps Tactical School—right up to World War II. The civilian population was to show itself far tougher than anticipated, and the damage wrought from the air may well have proved as destructive of the "real objective" of war as did the damage inflicted by surface forces.

The immediate influence of the line of thinking expressed by Liddell-Hart was shown in a lecture by General Patrick. Addressing the Army War College on 9 November 1925, Patrick admitted that he was quite impressed with the captain's "little book." He accepted its underlying assumptions regarding the aim of war and agreed that direct action against enemy will, rather than slaughter of armies, was the correct means of conducting war. Patrick also saw the air arm as the perfect weapon for waging war in the proper fashion, for the airplane alone could "jump over" enemy armies and strike directly the "seat of the opposition will and policy."²¹ Air supremacy, he declared, was the easiest and surest way of breaking the hostile morale. Asking his audience of ranking officers to imagine the effect of the destruction of an enemy's industrial establishments, munitions factories, and communications, plus

*This article, with portions marked for use in General Patrick's speeches, was found by the author in Patrick's file in the National Archives, Washington, D.C.

"drenching with gas," Patrick left it to them to estimate how long the enemy would fight. Summing up his argument by a reference to recent military history, Patrick put this leading question to his listeners: "Had it been possible for the Allies to wipe out or paralyze the Krupp works and other munitions factories of the Germans, how long would their armies have been maintained in the field?"²²

In concluding his lecture, General Patrick neatly tied the issue of the nature of war to the issue of organization of the air arm. Granting that Liddell-Hart's ideas were substantially correct, how could airpower best be applied against the will of an enemy? Only, Patrick answered, by air force centrally organized and controlled by those who understood it.²³ Thus, he turned to the question that had most agitated the War Department and the Air Service since the end of World War I: how should the air arm be organized and controlled? This question was inseparably linked with the question of the employment of military aviation, and the two together constituted, perhaps, the principal over-all issue in the development of air doctrine: what was the role of airpower in war?

While the matter of proper employment inevitably entered into the heated, drawn-out arguments of the 1920's, the question of organization and control of the air arm dominated all discussion. Fundamentally—and putting the matter in a simple, general statement—the War Department General Staff insisted that the air arm be organized so that it could support surface forces; airmen insisted that it be organized so that it could carry out its independent mission at the outbreak of hostilities. That the question of organization should have preceded the question of employment or function, might seem illogical. It did so, doubtless, because organization and control directly affected important, powerful personalities and the large vested interests of the military and naval establishments.

THE STRUGGLE FOR CONTROL OF AIRPOWER: STEPS TOWARD AIR EMANCIPATION

Even before the armistice of 1918, bold proposals for complete separation of the

air arm from the War Department had been advanced in Congress. This was a far step from the modest prewar proposal to divorce aviation from the Signal Corps, a move which was unsuccessful at the time.* However, at war's end a full-fledged campaign was launched for an independent Department of Aeronautics. The most important of the Congressional bills appearing at this time was the one submitted on 28 July 1919 by Representative Charles F. Curry of California. It opened a period of some two years of all-out struggle for independence by leading officers of the air arm. Only after the futility of this effort became apparent and after Mitchell had been court-martialed did the air leaders lower their sights; during the remainder of the '20's and '30's they were to aim at a stronger, more autonomous air arm within the War Department.

Demands for complete separation

The Curry bill would have concentrated all aviation affairs in a Department of Aeronautics. It provided for a Secretary to whom would be entrusted "all duties heretofore assigned to the War, Post Office, and Navy Departments in so far as they relate to aviation." In addition, the Secretary would be responsible for promoting all matters pertaining to aviation, "including the purchase, manufacture, maintenance, and production of all aircraft for the United States." Curry also proposed a regular air force to be organized within the framework of the Department of Aeronautics as a combat force, capable of independent or joint operations.²⁴ It fully reflected the desires of all those, inside the Army and out, who took the extreme view of the importance of aviation and its untrammelled development.

The issue having been thus sharply drawn, the battle began over the question of independent air organization. It was to take the form of legislative proposals and counterproposals, of rival investigating boards and committees, of sharply differing testimonies from both military and civilian experts. One of the boards worth noting in this connection was designated the American Aviation Mission, better known as the

*See above, pp. 1-2.

Crowell Mission. On 1 May 1919, Secretary Newton D. Baker directed the Assistant Secretary of War, Benedict C. Crowell, to organize a group for studying aviation problems as they had been dealt with by the principal Allied powers during the World War. The underlying purpose of this investigation was to gain, through observation abroad, ideas which might prove useful in meeting the aviation problem in the United States. To aid him in conducting the mission, Crowell selected an able team, including Howard E. Coffin, member of the Council of National Defense, a representative of the General Staff, an Air Service officer, a naval officer, and several executives of the aircraft industry. In the late spring and early summer of 1919 the Crowell group visited England, France, and Italy, where they conferred with aircraft manufacturers, cabinet officials, and ranking officers of the armed services. In their final report to Secretary Baker on 19 July 1919, they expressed their favorable impression of foreign steps toward centralized organization of military aeronautics. Their recommendation for the United States was similar to the Curry proposal for a Department of Aeronautics; it suggested a concentration of responsibility for aviation development in the hands of a Secretary for Air. Independent military operations, however, were not contemplated. The national air service would be primarily a training, development, and promotional activity; personnel and equipment assigned by the Air Service to the Army and Navy would pass automatically under their full control. Although the members of the Crowell Mission were in strong agreement on their recommendation (with the exception of certain reservations by the naval representative), no direct action resulted from this study. In making public the report, Secretary Baker clearly stated that he was opposed to a centralized air service, even if its function were restricted to training and procurement. Efficiency demanded, he argued, that each fighting service exercise complete control over its personnel, training, equipment, and operations.²⁵

The answer of the Crowell Mission to the

question of air organization was obviously unacceptable to Secretary Baker. With the Curry proposal and others pending in Congress, Baker decided to establish another board, specifically to investigate the advisability of a separate department of aeronautics. The make-up of the new group, consisting of Maj. Gen. Charles T. Menoher, nonflying Director of the Air Service, and four artillery officers, virtually assured a result more in keeping with the Secretary's views. The Menoher Board, which convened on 8 August 1919, proceeded by examining relevant reports by other groups and individuals, consulting a limited number of witnesses in person, and by obtaining telegraphic reports from some 50 division, corps, and army leaders who had actually operated with air units under their command. As might have been expected, the bulk of the testimony from these sources was opposed to an independent department of air, and the Menoher Board's report, submitted on 27 October 1919, counselled against any such proposal. It declared that independent air action could not prove decisive against ground forces and insisted upon maintaining the principle of unity of command. The air arm, like the other combat branches, must be coordinated and controlled by the commander in chief of the military operation. The Secretary of War, finding this report more to his liking, gave it his stamp of approval and forwarded it to the Senate Committee on Military Affairs on 31 October 1919.²⁶

Arguments of the air crusaders

As investigating bodies piled up evidence on both sides of the issue, individuals within and without the military services began to come forward with their own views on air organization. These individuals fell into two principal groups, which, like the investigating boards, tended toward clearly opposed positions. The most colorful group was no doubt that company of aviators returned from glory overseas. Generally youthful, vigorous, and enthusiastic, they were convinced that future wars would be increasingly dependent upon airpower and that aviation had to be regarded as an equal if not superior branch of warfare. They

avored a kind of organization which would give full play to the myriad possibilities of airpower and one which would be controlled by men whose experience and sympathy were with the new medium of fighting. This could best be realized, thought the air crusaders, in a separate Department of Aeronautics or under a unified Department of National Defense, consisting of air, army, and navy as coordinate branches.²⁷

The group opposing them fought every move to increase the power or prestige of the air arm. Its spearhead consisted of the ranking military and naval personnel, the civilian heads of the War and Navy departments, and the General Staff, all of whom regarded aviation as auxiliary to surface forces. It included most of the nonflying officers in both regular services, men who often looked upon the aviators as youthful upstarts. Some of these old-line officers fought the airmen because of jealousy of their traditional prerogatives and position; others were simply indifferent to what airpower could do or were honestly doubtful of its effectiveness as an independent force. Whatever their reasons, it soon became clear that those who opposed air independence represented the majority in the military establishments and held the positions of major influence. At this stage in the contest for control of military aviation, the enthusiasm of the air crusaders proved no match for the numbers and power of the opposition.²⁸

Nevertheless, the advocates of independent air organization had their hearing, and their arguments helped to develop and crystallize the many facets of air doctrine. Leading the fight were congressmen like Curry of California, Senator Harry S. New of Indiana, and the returned aviator, Representative Fiorello H. LaGuardia of New York. During the immediate post-war period, the most aggressive and defiant spokesman within the service was Maj. Benjamin F. Foulois. Somewhat more moderate in his insistence on air independence, but untiring in his efforts, was General Mitchell. Further support came from officers like Charles DeF. Chandler and Henry H. Arnold. In civilian ranks the air crusaders

had the help of such men as Benedict Crowell and the industrialist Glenn L. Martin.²⁹

The points set forth by these men in 1919 and 1920 on the subject of air organization can be summarized readily. They argued, in the course of numerous hearings and debates, that military aviation was no longer a mere auxiliary force. It was important in its own right. Mitchell pointed out, for example, that the chief aim of the air arm was to gain control of the sky; this aim had to be achieved by direct action in the air and not as an activity auxiliary to some other operation. Lifting the curtain upon an idea which he would later stress more vigorously, Mitchell also suggested that full development of the airplane might render surface navies useless. Major Foulois pressed another point generally accepted by the air leaders. It was necessary, he said, to have final authority for aviation vested in those who were genuinely interested in the air arm. Foulois charged that the General Staff did not have that interest, that through lack of knowledge and vision it had subordinated the air arm to the needs of the other combat branches. What advances had been achieved in military aviation were the results of the initiative of the Air Service and in spite of the attitude of the General Staff. Secondary arguments included the assertion that an independent air organization would eliminate duplications in aerial expenditures and would give needed encouragement to the important commercial aviation industry.³⁰

Rebuttal by the high command

The Director of the Air Service, General Menoher, did not share the view of the crusaders regarding the proposed independent air organization, and at least for the time being, he joined the general line-up against such a move. Asked by the Chief of Staff for his attitude on the matter, Menoher replied unequivocally that the Air Service must be a part of the combatant forces, both military and naval. It should be considered a fourth combat branch of the mobile army, on a par with the infantry, cavalry, and artillery. But Menoher made a hedge upon the future and forecast that

in wars to come, separate air operations could be expected, similar to operations on land or sea. Looking into the future, he saw the time when

flying squadrons may cruise through the air o'er land and sea for protracted periods of time, supplying and subsisting themselves from aerial "colliers," subject to tactical control by wireless and directional control by radio, and with sufficient ammunition transports to sustain active combat operations sufficient to accomplish the complete demolition of land or water craft, or the destruction through aerial combat of similar forces of the enemy.

Until such a time arrived, however, Menoher believed that aerial forces should be part of the Army and Navy, in order that the plans of those two services could be carried to a successful conclusion.³¹

It is interesting to note that General Menoher was not the only Air Service officer who willingly accepted the position of the General Staff relative to the organization of the air arm. Lt. Col. Oscar Westover, who was to become Chief of the Air Corps in 1935, believed it was a question of submitting to proper authority, which in this case was the War Department. Writing to Menoher on 5 May 1919, Westover called attention to the propaganda activities of General Mitchell and other officers in the Training and Operations Group which Mitchell headed. Westover stated that such activities called for immediate action; military inferiors must subordinate the expression of their own opinions to the opinions and policies of their superiors. Mitchell's public insistence upon independent air organization was contrary to the War Department view and was therefore "subversive of discipline." Westover recommended that Mitchell and his executive assistants be so advised and that they be directed to make their words and actions conform to War Department policy. He went on to urge that Menoher demand a statement of loyal support from Mitchell; and if it could not be given, he favored relieving all the executive heads of the T&O Group except Cols. Thomas DeW. Milling and Charles DeF. Chandler ("who are both loyal and efficient").³²

Colonel Westover did not commit himself on the issue proper, except to insist that higher authority be obeyed. Apparently his position had at least some degree of support, because in his memorandum to Menoher he referred to the fact that opposing factions still existed in the Air Service. But while there was some division in the air arm over the question of independence, the War and Navy Departments were united in opposition from top to bottom. Secretary Baker, heading the War Department hierarchy, made his position crystal clear in his Annual Report for 1919. The infantry was still the backbone of military operations, and all other arms (land, sea, and air) should serve as mere auxiliaries. Separation of the air arm could only weaken over-all military efficiency; the temporary unified control which might be achieved during combined actions was no substitute for continuous, integrated training and operations. Finally, the only indispensable functions of aviation in World War I had been those of support—observation and artillery control. Baker did not preclude important changes in the functions of airplanes in the future, but he insisted on considering the "here and now."³³ In the light of wartime experience, the actual capabilities of aviation in 1919, and his concept of the nature of civilized warfare, Baker was undoubtedly consistent and logical in opposing an independent air organization.

Gen. John J. Pershing, the victorious commander of the AEF, lent his high prestige to the fight against air independence. In reply to a request by General Menoher for clarification of his views, Pershing replied in simple, straightforward fashion. He declared that an independent air force was incapable at that time, or so far as he knew at any future time, of winning a war by itself. Such a force could not even win a decision over an enemy ground force. On the other hand, asserted Pershing, a ground force needed an air arm to operate successfully against other ground elements. The air force was an essential combat branch of the Army, like the infantry, cavalry, and artillery; for success in war they must all be controlled, disciplined, and trained

in the same way. Separate organization could only have been antagonistic to this end; therefore, Pershing wanted to keep the air arm in the War Department.³⁴

Field commanders who had served under Pershing shared his view on the need for integration of the air arm with the other combat branches. A board of superior officers of the AEF, headed by Maj. Gen. Joseph T. Dickman, was appointed by Pershing on 19 April 1919 to draw lessons from the World War regarding air tactics and organization. The Dickman Board reported, as one might have expected, that "so long as existing conditions prevailed" ground forces would continue to be dominant in warfare. The infantry was the principal arm, and aviation must be regarded as one of its auxiliaries. Nothing in the war, concluded the board, indicated that air activities could be conducted independently of ground troops so as to affect materially the outcome of the struggle. And it seemed unlikely that air forces would ever supplant ground and naval forces unless such a proportion of the population became "airfaring" as were then seafaring.³⁵

In August 1919 the War Department invited from all its general officers comments on the Congressional proposal to create an independent Department of Aeronautics. The responses that came in echoed and re-echoed the fundamental propositions set forth by Baker, Pershing, Dickman, and the other top military brass. There were additional arguments against a separate air service; though rated as secondary points, they loomed large in the minds of the ground generals. Chief among them was the notion of discipline. One respondent wrote:

No people in this war needed discipline more than the aviators and none had less. All the attention was given to handling the machines and but little thought was had of discipline. The result was more or less of a mob with great loss of efficiency, as strict discipline is the foundation stone of military success.³⁶

Another general agreed "that the factor of greatest importance in the aeronautical service is discipline. The question of flights and observation must not be left to the

artistic temperament, or the opinion of subordinate Air Service Commanders, but must be controlled by the judgment of Commanding Officers of troops. . . ."³⁷

While the War Department often found itself in disagreement with the Navy on important issues, the question of an independent air service found the two departments in powerful alliance. The Navy did not deign to enter the lively controversy about the discipline of military aviators, but it took a strong stand in opposition to a separate air organization. Josephus Daniels, Secretary of the Navy, was a well-known opponent of separation, as was the Assistant Secretary, Franklin D. Roosevelt. Writing in the magazine, *U.S. Air Services*, in July 1919 Roosevelt declared that the Navy must preserve its air arm intact. He saw the air branch of the Army in a similar subordinate light. Roosevelt recognized the need for full cooperation and interchange of plans between the two air services, but thought that removal of aviation from the Army and Navy to a third organization would invite disaster.³⁸

Naval officers apparently shared the view of their civilian superiors. An unsigned statement purporting to summarize the Navy's attitude toward the proposal for a unified air service was based on the premise that the nation had to be prepared to defend itself in two general localities, at sea and on land. The Navy took care of the first, the Army the second. No need for a third agency of defense was seen, since shore-based aircraft, in their existing state of development, could not act offensively overseas unless first carried across the sea in ships. The dependence of all operations upon sea control, in turn, underlined the importance of naval aviation as an essential aid to the forces afloat. As the case for integrated aviation services was thus so clear and patent, there could be only two classes of advocates of a separate air arm. One class, the Navy summary generously conceded, consisted of those persons who lacked full knowledge of the military and naval duties of aviation and who consequently believed, quite innocently and sincerely, that a unified service would be ad-

whereas Patrick had favored consolidating it in the corps. There was a difference also in the recommended distribution of air force elements. Patrick wanted all types (attack, bombardment, and pursuit) held in the GHQ Reserve; the Lassiter group assigned an air force of attack and pursuit to each field army, while providing a force of bombardment and pursuit for the GHQ Reserve. Notwithstanding these differences, the Lassiter report was a modest step in War Department thinking toward the idea of a concentrated air force. Greater emphasis was placed on the GHQ Reserve than had appeared in the principles of Air Service organization adopted in 1920. In place of the single bombardment group provided for in the existing GHQ table of organization, the report called for a peacetime minimum of two bombardment groups, plus four pursuit groups. This provision fell short of the desires of Patrick, but the reserve was afforded recognition as "insuring mobility and independence of action" and as a weapon for both tactical and strategic missions.⁴⁶

Although the recommendations of the Lassiter Board did not materialize as legislation, they had a considerable educational value within and without the War Department. The report was frequently reviewed and quoted by subsequent groups studying the aeronautical problem, and it came, in effect, to represent War Department policy regarding Air Service organization.⁴⁷ In the following year General Patrick used the board's recommendations as a point of departure for a further proposal of his own respecting air organization. He emphasized the growing necessity for a method of control which would insure the maximum effectiveness of airpower in the event of future emergencies.

We should gather our air forces together under one air commander and strike at the strategic points of our enemy—cripple him even before the ground forces can come in contact. Air power is coordinate with land and sea power and the air commander should sit in councils of war on an equal footing with the commanders of the land and sea forces.⁴⁸

It may be noted that this latter suggestion by Patrick was not carried into effect until creation by President Roosevelt of the Joint Chiefs of Staff in 1942—some eighteen years later. Patrick also looked forward to the ultimate creation of a Department of National Defense, which was to be realized in 1947. But for the time being he regarded such a radical reorganization as beyond practical possibility. In the meantime, he proposed to the War Department certain preliminary steps which would greatly augment the striking power and effectiveness of the Army's air arm.

Patrick's major proposal in 1924 was that there should be created an Air Corps which would be subject directly to the Secretary of War. He described the projected organization as similar in status to the Marine Corps in its relation to the Navy. By freeing military aviation from control by the General Staff, Patrick hoped to achieve an organization in which men of air experience and competence would exercise the key influence over aviation matters—from the lowest echelons up to the level of the Secretary himself. Along with this change, Patrick recommended that a separate budget for aviation be prepared by the air chief and that a single air commander be designated to control all air operations, at least in the initial stage of an emergency or war. According to this proposal, the air commander would be directed by the Secretary of War to report to an army commander in chief for orders when the army was ready to take the field. But his instructions would be only in terms of a general plan; the air commander would determine the manner and detail of execution.* Patrick also recommended that the Army air arm be given responsibility for all aerial operations from shore bases. Finally, he asked for legislative action on the Lassiter Board recommendations for expansion and development of air strength.⁴⁹

While General Patrick was urging this line of action upon the War Department, Congress continued to show concern over the position and control of airpower in the

*This suggestion anticipated the actual arrangements for ground-air cooperation which, after months of successful use by the British in the Western Desert, were finally adopted by American forces in North Africa in February 1943.

a factory somewhere when the commander-in-chief will want to bomb a certain objective. We had the experience—and this is a personal experience, not from hearsay—where the Air Service given a corps or division commander flitted away without fully transacting its business. That is why it is now an organic part of the corps and divisions.⁶⁹

The air officers, for their part, were flattered by the opinion of the ground troops; they argued, however, that it was not a question of vanity, but of efficiency. The Air Service manual on doctrine in 1923 accepted without qualification the proposition that aviation should be directed toward the success of the infantry; but it contented that in the furtherance of that principle, the air striking arm must often wander far afield and that there were times when indirect action was more effective than direct. The principle of concentration and unified command was stressed repeatedly, as in the arguments of General Patrick, referred to above. Furthermore, aerial tactics differed basically from ground tactics, as did naval tactics. The most efficient operation of the air force elements required, therefore, control by personnel skilled in air operations. The greater the skill of the air commander, the greater the contribution to ground support.⁷⁰

The air leaders were also careful to suggest that ground support, by whatever means of control, was not the only function of military aviation after gaining air control. General Patrick, when requested to comment on the possible uses of aircraft in warfare, made the point that airpower, when developed, could carry destruction to the vitals of an enemy nation, disrupt war industries, attack communications, and secure information otherwise inaccessible. He also saw aircraft in the next war as carriers of troops and supplies.⁷¹ At the same time Patrick wished to make clear that he favored complete coordination of air operations with the efforts of the War Department. During the preparation of TR 440-15, *Fundamental Principles of Employment of the Air Service*, he had opportunity to state his position. Patrick expressed concern that some of the coordinating authorities in-

involved, including the heads of the general service schools, seemed to have the impression that the Air Service wanted to fight future wars alone. This was not the idea at all, Patrick insisted. He believed that air force units might carry out missions independently of the ground troops; but such missions would be absolutely in accord with the general plan of operations of GHQ and would aim primarily at assisting other components of the armed forces to final victory. Patrick said he would see that changes in the wording of TR 440-15 were made, as necessary, to convey the correct meaning. The major functions of military aviation, as he saw them in 1924, were neatly summarized in his statement approved by the General Staff: "To assist the ground forces to gain strategical and tactical successes by destroying enemy aviation, by attacking enemy ground forces and other objectives on land or sea, and by protecting ourselves from aerial observation and attack."⁷²

Argument with the Navy regarding coast defense

The problem between the Air Service and the General Staff relating to organization and control of military aviation has already been given a considerable accounting. Equally troublesome, and in some ways even more exasperating, was the difficulty with the Navy regarding coastal defense. Until the advent of the airplane, the lines of demarcation and responsibility between the Army and the Navy were relatively simple and clear, but the rise of aviation vastly complicated the situation. Both services developed their own air arms, operating in the same medium, while the broader question of what airpower could do to seapower was unsolved.

General Mitchell, who "destroyed" the Navy many times over in his writings and speeches, was more enthusiastic about the capabilities of aviation against ships than against any other kind of target. To him and to his followers in the Air Service, the problem seemed cut and dried; soon after the armistice, Mitchell worked out a simple formula for aerial defense of U.S. coasts. It involved, first, reconnaissance by air to

locate approaching air forces and surface fleets; second, a series of sky battles to determine control of the air; third, after control was attained, direct attack on enemy vessels. He worked out a plan of coordinated action for the third phase, which was to remain the ideal plan for concerted attack on ships for many years. It involved simultaneous action by low-level attack planes (using cannon and machine guns against deck personnel), high-level bombers (dropping special purpose armor-piercing projectiles or depth bombs), submarines (guided to torpedo attacks by director aircraft), and torpedo bombers.⁷³

The basic plan seemed simple enough, but the key question remained: how effective would such an attack be against well-manned, armored vessels? Mitchell pointed to certain theoretical considerations that favored the airplane, such as the power of the initiative derived from its superior speed. He drew attention to the terrific explosive power of an aerial bomb, by comparison with its equal weight in a cannon shell, and asserted that the accuracy of high-level bombing exceeded that of coast artillery at twelve-mile range. Finally, after considerable haggling and frustration, he successfully arranged for actual bomb-dropping tests against retired naval ships. Small vessels were easily destroyed in these experiments, but Mitchell's triumphs came in the devastating strikes against battleships. On 3 October 1920, for instance, the obsolete *Indiana* was severely wrecked; on 5 September 1923, off Cape Hatteras, the *Virginia* and the *New Jersey* were sent to the bottom with shocking ease. Of course, as the Navy feverishly explained, those vessels had been towed out into open water, were incapable of maneuver, and were unarmed and unmanned. But even the admirals were abashed at the destructive power shown by aerial bombs against the stoutest naval armor. Mitchell, in any event, was thoroughly convinced; after the tests he declared without reservation that existing types of airplanes could seek out and destroy all existing classes of seacraft with negligible loss to themselves.⁷⁴ He was largely supported in this sweep-

ing claim by the official conclusions of the Joint Army and Navy Board, approved 18 August 1921. While granting that the probability of hits would be reduced in the case of a ship maneuvering at high speed, the board stated that without fighter opposition, attacking bombers could make an effective percentage of hits with small loss of aircraft. It confirmed, further, that existing aerial bombs could sink or seriously damage any existing types of vessel. Adequate quantities of bombers were seen by the board as possibly the decisive factor in coast defense, notwithstanding the limitations imposed by weather and range upon their operations. In any future attack upon the American coast, the Navy must share with the air arm its primary function as the first line of national defense.⁷⁵

The Navy agreed that coastal defense should be shared with the Army and Air Service. But in what manner? What constituted the surest and most efficient arrangement for cooperation? General Mitchell answered such questions in typical unequivocal fashion. He believed that since "the problem of destruction of seacraft [from the air] is now solved and finished," the next step was to provide an adequate air organization to assume the entire task. He criticized the existing system of Army coastal defense as wrong; large fixed guns were more expensive and less efficient he charged, than an equivalent force in bombers. Mitchell proposed that an air force be set up, which would have all anti-aircraft weapons under its control and would be responsible for frontier and coast defense. The Navy, with its supporting air units, would be removed entirely from the shore line, and its assignment would be a purely offensive one against hostile forces on the high seas.⁷⁶ General Patrick agreed with Mitchell on this proposition. As early as 1921, he had declared that the Army air arm could take over coast defense, that it could perform all the functions of shore-line patrol, sea search, and attack on hostile vessels.⁷⁷ In his Annual Report, dated 10 September 1925, the Chief of the Air Service asked for additional air strength for

this purpose. He pointed out, as had Mitchell, that the flexibility and striking power of aircraft had greatly reduced the need for mobile guns on the ground, and he pleaded again that a study be made of the airplane as the major weapon of seacoast defense.⁷⁸

Whatever the opinions of the air leaders, the War and Navy departments moved slowly and cautiously in this no-man's land of overlapping jurisdiction. Effort after effort was made during the interval between wars to delineate precisely the respective functions and responsibilities of both with regard to coast defense, but all failed to dispel the ambiguity and conflicting interpretations that persisted right up to Pearl Harbor. As far back as March 1917, the Aeronautical Board, appointed specifically to study this problem, had made a report to the secretaries of War and Navy, who approved its recommendations. This board had favored joint development, organization, and operation of Army and Navy aviation, instead of separate development within delimited areas of responsibility. Although the naval air arm would fly chiefly over water and the army chiefly over land, the two would be constantly working together in any war with a first-class power. For this reason, the Aeronautical Board had gone so far as to propose joint training, joint occupation of bases, and the greatest possible standardization of equipment. While opposing the specification of any exact line separating Army and Navy air spheres, it indicated that such a line, if drawn, would coincide approximately with the coast lines of the United States and her possessions. Before an invasion the Navy would have precedence along the coast and in the adjacent water areas; if a hostile landing were achieved, the Army would assume precedence. With all this in mind, the board had spelled out the general duties of each service in coast defense as follows: the Army air arm had responsibility for fire control of coast artillery and for defense of forts, navy yards, arsenals, shipbuilding works, utilities, and cities; the Navy had responsibility for fleet air support, over-water scouting from shore bases, and land-

based air activities within the control of commandants of naval districts and advanced bases.⁷⁹ These rather loose provisions made it possible for both services to make a liberal interpretation of their authority. Army aviation, for example, assumed the right to attack enemy vessels "operating against the coast." But at what range were enemy vessels to be considered as so operating? The Army desired no limits on range. The Navy, for its part, was to interpret its scouting prerogative to include bombing, at any range, of hostile vessels which might be sighted, and demanded the right to use land bombers for this purpose. It is easy to see how confusion of responsibility, unwholesome service rivalry, and duplication of facilities and functions developed under these conditions.

Although the Secretary of War and the Secretary of the Navy gave joint approval to the successive agreements covering coast defense responsibilities, Army leaders were outspoken in their criticism of the dual arrangements. A special board of officers, headed by Brig. Gen. Charles E. Kilbourne, was appointed by General Pershing on 12 February 1919 to study the problem. The Kilbourne Board reported that joint responsibility for coast defense, in effect during the war, had proved unwise. All the European powers had avoided this ambiguity, and the United States should profit from their example by giving responsibility to either one service or the other. The single commander would have control of all means of coast defense, including naval vessels assigned to the purpose. The Kilbourne group favored the Army for the coast defense job, because the Army controlled the mobile ground units which, with the coast defense forces, would have to meet any hostile landing. A shift in command of coast defense forces, at the time of such a landing, as provided for in the joint agreements, would seriously handicap operations against the beachhead.⁸⁰

Leaders of the Army's air arm were especially concerned about the overlapping activities of military and naval aviation in coast defense, and they offered from the beginning a clear-cut and consistent doc-

trine on the matter. General Patrick, for example, in July 1923 urged the War Department to press for revision of the Joint Army and Navy Board directives. He objected specifically to allowing the Navy to use land-based aircraft as scout-bombers and insisted that for reasons of economy and security all land-based planes should be operated by the Army. He would have limited the Navy's tactical aircraft to fleet-based types.⁸¹ In the following year Patrick officially reiterated these views. He explained that confusion still existed as to the coordination necessary and the functions each service would perform in order to secure an actual defense. There was only one practical solution: "The Army Air Service should be definitely charged with all operations conducted from shore stations."⁸² General Mitchell was of the same conviction. The Navy's air units, he contended, should stay with its ships and fight with them on the high seas. Complete control of coast defense should be left to the Army; to make this arrangement specific, Mitchell suggested that all naval control relating to coast defense should cease within 200 miles of the shore.⁸³ But neither the Army nor its Air Service was successful in removing joint control or in drawing a line which would keep the Navy at sea. On the contrary, the Navy was able in 1938 to effect a reverse twist of Mitchell's suggestion: it wangled a promise from the Secretary of War to keep Army bombers from flying more than 100 miles to sea.*

The growth of airpower had raised the problem, which proved to be a very knotty one, of the proper control and employment of airplanes in coast defense. Since coast defense meant primarily defense against naval vessels, that problem led to a larger and more fundamental question: what would be the effect of military aviation upon seapower? The views of the air leaders are not difficult to find on this subject. General Mitchell, ready as usual with the first and most extreme statement, declared in 1920, "Personally, I believe that aviation will completely drive the surface ships off the water in the next war. . . ." ⁸⁴ He con-

ceded that the Navy should not be discarded until a proved substitute for it was found; but he was certain that, at the very most, the Navy's usefulness was limited to the high seas.⁸⁵ Surface vessels within range of land-based aircraft were doomed, and in consequence, "Expeditions across the sea as occurred in the World War will be an impossibility."⁸⁶ It is hardly necessary to observe that Mitchell underestimated the defensive counter-measures of warships and, above all, the formidable character of carrier aviation, although such an observation is, of course, based on hind-sight. But even more moderate air leaders, who saw seapower as altered rather than eliminated, agreed with Mitchell on this point. It was recorded as a matter of Air Service doctrine that oversea invasions would be impossible against any nation having an adequate air force.⁸⁷ Under this doctrine, seapower would be relegated to the task of protecting shipping lanes beyond the range of land-based aircraft.

Pursuit Aviation

During the immediate postwar era, primary attention was given in the development of air doctrine to those larger issues which have been discussed so far in this chapter: the nature of warfare, organization and control of airpower, and the general functions of military aviation. But steady progress was also made in spelling out tactical doctrines for each of the branches of the Air Service. While observation was generally recognized as the principal activity of the air arm during the first World War, the indispensable role of pursuit in relation to all aviation activities had been clearly established by 1918.† Pursuit's primary task was then defined as keeping a specified area of the sky clear of enemy planes. A tentative manual under preparation in 1919 described the area as equal in depth to the distance beyond U.S. front lines which was allotted to corps and divisional observation squadrons. The aerial front to be maintained, at a minimum, extended in front of the battle line to the range of corps artillery.⁸⁸ In the years just following the armistice a

*For discussion of this development see below, pp. 90-91.

†See above, pp. 7-8.

more sweeping concept of pursuit action was officially embraced. As stated by General Mitchell, the primary aim of pursuit was not to clear an area, but to destroy the enemy's air force—thereby permitting all branches of aviation to perform their special duties. He forecast the greatest development of pursuit, "...because this is the branch of aviation which assures victory in the air."⁸⁹ Again, he declared, "Pursuit aviation is the basis of an air force, just as infantry is the base on which an army rests." Its superiority rested upon its equipment. Nothing could resist pursuit, Mitchell explained, because it was designed to attack another plane from every possible angle—front, side, and rear—with concentrated firepower. No large, lumbering aircraft, or collection of them, could provide adequate defense against pursuit. The only protection against pursuit was pursuit.⁹⁰ Another mission assigned to this branch of aviation, secondary to relentless air combat, was attack of personnel and equipment on the ground. Airdromes, troop concentrations, convoys, seacraft, and debarkation operations were listed as profitable targets.⁹¹

The postwar period saw not only an enlargement of the concept of the pursuit function, but a significant evolution in the tactics of air fighting. During World War I air combat had been chiefly an individual affair, with each pilot fighting more or less independently. It is true that by the time of the armistice, the importance of teamwork and concentration through formations was increasingly recognized; but even in 1919 the tactical unit was limited to the size of a flight of five or six planes. When more than one flight was employed on any mission, they operated in a chain formation, mainly for purposes of *esprit de corps*.⁹² By 1923 the group, composed of four squadrons, had become the standard pursuit tactical unit, with the squadrons divided into flights. Each squadron and each group was normally deployed in three dimensions for the most effective concentration and tactical advantage: the attack force, the support force, and the reserve, each flying at a different altitude (usually

"stepped up"). All elements in the formation were held within distances to insure mutual aid, and attacks upon enemy planes were to be made by successive waves of units from the attack and support elements, striking on converging lines.⁹³ It was upon this general basis, at least in theory, that pursuit tactics developed during the 1920's.

The biplane continued to be the standard design for pursuit during a 10 year period following the first World War. Several attempts were made to build a satisfactory monoplane, but the engineers and pilots alike seemed to agree that only a biplane could stand the stresses of pursuit maneuver at high speeds. Capt. Claire Chennault noted in his pursuit aviation textbook, written in 1933, that the postwar period was, in fact, characterized "by neglect of pursuit design." Consequently, the speed of pursuit was but slowly increased through the expedient of successively larger engines; there was no real progress in airframe efficiency.⁹⁴ Although there was not an impressive advance in the general performance of pursuit, considerable thought was given to developing several types to serve special purposes. Among the leaders in pursuit theory and practice during this period was Major Carl Spaatz, who on 7 February 1922 wrote that he conceived of four main pursuit activities, each of which demanded a different combination of aircraft characteristics. The offensive pursuit plane, whose job involved aggressive action to secure air superiority, required, in order of priority, strength of construction, unobstructed pilot visibility, and speed and maneuverability. The defensive pursuit (escort-type) required range equal to the aircraft it was protecting, speed superior to the protected planes, flexible machine guns for the observer, strength, and maneuverability. Night pursuit had a special requirement for an engine that needed no warm-up, fast rate of climb, and slow landing speed. Attack pursuit, which anticipated in concept the fighter-bomber of World War II, demanded cockpit visibility, maneuverability, speed, and armor plate.⁹⁵ Major Spaatz in making these propositions was opening one of the perennial questions of air doctrine, that re-

garding the number of aircraft types. Should there be one all-purpose type for each branch of aviation, or, at the other extreme, should there be a type for every specialized function? Experience was to show that no final answer could be reached on this question. There is no evidence that any effort was made in the postwar period to meet the separate sets of specifications suggested by Spaatz, but the Air Service did allow considerable experimentation with one-seater and two-seater pursuits models. By the middle-twenties the principal model appeared to be the one-seater Curtiss PW-8A (Hawk). Its 440-horse power engine gave the Hawk a top speed of 178 miles per hour and a cruising range of 335 miles. It had a service ceiling of 22,000 feet and armament of two .30-cal. or .50-cal. machine guns.⁹⁶

Bombardment aviation

While pursuit aviation held sway as the primary element of airpower during the early 1920's, there was a steady decline in the status of bombardment. General Mitchell did what he could to uphold the importance of the striking arm; but even he, during this period, placed pursuit first. The Army in general, and even the Air Service, backed away from the radical concept of bombardment employment which had emerged at the close of the World War. The Gorrell plan for strategic operations against Germany, for instance, was generally forgotten, and the training regulations and manuals after 1918 emphasized the auxiliary, supporting role of bombardment.* The idea of strategic operations was not entirely neglected, but it tended to be overshadowed by re-emphasis upon missions in support of forces in the field. The 1923 Air Service manual on doctrine specified a variety of missions for the bombardment branch: attack of naval vessels, action in the theater of operations against field targets, and strikes in the zone of the interior against industrial centers and other key objectives. But the whole context of the manual was one involving large-scale surface operations, and very little attention was given to the

*For discussion of the Gorrell plan, see above, pp. 10-12.

actual planning or tactics for strategic bombardment.⁹⁷

As to tactics, the theory of the 1920's assumed that both day and night operations were necessary and feasible. Control of the air, made possible by pursuit superiority, would allow bombers to fly in daylight and to bomb accurately with small losses. Formation flying in the standard inverted "V" was prescribed for mutual defense against enemy pursuit and for concentrated effect upon the target. Day attacks were to be flown at high altitude in order to minimize damage from anti-aircraft guns, while the altitude for night attacks would be governed by the tactical situation. In either case, the Air Service believed that losses from ground fire would be rare, and the experience of the World War was usually cited to confirm the point. Special tactics, essentially those outlined by Mitchell† in 1920, for attacking seacraft were stipulated.⁹⁸

All bombardment was organized in the familiar pattern of flight, squadron, group, and wing (the latter including pursuit units). In addition, there was a division of bombardment into two classes, light and heavy. The type of airplane conceived for the former was a single-engine bomber, with space for a pilot and a crew of one or more. Its armament was to consist of fragmentation bombs, small demolition charges, and fixed and flexible machine guns. The plane was to have long range at cruising speed, with provision for a large quantity of fuel. As a matter of fact, few planes of this type ever materialized; the move was to multiengine models for all bombardment types. The heavy class consisted of models of two or more engines, designed to carry a great weight of bombs over long distances. Several of this type appeared during the 1920's.⁹⁹

The lag in development of bomber models, at least until after 1926, retarded the growth of the aviation force and also the theories of employment. Probably one important reason for the decline of the strategic airpower idea in the immediate postwar period was the failure of bomber planes to measure up to the sanguine expectations

†See above, pp. 33-34.

of Mitchell and his fellow-enthusiasts. As late as June 1926, the general design of the newest service bomber showed little improvement in aerodynamic structure over the Martin MB-2 of 1920. All models were underpowered, bomb loads were small in relation to size of plane, ceilings were under 13,000 feet, and the normal radius of action was less than 300 miles. Perhaps the best bomber of this period was the Curtiss NSB-4 (Condor), built in 1924 and still being flown in 1930. It was a cleanly designed biplane, powered by two 400-horsepower engines, and with a top speed of 100 miles per hour—hardly the weapon to fulfill the prophecies of airpower!¹⁰⁰

Much of the delay in bomber development was attributable to insufficient equipment for conducting necessary engineering tests and studies. The Engineering Division of the Air Service complained of meagre appropriations, blaming the situation upon the unfavorable attitude of the War Department toward strategic bombing. At any rate, General Patrick expressed his dissatisfaction with the slow rate of progress in 1924 and ordered the Engineering Division to accumulate data on the desired specifications of an improved bomber and to prepare it in the form of a circular proposal for distribution to the aircraft industry. Shortly thereafter, the Materiel Division urged that the outmoded biplane bombers be completely replaced with multiengine monoplane models, and research was started to find a satisfactory design. However, the work was virtually limited to two-engine models, for in 1926 the chief of the Engineering Division (as well as the War Department) recommended against the development of four-engine aircraft. His reasons were: high production cost, difficulty of operation, lack of maneuverability, maintenance problems, and higher fuel consumption.¹⁰¹ It was not until some years later that designers broke through the barriers of economy, doubt, and fear to build a bomber which could serve as a true instrument of airpower.

Attack aviation

As the war ended in 1918, the Americans had just begun to see the possibilities of a

specialized branch of attack aviation.* During the 1920's, with the personal encouragement of General Mitchell, considerable attention was given to developing precise concepts of employment and tactics. Leaders of both the air and ground arms agreed that the aim of attack aviation was immediate support of the field forces; the specified objectives included troop columns, tanks, roads, communications, airdromes, and cantonments.¹⁰² There was a major difference of opinion, however, concerning the control of these air units and the priority of targets. The ground commanders felt that attack elements should be assigned to individual field armies and remain at their disposition, while the air commanders opposed dispersion of force and argued for consolidation of all air force units under GHQ. Also, the Army people favored front-line, morale-boosting action, aimed at enemy trenches, concentrations, and gun positions. The airmen believed such attacks to be wasteful and inefficient, and they insisted that the normal targets for aviation lay beyond the range of artillery and consisted of the supply and communication systems in the enemy's rear.¹⁰³

During this period the low-altitude, level attack was most favored in the Air Service. Planned tactics called for a series of attacks by flights, normally protected by pursuit cover. The weapons employed were machine guns, cannon, grenades, fragmentation bombs, and chemical bombs. Dive-bombing was considered an inferior method, although when assigned to attack missions some efforts were made to use pursuit planes in this fashion. High-altitude, level bombing was reserved as the approved method for bombing large targets far to the rear.¹⁰⁴ The attack plane itself was conceived as a fast, maneuverable ship, with as much forward firepower as possible and with capacity for a large number of small bombs. The models actually developed at this time, however, were but modified versions of standard observation aircraft. Mitchell had a special interest in developing armor for attack planes and expected success in that direction. As early as 1919

*See above, p. 12.

he also had hopes of mounting large-bore cannon on attack aircraft. Reporting on experimental work being conducted at the Dayton, Ohio, base, Mitchell wrote enthusiastically that cannon, up to three-inch caliber, could be used successfully and would "almost revolutionize our tactics in the air and against objects on the ground." Anticipating the Stormoviks and similar models of World War II, he stated that cannon already in experimental use (37-mm.) could pierce any tank made and could hit the target without difficulty.¹⁰⁵

Comparative summary of doctrines in 1926

It is worthwhile to take a careful look at the status of air doctrine in 1926 when the Army Air Corps was created. Close examination reveals that there were in existence by then two well-formulated plans for the use of airpower; actually, these two plans were to continue as principal alternatives right down to the outbreak of World War II. The view that enjoyed full official support, especially from the General Staff and high levels of the War Department, was incorporated in TR 440-15, *Fundamental Principles for the Employment of the Air Service*, dated 26 January 1926. It represented the traditional attitude toward warfare in general and airpower in particular, with recognition of the principle of concentration of combat aircraft and the possibilities of some kind of strategic operations. The contrasting view, which was undoubtedly supported unofficially by the majority of air officers, was comprehended in a single textbook published at the Air Service Tactical School in April 1926. This text was for use in a course named *Employment of Combined Air Force* (later called simply *Air Force*), and it set forth the most advanced theories regarding the nature of war and the function of military aviation. While other texts at the school showed a conservative bent, with due obeisance and reference to pertinent regulations and policies of higher authority, this manual appears to have been written with a great degree of independence—composed largely from theoretical concepts of the problem, unrestricted by directive from above. Maj. Oscar

Westover was commandant of the school when the text was released, but the authors of this interesting document are unknown. In any event, the fundamental doctrines enunciated therein became the core of air theory at the school and were reiterated in successive revisions of the Air Force text. The text well represents the prevailing attitude of the Air Corps Tactical School, which from 1926 until 1941 opposed (almost to the point of heresy) the doctrinal assumptions of the War Department.

TR 440-15* took a broad view of war as the use of every national resource—mental, moral, and physical—to bring about victory over an enemy. But, following the traditional military view, it specified that the first move was to carry operations into hostile territory. The primary objective of the Army (including the air arm), furthermore, was destruction of the enemy's armed forces. The mission of the Air Service was defined as that of aiding the ground forces to gain decisive success by destroying enemy aviation, attacking surface forces and facilities, and by protecting friendly ground units from hostile air reconnaissance or attack. In addition, the Air Service was to furnish observation for information and for artillery control, messenger service, and transportation for special personnel.¹⁰⁶ Although the organization and the training of all air units were based upon their role of assisting the ground forces, TR 440-15 stated that control of air units would vary according to their types and the tactical situation. Some units would always operate as organic elements of ground commands; others might be attached temporarily or might cooperate by indirect support in the battle area or at a remote distance.¹⁰⁷ Following the recommendation of the Lassiter Board,† the regulation provided observation aviation as an integral part of infantry divisions, corps, and armies, with a reserve under GHQ. An air force of attack and pursuit units was assigned to each field army, and a substantial force of bombardment and pursuit aviation was

*TR 440-15, *Fundamental Principles for the Employment of the Air Service*, 26 Jan. 1926, was prepared under direction of Maj. Gen. M. M. Patrick, Chief of Air Service, and issued by order of the Secretary of War.

†See above, pp. 26-27.

made a part of GHQ. It was assumed that when a field army became involved in important operations, it would be supported by GHQ aviation. Emphasis was placed upon the mobility and adaptability of the GHQ air force, described as capable of

Great freedom of movement, making it possible to rapidly concentrate superior forces at important points when necessary. The GHQ air force may assist the army in the execution of tactical missions by being employed on the battle front . . . or, indirectly, when conditions are favorable, by carrying out special missions at great distances from the ground forces.

TR 440-15 admonished against breaking up the GHQ force, except in "special and temporary situations." This powerful "all-purpose" unit could be used for coast defense as well as for the operations already described.¹⁰⁸

The functions and tactics prescribed for specific classes of aviation—observation, pursuit, bombardment, and attack—were virtually the same as those discussed in this chapter under the appropriate headings. Special attention was given to defining the task of the bombers. Destruction of hostile military and naval targets was given priority although allowance was made for other aims—such as the damaging of enemy morale. Bombardment might aid the infantry by striking objectives such as communications and military industrial centers beyond the range of artillery. A distinction was drawn between tactical and strategical bombing: the former was restricted to the combat zone and the latter reached into the zone of interior. Although strategic operations were not considered to involve direct cooperation with ground forces, TR 440-15 emphasized that they should be based on the "broad plan of operations of the military forces."¹⁰⁹

The 1926 text for the Bombardment course at the Air Service Tactical School was even more conservative than the War Department regulation. It stated that the bombardment operations considered in the course would be those in conjunction with large forces of ground troops rather than those of an independent character. Hence the approach was always "from the stand-

point of various ground situations." Reflecting the General Staff view, this text questioned the morale value of bombing civilian population centers and deplored the fact that independent bombardment operations were "popularly conceived to be the true role of that class of aviation."¹¹⁰ In the later view of a ranking Air Force general, this document represented "The deterioration of the strategic idea . . ."¹¹¹ However, strange as it may seem, the text for a companion course at the Tactical School, taught in the same year, contained the most advanced statement of air doctrine then in existence. Employment of Combined Air Force, a course which would appear to be on a higher doctrinal level than the Bombardment course, rested upon a far different concept of the nature of war and the role of airpower.

The Combined Air Force text stated the mission of the air force to be cooperation with the military and naval forces "in furtherance of the national war policy."¹¹² Here the air arm was clearly conceived as a coordinate branch of the nation's armed forces, rather than subordinate to the infantry. Furthermore, the aim of war policy was not to destroy enemy armies, but to destroy the enemy's morale and will to resist. Any effective means, including destruction of field forces, could be chosen to this end; at the beginning of hostilities the best means might be air attack on the enemy's interior. Such action

is a method of imposing will by terrorizing the whole population of a belligerent country while conserving life and property to the greatest extent. It is a means of imposing will with the least possible loss by heavily striking vital points rather than by gradually wearing down an enemy to exhaustion.

If destruction of the enemy's morale through attacks on the interior was not possible at the outbreak of war, then the air force objective had to be selected with a view to destroying the enemy's military strength. Most suitable objectives for this purpose were the hostile air force, troops, lines of communication, concentration centers, and industrial and transportation centers.¹¹³

Control and assignment of air units followed the basic pattern outlined in TR 440-15. However, in the Combined Air Force course even greater emphasis was given to the importance of the GHQ air force. It was seen as a mobile element of tremendous power, which should be held intact to guarantee control of the air and to make decisive attacks whenever and wherever required. Elaborating the principle stated in TR 440-15, the Combined Air Force text stressed the characteristics of mobility and concentration:

By virtue of its great mobility this force can be used to make successive concentrations of air forces in different sectors of operation and it can be moved from one theater of operations to another with comparative ease. With such a force, it is possible to concentrate superior forces at important points where and when necessary to assume and maintain offensive action.¹¹⁴

Thus the important ideas of Mitchell, Patrick, and other air leaders regarding organization and control of combat aviation were upheld in the text.

Strategic operations against the enemy's interior were given a place second only to command of the air. The text admitted that the ultimate effect of strategic employment of air forces on warfare was to some extent conjectural since lack of experience prevented accurate prediction. However, it stated that the power of aviation far exceeded any other means of offensive action. Strategic air operations could and should continue even when ground units were forced to take the defensive; it was considered the only means available to a commander for striking quickly and decisively at the enemy's bases and concentration centers. It was also the weapon which could be used to destroy morale and sources of supply with the least expenditure of effort and materiel. The text pointed out further that strategic operations would divert enemy personnel and materiel to defensive action and thereby weaken his forces at the point of decisive tactical operations. Finally, it was emphasized that strategic operations had to be conducted according to a well-defined plan. A key element of the enemy's organization should be selected for

attack and should be completely destroyed before the attack was shifted to other important elements. Progressive destruction of vital parts of the enemy system would lead eventually to collapse of the enemy nation.¹¹⁵

The full meaning of this concept of military aviation, as conceived at the Tactical School, was perhaps best articulated in the pages of the text devoted to various phases of air operations. The first phase covered the period of national mobilization and concentration of forces in the event of war. During this period the air force would be employed in a strategic, independent manner to prevent the completion of hostile preparations. Its chief objectives would be the enemy air force, mobilization centers, munitions factories, communication centers, and concentration areas, and it would have the secondary aim of reducing civilian morale as a by-product of these attacks. Defensively, the air force would operate to protect the seacoast; this would probably involve cooperative action by pursuit, attack, and bomber forces against surface vessels.¹¹⁶ The second phase covered the period between concentration of forces and the actual contact of ground elements. The main air effort would then be directed against the enemy air force; control of the sky would have a crucial influence upon the developing surface battle. Pursuit was to seek out enemy aircraft and give protection to bombers and attack planes; attack units would strike at airdromes and troops; bombardment would then undertake tactical as well as strategic operations. Seacoast defense would in this phase consist of attacks upon landing forces and ships approaching the shore.¹¹⁷ The third phase was the period following ground contact and deployment of the main forces. Under conditions of open warfare the air force mission would be essentially the same as in the second phase; but if a stabilized situation should develop on the ground, it would call for the greatest possible concentration of air forces in GHQ reserve, to be thrown into action for either tactical or strategic purposes as the need arose. Third-phase seacoast defense would mean attack upon an

enemy who had established a base on shore. Targets would be landing terminals, transports, debarkation points, and surrounding rail facilities.¹¹⁸

In the event, the division of air operations into phases proved to be what unrealistic, but it served, along with the earlier discussion, to illustrate the role of military aviation in the national defense and offense, as seen by instructors at the Tactical School. The major issues of air doctrine were thus clearly joined between TR 440-15

and the Employment of Combined Air Force text. While the question of air organization seemed temporarily answered in the creation of the Air Corps in 1926, the unresolved questions about the use of airpower pointed to a continued struggle over development, control, and employment. In the decade which followed, the production of radically new airplane models—weapons capable of successful strategic attack—would turn the tide in favor of the air war concept and force another step in the direction of autonomy for the air arm.

DEVELOPMENT OF THE AIR FORCE IDEA, 1926-1935

THE PRINCIPAL change in the tenor of the arguments over airpower, in the period from 1926 to 1935, derived from technological advances in aircraft production. The standard theories, representing the traditional position of the War and Navy departments on the one hand, and the "new warfare" view of the Air Corps on the other, held up face-to-face during the decade. Very few new ideas appeared in this prolonged debate, but the production of new weapons which could actually fulfill the airmen's visions gave them a renewed assurance of ultimate success. As a consequence, even while old-line military personnel refused to budge in their basic assumptions, the air leaders plunged ahead eagerly, developing their theories in greater detail, confident that sooner or later their fundamental notions would carry the day. By 1935 the War Department was forced to make another compromise with the rising pressure when it established the GHQ Air Force as a tactical unit of the Army. But although the new weapons aided the general advance of airpower, they had a concurrent effect which temporarily divided the air leaders themselves; they contributed to doctrinal revolution relative to functions of pursuit and bombardment. The center of this revolution and of the over-all development of air theory after 1926 was the Air Corps Tactical School.

DEVELOPMENT OF THE HIGH-SPEED BOMBER

From the earliest concept of airpower, dating back to the first World War, there has been an interesting interaction between theory on the one hand and aircraft performance on the other. Almost from the beginning the unlimited potentialities of airpower were appreciated by such pioneer

thinkers as Milling, Gorrell, Mitchell, Foulois, and Patrick. But tactical doctrine for immediate use had to be fitted to the performance of planes actually in existence. Aircraft specifications reflected, within technological limits at a given time, the desires of the air doctrinaires; the performance of the planes, once off the drawing boards and in the air, modified in turn the articulation of theory. There were occasions when unforeseen technological advances upset major premises of doctrine, but these were rare. The period 1926 to 1935 was especially interesting as a time when aircraft performance clearly responded to the demands of doctrine, and in so doing, exercised a revolutionary effect upon at least one aspect of air theory.¹

Efforts to stimulate improved aircraft design

As was mentioned in the preceding chapter,* little progress has been made in bomber design before 1926. In March 1927, trying to speed up the still lagging development, General Patrick outlined to the chief of the Materiel Division the minimum characteristics needed for "expanding tactical requirements." These were, indeed, modest specifications, only slightly higher than those already built into the current Curtiss NSB-4 (Condor). Patrick wanted a speed of 115 miles per hour at 10,000 feet, bomb load of 2,000 pounds, radius of action of 400 miles, and service ceiling of 15,000 feet.² The Keystone XB-1 and the Curtiss XB-2 were produced according to the above standards and were delivered for service test in 1928. Both proved disappointing, however, to the bombardment leaders. They showed no significant advance in design over existing types; and while the XB-2,

*See above, pp. 38-39.

chosen as the better of the two, was somewhat superior in performance to the NSB-4, it fell short of the plane hoped for by veteran pilots like Maj. Hugh Knerr, the doughty commander of the 2d Bombardment Group, who had his sights fixed far beyond the XB-2. He wanted an all-metal monoplane day bomber with a minimum speed of 160 miles per hour and a ceiling of 18,000 feet.³ He insisted that two types of bombers were necessary to meet tactical requirements: a high-flying, heavily armed plane of short range for daylight, precision operations, and a long-range, heavy-capacity plane for night-time, general attacks. He argued that no single model, certainly none in existence, could effectively serve both requirements. Knerr was anticipating with great accuracy the eventual development of day bombers (B-17 and B-24) by the Americans for operations against Germany, and the design of night bombers (Wellington, Stirling, and Lancaster) by the British for area attacks at night. But the General Staff was skeptical in 1928 and urged standardization through development of a single, all-purpose model, presumably for economy and production reasons. The "bomber battle" between the Air Corps and the General Staff was now on in earnest—and it would continue up to 1940.⁴

Major Knerr pointed to the folly of restricting bomber design in the interest of standardization and charged that such hampering would lead to the loss of the Army's most powerful weapon through incorrect employment. He was upheld in this view by Lt. Col. C. C. Culver, commanding the 2d Bombardment Wing. Culver, like Knerr, favored "a single purpose airplane rather than one which may be susceptible to modification to adapt it to other uses, thereby making it a mediocre all-purpose airplane rather than a first-class single purpose one."⁵ Despite these arguments, the Chief of the Air Corps, then Maj. Gen. James E. Fechet, yielded to the view of the General Staff and directed the Materiel Division to proceed with development of a fast, two-engine plane for day and night bombardment, as well as for observation.⁶

The chief of the Materiel Division balked at this proposal, indicating that it was unsound, and for many months correspondence was exchanged on the subject. Finally, Knerr crystalized the matter once again by writing to the chief of the Materiel Division in February 1929. He urged development of the day-bomber type which he had suggested more than six months before. The specifications were only slightly revised and this time carried the approval of the bombardment board appointed to review aircraft specifications and of the Air Corps Tactical School. Nevertheless, contrary to this request, the Materiel Division, complying with final orders from General Fechet, developed the Douglas XO-35 as a two-engine observation model; a modified version of this ship, the XO-35A, was to be used for day bombardment.⁷ The O-35 was a gull-wing monoplane with metal monocoque fuselage and carried a crew of three. Although representing some advance in aerodynamic structure, it was not adequately suited to either observation or bombardment purposes and was soon superseded by more specialized types.⁸

Successful development of two-engine bombers: the B-9 and B-10

In spite of the apparent setback, Knerr and the other bombardment enthusiasts continued to agitate for more powerful, specialized bombers. They succeeded during 1930 in having issued by the Air Corps a circular design proposal for an advanced heavy bomber. Six leading manufacturers responded and submitted experimental models for comparative tests; these proved to be the most important bombardment competitions to date, and the models showed aerodynamic improvements which greatly heartened the bomber proponents. The year 1930, which saw the initiation of these design advances may be regarded, therefore, as the major turning point in bomber development in the period between wars. Success of these two-engine models was to open the way to still faster and larger planes—planes with the range and load which would make strategic airpower a reality.⁹

The two outstanding models in the heavy bomber competition were the Boeing XB-901 (B-9) and the Martin XB-907 (B-10). The former, an all-metal, low-wing monoplane of clean design, was delivered first for flight test. Two 600-horsepower engines gave the Boeing entry a speed of 186 miles per hour at 6,000 feet, which was some 60 miles per hour faster than the speed of any existing service bomber. The extra speed was not attained through extra horsepower, however, but by structural refinements and reduction in drag resulting from incorporation of a retractable landing gear. Even more striking was the performance of the Martin entry, a plane that looked, as well as acted, the part of a modern bomber. It was a mid-wing, all-metal monoplane with retractable gear; when tested in 1932 the Martin showed a speed of 207 m.p.h. and a ceiling of 21,000 feet. The over-all performance rated it as the fastest and most powerful bomber in the world.¹⁰ The United States had forged ahead in bombardment weapons and was to retain that advantage in the years which followed.

Both the Boeing B-9 and Martin B-10 became official Army aircraft, and they established a new standard of performance and design. During 1932 the Materiel Division took steps to improve all heavy bomber equipment. Emphasis was placed on monoplane design, all-metal construction, and streamlining; the transition from wood-and-fabric to metal was virtually complete by 1935.¹¹ Even more significant, however, was the consequence of the success of these new bombers upon the development of larger aircraft. Supporters of the strategic bombardment idea had always seen the desirability of large planes, since both range and load are primarily a function of size. However, until this time it had been believed that size mitigated against speed. Development of the B-9 and B-10 demonstrated that aerodynamic efficiency could be increased with size, thereby providing an open sesame for development of bigger and faster bombers.

Sensing the new possibilities, pilots responded eagerly to a questionnaire distributed in March 1933 by Maj. Gen. Benjamin

D. Foulois, then Chief of the Air Corps. Foulois wanted their comments and recommendations regarding future bomber development. Many novel ideas were submitted, as might be expected, but the trend of thought was distinctly toward a large, four-engine ship, capable of flying hundreds of miles at high altitude and with heavy load, to attack either sea or land targets. In the Materiel Division intensive research was launched to meet and solve the countless technological problems involved in construction of such a plane—more efficient streamlining, greater construction strength to meet the higher speeds and wing-loadings, adequate defensive armor and firepower, and more powerful engines. The basic challenge was, of course, more than the Materiel Division alone could answer; the "ideal" plane of the bomber proponents called for the best engineering thought and production skill that American industry could offer.¹²

The B-17 Flying Fortress

In 1933 the Air Corps issued a new circular design proposal for an advanced multi-engine bomber. All but one of the interested manufacturers assumed that this meant a superior two-engine model; Boeing engineers, however, decided to undertake the development of a four-engine bomber of radical design. Only twelve months were allowed by the Air Corps for construction of an experimental model, but in September 1934, the XB-17 emerged as a workable design. The Boeing ship incorporated many improvements—all of the best aircraft features which had been developed since construction of the B-2. It carried bombs internally, heated quarters were provided for the crew inside the fuselage, every possible protuberance was eliminated to make an aerodynamically clean structure, and machine guns were installed to be fired from enclosures in the fuselage. The service-test model, which made a sensational, record-breaking flight from Seattle to Dayton in August 1935 was a mid-wing, all-metal monoplane of 103-foot span (the Martin B-10 had a span of 70 feet). Its weight was 35,000 pounds (the B-10 weighed 9,000), and it mounted four 850-horsepower radial

engines. Top speed was 250 miles per hour at 14,000 feet, and the service ceiling was 30,000 feet. The XB-17 could carry a load of 2,500 pounds for a range of 2,260 miles at cruising speed; it was capable of a maximum bomb haul of 5,000 pounds for a range of 1,700 miles. So impressive were the preliminary tests of the Boeing entry that the Air Corps recommended the purchase of 65 XB-17's for delivery in 1936.¹³

Here, at last, was the kind of airplane fondly dreamed of by the air planners. Such leaders in bombardment as Hugh Knerr, Frank M. Andrews, Follett Bradley, C. C. Culver, Herbert A. Dargue, Harold L. George, Robert Olds, Kenneth Walker, Donald Wilson, and Walter H. Frank were very enthusiastic over this realization of a concept—a long-range, self-defended, offensive terror of the skies—truly, a Flying Fortress. Lt. Col. Henry H. Arnold seemed at the time more favorable toward bombers of medium specification, like the B-10's, which he had led in a spectacular mass flight to Alaska during the summer of 1934.¹⁴ But Arnold could write later in his memoirs that when the first delivery of B-17's was made to the bombardment group at Langley Field in the spring of 1936, "This was the first real American air power." The B-17's were not just prophecies, coastal planes, or promising techniques, but, he wrote warmly, "for the first time in history air power that you could put your hand on." The four-engine bomber was the main turning point in the course of the development of airpower and, concluded Arnold, of world power. The retired general, who commanded America's air might during World War II, went on to insist that technological advance, as expressed in the B-17, had been the true key to America's air strength. He discounted the theory, generally held in the air arm, that independent air organization could have brought airpower much sooner. The power lay not in organization or unsupported theory; it lay in the four-engine bomber.¹⁵

But the B-17 represented in no way the final goal of the bombardment leaders. It was power achieved; it opened the way to still greater power in the future. Not con-

tent with what the B-17 could do, the leaders of the air arm championed experimental development and construction of still larger models. As early as July 1933, the Materiel Division had started a preliminary study for the design of a four-engine monoplane bomber to solve the problem of maximum range with a 2,000 pound bomb load. Favorable results in pertinent tests at Wright Field had prompted the Air Corps to submit Project A, for the building of such a plane, to the War Department. It was approved in principle, and in June 1934 the Chief of Staff authorized contractual negotiations with Boeing. The resulting XB-15, far larger (149-foot wing span) than the B-17, was not completed until 1937, and it proved inadequate in performance. The engineering experience gained in its development, however, was invaluable in the subsequent design and construction of super-planes like the B-29 and the B-36.¹⁶

TREND OF DOCTRINE AT THE AIR CORPS TACTICAL SCHOOL

The appearance of the B-9 and B-10 in the early 1930's, the performance of the B-17, and the promise of even greater things to come, sharply stimulated the development of air doctrine. If the center for technological advance in the Air Corps was the Materiel Division at Wright Field, the center for doctrinal progress was the Air Corps Tactical School, moved in July 1931 from Langley to Maxwell Field, Alabama. At this school instructors and students alike wrestled vigorously with such problems as the nature of war, the employment of airpower, and tactical doctrines for the individual branches of military aviation. The function of the school was not only to develop new ideas but, more important, to attempt to coordinate individual notions into a unified and consistent body of doctrine. Although too far removed from actual experience, as some thought, the instructors at the school performed the very necessary task of specifying and detailing the items of air doctrine, which, though existing in gen-

eral form since 1918, had lacked definite and precise form.*

Concepts of the nature of war: influence of Mitchell and Douhet

The view held at the Air Corps Tactical School regarding the nature of modern war and proper aerial employment was outlined as early as 1926 in the text for the course, *Employment of Combined Air Force*.† In the text the air arm was envisioned as a branch coordinate with the nation's land and sea forces, having as its aim the destruction of the enemy's morale and will to resist, preferably by means of attack on the interior. It is difficult to determine to what extent this concept was actually accepted by officers at the school and in the Air Corps generally. It appears to have been as radical a doctrine as any later promoted at the school, but there seems little doubt that such notions gained momentum during the '30's and were expressed with greater emphasis and detail. Some of this trend in the broad concept of war was due, no doubt, to the technological advance of aircraft. Some of it was due also to the influence of personalities outside the walls of the Tactical School—in this country and abroad. One figure of towering influence, though now a civilian, was Billy Mitchell; another was the famed Italian prophet of the air, Giulio Douhet.

In spite of the advanced concept of war contained in the *Combined Air Force* text of 1926, the ideas set forth as school doctrine in 1928 were extremely conservative. So conservative was the official statement, supposedly representing the composite judgment of the faculty, that it became a matter of serious dispute with the Office of Chief of the Air Corps (OCAC). A paper, *The Doctrine of the Air Force*, was submitted to Washington by the Commandant, Col. C. C. Culver, in an effort to gain sanction for a consistent air force theory which might then be propagated at the school and throughout the Army. On most crucial points, however, the officers in

OCAC took sharp issue; and on 1 September 1928 Maj. Gen. James E. Fechet replied to Culver with a lengthy criticism of the school's propositions and a directive to rewrite the paper according to the concepts specified by OCAC. The author of Fechet's letter, signed by his executive officer, L. W. McIntosh, is not known; but the fact remains that at this time, on paper at least, the OCAC appeared to be far ahead of the thinking of the Tactical School.

The general purport of the school paper was to place the air arm as an auxiliary to the ground force. Correcting this view, OCAC declared that airpower was coordinate with land and seapower and that it had gained sufficiently in importance greatly to "influence, if not entirely remove the necessity in some cases, particularly at the beginning of a campaign, of the ground forces ever coming into contact." Hence, modern war might conceivably become an all-air operation. To the premise that occupation by infantry was necessary to end a war, OCAC replied by rejecting the assumption completely. Victory was achieved, stated OCAC, when the enemy's will to resist was overcome; armies and navies were only means to that end, and airpower might achieve it without reference to surface forces.¹⁷

The conservative position of the Tactical School, as represented in 1928, is mysterious and unexplained, but in any event it was soon to be altered. Perhaps the sharp criticism from OCAC was the turning point. Certainly, no such statements were to emanate from Maxwell Field, whence the school was transferred in 1931. Instead, the texts, lectures, and doctrinal papers there smacked of the ideas of Billy Mitchell, who was writing and lecturing tirelessly as a private citizen. The earlier attitude of Mitchell on the nature of modern war has been described in the preceding chapter;†† by 1930 he had become even more consistent and dogmatic in his radicalism. Some believed that this development resulted in part, at least, from the influence of Douhet, who has been described as Mitchell's counterpart in Europe. Douhet himself was also

*For discussion of the origin and early years of the Tactical School, see above, pp. 29-30. Comments on the function of the school are based on pertinent regulations, interviews by the author with officers who have been associated with the school, and the USAF Historical Division's *History of the Air Corps Tactical School*.

†For discussion of this concept, see above, pp. 41-43.

††See above, pp. 16-18.

being quoted directly and frequently at the Tactical School. In order to analyze and evaluate the Mitchell-Douhet influence upon doctrine in the Air Corps, it will be necessary to review briefly the career and writings of Giulio Douhet.

Douhet, an officer of the Italian Air Force during World War I, had come out of that conflict with a firm conviction that future warfare would be predominantly in the air. Aggressive, stubborn, and egoistic, he made something of the same kind of impression in his native country as Mitchell did in America. Douhet, however, was more successful personally in gaining ultimate official support for his views. Under the Fascist regime the doctrine and organization of the Regia Aeronautica (Italian Air Force) closely followed the theories of Douhet, whose doctrines meanwhile were receiving approval in aviation circles abroad. He was least known, perhaps, in the United States; for although Douhet worked steadily on his theories from 1909 until his death in 1930, no published English translation of his works appeared in this country until 1933.¹⁸

The ideas of Douhet were set forth in several of his writings, beginning with *Command of the Air*, published in 1921. This study was revised and republished in 1927 with the blessing of the Italian Air Ministry. In 1930 he wrote a book-length article for the *Rivista Aeronautica*, entitled "The War of 19—"; this article, written on request of the magazine's editor, was an imaginary projection of future war, fought according to the Douhet theory. A summation of his most important writings, including the article and *Command of the Air*, was published in 1932.¹⁹ It is not difficult to summarize Douhet's ideas regarding the nature of modern warfare, which he saw from the particular point of view of his own country. Douhet held that the next war would be a total war of peoples and national resources; victory would go to the side which first destroyed the material and moral resistance of the other. He believed that armies and navies would play essentially defensive roles, while the offensive

would be assumed by the means best conceived for attack—namely the air arm. All national resources should be marshaled for construction of the maximum bomber force, which must be held ready in peace in order to strike immediately and decisively in war. Other classes of aviation, save necessary reconnaissance, could be ignored, while the bombers would be designed to strike in mass—first, at enemy air forces on the ground and second, at political and industrial centers. Thus, an air force might obtain victory without intervention of surface forces, if it quickly secured command of the air and then used it to bomb vital targets without respite. Douhet foresaw that under such conditions the enemy civilian population might be forced to yield within a few days.²⁰

Much of what Douhet wrote regarding the nature of war was to be supported by later theorists and actual experience. Much, on the other hand, was to prove overdrawn or erroneous. Yet, as in the case of Mitchell, the trend of military development followed in the general direction conceived by Douhet. Air attack alone has yet to force the surrender of a major power (although the situation was approached in the strikes against Japan in 1945), but more powerful weapons of the future may one day make the Douhet thesis come true. The two major flaws in his thinking were his underestimation of the strength of civilian morale and his discounting of the effectiveness of pursuit (at least in terms of the aircraft and tactics of his day).²¹ This latter error was to be repeated in the dominant thought of the Air Corps Tactical School during the 1930's.*

Regardless of the evaluation of Douhet, as determined by hindsight, he was taken very seriously in his time and had extensive influence among air theorists. Just how much influence he had on American thought is a moot question; but the consensus is that, directly or indirectly, it was substantial. Billy Mitchell is usually cited as the American leader who came the nearest to reflecting Douhet's ideas about the nature of modern war,²² but it is impossi-

*See below, pp. 58-60, 82-83.

ble to determine how much of Mitchell's thought was original and how much he owed to external influences. In any cases, certainly by 1930, Mitchell and Douhet appeared to hold almost identical views. True, the American wrote from a different geographic and strategic situation; had Mitchell been an Italian, he would doubtless have sounded even more like the twin of Douhet. In his early writings, Mitchell gave some attention to air attack against armies and navies, but gradually he shifted to the position which Douhet had assumed from the first: armed forces could be ignored while driving home massed air attacks upon the enemy's vital centers.²³

In some respects, Mitchell came to appear even more radical than his Italian counterpart. As early as 1927, he declared flatly that "The airplane is now the arbiter of the nation's destiny," and "The airplane is the future arbiter of the world's destiny."²⁴ In 1928 he was still making occasional reference to air attacks against surface forces,²⁵ but in 1930 he wrote that war is an attempt by one nation to impress its will on another by force.

The attempt of one combatant, therefore, is to so control the vital centers of the other that it will be powerless to defend itself. . . . From the dawn of history nations have put armies in the field and launched them at these hostile centers. . . . Gradually the theory grew up that the object was to destroy the hostile army, thereby opening the nation for invasion. But development of firearms has progressed to the point where an army is no longer able to advance rapidly. . . . The advent of air power which can go straight to the vital centers and entirely neutralize or destroy them has put a completely new complexion on the whole system of making war. It is now realized that the hostile main army in the field is a false objective and the real objectives are the vital centers. The old theory . . . is untenable. Armies themselves can be disregarded by air power if a rapid stroke is made against the opposing centers. . . .²⁶

By 1935 Mitchell proposed airpower as a means of world dominance, reaching beyond Douhet's concept of a weapon for survival and control in Europe. "Air power," Mitchell wrote in unpublished notes for an article,

can neutralize anything . . . on the surface of the earth or water. It can operate all over the world from land bases. A nation now expresses its strength by the air power it has, capable of reaching through the air the vital centers of other nations. . . . This means that aircraft should be developed with sufficient range and striking power to threaten any nation that stands in the way of national policy.

And, supporting once again the special notions of Douhet, Mitchell declared that any military threat against a nation "must be one against its population and resources, not against its army and navy . . . no matter whether armed forces, on the water or even in the air try to resist, they cannot stop bombardment."²⁷

How deeply did the Douhet-Mitchell theories penetrate the thinking of Air Corps leaders? The evidence indicates that American airmen found inspiration and support from the ringing claims and predictions of the two air prophets. They were not often familiar, from first-hand reading, with the details of Douhet's doctrine, and they sometimes disagreed with portions of it; but they cheered Douhet's emphasis on the importance and power of aviation and regarded him as a valuable ally in the fight for recognition. General Ira C. Eaker has neatly summed up the attitude of most Air Corps officers by stating that Douhet was very useful for his publicity value and for quoting as an authority in support of Air Corps arguments. As to his doctrine, Eaker regarded it as extreme—possibly true for the future, but not for the time being.²⁸ An example will serve to illustrate how Air Corps officers might make use of Douhet's writing. On 9 May 1933, as a supplement to his testimony before a Congressional committee, Maj. Gen. Benjamin D. Foulois, then Chief of the Air Corps, sent 30 mimeographed copies of a translation of Douhet's air warfare doctrine to Rep. John J. McSwain, chairman of the committee. In the letter of transmittal, Foulois stated that the paper "presents an excellent exposition of certain principles of air warfare."²⁹

It might be expected that if there was any serious study of Douhet's doctrine, it would have taken place at the Air Corps Tactical School. According to Maj. Gen. Walter H.

Frank, Ret., who exercised direction of the school during its last years at Langley Field, a translation of Douhet's theory was made at Langley and issued to all students there. There is no documentary evidence to substantiate this, however, and the earliest copy of any Douhet translation to be found in the school archives is one which was placed in the library after the move to Maxwell Field. This was a translation from the Italian of Douhet's article, "The War of 19—," in *Rivista Aeronautica* of March 1930. The library record shows that five copies of this article were produced and made available for reference in November 1931, but apparently little use was made of them.* Gen. Laurence S. Kuter has denied that Douhet had any considerable influence at the school, having stated that the only translation he had ever seen was one made in 1933 by Mrs. Dorothy Benedict, aided by Capt. George Kenney. This was a translation from a French magazine, *Les Ailes*, of an article based upon extracts from three of Douhet's works. Mrs. Benedict's translation was reproduced by mimeograph in Washington, D.C.,³⁰ and copies were placed in the school library at Maxwell Field. General Kuter has declared, however, that the study was employed only for reference and was never used or quoted extensively in tests, lectures, or official utterances at the Tactical School.³¹ In addition to the article from *Les Ailes*, there was a summary statement, in mimeographed form, by Col. Charles DeF. Chandler, Ret., of the "Air Warfare Doctrine of Gen. Douhet." This was copied from Chandler's article in the *U.S. Air Services* for May 1933 and was available at the school.³² So far as is known, no other sources in English for Douhet's writings were available in this country until 1941.³³

Although actual use of Douhet's writings appears to have been very limited, his basic ideas were apparently well known at the Tactical School. Maj. Gen. Donald Wilson, Ret., who was one of the leading theorists at Maxwell Field during the '30's, has said that he had never read Douhet all the way through and, in any case, disagreed with his idea of mass bombing. Yet General

Arnold could write in his memoirs that the school had been teaching the Douhet theories as an abstract science for several years.³⁴ Examination of doctrine, as it was taught and promulgated at the school, shows that the concept of war as seen there was similiar in most respects to the views of Douhet. But it also differed in some ways, and the only fair conclusion seems to be that Douhet was only one of many influences which impinged upon the Tactical School.

General statements at ACTS on the nature of warfare reflected the basic Mitchell-Douhet view. The Air Force course text, written in June 1934, established national morale and industry as more crucial objectives than enemy armies. The easiest and cheapest way to win a war was thought to be by air attack upon the enemy's population and production facilities. In support of such ideas, a number of foreign military authorities (not including Douhet) were quoted: Gen. Eric Ludendorff, Gen. Max de Montgelas, and Prof. André Mayer.³⁵ In preparing *A Study of Proposed Air Corps Doctrine* in January 1935, the school made the following assumptions, among others:³⁶

1. Air Forces must be employed offensively. The ideal combination in war is an air offensive and ground defensive.
2. The only practical means of defense against air attack is counter-air attack.
3. In a war between major powers, an air force phase, which may be decisive, will start before ground contact.
4. Initial operations are of the greatest importance. No nation can afford to decline the role of aggressor and sacrifice the opportunity of attacking an enemy that may be unprepared.

Douhet himself would have been proud to have written the above, and Mitchell in 1935 would surely have accepted it. The Axis powers apparently had similar notions, and they put them into practice before another decade was ended—notably in Poland and at Pearl Harbor.

Instructors who participated in the Air Force course at Maxwell Field and in the preparation of school doctrines spoke in the

*Copy No. 2, used by the author, showed no record of having been charged out.

same vein when called upon to testify before the Federal Aviation Commission. The commission, appointed by the President in June 1934 to study aviation problems in the United States, was gathering ideas about the prospective role of airpower in war. Among the many authorities called were several leading theorists from the Tactical School, who presented to the commission what was represented as the school attitude toward this general problem. Maj. Donald Wilson and Capt. Harold L. George, instructors in the Department of Air Tactics and Strategy, perhaps best summed up the school view of the nature of modern warfare. Wilson saw war as the inevitable result of increasing nationalism and overproduction. Following the economic theory of war which was so popular in the Depression era, Wilson stated that the struggle for markets "can lead only to national conflict of interests." Under such conditions the welfare of a nation could be protected only by force. What kind of force, in what kind of war?³⁷ Both George and Wilson believed that airpower was not merely a new weapon—but a new method of waging war. For it was the means by which the true aim of war (overcoming the enemy's will) might be directly realized.³⁸ Ground and naval forces would be used only to the extent necessary to mount an air invasion, which would be aimed at the enemy's industrial areas. And the only effective defensive measure against such an attack was a counter-air offensive.³⁹

The employment of airpower

Given the nature of war as seen at the Tactical School in the 1930's, how could airpower be most efficiently employed? This was a question which could not be answered in sweeping generalities, but which demanded more careful analysis, technical knowledge, and precise thinking. Primary attention was given to this question at the Tactical School during the period under consideration; and while there proved to be virtual unanimity regarding the importance of airpower in war, there emerged sharp and bitter difference concerning the manner of its development and application. Yet it was specifically in this

area—the methodology of air warfare—that the Tactical School was to make its most original and significant contribution to air doctrine.

The difficulty of formulating a clear-cut theory for employment of armed forces, in the absence of a definite national strategic policy, has been noted in the preceding chapter.* This difficulty remained after 1926 and persisted, in fact, until the late 1930's. The officially pronounced policy of the American government continued to be one of defense of its shore lines. The Army, in developing appropriate war plans, usually postulated a European coalition as the attacking force, possibly in combination with Japan. The Air Corps saw such attacks mainly in the form of air strikes from Canadian, Mexican, or island bases, and thought of defense chiefly through counter-air operations against those bases. No overseas offensive plans were worked out, although there were some air leaders who anticipated a repetition of the World War I situation. With these rather vague and unrealistic strategical assumptions, what kind of force and doctrine would the Air Corps evolve? How could such defense-mindedness be reconciled with the dominant Mitchell-Douhet offensive theories of strategic air attack? The two approaches were, indeed, contradictory; and the consequence was a kind of organizational schizophrenia and double-talk.⁴⁰

When reference was made at the Air Corps Tactical School to the actual strategic situation of the United States, the policy of pure defense was indicated. In the 1930 text for the Air Force course, for example, this policy was given full endorsement and was applied without reservation to the problem of air employment. The organization of the air force, the text stated simply, should be based on defense of the country against invasion by the most probable coalition of powers. Accordingly, the composition and strength of the Air Corps should be developed primarily for the purpose of successfully driving home bombardment attacks against the invaders; the various classes of aviation

*See above, pp. 30-31.

should be balanced upon this premise.⁴¹ Capt. George Kenney, former Tactical School instructor, developed the same view in a paper prepared at the Army War College in April 1933. In view of American military policy, which was one of national defense, wrote Kenney, the Army Air Corps would be employed as an essential element of the Army in protecting the U.S. coasts. Its objectives would be: gaining air control; locating and attacking enemy vessels, landing parties, airdromes, lines of communication, and industrial centers; and defending American vital centers, bases, and communications from air attack.⁴²

By 1935 the Tactical School was beginning to make reservations in its statements about the purely defensive mission of military aviation. In proposing a doctrine for a GHQ air force in that year, the school study pointed out that the primary place assigned to air defense and counter-air force operations was dictated by the expressed national policy, location of bases, and limited range of existing aircraft. But, it insisted, such employment of airpower should be practiced only while vital strategic objectives lay beyond the effective radius of action of American bombers. For,

the principal and all important mission of air power, when its equipment permits, is the attack of those vital objectives in a nation's economic structure which will tend to paralyze the nation's ability to wage war and thus contribute directly to the attainment of the ultimate objective of war, namely, the disintegration of the hostile will to resist.⁴³

Maj. Donald Wilson, when testifying before the Federal Aviation Commission, stated that the United States has need of a strong air defense force, but he pointed out that the only way for the nation to neutralize the strategic disadvantage of purely defensive warfare was to build an air force which could reach the homeland of a potential enemy from continental or advanced bases under U.S. control.⁴⁴

In teaching the subject of air force employment, the instructors at the Tactical School solved the problem by ignoring the actual strategical demands of the United States and by discussing pure theory. Hypo-

thetical situations, involving American bases and frontiers, were introduced as illustrative problems, but only to explore or demonstrate the uses of airpower. This was particularly true in the study of strategic bombardment. Although from a practical point of view, American planes had insufficient range to reach the vitals of any major industrialized country, careful analysis was nevertheless given to the problems of target selection, strategic bombing tactics, and related matters. In most cases the actual study was made of appropriate targets in the United States—not that the instructors necessarily believed that these would become objects of attack, but because the necessary data from other countries was more difficult to obtain. Although the instructors were thinking in terms of offensive air action against potential enemies, they found it more practicable and discreet to talk and study in terms of possible air attack on the United States. In other words, the school instructors developed a doctrine of air employment in terms of general capabilities of the weapon; they did not restrict themselves to the expressed national strategic policy, probable combinations of allies, or existing aircraft equipment.⁴⁵ The fact that the school took this liberty was indeed fortunate. Had air doctrine been limited to defense of our coast line, the Army Air Forces would not have had the theory, the organization, or the planes which carried it to victory in Europe and Asia during World War II.

Although references to anticipated national strategy remained general and vague, the instructors at the Tactical School were definite and specific in their views on proper organization and control of combat aviation. They spoke of the GHQ Air Force as the only air force authorized by existing tables of organization, but they clearly anticipated that in case of war task forces would have to be organized from it. When instructors referred to "air force" (either "an" or "the"), they had in mind a task organization, normally composed of all four classes of combat aircraft, but containing in every case a nucleus of either bombardment or attack. It was believed that the

principles of operations, methods of employment, and tactics of a task force would parallel closely those of the GHQ Air Force. According to the official text, aerial units would be allotted to an air force according to the requirements of its general mission. In this connection, it was assumed that in most situations the operations of the bombardment component would be of paramount importance; after determining the number and types of bombardment units required, the air force would be balanced by the assignment of such numbers of pursuit, attack, observation, and auxiliary units as would permit the bombardment missions to be driven home successfully.⁴⁶

Emphasis was placed, following the tradition of Mitchell and Patrick, upon high-level, unified control of the air force. Criticizing the permanent assignment of striking forces to field armies, the school derived a general theory for correct control of the air force. It held, according to the text of 1934-1935, that no tactical commander should be charged with a responsibility beyond the capabilities of his units; an army commander, for example, could not be expected to assume responsibility for the success of a group of armies. In order to secure the advantages which accrue from the radius of action and flexibility of an air force, it should be assigned and employed by no lesser commander than "he who has the ultimate outcome at stake. Insofar as the field forces are concerned no commander less than the GHQ commander has this responsibility."⁴⁷

Before outlining the application of fundamental military principles to air force employment, the Tactical School considered the special characteristics of aviation as compared with other arms. Mobility, derived from the speed and freedom of movement of aircraft, was regarded as one of the principal powers of aviation. Rapid concentration of an air force was possible at any point within its radius of action, and this ability had the effect of multiplying its striking force in military operations. Only the requirement of adequate bases limited the indefinite extension of the area of movement. The great range and flexibility of use

of an air force were also stressed as leading attributes.⁴⁸

The general theory of employment of air-power rested upon the assumption that the traditional principles of war applied to the air force. The official texts, from the earliest years of the Tactical School, gave particular attention to this point. The principles were consistently set forth as nine in number: the objective, the offensive, mass, economy of force, movement, security, surprise, simplicity, and cooperation. The selection of objectives was regarded as the primary duty of the higher commanders of air forces—"the very essence of proper employment." The estimate of the situation would usually disclose the one objective best suited to the accomplishment of the mission; once selected, the target should be attacked without vacillation, deviation, or dispersion of effort on targets of only secondary importance. An air force, while unable to hold a successfully attacked objective, possessed the power of destruction and the power to strike again and again.⁴⁹

As to the principle of the offensive, the air theorists repeatedly pointed out that air forces were by nature bound to aggressive action. They could not occupy any kind of position and defend it. Even while conducting operations that were strategically defensive (such as interception of hostile bombers), the air action always had to be offensive. The theorists recognized, too, the application of the principle of mass, and they cited World War examples, St.-Mihiel and Meuse-Argonne, as demonstrations of the most effective method of employment. In this connection, the instructors observed that air units could achieve mass action by rapid concentration from dispersed air-dromes, while surface forces normally had to be kept physically close together in order to strike in force. Massing of air units at the decisive point required rigid application of the principle of economy of force. This meant reduction of activity on quiet fronts and against unimportant targets, as well as unified control over all air units in a given theater. It involved also the principle of movement, an inherent characteristic of the range and flexibility of air action.⁵⁰

The principles of security and surprise were seen to be as essential to air as to ground forces. Surprise could be readily achieved in air action, because of the great speed of movement and the possibility, in tactics, of taking advantage of atmospheric conditions and the versatility of aircraft maneuvers. As a consequence of the speed of aircraft, the difficulties of communication, and the short duration of aerial fire contact, the principles of simplicity and cooperation were held to be even more essential to air than to ground operations. Cooperation of all elements concerned in an operation was regarded as indispensable to fulfillment of the principles of mass and economy of force.⁵¹

In the over-all development of air theory at the Tactical School the most striking change after 1930 was the increasing emphasis upon bombardment and the concurrent decline of pursuit. At the close of the first World War, and well into the 1920's, pursuit had been regarded as the basic arm of the air force—indispensable to the activity of all other branches.* But with the development of the high-speed bomber, first the B-9 and B-10, and later the B-17, the picture began to alter radically. Billy Mitchell, the earlier champion of pursuit, by 1930 saw bombardment as the key element in airpower. He wrote that "This phase of air force work is the one outstanding development that occurred in the European War. It is the thing that will bring about victory or defeat in future military contests."⁵² Mitchell was at this time writing from the outside, but within the Air Corps, too, the 1930's saw bombardment rocket into a position of almost exclusive importance, while pursuit aviation fell into a limited and narrowly defensive role. This was partly the result of the technological advances in bombardment and partly of the growing influence of the Mitchell-Douhet doctrine. The struggle between personalities supporting the rival branches of aviation reached white-hot intensity at the Tactical School—that "crucible in which Air Corps policy was distilled."⁵³ The result of the struggle was to give dominance to the big

plane—and to reduce pursuit to a point which was to handicap the American air effort in World War II.⁵⁴

As early as 1926 the Tactical School took the view that bombardment constituted the basic arm of an air force. This assumption was rejected by the Office of the Chief of Air Corps, on the ground that the situation would determine which arm was basic. When the issue at stake was air supremacy, pursuit must be regarded as basic. OCAC opposed the designation of any one branch as basic, but contended that if any were to be so designated, it should be pursuit.⁵⁵ This, however, was the last occasion on record when any authoritative Air Corps statement recognized pursuit as basic. There was increasing emphasis upon the offensive principle in war, especially in air war, and the bomber pushed to the fore as the chief offensive air weapon. The Air Force text at Maxwell Field for 1933-1934 stated unequivocally that even if the over-all national effort be defensive, the air force as a whole had to wage offensive action. And since destruction by airpower was wrought chiefly through bombing, bombardment was the principal arm of the air force.⁵⁶ Again showing a direct parallel to Douhet's ideas, the 1935 text proposed as the ideal strategic situation a combination of the air offensive and the ground defensive.⁵⁷ And while Douhet had said that all organization and equipment should be devoted to bombardment, ignoring other classes of aviation, the Tactical School followed by stating that "auxiliary" aviation could be developed only at the "expense of offensive power."⁵⁸

General Chennault has written that the Douhet theory that bombers could not be stopped gained wide acceptance at the school. Coupled with the apparent superiority in performance of the new bombers over existing pursuit, acceptance of Douhet led the bombardment enthusiasts to an extreme position. Some of the instructors believed that pursuit could be abolished altogether, and OCAC adopted the slogan, "Fighters are obsolete."⁵⁹ Chennault, the leading pursuit instructor at the school, analyzed the issue in 1933 in terms of the following fundamental questions:⁶⁰

*See above, pp. 31, 33-37.

1. Should an air force be wholly of the bombardment type?
2. Should fighter types predominate?
3. Should an air force be "balanced" as to types?
4. Of what value are ground defenses against air attack?
5. Can fighters intercept and defeat raiders with any degree of certainty?

Chennault had his own answers to the above questions, but he saw the trend running the other way. The European nations, he wrote, were apparently concentrating on bombers and had accepted the notion that the bombers, once launched, could not be stopped. The ideal weapon seemed to have been discovered, Chennault added derisively. But the United States, he went on, could not subscribe to the European view; it had to provide an effective defense against the bomber as well as a counter-striking force.⁶¹

Chennault was, indeed, a voice crying in the wilderness. Col. H. H. Arnold, more in step with the rising bomber sentiment, wrote in the same year that the idea was now generally accepted among world air powers that the bomber was the basic type of aircraft and that all other branches should be built around it. Accordingly, stated Arnold, the United States should take its most modern bombers, and using their employment as the basic principle, determine the other types which would give the bombers maximum protection.⁶² But it was Lt. Kenneth N. Walker, instructor in bombardment at the Tactical School, who developed this idea most logically and completely. All other classes of aviation, lectured Walker, should be built around the backbone of airpower, bombardment, and their purpose should be to insure the success of the bombing attack. "Military airmen of all nations agree that a determined air attack, once launched, is most difficult, if not impossible to stop. . . ." The only reliable way to prevent an air attack was to stop it before it got started—by destruction of the bombers on the ground.⁶³ Capt. Harold L. George, another bomber enthusiast, was equally certain that

there could be no effective defense in the air against mass bomber attacks. "The spectacle of huge air forces meeting in the air is the figment of imagination of the uninitiated," he declared. The only protection was to seek out, bomb, and destroy the enemy air force on the ground.⁶⁴ Maj. Gen. Donald Wilson, reflecting upon the issue some years later, conceded that the Tactical School went too far in minimizing what pursuit could do and neglected to give it sufficient attention during the 1930's.⁶⁵ But the revolution of theory was accomplished, and the bomber became the shining new symbol of airpower.

Whether the bomber or the pursuit plane ruled the sky, another fundamental question respecting air employment remained. Was military aviation to be regarded chiefly as an auxiliary to the ground army, or was it to have a mission independent of the surface action? In the preceding chapter a comparative summary has been made of the two conflicting views as they appeared in 1926.* From that time on the General Staff and high command of the War Department continued their insistence that the air force should aim at destruction of the enemy army; the Air Corps, and especially the faculty of the Tactical School, moved further and further in the strategic direction. The Air Force text for 1930 stated that, with the exception of counter-air force operations, by far the greatest proportion of all operations would be against "strategical objectives."⁶⁶ Some attention was, of course, given to support aviation, but the emphasis during the 1930's was on attack of the enemy's industrial system. Much of what was taught in this connection was regarded as "forbidden doctrine by the War Department, whose defensive orientation frowned upon any suggestion of an overseas air offensive."⁶⁷ Nevertheless, the Tactical School succeeded in developing and teaching such doctrine—on an abstract or theoretical basis. In the opinion of one former instructor at the school, the trend went a bit too far. While the Army ground officers made the mistake of regarding airpower as mere

*See above, pp. 40-43.

flying artillery, some of the Air Corps enthusiasts tended to advocate strategic bombing to the exclusion of all else.⁶⁸

Bombardment aviation: the precision doctrine and the escort problem

This chapter has already shown that during the period under consideration, bombardment came to be regarded as the basic arm of the air force. It remained for the Air Corps Tactical School to work out detailed tactics for this branch of aviation. And while it might, with some justification, be charged that the school neglected pursuit and attack, it made a highly significant contribution in developing bombardment doctrine. The basic idea developed was that of sustained, precision attacks by heavy bombers against the industrial structure of an enemy nation. This notion actually went back to the first World War, when Trenchard, Gorrell, and Mitchell planned and tried out the theory of bombing production and communication centers.* But until 1930 the theory had been propounded only in the most general terms. What was needed—and what the Tactical School supplied—was a refinement of the concept and a detailed methodology for accomplishing the aim. The concept was actually altered somewhat from the kind of thinking expressed by such men as Mitchell and Douhet. Mitchell, for example, wrote in 1927 that the national existence of the United States, could be disrupted by the destruction of a few key centers (New York, Chicago, Detroit, Pittsburgh and the “Mackinaw Canal”)—“within a very short time the nation would have to capitulate or starve to death.” Obviously thinking in terms of indiscriminate mass attacks on specified areas, he gave an interesting illustration of what might be done to destroy New York City. Mitchell suggested that aircraft could stand off a hundred miles or so and launch air torpedoes against the metropolis. The torpedoes† would carry hundreds of pounds of gas, explosive, or incendiaries, and would “hit a place like New York practically every

*See above, pp. 9-12.

†He described these torpedoes as built like airplanes and controlled by gyroscopes; he referred with equal vision of the future to glide bombs. Mitchell's mind was already reaching into the age of guided missiles.

time.”⁶⁹ Douhet, likewise, was an advocate of mass, area bombing. During the 1930's the Tactical School rejected this aspect of the Mitchell-Douhet theory and invented its own special concept of industrial attack—precision bombing of the critical points of specified target systems. A small group of officers, led by Kenneth N. Walker, Harold L. George, Robert M. Webster, and Donald Wilson, was responsible for the origin and crystallization of this pregnant concept.⁷⁰

A complete account of the gestation, birth, and growth of the precision concept and tactics is impossible. The idea of limited area bombing, accomplished by night missions, was being taught at the Tactical School in 1926.⁷¹ Within a few years this notion was dropped, and the new precision idea, with its related tactics, began to take form. Certainly one factor that influenced this evolution of bombardment thought was the general public opposition to mass civilian bombings. Another may have been the traditional American respect for markmanship, going back to frontier days. Technical developments in bomb-sight construction must also have been considered; Air Corps observers were favorably impressed with demonstrations of the Norden Mark XV bombsight in October 1931, and a substantial Army order for its procurement was placed in 1933. Improved models of the Sperry sight were also ordered in the same year.⁷² With the successful tests of the B-17 in 1935, it appeared that the Air Corps had the plane and the bombsight which could accurately place heavy destructive loads on small, distant targets.

But the new concept seems in the main to have been one of those rare creative ideas that generate in several minds at about the same time. Maj. Gen. Donald Wilson, who has tried to explain the growth of the idea in his own mind, has said that he is not certain of its source. A student officer in the school at Langley, Wilson went with it to Maxwell in 1931 as an instructor. In 1933 he began to teach the Air Force course; then, he relates, the precision concept began to unfold in his mind. He recalls that his earlier experience with railroads may

have started the chain of thought—he had once observed that the operation of an entire railroad system could be stopped for lack of a certain lubricating ingredient. Applying such a principle to the industrial structure on a larger scale, Wilson began to see the possibility of a more efficient and economical method of waging air war. And at virtually the same time this concept appeared, more or less independently, to other instructors in the department: to Walker, George, and Webster.⁷³ Although further refinement was yet to come, the precision concept was rather fully expressed by 1935 in the Air Force text at the school. It stated that enemy target systems—such as steel fabrication, transportation, finance, utilities, raw materials, and food supply—had to be analyzed. Following that came the very important step of selection, choosing of the relatively few objectives whose destruction would paralyze or neutralize a particular system. Successful attack on these objectives would not only break the nation's ability to produce war materials, but would so disrupt civilian life that the population might well be forced to sue for peace.⁷⁴

The tactics for such precision bombing demanded accurate bombsights and daytime visibility. The school, therefore, abandoned its earlier teaching of night bombing as the principal tactic against industrial objectives.⁷⁵ Despite “miraculous modern devices,” daylight was regarded as essential for efficient results; night methods were allowable only when the strength of enemy pursuit was so great as to prohibit daylight strikes.⁷⁶ For defense against pursuit attacks and for concentrated effect upon the target, tactics required formation flying; for protection against antiaircraft artillery in daylight, high-altitude operation was necessary. Thus, the full-blown theory and tactics of precision industrial bombing emerged in the 1930's: high-level, daylight, formation bombing of vital, pin point targets.

There was one serious question about the above formula for successful precision bombing—a possible Achilles' heel of the whole idea. Could the bombers get

through and bomb accurately without prohibitive losses? This question immediately brought to the fore the issue which, in more general terms, has already been discussed: bomber versus pursuit. In 1930 the Tactical School was clearly of the opinion that bombers opposed by enemy fighters would have to be supported by pursuit escort.⁷⁷ But within a few years some bombardment enthusiasts were declaring that nothing could stop the bombers, and that escorts were unnecessary. This sudden shift was due chiefly to the appearance of the B-9 and B-10 as high-speed bombers. Until 1930 the pursuit plane was more than a match for the bomber in air combat. But the B-10 made the competition so even that it appeared that bombers might be safe from fighter attacks, and tests of the XB-17 gave promise of bomber superiority over pursuit. From the standpoint of technical development, the period from 1931 to 1935 seems to have been an all-time low in the status of pursuit relative to bombardment.⁷⁸

There was a strong difference of opinion at the Tactical School on the question of bomber escort, and it is difficult to state, therefore, what the school doctrine was. For a time, at least, there was a strong leaning toward the “no escort” position; this may have come, at least in part, from Douhet, who believed that his bombers could defend themselves by mass formation fire.⁷⁹ General Chennault is of the belief that a large number of officers at Maxwell Field, as well as in OCAC, fully embraced the Douhet theory of bomber invincibility. And he admits that circumstantial evidence from 1931 to 1935 supported their position. Pursuit tactics, as well as design, had been neglected; in addition, the test maneuvers of bombers versus pursuit were rigged in favor of the former. Chennault has charged that attempts to demonstrate fighter capabilities met with the same kind of ostrich treatment that the Air Corps as a whole received from the General Staff when it tried to prove what airpower could do. “All sorts of fantastic and arbitrary restrictions were placed on fighters in maneuvers that were

supposed to simulate honestly conditions of actual combat.”⁸⁰ As a consequence of these several factors, pursuit looked futile in their interception problems against bombers. Chennault quotes the official umpire of the 1931 exercises at Wright Field as having said, “due to increased speeds and limitless space it is impossible for fighters to intercept bombers and therefore it is inconsistent with the employment of air force to develop fighters.”⁸¹ Two years later, Lt. Col. H. H. Arnold conducted maneuvers on the Pacific Coast, pitting P-26's, the Air Corp's earliest standard all-metal monoplane fighter, against the formidable B-12. As a result of this and other experiences, Arnold concluded that the whole question of pursuit equipment and tactics would have to be reviewed. He believed that airspeeds had become so great that close firing was no longer possible; existing pursuit types were inadequate in daytime interception operations and of no value against modern camouflaged bombers at night.⁸² Largely on the basis of such reports, Col. Oscar Westover, commanding the provisional GHQ Air Force, went even further on the issue: existing pursuit aircraft were useless because of insufficient speed, and it was doubtful if pursuit could be operated efficiently or safely at the speeds required to catch the bombers. Formations of bombers, on the other hand, had such an effective firepower that there was warrant for belief that they could accomplish their missions without support. The modern trend of thought, concluded Westover, was that high-performance bombers, together with superior observation planes, would suffice for adequate air defense of the country.⁸³

Chennault was furious with this attitude toward pursuit and pulled no punches in expressing his views. When OCAC sent Arnold's report on the maneuvers to the Tactical School for comment, Chennault produced an eight-page, line-by-line criticism of Arnold's statement. Among other things, the fiery pursuit instructor charged that Arnold's statement that the types of aircraft involved in the maneuvers were equally modern was false; the P-26 was

inferior to the latest foreign pursuit, while the B-12 was the newest and finest bomber in the world. Chennault also criticized the technical setup of the simulated ground warning net and the tactical procedures imposed upon pursuit. Finally, he opposed the basic philosophy of Arnold's approach to the problem. While Arnold had written that the conclusion that pursuit was ineffective should be accepted only after verification by further tests, Chennault stated that the nation had to have an effective antiaircraft defense. That a certain pursuit model was ineffective in intercepting a certain bomber model was, taken alone, worthless knowledge. A more useful conclusion to be drawn from the maneuvers, argued Chennault, would be a positive statement of what improvements were necessary in pursuit—in organization, technique, and aircraft design. As it appeared to Chennault, what was needed was an effective aircraft warning service, intensive training of pursuit in all phases of interception and attack, and immediate development of a superior single-seater interceptor model.⁸⁴

Chennault demonstrated to his own satisfaction that even the existing, obsolescent pursuit planes could make successful interceptions if adequate information was supplied to a central fighter control. In exercises at Fort Knox in 1933, with a more complete ground net, Chennault's plan of interception proved successful. From this experience he drew two important conclusions:⁸⁵

1. Pursuit could intercept bombardment if furnished timely information and if the defense had sufficient depth to allow for necessary time factors.
2. Bombers, flying deep into enemy territory, required friendly escort to prevent heavy losses if not utter failure.

Had these simple and basic principles been accepted and applied vigorously by the Air Corps in 1933, some of the losses in World War II might well have been averted. But the “bomber boys,” who controlled the Air Corps at that time, ignored Chennault. This was true of Arnold, who commanded the 1st Bombardment Wing in 1933, as well as

other leading Air Corps officers.* In view of this fact it is surprising to find Arnold writing in his memoirs that the prevailing American doctrine in the 1930's differed from Douhet on the issue of bomber escort. Arnold conceded that the exercises involving B-10's and B-12's were at first "deceptive," because of the small speed margin of the P-26. "Naturally," he explained, "notions that unescorted bombers might be able to out-run defending fighters temporarily existed."

The idea was further encouraged, Arnold went on, by information that the B-17 would be faster than any fighter yet seen and would be heavily armed. "Nevertheless, we became convinced—at least I certainly did—that long-range, heavy bombers must have not only increased fire power and mutual support, but also a fast maneuverable fighter escort which could go with the bombers to their targets. . . ." Actually, there is no evidence to show that Arnold came to this conviction before the outbreak of World War II, and the American plan for a bomber offensive against Germany (AWPD/1), prepared in 1941, made no provision for the kind of escort referred to by Arnold in his reminiscences. The best that plan could provide was a plea for immediate development of an escort plane—conceived, however as a large, multiplace ship, not the "fast maneuverable fighter" referred to by Arnold.⁸⁶ Maj. Gen. Haywood S. Hansell, Jr. has observed that the statement in AWPD/1 represented, in fact, "the first [official] recognition of the need for escort fighters."⁸⁷

Looking back over the years, General Hansell frankly admits that the supporters of bombardment at ACTS persisted in their faith in the unescorted bomber, and that the faith was based more on hope than fact. The whole doctrine of precision bombardment hinged upon the premise that the bomber formation possessed adequate de-

fensive firepower, yet actually, as of that time, states Hansell, "we had no power turrets, no .50-cal. defensive guns, no accurate gunners." The former instructor at the Tactical School goes on to make this remarkable statement: "If our air theorists had had knowledge of radar in 1935, the American doctrine of strategic bombing in deep daylight penetrations would surely not have evolved." It would have been too easy, explains Hansell, to rationalize the power of the fighter defense against a medium-altitude bomber. Then, the General makes a still more startling remark: "Our ignorance of radar was surely an asset in this phase." With radar, pursuit planes could easily have demonstrated their power to intercept bombers, and the whole unescorted, long-range strategic thesis might have fallen.⁸⁸ It does not seem necessarily true, however, that the entire thesis would have collapsed; more probably what would have happened would have been the development of a theory which retained strategic bombing, but provided it with the proper fighter escort.

While the bombardment instructors at the Tactical School inclined toward the notion that bombers in formation could successfully defend themselves, they did not quite take the view that pursuit escorts were useless or undesirable. In this respect, they were perhaps less radical than some of the officers in OCAC and in the tactical units. The consensus seemed to be that, as a matter of policy, bombers should have escort to prevent high losses. However, since few could visualize a single-seater pursuit with range equal to the heavy bomber, they concluded that the big ships must, and if necessary could, go unescorted to their most remote targets. It was in this last assumption that the bomber enthusiasts were mistaken; instead of pressing for development of the desired fighter type, they allowed themselves to rest upon an unproved and, in the light of what happened in World War II, an incorrect belief.⁸⁹

Pursuit aviation

The general impact of the high-speed bomber upon pursuit has already been dis-

*In justice to the "bomber boys" it should be noted that in November 1933 the Tactical School announced that as a matter of policy it would continue to recommend the development of a fighter capable of escorting bombers. Furthermore, it was commonly believed that for engineering reasons it was impossible to produce a pursuit plane that could keep pace with a bomber without depriving the pursuit of its fighting characteristics. It also is important to remember that the air arm's budget was small and that the airmen quite logically felt that the limited funds should go into the basic element of the air arm.

cussed at some length.* After 1926 pursuit fell from its position as the basic arm of the air force and entered a period of decline and confusion. The fact that this branch of aviation had entered an uncertain state was revealed as early as April 1929, when the Chief of the Air Corps, Maj. Gen. James E. Fechet, directed that a special conference be held at Langley Field "to determine the mission of pursuit and to make recommendations if necessary for the technical development required to permit efficient fulfillment of the pursuit mission." The Air Corps Tactical School, charged with making preparations for this important conference, posed the following questions for discussion:⁹⁰

1. What are the specific missions of single-seater pursuit?
2. Is pursuit more effective than bombardment in destroying enemy aircraft a) in the air b) on the ground c) during bad weather?
3. Is pursuit more valuable when used on the special mission of reducing enemy airpower or when used to protect bombers and other types?
4. To what depth can pursuit escorts be expected to penetrate if the enemy has equal pursuit?
5. Can pursuit accompany and protect bombers as now organized and equipped on day raids?
6. Do bombers and attack actually need pursuit support as escort?

The above questions clearly show that serious doubts were being raised regarding the function of pursuit; special concern with the escort problem is indicated, even at this relatively early date. It is hardly necessary to observe that no definitive answers were found to these questions, either at the pursuit conference or in the years preceding World War II.

While some pursuit leaders transferred to the bombardment branch during this discouraging period, and others assumed a defensive polemical attitude, one of them waged an all-out, aggressive fight to restore pursuit to its "rightful" role in the air force. For five years Claire L. Chennault,

as an instructor at the Tactical School at Maxwell Field, was the leading figure in the pursuit department; he wrote the text for the course and a special manual on defensive fighter tactics. It might almost be said that pursuit doctrine at the Tactical School during the critical period 1931-1936 was Captain Chennault's doctrine. He left the school because of ill health, and was retired for physical disability in 1937. After his departure from the Air Corps, pursuit lacked the vigorous leadership he had given it, but he was soon to show in China what his theories could do in practice.⁹¹

In general, Chennault tried to uphold the doctrine of pursuit which had come out of the first World War. In his Pursuit Aviation text, completed in 1933, he stated that "Since the World War there has been no new aeronautical development or invention which render unsound the broad principles evolved during the war." Those principles he summarized as follows:⁹²

1. Attainment of air supremacy depends upon success of the pursuit force.
2. The primary function of pursuit is to gain air supremacy.
3. The first objective of pursuit is to destroy the enemy pursuit.
4. Success of pursuit depends upon equipment, selection and training of pilots, numbers, tactics, and organization in units large enough to provide effective concentration of force.

Chennault observed that the air leaders in 1918 were firmly convinced of these principles, and he decried the tendency to abandon them because of the "lessons" of one peacetime maneuver. He was obviously referring here to the bomber-pursuit tests conducted by Colonel Arnold.†

To the extent that he referred to massed land battles of the pattern established in World War I, Chennault was not writing very realistically in 1933. The official strategic policy of the nation was then one of defense of the coastline, and thinking in the Air Corps had swung toward a concept of war far different from the traditional one. For example, his idea of attaining air supremacy was related to a situa-

*See above, pp. 55-56.

†See above, p. 59.

tion in which forces are in contact within a limited area. Where belligerents were widely separated (as would be the case in a war between America and a major European power), pursuit could hardly hope to maintain air supremacy over the hostile country. The old-fashioned concept of pursuit might, indeed, prove sound only in an old-fashioned kind of war. It may have been Chennault's association of his theories with the World War concept of strategy, as well as his truculent manner, that contributed to his failure to gain greater support at the Tactical School.

Chennault, however, did not actually limit his concept of pursuit function to any particular strategic situation; the vital feature of his theory was its breadth and flexibility. Once the ground situation was stabilized, he wrote, bombardment missions against strategical objectives would become of paramount importance. Pursuit support for bombers would be rendered by either general offensive sweeps or by escort, according to the situation. Pursuit would always be required to defend vital installations, at home or in the field. And, beyond those activities, pursuit would be used "whenever necessary to gain the air force objective."⁹³ The Chennault philosophy of pursuit was well expressed in a summary of questions and answers, believed to have been prepared by Chennault in January 1934 for a conference on doctrine. To the question of the normal role of pursuit in the early phase of a war, this answer was given:

Pursuit has no "normal" role in any phase of war . . . ; pursuit is a weapon of opportunity and should be employed strictly in accordance with the situation at a given time. If war begins with long-range bombardment and with rival airdromes beyond the radius of action of pursuit, then the only role possible to pursuit is active defense. If war begins in the "usual manner," the manner which may be called "historically normal," pursuit will be employed both offensively and defensively.⁹⁴

The pursuit leader was irked and offended by suggestions that pursuit be restricted to the defensive role of interception alone. He would place no limits on the range of activities that fighters could and should

perform.

During his years at Maxwell Field, Chennault did not succeed in winning the flexible, powerful role for pursuit that he desired. By dint of great personal effort, however, he did succeed in developing effective pursuit tactics, tactics that gained ultimate indorsement by the Air Corps. At a time when many of the leaders showed little interest in pursuit, and some regarded it as obsolete, Chennault plunged into the job of making it more effective. When he began teaching at the Tactical School, the doctrine of mass tactics, rather than individual combat, had already become established in principle. The idea of holding pursuit as a unified force, rather than dispersing it for defense of localities, was also recognized.⁹⁵ But a great deal remained to be done to evolve and prove the specific techniques.

Chennault began his study of tactics by painstaking analysis of the lessons of World War I. He perceived, for example, the demonstrated necessity for teamwork and adaptable flight formations. He saw the shortcomings, too—the frequent failures of pursuit to maintain the all-important advantage of superior altitude, weakness in command position, lack of provision for adequate security of force and for reserve, and failure to develop a dependable method for reorganizing a formation after its engagement in combat.⁹⁶ In constructing his own system of tactics, Chennault emphasized effective formation flying.* The purpose of the pursuit formation, he explained, was to concentrate sufficient firepower to destroy the particular aircraft being attacked. Other factors to be considered were simplicity of arrangement, maneuverability, flexibility, and ease of control. The smallest pursuit tactical unit was the element of two or three planes; then, in order, came the flight (two or three elements), the squadron (two or three flights), the group (two or three squadrons), and the wing (two or three groups). Flight units were normally divided into assault, support, and reserve echelons. The assault was

*As a means of demonstrating and dramatizing pursuit formation maneuvers, Chennault organized and led an acrobatic trio dubbed "Three Men on a Flying Trapeze" which performed all over the country.

the leading and guiding unit, the support provided immediate assistance to the assault, and the reserve, held in the highest formation position, was normally used to pursue and destroy enemy units after the attack.⁹⁷

The technique of approach and contact was related to the type of aircraft opposed. Against enemy pursuit, the attack was to be made from the rear with a force at least equal to that of the hostile formation. This plan would enable each pilot to concentrate upon a particular opponent in the close fire which followed. Against bomber formations, Chennault's tactics were more elaborate. First, action with time-fuze bombs, cannon, or .50-caliber machine guns necessary in order to disorganize the defensive formations. After forcing dispersion in this manner, the pursuit units would then close in on the broken formations, delivering their fire simultaneously from various angles. Pursuit tactics demand, said Chennault, that full advantage be taken of the three-dimensional attack plan. Since the possible avenues of approach in space were virtually unlimited, it would be very difficult for the bomber unit to organize an effective scheme of fire either before or during the combat. As to timing of the attack, the Chennault text suggested that bombers were particularly vulnerable just before or during their bomb run, although attacking them at that time exposed pursuit to possible antiaircraft artillery damage. A more favorable opportunity was after the bomb release, as the enemy dispersed to evade ground fire; pursuit elements at this time could pick out and attack individual bombers. The text conceded that this allowed the bomber to perform its mission first, but the infliction of sufficiently heavy losses might forbid repetition of the attacks.* So far as individual pilot technique was concerned, whether attacking pursuit or bombers, Chennault emphasized two points: fearless closing to the necessary range for accurate shooting and concentration of fire upon such vital points as personnel and vulnerable equipment.⁹⁸

Tactics at night were to be strictly individual, since darkness made it impracticable to employ pursuit formations. The greatest problem, stated the text, was locating the enemy planes in the air. Searchlights and flares must be used; after spotting his target, the pursuit pilot would approach from below and open fire when reaching the shortest possible range. This method should prove highly successful, the text stated, because the searchlights would blind the personnel in the hostile aircraft, and at night a plane at lower altitude was almost always invisible to a higher observer.⁹⁹

Probably the most significant contribution that Chennault made was the development of a workable plan for fighter control in the interception of bombers. Chennault saw a ground information net as an absolute necessity to successful air defense, and although his views at first met with much indifference and even resistance, they were ultimately accepted by the Army. Against the teaching of the bomber enthusiasts that employment of bombers was limited only by their radius of action, Chennault argued that it was, in fact, also limited by the amount of effective opposition that could be thrown against it. But in order to stop the bombers, pursuit pilots had to know where they were, and had to know in time. Chennault was confident that his formation tactics assured destruction of the bombers if they were intercepted in time; the only problem was securing sufficient information to assure the interception. Looking abroad in 1933, he noted that Germany and England already had effective aircraft reporting and warning systems, and Italy was making plans for one. America, on the other hand, had made no progress in this direction. On the basis of his investigations, Chennault in 1933 wrote a study, *The Role of Defensive Pursuit*. It did not become an official text at the Tactical School, but later Chennault applied its tenets successfully in China, and its ideas influenced the later development of air defense in this country.¹⁰⁰

The Role of Defense Pursuit made a formal analysis of the factors involved in

*This tactic was probably applicable to conventional attacks, even of World War II, but would hardly apply if the bombers were carrying atom—or hydrogen—explosives.

the bomber interception problem. Experience had proved, it stated, that an effective pursuit force could not be maintained on air alert at all times, or even at such times as to insure interception of an invading force. Experience had also proved that pursuit planes on the ground were unable to rise and defend successfully if information regarding enemy air movements was limited to the vicinity of the fighter base itself. In order to allow time for interception and delivery of fire before the attackers could reach their objective, information had to come from a source distant from the defending airdrome. How distant that point had to be depended on such obvious factors as bomber speed, pursuit take-off time, rate of climb, and ability to meet the attack by the shortest line of flight. Chennault visualized an air and ground reporting net which could satisfy these conditions. Information had to be sent continuously, or at frequent intervals, to a control center, in order to prevent the bombers from avoiding interception by changing course; transmission would normally be by telephone although radio might be necessary from marine posts or isolated advance stations. Final evaluation of all reports would be at the control center, where the pursuit commander would exercise authority over all the means of antiaircraft defense (planes, ground weapons, and searchlights). By means of a powerful radio transmitter, the commander would give direct instruction to all pilots, guiding them to the attack. Chennault warned again and again that the presence of pursuit near a vital area was useless unless intelligence was received from a considerable distance. Such intelligence required, in the case of an island or a point on the sea coast, a net well extended to sea. With an unconscious note of prophecy, he stated specifically that such areas as Oahu and the Panama Canal could not be defended unless marine posts were established.¹⁰¹ The morning of Pearl Harbor gave tragic proof of his point.

For defense of the continental United States, Chennault recognized that the area was too vast to cover completely with a warning net, as could be done in England or Italy. He therefore advocated creation

of a "mobile intelligence system," which could be shifted to any threatened sector. Chennault thought it unlikely that a potential enemy could launch an attack against the mainland without disclosing his intentions soon enough to permit transfer of the mobile net to the danger zone. He urged that organization and training of an Air Defense Information Group to operate the net be started immediately; the initial equipment needed would be locating devices, course-plotting instruments, communications equipment, and other specialized facilities. The functioning of the group would be modeled on similar operations in England and Germany.¹⁰² But once again Chennault's voice went unheeded, and when war came to America the nation had no effective aircraft warning system.

In view of the uncertainty in the Air Corps regarding the role and capabilities of pursuit, it is not surprising to find a corresponding uncertainty about the type or types of aircraft to be employed. Even before 1926 equipment development had been regarded as unsatisfactory, and there was disagreement as to how many kinds of pursuit there should be.* This latter question still puzzled Air Corps leaders when they met in the pursuit conference at Langley Field in April 1929. At that time they discussed questions such as the following:¹⁰³

1. Is there need for two-seater pursuit? If so, what should be its role and performance characteristics?
2. Is there need for a change in the specifications of present one-seater pursuit. If so, what?
3. Is there need for multi-seater pursuit? If so, what should be its role and performance? Should it be designed for long-range escort?
4. Should pursuit be designed for air fighting only, or should it carry equipment for dropping bombs or gas (which would necessarily reduce its performance as a fighter)?
5. For attack on bombers, should pursuit be designed to launch bombs, liquid fire, or other agents, in lieu of machine-gun fire?

*See above, pp. 37-38.

Apparently no conclusive answers to such questions were reached in the conference or elsewhere, for the most which could be said on the subject in the Air Force text of February 1931 was that the value of two-seater pursuit remained controversial, and "its development over the next few years will be watched with intense interest."¹⁰⁴

By 1933 when Chennault was preparing his pursuit text, he could summarize the actual state of affairs by writing that the majority of pursuit units were equipped with single-seaters and that a limited number of two-seaters had been issued for tactical service test. At the same time he surveyed the general lag in the development of pursuit, compared with bombardment, and explained how the new high-speed bombers had forced pursuit to the monoplane design in order to maintain a margin in speed. The Boeing P-26's, produced in 1933, made all the existing biplane equipment obsolete. But Chennault was far from satisfied with the performance of the P-26. He called for immediate improvement, concentrating attention upon the single-seater type. Of utmost importance, Chennault believed, was speed—to permit rapid engagement and withdrawal. Speed was the indispensable factor in giving to pursuit its required capability for the initiative and aggressiveness in combat; he was willing to sacrifice other elements, including acrobatic strength, in order to increase speed. Chennault had high regard, too, for maneuverability, especially a short turning radius, and for a ceiling above that of any other military type. Pursuit range, he said, was limited only by pilot stamina and fuel capacity.¹⁰⁵

Chennault, who served as a leading member of the Pursuit Development Board while at the Tactical School, was in a position to translate his ideas into official recommendations. During that period he fought bitterly against the idea of limiting pursuit to "monkey-stick" interceptors; he wanted pursuit to be capable of long-range escort and an offensive role as well. He and the board constantly demanded extended range, greater speed, and more firepower. By the end of 1936 they succeeded in obtaining the

Republic P-35 and the Curtiss P-36 (forerunner of the P-40).¹⁰⁶ Each was an all-metal low-wing monoplane, with a 1,000-horsepower radial engine; range was about 1,000 miles, ceiling over 30,000 feet and top speed around 300 m.p.h. These well-designed planes, normally carrying two or four machine-guns, incorporated the latest features of retractable gear and streamlining. They represented a leap forward from the P-26 (top speed of 235 m.p.h., range of 360 miles) and regained for pursuit some of the ground lost in the preceding years.¹⁰⁷

Chennault favored development of single-seaters for pursuit, but opposed the trend toward multiseater pursuit which gained momentum in the Army during this period. After the maneuvers of 1933, Colonel Arnold had concluded that one-seaters were ineffective against bombers and had therefore recommended to the Chief of the Air Corps that a multiseater be developed without delay. Chennault, in his comments on Arnold's recommendations, made a logically devastating criticism. He declared that a multiseater would be ineffective as an interceptor because 1) with its armament and extra personnel, it would weigh nearly as much as a bomber and therefore could not have superior speed, 2) it could not equal a single-seater in quickness of take-off, climb, and assembly, and 3) it was far more expensive to build, operate, and maintain. Chennault recommended, instead, that a superior single-seater be developed to meet the interception requirement. For this purpose he outlined the desired specifications, including an in-line, water-cooled engine, which were later to be realized in the Curtiss P-40—the plane that became the backbone of Chennault's fighter units in China during World War II.¹⁰⁸

The Air Corps Board also opposed the project of developing a multiplace pursuit, concluding that its performance would be unsatisfactory for any purpose.¹⁰⁹ However, agitation for such a type, either as interceptor or escort, persisted during the 1930's. Some air leaders, especially in bombardment, thought the answer for long-range escort was to convert a heavy bomber into a super-armed defensive ship.¹¹⁰ This idea

was ultimately to be tried out in World War II (with a modified B-17), and the experiment was a failure. However, the most popular notion in connection with multiplace fighters was that an all-purpose plane whose primary function would be interception should be developed. It is rather difficult to understand how aviation experts could have taken this proposition seriously, since all experiments with multiplace pursuit, going back to World War I, had been unsuccessful.* Perhaps one reason for the support of the idea was the fact that it appeared to the General Staff to be a possible means of reducing the number of Air Corps types, a policy consistently encouraged by the War Department in the interest of standardization, quantity production, and economy. At any rate, the promoters of a new design, built to meet the demand for a multiseater, skillfully used this approach as a selling-point. Beginning with the assumption that "present and potential single-engine pursuit planes are wholly ineffective against bombardment aircraft," the statement describing the Bell design (later to become the XFM-1, "Airacuda") claimed that the proposed model would serve not only as a successful interceptor, but also as an all-purpose fighter, bomber, observation, and attack plane. In November 1935 the Secretary of War approved the characteristics for this experimental plane; its primary mission was to be "sustained attack of hostile aircraft in flight," but "The idea should be kept in mind of a several purpose airplane capable of replacing various other types now authorized."¹¹¹ The XFM-1 was to prove one of the most disappointing technical and tactical failures of the pre-World War II period. It apparently was a case of "too much engineering and too little tactics." Chennault fought unsuccessfully against the Wright Field experts on this question of multiplace fighters. He has referred to the XFM-1 contemptuously as a plane having no tactical use, but the engineers, Chennault says, "were fascinated with the intricacies of its construction."¹¹² The judgment may be harsh and unfair, but Chennault has been vindicated in his

*See above, p. 8.

criticism of the plane and the idea of multiplace pursuit.†

Attack aviation

During the late '20's and early '30's, aviation in support of ground forces continued to occupy major attention in the Air Corps and at the Tactical School. The War Department favored this type of employment for the air arm, and the air leaders did not yet have the kind of equipment required for strategic operations. Differences in the ground and air view of control and objectives persisted; the Tactical School continued to favor control of all striking forces by GHQ, the gaining of control of the air as the first priority in the role of close support, and the objective of interdiction of the battlefield. The branch of aviation primarily identified with ground support was attack, and probably the most influential teacher of attack aviation at this time was Capt. George C. Kenney.¹¹³ While serving as an instructor at Langley Field, from 1926 to 1929, Kenney wrote the textbooks for the Observation and Attack courses. He developed tactics largely by actual flying practice, using members of his school classes to make up formations and carry out various maneuvers. It was during this period that Kenney developed many of the techniques and some of the weapons that were to prove successful under his Southwest Pacific air command in World War II.¹¹⁴

Soon after Kenney's departure from the Tactical School, attack aviation suffered a decline. One reason for this, perhaps, was the effect of the forced resignation of General Mitchell in 1926.¹¹⁵ Moreover, although he had been one of the principal supporters of this branch of the Air Corps, by 1930 even Mitchell had become obsessed with the single notion of strategic bombing. The influence of Douhet, who believed that all classes of aviation except bombardment should be ignored, has already been mentioned.†† By 1933, with the high-speed heavy bomber almost a reality, and with the emerging concept of long-range, precision attack becoming dominant at ACTS, ground support

†It should be noted that the idea of a multiplace fighter is not as preposterous as Chennault thought. Current (1955) USAF night fighters carry from two to three men.

††For Douhet's ideas and influence, see above, pp. 49-50.

aviation fell into neglect.¹¹⁶ In a word, the development of the heavy bomber and its doctrine of employment, although the most important American airpower accomplishment of the 1930's, had a retarding effect upon attack, pursuit, and all other aviation activities.

The theory of attack objectives and tactics remained virtually what it was when Captain Kenney wrote the text in the late '20's. Proper targets were considered to be the enemy air force and other vulnerable objects beyond the range of artillery, especially lines of communication and supply. Low-altitude, level attacks by small formations were favored; weapons included machine guns, small bombs, and chemicals. A special innovation in this connection, nurtured by Kenney, was the development of time fuzes and, later, parachutes, for use on fragmentation bombs—with the purpose of allowing the delivering aircraft to clear the target before the detonation.¹¹⁷ The morale effect of front-line strafing was recognized, but it was generally agreed that the risk to plane and personnel from small-arms fire was too high for the advantage gained.¹¹⁸

The development of appropriate attack aircraft was extremely slow. Until 1930 the only standard models in use were modified observation types.¹¹⁹ A difference of view regarding the desired characteristics no doubt contributed to the difficulty. The main question was related to size of plane and number of engines. Some favored a relatively light, single-engine type, while others wanted a larger, two-engine ship.¹²⁰ All of the early models specifically assigned for attack were single-engine, however. The Curtiss XA-7 of 1930 was the first attack monoplane, constructed with built-in machine guns. A year later the A-8, one of the first all-metal Curtiss planes, appeared. This ship, with an in-line engine, was superseded in 1933 by the A-12 (Shrike), which was essentially a redesigned A-8, built around a radial engine. A considerable quantity of A-12's were delivered in this period, and they became the chief attack plane.¹²¹ They were two-seaters with a top speed of 186 miles per hour, range of about 500 miles,

ceiling of 20,000 feet, and armament of four fixed and two flexible .30-caliber machine guns. The A-12 could carry internally ten fragmentation or chemical bombs, or four 100-pound demolition bombs. Not satisfied with this performance, the attack instructors at the Tactical School called for a faster, more maneuverable plane, with a longer cruising range. These improvements, plus a larger bomb load, were to come in 1936 with production of the Northrop A-17.¹²²

THE IMPASSE WITH THE NAVY REGARDING LAND-BASED BOMBARDMENT

An unresolved conflict which affected all branches of aviation during the period 1926-1935 was the continuing argument between the Army and Navy regarding responsibility and authority for coast defense. It had special implications for long-range bombardment since the principal function of this branch was being officially explained as one of coast defense. The Navy desired jurisdiction over all planes flying over water; if the Navy were itself to provide land-based long-range aircraft, Army bombardment might thereby be denied its chief "legitimate" function. And without having that function, there might be insufficient reason for the continued support of a heavy bombardment program in the Army.

The argument after 1926 was not so much the earlier one of aircraft versus ships. The Navy still held to its reservations about what bombers could do when opposed by an active defense of naval air and surface units. The Air Corps, for its part, was still convinced that traditional navies were doomed. Billy Mitchell, writing as a civilian in 1927, asserted that the greatest battleship was actually more vulnerable to air attack than the smallest torpedo boat; naval functions of the future would have to be carried on chiefly by submarines.¹²³ Chennault in 1933 declared that there would never again be a major naval battle within range of land-based aircraft and predicted that long-range planes might well prove more effective than warships for controlling commerce on the high seas.¹²⁴ Naval leaders tended to disregard such claims; they sim-

ply accepted aviation as a useful auxiliary and sought to gain control over all aspects of it that related to seapower. The question, then, was not so much whether airplanes could affect seapower. The argument, cast in terms of coastal defense responsibilities, was really one of who would control over-water flying operations, particularly bombardment.

Recommendations of the Aeronautical Board (representing both services) had been followed in 1917 by the Secretaries of War and the Navy in establishing a policy relative to this problem. The board, which had favored joint training and operation of Army and Navy air forces in coastal areas, suggested the shore line as an approximate line of demarcation between Army and Navy activities, but insisted that there would and should be considerable overlapping of operational zones. In general, Army aviation was assigned the defense of vital shore installations and fire control for coast artillery, while the Navy was given over-water scouting and limited activities in connection with naval ground stations.* This arrangement did not satisfy either the Army or the Navy and left an uncertain situation during the 1920's. When the Joint Army-Navy Board was reconsidering defense policy in 1926, Maj. Gen. Mason Patrick demanded a more specific statement of Army air functions. He was especially concerned that this should include explicit provision that 1) Army aircraft assigned to coast defense be free to fly over water to the limit of their practical operating radius and 2) Navy land-based aircraft be designed and normally used for sea scouting and patrol only. Patrick wished to avoid the unnecessary duplication of bombers by both services. But the Navy had a different view. Rear Adm. W. A. Moffett, senior Navy member of the Aeronautical Board, was even more opposed to duplication than was Patrick. He believed that all aircraft (including pursuit) operating over water should be furnished and controlled by the Navy. Granting that the Joint Board had already assigned pursuit defense of the coast to the Army, Moffett nevertheless in-

sisted that the Navy could not restrict its land-based operations to scouting and patrolling. The Navy must also provide appropriate types of bombers and trained personnel for making attacks at sea. He argued, and with some point, that Army bombers might be engaged elsewhere when the Navy needed help at sea and that the Army types of bombers and training were not suited to operations over water.¹²⁵

The Joint Board paper, *Functions of Army and Navy Air Components*, when finally approved in December 1926, did not carry the provision desired by Patrick regarding the freedom of action for Army planes. The policy remained vague, permitting such air actions over water as were "incident to Army functions," or "in support of or in lieu of the Navy." The Navy, on the other hand, succeeded in holding the door open for its own air operations. The sea service was authorized to provide all types of aircraft, "primarily designed for operations from carriers or other vessels, or based on tenders, or for operations from shore bases for oversea scouting and for observation and patrol of sea communications and their defense against raids."¹²⁶ Such a broad and ambiguous authorization, while possibly appearing to restrict naval types, was actually subject to almost any interpretation.

Efforts of the Army to clarify the situation and make more definite the role of its bombers in coast defense proved futile. Secretary of War Patrick J. Hurley became personally concerned about the matter in August 1930 and warned President Hoover that the situation was endangering the national defense.¹²⁷ Following this, Gen. Douglas MacArthur, Chief of Staff, attempted a high-level solution to the problem through negotiation of an agreement with his opposite number, Adm. William V. Pratt, Chief of Naval Operations. According to MacArthur's subsequent report to the Secretary of War, this endeavor was successful. The Chief of Staff had this to say of the agreement, which constituted a modification of the basic paper, *Joint Action of the Army and Navy*, prepared by the Joint Board:

Under it the naval air forces will be based on the fleet and move with it as an im-

*See above, pp. 88-89.

portant element in performing the essential mission of the forces afloat. The Army air forces will be land based and employed as an element of the Army in carrying out its mission of defending the coasts, both in the homeland and in overseas possessions. Through this arrangement the fleet is assured absolute freedom of action with no responsibility for coast defense, while the dividing line thus established enables the air component of each service to proceed with its own planning, training, and procurement activities with little danger of duplicating those of its sister service.¹²⁸

A year later, testifying before a congressional committee, MacArthur declared that a "complete understanding" had been reached with Pratt.¹²⁹ The Navy was to be based on the sea, with only a few land bases for training and maintenance. With typical MacArthur flair, he stated that the solution was based on "well-established military and naval principles" and was "accepted and believed in by all groups concerned." In a tone of simple finality he concluded that the question of air defense of our coasts was "completely and absolutely settled."¹²⁹

The agreement seemed clear enough, all right, to the General Staff and its War Plans Division. Accordingly, it was decided to spell out the function of the Army air arm in coast defense, and a collaborative study by WPD and OCAC was undertaken. The results of this study served as the basis for a letter, dated 3 January 1933, from the Chief of Staff to commanding generals of armies, corps areas, and departments. The letter recognized two classes of aviation connected with frontier defense: 1) corps and army observation units normally assigned to ground organizations, mobile forces, and harbor defenses and 2) "GHQ Aviation, the principal and only component of which, in addition to army reserve aviation, is the Air Force which normally operates initially directly under the Commander of the Army Group." The observation component of the air force, it was declared, should include special equipment suited to long-range reconnaissance over land and water in order that approaches to critical areas might be covered "to the limit of the radius of action of the airplanes." Furthermore, air force

operations in actual defense would include the following operational phases: 1) reconnaissance and offensive operations between the outermost range of the air force and the line of contact with ground forces, 2) the support of other forces after the enemy came within the range of ground weapons, and 3) operations "in connection with the use of all arms on our frontier," under the rules governing cooperation with land forces.¹³⁰

Although the Air Corps had no positive assurance that the Navy would restrict its own land-based aviation, it at last had received, in the above letter, a specific authorization from the Army for development of larger planes. On the basis of this officially recognized requirement for long-range oversea reconnaissance and attack, the War Department approved the Air Corps' Project A* in June 1934.¹³¹ This engineering and research project for exploring the problem of maximum range resulted directly in the construction of the XB-15 and indirectly in the design of the B-29 and other "super" bombers. By means of achieving a recognized and explicit role in coast defense, the Air Corps had opened the door to big plane development.

Air Corps leaders, however, were uncertain of the future status of Army long-range aviation and feared the build-up of land-based air forces by the Navy. MacArthur had seen a "complete understanding" with the Navy on this issue, but apparently the Navy reserved its own interpretation. In spite of the MacArthur-Pratt agreement of 1931, the Navy continued the expansion of its naval air stations, developed various types of land-based planes, and employed bombers under the designation of "patrol" and "torpedo" types. Early in 1934 the Army members of the Aeronautical Board charged that this latter practice constituted a violation of the MacArthur-Pratt understanding, but the Navy Bureau of Aeronautics denied the charge. Finally, when Adm. Ernest J. King succeeded Pratt as Chief of Naval Operations, he repudiated the agreement of his predecessor in office.¹³²

The 1935 revision of the Joint Board paper

*See above, p. 47.

governing Army-Navy cooperation did not bring any substantial improvement to the situation although it added specific authorization for Army air operations over the sea when engaged in "direct defense" of the coast. It also authorized the Army to supply aircraft for "support of naval forces to assure freedom of action of the fleet."¹³³ This latter provision could be interpreted to mean long-range bombers for attacking enemy surface vessels when the main fleet was engaged elsewhere. But the Army air leaders were deeply concerned over the Navy's intentions as both services continued to build under a free interpretation of Joint Board policy. In November 1935 Brig. Gen. Frank M. Andrews, commanding the newly-established GHQ Air Force, unburdened his fears to Gen. Malin J. Craig, MacArthur's successor as Chief of Staff. Andrews believed that the Navy would attempt to usurp Air Corps functions in coast defense and in over-water operations generally, and he cited other leading officers—Kenney, Arnold, Pratt, Knerr, and H. L. George—as holding the same view. He was particularly disturbed by a report from Lt. Col. H. A. Dargue, assistant commandant of ACTS. Dargue, who attended Pacific fleet maneuvers during the summer of 1934, quoted Adm. W. H. Standley as having said that the Navy was satisfied with existing agreements and was going to build an over-water striking force of at least 1,000 land-based planes. On the basis of this and other contacts with the Navy, the Air Corps officers were persuaded that the sea service wanted charge of all operations "out of sight of land."¹³⁴ Andrews, whose heart and soul were in the long-range bomber and who saw the coastal defense assignment as the principal existing justification for its development by the Army, was worried that the entire program might be undermined by the "tendency of the Navy to come ashore."* In his years as chief of the GHQ Air Force, Andrews was to learn that he would have to defend the program not only against the Navy, but against the General Staff and War Department as well.†

ESTABLISHMENT OF THE GHQ AIR FORCE (1935)

After the Air Corps had been created in 1926, there was a period of temporary calm in the struggle for greater air autonomy. The question of proper organization and ultimate authority for aviation matters still figured as an important issue of air doctrine; but the majority of air leaders was inclined to believe that practical considerations limited, for the time being, what could be accomplished in that direction. In the years that followed 1926 there appeared to be two principal schools of thought: one favored a continued campaign for outright independence; the other favored a further compromise step, if necessary, which would permit the building up of an actual air striking force. By 1933 the latter, moderate view strongly prevailed. Renouncing temporarily the more extreme goal, most of the responsible leaders of the Air Corps concentrated their endeavor upon the limited objectives of creating a unified, all-purpose tactical air organization and providing for a separate budget and air staff.¹³⁵

The more radical, minority view is worth examining; for although this argument was unsuccessful at the time, it doubtlessly contributed to the achievement of the relatively moderate step in 1935. Overseas aeronautical developments, apparently progressing under separate organizations, continued to inspire the more extreme thinkers in this country. The necessity for independent organization, based on British experience, was nowhere more clearly set forth than in the writings of James M. Spaight, a noted air scholar. His study, *The Beginnings of Organized Air Power*, demonstrated the importance of central supply and control services in the building of air strength. Airpower, Spaight argued, should be coordinate with sea and land forces; it could not truly exist where it was regarded and managed in a subordinate, auxiliary sense. Spaight took a sensible view as to air employment, emphasizing that airpower, like seapower, could not win wars alone. But ex-

*This phrase was used by MacArthur in his testimony of 25 May 1932.

†See below, pp. 89-101.

plotitation of the full potentiality of the air sphere required independent organization.¹³⁶

This general line of argument was picked up, with special application to the United States, by proponents of air independence. Since national policy was invariably stated in defensive terms, these advocates geared their case to the problem of air defense. The air defense mission could not be fulfilled by an army or a navy, asserted Lt. Kenneth N. Walker in testimony before an investigating group. Army and Navy air units, while required for their own purposes, were not designed for air defense of the United States. War Department doctrine, for instance, held that all combatant arms, including the Air Corps, had to contribute to "execution of the infantry mission." How could an air force whose size and composition were determined by the needs of the Army in fulfillment of a distinct mission meet the needs of national air defense? "How," Walker pursued, "can the air defense of the United States be assured by officials who deny its necessity and whose doctrines fail to consider it?" The same questions, of course, might have been asked of naval aviation, whose mission was support of the fleet. There was only one logical answer: air defense was of "such importance that a separate Air Force must be created for that purpose—and charged with that responsibility."¹³⁷

Walker, when referring to the attitude of military officials, had in mind statements such as those made by a special committee of the general council of the War Department. This committee, headed by Maj. Gen. Hugh Drum (and generally known as the Drum Board), investigated the question of employment of the Air Corps and made a report on 11 August 1933. The board assumed a strategic situation involving defense of the northeastern United States against an attack launched by a European coalition. The air arm would be used in such circumstances mainly in support of a ground campaign against Canada and for defense of vital centers.¹³⁸ The board made a particular point of denying the possibility of a serious air attack on the United States, either

from bases across the sea or from improvised bases near the mainland. Labeling contrary claims as fallacious, the board went on to state that aviation development had actually increased the difficulties of overseas invasion and had thereby strengthened the defense. The Army's air arm, indeed, had a function, but it was not one of imaginary air defense. It was the strategic and tactical support of land operations. Another War Department investigating committee, the Baker Board, took a similar stand in the following year. Allowing that the close proximity of European nations might favor independent air organization because of the possibility of a sudden air attack, the Baker Board concluded that these conditions did not apply to the United States and that the existing military organization was therefore superior for this country's needs.¹³⁹

Capt. Robert M. Webster, representing the air view before a later investigating group, pointed to the Drum Board statement as another proof that the terms "air defense and air power have not received the sanction of our officialdom. Their usage is heresy while they are the salient words in the military vocabularies of our possible enemies."¹⁴⁰ Capt. Harold L. George hastened to refute the Baker Board's notion that the geographical location of the United States reduced the necessity for independent organization. On the contrary, said George, in Europe the land armies would become locked very quickly; hence there was greater need for air forces as integral parts of armies. The American situation was one in which an air war might be conducted for an indefinite period before ground elements came into contact. The only force available against attacking air units was the air force; it must be organized separately to perform that mission effectively.¹⁴¹

The demand for independence, led by men like George, Webster, and Walker, was hopeless in 1935. The power was on the other side, as it had been since 1918. The solid opposition of the General Staff and the War Department was buttressed by the position of the Navy. Supporting the conservative conclusions of the Drum and

Baker boards, the Navy took the view that there was no necessity for change in existing organization and policies. A prepared statement declared that

The geographic-strategic situation of the United States is such that it is immune to attack except *via* the sea, and that its first line of defense remains the Navy, which includes Naval aviation. . . . Claims of performance of airplanes do not warrant belief that trans-oceanic air attack is to be feared now or in the future.¹⁴²

The combination of powerful forces, regardless of logic and theory, made the achievement of air autonomy impossible at the time.

Independent organization was not to be realized in 1935, but another important idea was. It was the air force idea, which really went back to the first World War, but which had gathered momentum and recognition during the postwar years. This notion was that, in addition to service elements such as observation for ground units, the air arm should provide a unified and powerful offensive striking force. Maj. Gen. Mason M. Patrick, Chief of the Air Service, gave official expression to this concept as early as 1922* when he called for establishment of a strong force of pursuit, bombardment, and attack units under direct control of a GHQ Reserve commander. No tactical unit such as a GHQ air force was actually set up at the time; but after creation of the Air Corps in 1926, the air force idea gained increasing support in all quarters. The ability, which it promised, to strike heavy blows for command of the air, tactical support, and against objectives behind the lines, was generally appealing. Technological advances, augmenting the power and employment possibilities of offensive aircraft, strengthened the advance of the air force concept. Although the Army as a whole was cold to strategic operations and to independent air organization, it recognized the value of a concentrated striking force for its own purposes; such recognition became embodied in Army regulations in March 1928 (AR 95-10). At the Air Corps Tactical School, the Air Force text stated in 1930 that other world powers had recognized the principle

of centralized control of air forces. All combat air units of the Army should be assigned to GHQ.¹⁴³ Agencies outside of the military approved the notion, too. The Federal Aviation Commission, appointed by President Roosevelt in 1934, to study aeronautical problems, urged that continued attention be given to the employment of the air force as an independent striking unit. In its final report the commission stated its conviction that aircraft had passed beyond the position of useful auxiliaries and that "An adequate striking force against objectives both near and remote is a necessity for a modern Army. . . ."¹⁴⁴

A number of important factors combined by 1935 to make possible the translation of the air force idea into an organized tactical unit. During the late 1920's there had been a series of record-breaking flights which gained tremendous popular attention—the Kelly and Macready transcontinental hop; the Air Service round-the-world success; the Lindbergh, Chamberlin, and Maitland flights; and the Spaatz-Eaker endurance record of 1929. These achievements, plus the personality of America's outstanding airmen, aroused public interest to a high degree and stimulated the technological development which gave promise of still greater performances. Another favorable influence was the election in 1932 of Franklin D. Roosevelt, who had developed an early interest in aviation as Assistant Secretary of the Navy and who later became the first flying President. The aircraft industry and air leaders, including such pioneers as Billy Mitchell, were encouraged by the new President's attitude; he was the first Commander in Chief to show serious interest in the idea of an air striking force.¹⁴⁵

The reorganization of the Army, which had been started before Roosevelt's election, opened the way to a new place for the air arm in the defense structure. Tactical units formerly under nine corps areas were re-grouped into four field armies—to be ready for instant response to orders by the Commander in Chief. In 1933 the Air Corps was asked to indicate how it could best participate in the new program, and following its response came the appointment of the

*See above, p. 26.

Drum Board to study the question of employment of the Air Corps. The Drum report favored the establishment of a standing GHQ air force, which could be used for strategic reconnaissance, long-range bombing, and tactical support of ground forces. Finally, the near-debacle of the Army's attempt to carry air mail focused public attention on the air problem and resulted in the appointment of two more investigating bodies in 1934. The general consequence of these investigations was to highlight the inadequacies of military aviation and to give additional support to the limited objectives of the air leaders.¹⁴⁶

The War Department Special Committee on the Army Air Corps (Baker Board) was appointed 17 April 1934 under the chairmanship of Newton D. Baker, the wartime Secretary of War. The board had a total of six civilian and six military members, including General Drum of the General Staff and General Foulis, Chief of the Air Corps; as on all previous War Department bodies studying aviation problems, the nonflyers outnumbered the flyers. Charged to make a "constructive study and report" upon the Air Corps as an agency of national defense in peace and war, the Baker Board spent 25 days taking testimony from 105 witnesses; it received, in addition, some 500 written statements from Air Corps officers. The report, issued on 18 July 1934, proved highly influential and was generally accepted as a guide to action, as the Morrow report had been in 1925.* It summarized the long list of investigating bodies that had examined the question of a separate air organization and agreed with their preponderant opposition to such an arrangement. However, while reflecting the conservative view of the War Department toward airpower and air autonomy, the board did recommend establishment of a GHQ air force made up of all air combat units, trained as a homogeneous force and capable of either close support or independent action.¹⁴⁷

A study group more favorable to the airman's view was the Federal Aviation Commission, created in accordance with the Air Mail Act of 12 June 1934 for the purpose of

recommending a broad policy covering all phases of aviation. Clark Howell, editor of the *Atlanta Constitution*, was chairman of the group, which consisted almost entirely of civilians. After several months of interviewing and study, the Howell Commission reported on 22 January 1935. It leaned toward greater independence of air organization and might have so recommended had it not been for the appearance of the Baker report only a few months earlier. In view of the Baker recommendations, the Howell group decided to watch and wait—to give the GHQ air force experiment an opportunity to prove itself. The Howell report predicted that as aircraft capabilities increased, progressively greater freedom of action would have to be granted the air arm; it regarded the GHQ air force as a step in that certain direction.¹⁴⁸

In accord with suggestions from its own Drum and Baker boards the War Department moved to establish the GHQ Air Force as a new tactical unit of the Army. Plans were completed, and the new organization was given an effective date of 1 March 1935. All air combat units located in the several corps areas were consolidated into this new force, which was placed for purposes of training and employment under its own commanding general. The latter reported directly to the Chief of Staff in time of peace and to the theater commander in time of war. Supply and individual training remained the responsibility of the Chief of Air Corps, who was on a level coordinate with the Commanding General, GHQ Air Force. The corps area commanders retained administrative jurisdiction over the bases where air units were stationed. Headquarters for the force was established at Langley Field, with subordinate wing headquarters at Barksdale and March fields; each wing consisted of one or more groups of bombardment, attack, pursuit, and reconnaissance aviation, in varying combinations. The first leader of the new organization was Maj. Gen. Frank M. Andrews, formerly chief of the Training and Operations, OCAC, and a member of the General Staff.¹⁴⁹ Under his guidance the concept of

*See above, pp. 28-29.

the GHQ Air Force as a unified striking force was to become a reality.

After the creation of the GHQ Air Force it remained to be seen just what its role would be. As early as December 1934 Brig. Gen. C. E. Kilbourne of the General Staff had initiated a move to reach agreement on this question. His conservative "sighting shot" was circulated for comment within the Air Corps and elsewhere; it conceived of the GHQ air organization as an all-purpose force. Operations of the force were divided into four categories: beyond the sphere of ground forces, immediate support of ground forces, defense of seacoasts, and defense of rear areas. Among the specific objectives included in the first category, the enemy air force was ranked first. The importance of other objectives beyond the sphere of ground forces would depend upon the situation; hostile communications, munitions storage and factories, troop concentrations, power plants and other utilities, and population centers (in reprisal only) were stipulated. Operations in immediate support of ground forces were subdivided into two phases: the approach to battle and the battle itself. During the first phase the most important activities would be interdiction of enemy air action, reconnaissance, enemy communications, and attack upon troop concentrations, moving columns, and strikes against ammunition dumps. During the battle, the GHQ Air Force would be called upon to deliver massed attacks upon key points in the enemy position, upon enemy units preparing for an assault, and upon enemy reserves. Should the enemy be defeated in battle, the air force would attempt to block the line of retreat; should U.S. forces be beaten, the air force would interdict enemy air operations and perform necessary demolitions. In the War Department view, all elements of the air force would have important functions in ground support, "Success on the battlefield being the decisive factor in war. . . ." ¹⁵⁰ In connection with the remaining operational categories, coastal defense and defense of rear areas, the Kilbourne draft proposed appropriate procedures for reconnaissance, attack, and interception.

As to the method of control of the GHQ Air Force, the War Department proposal conditioned this upon the stage of warfare in progress. During the period of "strategical development," prior to the contact of ground forces, the air commander would control the force under a general directive from GHQ. During the preliminary period of contact between ground forces, GHQ would assign to the air commander special missions involving major objectives; during decisive ground battles, GHQ would assign specific missions or direct the air commander to take instructions from the commander of the army engaged. ¹⁵¹

Although Kilbourne's draft subordinated the idea of strategic aviation, OCAC accepted the general line of these proposals; gone was the "independent" spirit of the OCAC of 1928, when it advocated a Mitchell-type thesis.* The Air Corps Tactical School, however, sharply criticized the Kilbourne paper, both in general and in detail, and individual officers, like Maj. Carl Spaatz, also decried the limited role assigned to the striking force. In the end the War Department largely ignored the criticisms, and the revision of TR 440-15, dated 15 October 1935, embodied the more conservative doctrine. ¹⁵² The categories of operations established in the Kilbourne paper were retained, and the individual objectives listed were almost the same. The function of an air force was stated as the furtherance of the mission of the "territorial or tactical command" to which it was assigned. The higher commander would employ the air force within or beyond the sphere of action of his ground troops, either in support or in independent operations; he could specify general missions or particular objectives. ¹⁵³ While air leaders sought to place their own desired interpretations upon TR 440-15, they were not satisfied with the general concept of airpower which it presented.

The War Department regarded the GHQ Air Force, with its official doctrine as an excellent and lasting solution to the problem of air organization and employment. General MacArthur, hoping that the arrangement would quiet the furor of the past

*See above, p. 48.

years over the status of the air arm, saw the GHQ Air Force as "ideally suited to the country's needs." In order to insure continuity of policy, MacArthur thought that the military authorities should refuse to consider, at least for five years, any change in the *status quo*.¹⁵⁴ Air leaders, on the other hand, were divided in their attitude toward the new arrangement. Billy Mitchell attacked the plan as a "subterfuge" which merely "divided aviation into more parts." But the majority accepted the GHQ Air Force as a step in the right direction. It was admittedly a compromise move which fell short of the desired goal: military aviation was indeed split between Air Force and Air

Corps, there was still no provision for a separate air budget, and corps area commanders continued to exercise administrative jurisdiction over air personnel. Furthermore, the General Staff remained the final authority, and airmen thought that full development of aviation could not come until ultimate authority rested in the hands of flyers themselves. However, the GHQ Air Force was a real advance. It was a clear recognition of the air force idea, the concept of unified air striking power. And in the new tactical unit there lay the first opportunity for building a strong force in being—one that could dramatize and demonstrate the potentialities of airpower.¹⁵⁵

REFINEMENT AND SUBSTANTIATION OF THE LONG-RANGE BOMBARDMENT CONCEPT, 1935-1939

HEMISPHERE DEFENSE POLICY AS A FACTOR IN STRATEGIC CONCEPTS AND AIR DOCTRINE

Hitler's rise to power in Nazi Germany and the forming of the Axis alliance of Germany, Italy, and Japan in 1937 had a clarifying effect upon American strategic thinking and military doctrine. Before these dramatic developments, the official policy of the United States had been to defend its shore lines, and the imaginary invasion conjured up was usually a British-led coalition against the northeastern region of the country.¹ As the new and real threat took shape in the late 1930's, it was seen that an initial attack was not likely to be made directly against the United States, but against other portions of the Western Hemisphere. By infiltration, subversion, or military pressure, the Axis might seize control in vulnerable parts of Latin America; from those bases they could threaten the United States itself.

Hence, a more definite strategic situation, upon which a firm military policy could be built, was materializing.* The notion gradually became established that while defense of the shore line must be taken for granted, the United States should at the same time make preparation to enforce the Monroe Doctrine. And although even this broadened concept was essentially defensive, it obviously called for offensive military capabilities. This application was clearly recognized in the Army's air arm by 1938 when the Air Corps Board undertook a special study of the Air Corps mission under the Monroe Doctrine. The report concluded that

enforcement of the Monroe Doctrine was an integral part of the defense of the United States. Possible violations were seen in the form of encroachments on the political independence of American states or in acquisition of control of additional territory in the Western Hemisphere by a non-American power. The Air Corps Board assumed that enforcement of the Monroe Doctrine in case of such violation would begin with measures of diplomacy. However, should diplomatic overtures fail, armed force might be necessary in any country of the hemisphere, and they might have to be employed in one or more of a variety of ways. Military operations, for example, might be limited to quelling internal disturbances and restoring legitimate governments to power. On the other hand, they might consist of resisting major invasion efforts from the air and sea or of ejecting non-American forces which had gained a foothold. The Air Corps Board believed that the Army's air arm, to contribute to hemisphere defense, required a substantial force in being of long-range reconnaissance bombers. This force, "capable of offensive action from Alaska to the Straits of Magellan," would meet the initial requirements for enforcement of the Monroe Doctrine and would discourage possible violations.²

In the following year, 1939, another study of air defense of the hemisphere was conducted at the Air Corps Tactical School. It stated categorically that the air force must deny bases in the hemisphere to any non-American power; the most vital areas were specified as Newfoundland, northeastern Brazil, and the vicinities of Rio de Janeiro and Santiago, Chile.³ The study saw a German-Italian coalition as the most

*For discussion of the earlier lack of realistic strategic thinking, and the resultant difficulties for military planners, see above, pp. 52-53.

serious potential threat to the security of Latin America, estimating that those nations could divert as many as 500 planes against the Western Hemisphere. To meet such a possibility, the Tactical School planners thought some 20 squadrons of super-long-range bombers would be needed. Ideally, these squadrons would be based at Fortaleza in northeastern Brazil, Rio de Janeiro, and Santiago, but less effective operations could be conducted from United States bases in Panama and Puerto Rico.⁴

ELABORATION OF AIR THEORY AT THE AIR CORPS TACTICAL SCHOOL

The broader concept of national policy and strategic considerations arising from the growing emphasis upon hemisphere defense was welcomed in the Army's air arm. Since aviation was regarded by air leaders as primarily a weapon of offense, they had always felt a bit constrained by the established national policy of defense. The Monroe Doctrine, as applied to the hemisphere in the 1930's, opened the door to a kind of air operation which was, at least tactically, offensive. It also involved long-range action and large planes, both of which were required for offensive air warfare. In this revised frame of reference, the instructors and students of the Tactical School proceeded with the development of air doctrine—taking into consideration such fundamental matters as the nature of war, employment of airpower, and tactics for the various branches of military aviation.

The nature of war and the employment of airpower

The view of war at the Tactical School in the late 1930's remained virtually the same as it had been in the earlier years of the decade.* War was regarded as the inevitable result of conflicting national policies, arising chiefly out of economic forces. Students in the Air Force course at Maxwell Field were being taught in 1935 that overproduction, brought on by the Industrial Revolution, caused a con-

tinual struggle for world markets. The sovereign states involved sought to solve these conflicts by diplomacy and other measures short of war, but armed force remained the final arbiter. If a nation was to continue as a great power, it had to be prepared to support its national policy by military might. Borrowing from Frank Simonds' *Price of Peace*, the instructors asserted that the core of national policy consisted of insuring economic prosperity, security, and ethnic unity. Since these elements constituted the basis for peace and contentment of the nation's citizens, it became the duty of every government to use all possible means of attaining them. The United States, as a "have" nation, was mainly concerned with keeping what it already had; but it had to be prepared to defend its interests against the "have-not" nations which desired to improve their status.⁵

This gloomy view of the capitalistic production system envisioned ceaseless warfare among the major powers. The enemy, even when defeated, was seen as bound to join the struggle again, once his economic system was rehabilitated. For modern wars "are essentially economic wars, caused by the clash of rival production machines," and "there can be no permanent peace without removing from world production enough of the producers to secure a balance between available products and world outlets." The Air Corps officers concluded that for the present and "probably for the full extent of our military careers, we will see wars which have no broader purpose than a temporary readjustment."⁶

As to the general methods by which these interminable wars were to be fought, there was held out some promise of gradual advance from violence. The history of conflict was seen as a progression from the hand-to-hand stage, through the contemporary missile stage, to the

"future war of intellects where there will be no contact between combatants. This future method may have been already inaugurated by Russia with the prime purpose of self-defense. It has been said that Russia has waged war since she regained

*For discussion of the concept of war in the early '30's, see above, pp. 51-52.

her equilibrium after the Revolution—and this simply means that she has tried to change the minds of sufficient people concerning the established forms of government to bring about tolerance for the form she is experimenting with.

This interpretation of the aims of Soviet propaganda was used as a basis for prediction: "If we progress, which we always have, we will some day leave the phase of violence and enter a phase of educational conflict." But intelligence progresses slowly, and until the futility of violent war is generally recognized, war will be waged with the most effective means for destruction.⁷

For the immediate future, airpower was seen as the primary weapon of destruction in war. And war would take the form, not of attack upon armies and other surface forces, but upon the nations themselves. The real purpose in warfare was to gain the submission of the enemy, and this aim could be achieved most quickly and efficiently by disrupting national life. Airpower was the direct means to that end, for it could leap over armies and navies to strike at the economic and social fabric of the enemy.⁸ Lt. Col. Donald Wilson, director of the department of Air Tactics at Maxwell Field, elaborated this point in a note to his colleague, Maj. Muir S. Fairchild:

Air warfare requires an entirely different approach. It requires thinking which can grasp the object of war and a realization that any nation's war potential is basically rooted in the people in the nation's home territory. Any method which causes the people to prefer the terms for peace to continued suffering is effective. The airplane with the proper military intelligence provides a means which can reach these people immediately upon the outbreak of hostilities. Even though we do not plan to use our forces in this manner, such a short-sighted policy will not prevent the enemy from doing so. Such action on the part of the enemy may cause such disruption that we have no other course except to sue for peace.⁹

The employment of air forces should be geared to the new kind of war and the potentialities of the airplane. It was believed essential in this connection that regardless of national policy, airpower should be used

offensively. A statement issued at the Tactical School conceded that avowed national strategy was defensive and that for various reasons it was undesirable to maintain the attitude of an international bully. But although the United States talked of defense, the paper declared, it had to realize that ultimate military success was gained only through the offensive. While assuming a defensive attitude, the United States should build a powerful offensive force; and once the fight began, the nation should attack—"or if the opportunity presents, we would not be above taking the offense initially; in which case we convince ourselves that the conflict could not be avoided anyway."¹⁰

The views of the Tactical School instructors on the primary objectives of an air offensive were a continuation of the ideas developed in the early '30's.* Main emphasis was placed upon the ultimate objective of dislocating the enemy's national structure through precision attacks against vital points. However, attention was also given to the necessity of destroying the enemy's air force, and it seemed generally agreed that counter-air force action would take precedence over the national structure objective.¹¹ In any case, it was believed that the principal elements of the airpower of a nation should be held and employed as a unified force, no matter what the mission. Concentrated action, independent of surface operations, was regarded as the most appropriate use of military aviation; functions in support of ground forces were viewed as a necessary but subordinate consideration.¹²

In stressing the principle of concentration and the priority of the counter-air force mission, the Tactical School instructors could point to the parallel case of the U.S. Navy. Indoctrination in naval tactics had resulted in universal acceptance, inside the Navy and out, of the proposition that the fleet should not be divided and that its offensive power should be directed toward a single and all-important objective—the hostile fleet. The mission of coast defense and the political pressure to base units in widely scattered ports were never allowed by

*For discussion of this development, see above, pp. 57-58.

the Navy to interfere with its primary responsibility. One Air Corps instructor expressed the wish that his fellow officers were equally well indoctrinated with the same principle of war as applied to air forces. He regretted the scattering of GHQ air units all over the country and emphasized what he considered to be the foremost principles of air employment: concentration of force and the objective of the enemy air force. He recognized that other objectives existed, but he insisted,

An air force that is designed for its true objective will not be inadequate to its lesser obligations. It cannot measure up to its real task, however, if it is designed for the transportation of troops, the movement of supplies, participation in battle, or in futile defensive operations.

And, quoting Napoleon, the instructor concluded, "Exclusiveness of purpose is the secret of successes."¹³

Questions of air employment, as studied and discussed at Maxwell Field, continued on a theoretical basis, with little reference to the actual strategic position and needs of the United States. The advantage of this approach, from the standpoint of constructing doctrine, has already been pointed out.* It is interesting to observe that there was some internal criticism of this policy in the Air Force course. In December 1935 Capt. Robert M. Webster, a member of the Department of Air Tactics, proposed to the director that a change be made in the nature of the program. As taught over the past several years, stated Webster, the Air Force course had been confined to an exposition of airpower. He complained that it attempted to illustrate the "grand principles of employment," with which few, if any, students would be even remotely concerned.† More attention needed to be given, thought Webster, to tactics in probable military situations. He pointed out that an air force actually existed in the Army,

and it seems more appropriate that we spend an increasing amount of our time in trying to find how we are going to utilize that force under restrictions imposed by our military policy. It seems proper that

we should accept the force as it is and that we depart from instruction that gives this force responsibilities that are inconsistent with its actual functions, as stipulated by higher authority.¹⁴

Notwithstanding the logic of Webster's dissent, the leaders of the Department of Air Tactics persisted in keeping the Air Force course on a theoretical basis. They were looking not to the past or present but to the future. And in that future they saw airpower unlimited.

The difference in viewpoint within the Department of Air Tactics was paralleled by the difference between the general teachings in the Tactical School and other service schools of the Army. Maj. Warren R. Carter, while a student at the Army War College in 1938, clearly defined this divergence in a carefully prepared paper. He pointed out that there existed two main schools of thought relative to the employment of airpower: one held that the primary role was immediate support of ground forces; the other held that it was long-range strategic operations. The latter view was the basis of instruction given at the Air Corps Tactical School, while the former, more limited concept, was taught at the Army War College. The Command and General Staff School, according to Carter, offered a third point of view, which was a compromise.¹⁵ The dichotomy noted by Major Carter was a continuation of the basic rift that had crystallized as far back as 1926. This has already been discussed as fundamental to the difference between the ground and air points of view during the period following the first World War.†† The two conflicting positions were set forth in TR 440-15, 26 January 1926, and in the Tactical School manual, *Employment of Combined Air Force*, issued in the same year. The underlying reason for the differing attitudes and instruction, in 1938 as well as in 1926, was in the setting of the sights. The ground view and the view of the service schools were cast upon past and present methods of warfare seen in a practical, immediate light; the air view and the view of the Tactical School were upon future methods as illumined by trained imagination.

*For elaboration of this point, in connection with doctrinal evolution of the early '30's, see above, p. 53.

†Webster's prediction was to prove erroneous; graduates of the ACTS were to become the core of the planning staffs for the grand offensives against the Axis.

††For comparison of these points of view as established in 1926, see above, pp. 40-43.

Bombardment aviation

The bomber continued to hold its position as the dominant air weapon in the thinking at the Air Corps Tactical School. It was seen as the basic arm of the air force, while pursuit and other branches of aviation remained generally in eclipse. Creation of the GHQ Air Force in 1935 as an offensive striking force in being strengthened interest in the bombers and stimulated the development of specific doctrines for the use of this new force. Maj. Gen. Frank M. Andrews, first commanding general of the GHQ Air Force, epitomized the prevailing philosophy of air leaders when he addressed the Army War College on 1 October 1938. Showing the required obeisance to the official national policy of defense, Andrews declared that the United States could best defend its frontiers by attacking the enemy. And, opening the way for his long-range bombers, he said that the attack should be made "as far from our shores as we can reach him." This fact forced attention, continued Andrews, upon the predominant role of bombardment aviation in the defensive problem confronting the GHQ Air Force. "I do not minimize the importance and value of reconnaissance, pursuit, and attack aviation . . . but bombardment aviation is and always will be the principal striking force in air operations. Air power is measured in terms of bombardment aviation."¹⁶ The Chief of the Air Corps, Maj. Gen. Oscar Westover, also supported this concept. In advising the Secretary of War on procurement matters, he wrote that the primary need of the Army for airplanes was in the category of long-range bombers—aircraft which would "insure the Army's responsibility in defending the United States," and which would permit the reinforcement of Hawaii, Panama, and Alaska with at least a portion of the GHQ Air Force.¹⁷

It is worth noting that the bombardment concepts evolving at the Tactical School were paralleled by the leading air thought abroad during the late 1930's. John C. Slessor, an RAF officer destined to become its chief of staff, in 1936 published a classic account of airpower. His thesis was that the

chief employment of military aviation should be an offensive striking force directed against the enemy national structure or armed forces according to circumstances. Slessor gave detailed attention to the subject that so intrigued Air Corps officers at the Tactical School—the selection and priority of targets in a sustained program of strategic bombardment.¹⁸ It is not known to what extent Slessor's book may have influenced the Americans—there is no evidence that it was used in the United States before World War II. In any event the ideas had already taken form at the Tactical School some years before publication of his volume. If used at all, Slessor's work was probably viewed as a welcome confirmation from abroad of what was already emerging here.

In sum, the evolving doctrine of bombardment called for precision attacks upon vital and vulnerable points in the enemy's national structure. The main outlines of this doctrine had been well expressed by 1935, and it remained only to work out in greater detail the specific methodology.* In fulfilling this need, the instructors at the school continued to ignore the actual strategic situation of the United States and the existing limits of range, bases, and equipment. They proceeded, unhampered, to build the theory and tactics of strategic attack as if the potential enemy country lay within the operating radius of our bombers. Maj. Gen. Haywood S. Hansell, Jr., who was connected with the Tactical School from 1934 through 1938, and who was closely associated with this theoretical development, is well qualified to describe how the instructors set about their challenging task. The central problem was that of enemy target selection:

Within the radius of action of the bomber are presumably hundreds of industrial targets of greater or lesser importance. How do we go about selecting which targets to attack? . . . It was essentially a problem for industrial economists, but no economists were available and no money was available to hire them, in view of the War Department's attitude toward such an approach. So the School did the best it

*For description of the basic theory of precision bombing, as constructed in the early 1930's, see above, pp. 57-58.

could. It reasoned that other great nations were not unlike our own, and that an analysis of American industry would lead to sound conclusions about German industry, or Japanese industry, or any other great power's industry. Major [Robert M.] Webster and Major [Muir S.] Fairchild . . . did most of the research that was conducted here at the School on our own national industrial structure Fairchild's investigation into our own economy developed some such picture as this. Our economy is highly specialized. For instance, the New England States make the great majority of our brass and copper items. Raw materials for these items are transported by rail primarily to New England. There they are processed or manufactured and shipped out to using plants elsewhere in the country. Likewise, almost all the shoes in the country are made in one locality. Most automobiles are made in one locality. Within each of these industries, there are in turn specializations.

One factory may make all the hardware for a number of automobile manufacturers. Another may make all the frames; still another all the transmissions. A small group of factories may make all the ball bearings for a great many industries. A few machine tool manufacturers may make tools on which all industries are dependent. And serving this specialization or these groups of specialties, are certain great services: the rail transportation system, the electric power system, the telephone and telegraph communication system. An analysis of this great complexity indicates that munitions industries are especially sensitive to a relatively small number of plants, which make specialized parts, or systems which provide specialized service. The classic example of the type of specialization, and hence, vulnerability, literally fell into our laps. We discovered one day that we were taking delivery on new airplanes, flying them to their points of reception, removing the propellers, shipping the propellers back to the factories, and ferrying out additional airplanes. The delivery of controllable pitch propellers had fallen down. Inquiries showed that the propeller manufacturer was not behind schedule. Actually it was a relatively simple but highly specialized spring that was lacking, and we found that all the springs made for all the controllable pitch propellers of that variety in the United States came from one plant and that that plant in Pittsburgh had suffered from a flood. There was a perfect and classic example. To all intents and purposes a

very large portion of the entire aircraft industry in the United States had been nullified just as effectively as if a great many airplanes had been individually shot up, or a considerable number of factories had been hit. That practical example set the pattern for the ideal selection of precision targets in the United States Tactical doctrine for bombardment. That was the kind of thing that was sought in every economy. . . .¹⁹

General Hansell's account, given here in detail to show the approach and the difficulties, is readily substantiated by papers in Tactical School files. The instructors sought, through official and unofficial channels, to secure needed information and assistance. In April 1938, for example, the school commandant wrote to the director of the Army Industrial College, requesting study of certain technical questions. Among the questions specified as most important was: What would be the effect on our industrial war effort of denial of increasing percentages of electric power in the northeastern industrial area? At what percentage would loss of power disrupt this effort? Another query asked if there was any single key industry, largely concentrated geographically, whose destruction would be more immediately disastrous than the loss of a substantial percentage of electric power in the vital industrial area.²⁰ These questions, and similar ones written by individual instructors to personal friends at the Army Industrial College, illustrate the kind of effort made to obtain data and the groping for solutions to the problem of target selection.²¹

It will be observed that the evolving strategic bombardment theory called for extreme accuracy in destroying small targets like individual plants and power stations. There was little doubt among most instructors that such accuracy could be achieved with the improvement in planes and bomb-sights, in spite of enemy anti-aircraft measures. This hope was to be only partly fulfilled in the aerial offensives against the Axis, and this element in the thinking of the Tactical School proved to be a serious flaw in the whole theory. At least one air officer in the '30's, according to his own testimony after the war, dissented from

the "pickle-barrel" doctrine. General Eaker has stated that he was more conscious than were some of the theorists regarding the effect of fighter defense upon bombing accuracy. Consequently, Eaker (who spent only one year at the Tactical School) favored a modified area-bombing theory rather than the one generally approved at Maxwell Field. Such a tactical plan, explained Eaker, would have represented a compromise between the British wartime theory of general area attack by night and the American doctrine of daylight precision.²²

Notwithstanding such criticisms, the Tactical School theorists held to their conviction that the bomber could and would hit targets of small dimension. They also persisted in their belief that heavily armed planes could penetrate to great distances without the necessity of pursuit escort.* While conceding that fighter protection was desirable, the general view was that sufficient range could not be built into fighters to enable them to accompany bombers all the way. But with or without escort, the bomber would get through. Even officers like Eaker, who later stated that he had always adhered to the escort theory, subscribed in 1938 to the view that nothing could stop the bombers. Collaborating with General Arnold in a popular book on aviation, he said that for years air strategists had assumed that aerial attacks would be turned back by anti-aircraft fire and pursuit, but that modern trends suggested that no method could be depended upon to prevent all enemy planes from reaching their objective. The authors of the book expressed confidence that defense against aerial attack would ultimately be found, but only two suggestions were offered, the possibility of developing an electric ray to stop gasoline engines or moving underground. Decisive interception by pursuit was evidently regarded as unlikely.²³ General Andrews, commanding the GHQ Air Force, and his chief of staff, Col. Hugh Knerr, likewise had faith that the bomber would reach its target. Andrews told officers at the Army War College that bombardment aviation had proved time and again that its bombers

could fight through to the objective regardless of interference by pursuit and anti-aircraft artillery. He rated the bomber's speed, altitude, and defensive firepower (in that order) as the principal safety factors.²⁴ Colonel Knerr was even more explicit than Andrews, who ultimately recognized the necessity of long-range escorts.²⁵ Knerr took the view that the proper function of the pursuit plane was to shoot down bombers; it served properly as an interceptor but not as an escort.²⁶ The Air Corps Board, in a study issued in May 1939, took the position that the bomber's speed reduced the need for escort and that a pursuit plane with the required range would probably lack adequate fighting characteristics for coping with enemy interceptors.²⁷

The idea of the invincibility of the bomber was supported not only by the leaders of the bombardment branch of the air arm, but by outstanding pursuit pilots as well. With the retirement of Capt. Claire Chennault in 1937, there remained in the Air Corps no powerful voice to speak up for the capabilities of the fighters.† Maj. Clayton Bissell, one-time pursuit instructor at ACTS and a tactical commander at Wheeler Field, T. H., in 1936 took a pessimistic view of the prospects for successful bomber interception. Asked by Capt. James E. Parker, instructor at the school, to elaborate his opinions on the subject, Bissell wrote that bombardment had become the major weapon of aviation. Furthermore, the bomber was superior to all existing countermeasures, including pursuit and anti-aircraft artillery. Some type of plane capable of overcoming the power of the bomber was necessary, conceded Bissell, and "If the need is great enough, money and genius will be directed to the production of such aircraft." The problem was simply a matter of relative speeds. Pursuit could not neutralize bombardment, stated Bissell, unless it enjoyed a speed advantage of 40 to 50 per cent; and until that should be possible, "there is no pursuit aviation." Given the requisite speed, the problem of attacking and destroying a bomber was viewed as relatively simple.²⁸ But clearly, no plane

*For discussion of this question, as it was argued in the early '30's, see above, pp. 58-60.

†For Chennault's stand on this problem, see above, pp. 58-59.

with the speed advantage stipulated by Bissell was even remotely available, and in such terms it appeared that the bomber had little to fear from pursuit.

After the appearance of the XB-17 in 1935, this plane became the principal standard of reference for discussion and planning of bombardment models.* The four-engine aircraft with transposable bomb and fuel capacity was generally recognized as the most suitable, both for reconnaissance and attack; the B-17 came to be accepted as a small or medium model of this general type, and development was aimed toward still larger planes.²⁰ While officers within the Air Corps were exuding confidence in the striking and defensive powers of the new bomber, some criticism was voiced from the outside. Alexander de Seversky, the famed aircraft designer, believed that the much-heralded Fortress was deficient in both firepower and armor. By way of comparison, he pointed to the fact that the B-17 had no tail guns, while the British Wellington carried a double .30-cal. "stinger" mounted in a power turret.³⁰ Seversky's criticism was to prove well founded in this respect, for when the B-17's were committed to combat, they had to be modified to fit the needs of the European theater. In justification of the Air Corps' position, it should be said that the Army designers were emphasizing speed, range, and altitude as defensive factors, rather than armament. And the B-17's, which were "sold" to the military establishment and the public chiefly for use in sea search and sea attack, were not expected to encounter the heavy pursuit opposition later put up by the Luftwaffe over Europe. The Air Corps, furthermore, was cognizant of the need for accurate and effective defensive fire by its bombers. In June 1939 the Air Corps Board recommended as a top-priority project the development of fire-control systems for both medium and heavy bombers.³¹

Pursuit aviation

When Col. Millard F. Harmon, assistant commandant of ACTS, wrote to the Office

of the Chief of Air Corps regarding the status of pursuit instruction in 1939, he indicated a picture of gradual recovery in emphasis from a low point reached about 1935. Harmon wrote with some pride of this trend, which he had supported. While recognizing the importance of bombardment development, he disliked the doctrine of "bombardment invincibility" and favored a balance between the principal branches of aviation. "We assign pursuit a very important role," wrote Harmon, "second only in importance to the main dependence placed on the striking force." For specific illustration, he referred to the increase in the length of the Pursuit course taught at the school and to the greater attention given to pursuit employment in the Air Force course.³² There is considerable evidence, too, in the texts and lectures at ACTS, that the role of pursuit was being given somewhat greater recognition than it had received in the early 1930's when the high-speed bomber first dazzled the imagination of air leaders. The text for the Pursuit course issued in September 1939 stated that the primary mission of pursuit was defensive, consisting of defense of bases and of aircraft in flight—in other words, interception and escort.³³ Capt. Earle E. Partridge, pursuit instructor, in one of his regular classroom lectures emphasized the need for escort operations. Accompanying fighter cover should be provided for bombers whenever they expected to encounter enemy interceptors, he said, and "Under certain conditions, such as in daylight, when the visibility is excellent . . . it may become imperative that friendly pursuit aid the supported air force unit by furnishing close support."³⁴ Another lecture in the Pursuit course referred to the employment of fighters in direct assistance to ground forces. This mission could be accomplished, stated the instructor, by denying hostile aerial observation and attack, by protecting friendly reconnaissance, and, when other missions did not interfere, by strafing and bombing sweeps against surface forces.³⁵

It would be misleading, however, to suggest that pursuit was by way of regaining

*The two-engine Douglas B-18 was actually in quantity production in the late 1930's, but Air Corps leaders regarded it as quite inferior to four-engine ships. The struggle for procurement of the B-17, and the broader issue of two-engine or four-engine bombers, will be discussed at length in a later section. See below, pp. 89-101.

the position of importance which it had enjoyed after World War I. It has been seen in the preceding chapter that Chennault supported a losing cause in his fight for greater pursuit recognition in the early 1930's.* The essentially limited, defensive role into which pursuit had been cast, was not thrown off in the period before the second World War. The same school text, which in one place referred to pursuit in the role of accompanying support, in another place emphasized that interception missions would of necessity comprise virtually all pursuit operations. This was the result of limited range, explained the text; enemy bombers were invulnerable so long as they remained beyond the fighters' radius of action. As a consequence, pursuit had to await the enemy instead of seeking him out—"In a word it becomes a defensive force."³⁶ Such a role was a far cry from the flexible, offensive-defensive, opportunistic concept in the mind of Chennault.

Lt. Col. Donald Wilson, director of the Department of Air Tactics and Strategy, presented a logical summary of the purpose and status of pursuit in a carefully drawn memo for Colonel Harmon in June 1939. His statement probably approached the consensus of the instructors at the Tactical School, for Wilson submitted it in an effort to bring about an official school policy regarding pursuit. The net effect of his analysis was to restrict fighters to the interception of hostile bombers. Wilson saw air defense of vital industrial centers as a continuous need in case of involvement in war no matter where the theater of operations might be. Not until adequate defense was provided for all key areas of the nation would it be safe or proper to employ pursuit in "auxiliary missions." And even if that time were reached, a decision to use pursuit in such fashion would have to be based upon demonstrated need and proof of effectiveness of fighters in auxiliary roles. Wilson himself had a low estimate of the relative usefulness of pursuit, except in air defense operations. Turning particularly to escort work, he seemed to think that a fighter with the range of a heavy bomber

could not have the requisite combat performance; furthermore, diversion of production to fighters when the total number of aircraft was limited would mean a corresponding loss of strength in bombers. Wilson concluded, in light of the foregoing, that escort should be adopted only in a military situation where its use appeared indispensable to the profitable conduct of bombardment operations.³⁷

Since interception was generally recognized, in terms of the American military situation, as virtually the only important mission of pursuit, it was natural that discussion of tactics would be related to that role. Colonel Wilson believed, at least until much larger defense forces became available, that the general tactical aim of pursuit would have to be harrassment of attacking aircraft, rather than their complete destruction. Pursuit attack, or even its threat, would require enemy bombers to carry heavy armament in place of a maximum bomb load, to fly in defensive formation, and to suffer loss of accuracy in dropping their projectiles.³⁸ Colonel Harmon referred to this as the limited aim approach for pursuit. Because of the lengthy borders of the United States, he explained, it was practicable to provide only a thin line of general air defense, in addition to more concentrated local defense of key centers or installations. Such an approach would impose substantial limitations upon the efficiency of attacking forces.³⁹ Maj. James E. Parker, instructor in the Pursuit course at ACTS, estimated that the loss in pay load of bombers, as a result of such tactics, might be as high as 35 percent.⁴⁰

Reference has been made in the previous chapter to the fact that Capt. Chennault laid the groundwork for pursuit combat tactics during the early 1930's. He was also one of the first to recognize the necessity of a ground information net for successful pursuit interception of hostile bombers.† Chennault's recommendations on the latter subject were severely criticized at first. Maj. Clayton Bissell, for instance, declared in September 1936 that he was not convinced of the soundness of any scheme for an ex-

*For discussion of the decline of pursuit and the efforts of Chennault to restore its role, see above, pp. 55-56, 60-62.

†Chennault's air fighting tactics are described in pp. 62-63; his plans for aircraft warning service are given in pp. 63-64.

tensive ground communication network. He stated that the amount of manpower required to operate such a network along long coast lines would be prohibitive. Bissell was inclined to escape from the difficulties involved in establishing an effective ground information system by taking a defeatist view of the whole interception problem.*⁴¹

Dissension over this issue continued until 1938. According to Capt. Earle Partidge, pursuit instructor at ACTS, most observers became convinced of the feasibility of a warning net by the results of the Fort Bragg exercises in October of that year. During those maneuvers, in which civilians manned a majority of the observation posts, a ground information system was employed that worked satisfactorily. Captain Partridge told his students that, "The entire scheme of general defense by the pursuit unit is based on the successful operation of an aircraft interception net."⁴² The pursuit course text issued in the following year included a long section describing the aircraft interception net; the description followed closely the provisions which Chennault had incorporated in his 1933 manual, *The Role of Defensive Pursuit*.⁴³ His theory had apparently gained official indorsement at the Tactical School, although it was not put into effect by the Army before World War II.

The Pursuit text for 1939 had an interesting section devoted to tactics of interception at night. It provided for formation flying with navigation lights until the elements were actually detached to make the assault. While Chennault had felt that darkness limited action to single-plane attacks, the 1939 text suggested attacking elements of either two or three ships, depending upon the width of the bomber formation. The text followed Chennault in calling for searchlight cooperation and delivery of fire from the rear.† Normally, according to the text, pursuit attacks were to be broken off when bombers entered the zone of antiaircraft fire and were to be resumed after they had passed through it.⁴⁴

Writing in 1942, after American planes had faced a limited test of combat in Eu-

rope and Asia, Alexander de Seversky roundly criticized their quality and performance. American fighters, alleged Seversky, were inferior to foreign types in range, altitude, and firepower.⁴⁵ Air Corps pilots would have disagreed sharply with Seversky's estimate of the B-17; however, there was considerable feeling that U.S. fighters had indeed fallen short. The Curtiss P-40 (Warhawk), the standard service pursuit in 1941, proved suitable only to secondary theaters of action; as an interceptor, the P-40 was not the equal of the RAF Spitfire or the German Me-109. Its principal weaknesses were insufficient firepower and inferior general performance at critical altitudes.⁴⁶ Certainly, no one could have asserted with any plausibility that American fighters were the best in the world.

One reason for the continued lag in pursuit development, even as the threat of imminent war became manifest, was simply that funds for aircraft development were restricted, and air leaders assigned priority to bombardment.⁴⁷ There is evidence to suggest, however, that the lag resulted also from lack of sufficient interest and support by the leaders of the air arm. Maj. Gen. Grandison Gardner has stated that engineering problems held back the design of an effective long-range fighter,⁴⁸ but those problems, while difficult, would seem no greater than the ones solved by technical experts building the super-bomber. General Eaker has offered the opinion that air leaders gave insufficient attention to interceptors, because they did not envisage for this country the heavy bomber assaults which were thrown against Britain.⁴⁹ Even less attention was given to development of long-range fighters, because the prevailing bombardment theory held that long-range escorts were impracticable and unnecessary.⁵⁰ The conclusion seems inescapable that, although financial and engineering factors exercised a contributing influence, the lag in pursuit design resulted chiefly from doctrinal shortcomings.

Development of pursuit was further hampered by lack of agreement upon the number of types desired and the features of performance considered most essential in

*See above, pp. 82-83.

†For Chennault's night-fighter tactics, see above, p. 63.

each. While the bombardment enthusiasts were nearly unanimous in their views regarding the ideal bomber—a multiengine, long-range, high-altitude, and large-capacity aircraft—the pursuit leaders remained as divided as they had been since World War I.* Maj. Bissell favored only one type of pursuit, as well as one for each other class of aviation; such a plan, he argued, would be most economical and would facilitate mass production. He thought that the overriding criterion for pursuit, regardless of type, was speed.⁵¹

Other pursuit leaders thought the problem a bit more complicated than did Bissell. They managed, it is true, to agree on the elimination of one type, which had been a controversial issue ever since the World War—the two-seater pursuit. Following a survey among all pursuit units in the air arm and a conference by the top pursuit commanders of the GHQ Air Force, the Chief of the Air Corps in June 1938 approved a development program which omitted two-seaters.⁵² However, the questions of number of types and their characteristics remained. Col. Hugh Knerr, chief of staff of the GHQ Air Force, argued for an interceptor type only. He strongly favored a small, heavily armed ship, which might be labelled a “flying machine gun.” Accordingly, Knerr proposed a plane of minimum size and weight, with maximum speed, maneuverability, and firepower, and flown by a small pilot. He stated later that the Bell P-39 (Airacobra) was built to this conception, but that it fell short because of inadequate engine power and excessive weighting with auxiliary equipment. The P-39, consequently, lacked the desired ceiling and performance. Furthermore, special limits on the size of the pilot were not imposed for assignment to this plane, as Knerr had hoped. Knerr averred, in passing, that, “The Japs took this interceptor conception laid down by the GHQ Air Force and built the Zero to it. . . .” The shortcomings of American pursuit planes during this period were generally attributable, Knerr has concluded, to the fact that “we were not able to crystallize our pursuit doctrine. . . .”⁵³

*For discussion of this division during the postwar years, see above, pp. 37-38, 84-85.

By 1938 the pursuit development program was focused upon two main types: a “clear-cut uncompromised single seat Interceptor Fighter” (either single- or two-engine) and a several-purpose, multi-seater fighter (chiefly for escort and long-range interception).⁵⁴ But a year later, the door had swung open again to three types, instead of two. The ACTS Pursuit text for 1939 stated that the Air Corps was, or soon would be, equipped with three types of fighters, including the interceptor and the multi-seater, mentioned above, plus the standard single-seat pursuit which had been in use for years. The latter would be required, said the text, for general defense and as a supplement to interceptors in local defense. The multi-seater fighter was to be used for long-range interception, patrols, trailing, and night defense; no mention of escort duty was made in the text.⁵⁵

The planes actually produced and developed in the period 1935-1939 were of the three types described in the Tactical School manual. By 1939 the standard pursuit equipment was the single-engine, single-seater “compromise” type: the P-35 or P-36, and their replacement, the Curtiss P-40,⁵⁶ a low-wing, all-metal monoplane. The innovation was the in-line, liquid-cooled engine; in fact, the P-40 evolved as an experiment to compare the relative efficiency of such an engine with the radial, air-cooled type. The experiment proved successful, at least with respect to maximum speed; the P-40 could make 350 miles per hour, compared with 310 for the P-36.⁵⁷

The interceptor type of pursuit was being developed at the same time. Design of the Bell P-39, with its 37-mm. cannon, has already been mentioned as having been favored by Colonel Knerr. Of radical design, with Allison engine mounted behind the cockpit, the P-39 had more speed and firepower than the P-40, but it had shorter range and proved more difficult to fly. Greater hopes for a successful interceptor were placed upon the two-engine, single-seater Lockheed P-38. This plane, considerably larger than any single-seater previously built, had a superior rate of climb, speed, range, and ceiling. The P-38, which was to

become one of the outstanding planes of World War II, was designed to mount four .50-caliber machine guns and one 20-mm. cannon.

The third type, the multiseater pursuit, whose development had started in 1935, never went beyond the experimental stage. The Bell XFM-1, powered by two Allison pusher engines, failed to come up to expectations. Designed primarily as a powerful interceptor, it suffered from slow rate of climb, low speed, and poor maneuverability. It did carry heavy armament, four machine guns and two 37-mm. cannon, but this firepower was of no use unless it could be brought to bear.⁵⁸ The money and energy spent on this futile project might well have been used instead to develop a long-range single-seat fighter. As it turned out, the requirement for such a plane, which became indisputable during World War II, was met by the P-38, which the Air Corps had designed as an interceptor. The P-38 had the feature of size, in addition to the normally desired features of an interceptor; it was readily convertible, therefore, to long-range operations.*

Attack aviation

No substantial improvement occurred in the status of attack aviation during the late 1930's.† Although ground support operations were considered by the War Department as perhaps the most important function of the air arm, the air leaders themselves were inclined to give it secondary attention, and attack aircraft were associated with the ground support mission. Furthermore, there was uncertainty regarding the methods and equipment for providing ground support; some air officers were convinced that the existing technique was ineffective. Major Bissell, who had participated in tactical exercises in the Hawaiian Islands, reported in September 1936 that attack planes were unable to place their bombs accurately on small targets. The aircraft which he observed, Curtiss A-21's, carried no precision bombsights and succeeded in hitting only large area targets with their

bombs. Smaller objects were regularly missed, and even machine-gun fire, wrote Bissell, was inaccurate against precision targets. Reviewing the tactics of this branch of aviation, he concluded that low-altitude attacks (under 1,000 feet) would secure some surprise but would result in heavy losses of aircraft and inflict negligible damage. Attack planes, said Bissell, had adequate firepower but lacked accuracy.⁵⁹

Doubts such as those expressed by Bissell, plus observation of air operations in the Spanish Civil War, led to a thorough study of attack equipment and technique. Following a directive from the War Department, the Chief of the Air Corps in August 1937 directed the Air Corps Board to undertake a study and to make recommendations on the question of redesigning attack planes. The suggestion from higher authority was that level bombing at medium altitudes be considered the primary tactic of this branch of aviation, instead of machine-gun fire. It was argued that the light bomber had proved effective in Spain as a weapon of ground support and that machine-gun fire from fast-flying aircraft was inaccurate except at dangerously low altitudes.⁶⁰ In connection with this and similar suggestions by the War Department, air leaders were generally wary lest changes in equipment provide an entering wedge for increased emphasis upon ground support functions. They tended to answer that attack planes should be designed for their primary purpose, counter-air employment, rather than for close support of ground units.⁶¹ This question of the probable and proper mission of attack aviation naturally complicated the question of correct equipment and tactics.

The studies initiated in 1937 produced no conclusive results on the attack issue. In April 1939, General Arnold communicated his persisting doubts to Lt. Col. Carl Spaatz, chief of the Plans Section, OCAC. He wrote that the status of attack aviation was in serious question—"what it is, its characteristics, its performance, and its proper place in the scheme of things in the system of national defense."⁶² In reply to Arnold's request, Colonel Spaatz submitted a state-

*It should be noted, however, that until 1943 when the P-51 was available in quantity, the Eighth Air Force had no long-range fighter suitable for escort operations over Europe.

†For discussion of the decline of this branch of aviation, see above, p. 86-87.

ment of the existing status and doctrines of attack aviation. Its mission was the destruction or neutralization of personnel and light material. Attack was regarded as more useful than heavy bombardment for close support of an infantry breakthrough or in opposition to a strong enemy ground assault. The attack planes must be fast and maneuverable, suitable to either area or precision bombing; machine guns, chemicals, and bombs comprised their armament. Spaatz added, however, that the attack ship had not been proved tactically. The extent to which it could be used successfully at low altitudes must be the subject of searching analysis. It was entirely possible, Spaatz thought, that experience might show the superiority of pure bombardment types, operating at higher altitude. Or it might be found that a better type for ground support would be a plane much smaller than the existing attack bomber, faster and more maneuverable. In any event, the Spaatz statement emphasized that the attack bomber was an experimental type, from both the tactical and engineering point of view.⁶³ The extent of neglect of ground support aviation is eloquently attested by this confession of doubt and uncertainty in OCAC.

Meanwhile, official reports, texts, and manuals set forth the doctrine of attack aviation, more or less as it had been developed in the 1920's, without any hint of reservation. An Air Corps Board report of 7 May 1939 referred to attack as a weapon of opportunity, designed for low altitude work. It expressed the general view of air leaders by stating that the proportion of attack aviation to bombardment should be small; U.S. aircraft-producing capacity should be devoted chiefly to those types which would be of greatest value in the initial phase of an attack on the United States.⁶⁴ The Attack text at Maxwell Field described the standard mission and tactics. While recognizing the likelihood of changes in equipment, the text asserted that the tactics of this branch of aviation would remain basically unchanged.⁶⁵ The school maintained the priority of counter-air opera-

tions over ground support missions and upheld the traditional Air Corps view that front-line attacks represented an improper employment of airpower. It was believed that the most effective way of rendering support to ground forces was by 1) gaining air superiority over the battlefield, 2) isolating the battlefield through destruction of enemy communications, and 3) attacking troop concentrations wherever found.⁶⁶ As to method of assault, the official doctrine still preferred low-altitude, level formation sweeps to individual dive-bombing tactics.⁶⁷

In 1936 the Northrop A-17 became the standard attack plane, replacing the Curtiss A-12 (Shrike). Incorporating the general characteristics called for in the 1930's, the A-17 was an all-metal, low-wing monoplane, with one 800-horsepower radial engine. It had a top speed of 220 miles per hour, ceiling of 20,000 feet, and range of 730 miles. It could carry 650 pounds of bombs, with five .30-caliber machine guns.⁶⁸ But even while the A-17 was being delivered in some quantities, the trend of design was toward a multiengine, faster, larger ship. The principal advantages to be seen in a multiengine plane were greater armament capacity, speed, and defensive ability; these characteristics were in some measure realized in the two-engine Curtiss A-18, which was given a trial by the Air Corps in the late '30's. This airplane did not give the desired performance, but it sustained hopes that a bimotored design might prove successful, and it proved to be the forerunner of the Army's light bomber.⁶⁹ The latter type was the outgrowth of a move made by General Westover in 1937 to secure a more powerful plane for ground support purposes.⁷⁰ In September 1938 he requested official War Department approval for an attack-bomber of the following characteristics: two engines, high speed (350 miles per hour); range of 1,200 miles, ceiling of 20,000 feet, and crew of 3. The armament included six .30-caliber machine guns and a load of over 2,000 pounds in bombs. The request was approved in short order, and the beginnings were made which were to lead to the successful Douglas A-20.⁷¹

THE CRUCIAL FIGHT FOR PRODUCTION AND DEVELOPMENT OF THE LONG-RANGE BOMBER

The shortcomings in attack aviation, as in pursuit and other branches, were in large measure the result of the overriding emphasis placed by air leaders upon strategic bombardment. With the appearance of the high-speed bomber in the early '30's, and particularly with the advent of the B-17, the major effort of the Air Corps was absorbed in the bombardment program. Air leaders believed that they saw in it the means of a true strategic offensive—the realization of the promise of airpower. They were no doubt justified in their belief and in their effort. Bombardment was to prove, indeed, the backbone of the air force in World War II and a principal factor in gaining ultimate victory for the Allied arms. If in the struggle to build strength in bombardment some other considerations were sacrificed, the consequence is understandable. The American idea of airpower rode with the bomber program.

From 1935 until the Nazi attack on Poland in 1939 was a crucial period for bombardment procurement and development. The Air Corps had its theories and its plans, but without suitable equipment it could not have molded the force which was later to help crack the Axis. Looking back upon that period from the vantage point of hindsight, it seems hardly conceivable that the Air Corps leaders should have faced such a desperate struggle in procuring the big bombers. But the fight was real, and it was earnest. It was, in fact, a three-cornered struggle involving the Air Corps, the General Staff, and the Navy. And in this bitter contest the air arm was almost always opposed by the two senior services.

Involved in this conflict which nearly wrecked the Air Corps program were, to be sure, personalities, prestige, the vested interests of the services, and competition for limited defense funds. But more important than those elements were the firm and honest convictions of strong men who were approaching the question from three different points of view. The General Staff looked at the question of bomber procurement

from the standpoint of traditional methods of warfare and a balanced military force, especially in terms of immediate availability. The Air Corps was thinking of a new kind of war, involving an air offensive, and in terms of a more remote future action.* The Navy was concerned almost exclusively with sea control, without respect to the plans and programs of ground and air. The underlying causes of the controversy among the services were, then, the divergent concepts of the nature of war, varying estimates of the capability of the airplane, differing time considerations, and unwillingness or inability of each arm to see the defense picture as a whole.⁷²

Bomber program related to coast defense

It has already been seen that the development of large aircraft by the Air Corps had been justified as a means of coast defense.† In June 1934 the War Department had approved Project A for exploring the problem of maximum range for a reconnaissance-bomber; this project brought forth the B-15. In May 1935 the Secretary of War approved a bigger and better venture, Project D, aimed at still greater size and range, which produced the giant B-19.⁷³ Both of these costly experiments were supported by the War Department, not to secure prototypes for strategic bombardment, but to develop the most efficient aircraft for use in coast defense. During the period that these projects were under way, Air Corps leaders continued to stress that they desired large planes only for protection of the hemisphere.

Maj. Gen. Oscar Westover, Chief of the Air Corps, related his plea for a stronger air force to the military dangers abroad. Addressing the National Aeronautical Association in November 1936, Westover declared: "If and when the great European conflict occurs, the only way in which the neutral nations in the world can keep out of that conflict is to have such a strong national defense that none of the belligerents involved dare violate their neutrality."⁷⁴ No suggestion was given of possible

*These disagreements between the air arm and the General Staff existed since World War I and were crystallized in formal statement in 1926 (see above, pp. 40-43).

†For discussion of this point, and the controversy with the Navy regarding control of land-based air operations over water, see above, pp. 67-70.

offensive operations by the big bombers. Likewise, Maj. Gen. Frank M. Andrews, commanding the GHQ Air Force, related his arguments for long-range aircraft to the coast defense requirement. The advantages of the large plane over the smaller one, said Andrews, were greater power of self-protection, less danger of forced landings, economy of operation per bomb delivered, and ability to contact the enemy sooner and to hold him longer under surveillance and attack.⁷⁵ In response to a query from Maj. Gen. Stanley D. Embick of the General Staff, Andrews stated flatly that the air weapons under development were purely defensive. "It is utterly absurd to consider them as anything else and I think we should emphasize this point on all occasions."⁷⁶ A year later found Andrews stressing the same theme in a lecture before the Army War College. Seeking to counteract criticisms of the big bomber projects, he told his audience:

From some sources comes the statement that the modern development of large bombers is for the purpose of aggressive action on the part of the United States. Often we hear of our large bombers spoken of as 'Weapons of Offense,' 'Super-bombers,' and similar appellations. These terms are unfortunate and misleading.

At the same time, Andrews pointed to the fact that commercial airlines were planning ships of greater weight—up to 250,000 pounds, and he emphasized the superior efficiency of such aircraft in defending the nation.⁷⁷

Quite naturally, the Air Corps continued to be concerned about arrangements with the Navy for joint defense of the seacoast. The powers of Army bombardment had not been spelled out in the Joint Action papers to the satisfaction of the air leaders, and the fear persisted that the Navy would develop a land-based, long-range force of its own. Every effort was made to clarify the coastal defense agreements so as to provide a clear-cut mandate for continued and unhampered development of Army heavy bombers. The Air Corps Board in October 1936 stated that the existing Joint Action paper gave to the Army responsibility for direct defense of the coast and that

the Army was to be prepared to fulfill that responsibility regardless of the presence or absence of naval forces. Performance of this function, concluded the board, included operations over water.⁷⁸ However, in a supplementary report the board complained that the Joint Action was based upon a restricted concept of airpower, a concept which considered it a mere auxiliary to surface forces. It called for immediate revision of the Joint Action, in order to provide a more adequate basis for the development, planning, and training required by the Air Corps for maximum operation.⁷⁹

General Arnold also called for a clearer policy on the question of responsibility for coast defense. He indicated, in June 1937 that the whole question of whether the Air Corps should have long-range planes was tied to the question of employment of the GHQ Air Force. If the Navy were given the task of air defense of the coast line, said Arnold, there was no justification for the Army having long-range ships. The entire case for larger planes in the Army, he implied, rested upon a clear assumption of the coastal defense responsibility. If the Air Corps did not perform that mission, it should logically limit its aviation to close support units, with the maximum range of aircraft being that necessary to reinforce Hawaii and Panama.⁸⁰ As late as 1939 the impression persisted, outside of the Army as well as in, that the Air Corps bombers were being built purely for defense. Maj. George Fielding Eliot, the popular civilian writer on military affairs, expressed the opinion that the chief use of the American air arm in case of war would probably be to attack hostile fleets and advance bases. "For this purpose we require bombers of greater radius of action, as far as we can achieve this, than any possible enemy possesses."⁸¹

The Navy, meanwhile, was maneuvering to eliminate the Air Corps from long-range operations over water. It insisted that offshore reconnaissance and attack were essentially part of the Navy's function of controlling the sea and fulfilling its duty as the nation's first line of defense. Naval leaders were willing to concede that under

Joint Action provisions, the Army had responsibility for direct defense of the coast, which fact would of necessity require some flying over water, but they attempted to block long-range operations. Their boldest move in this direction was to secure from the War Department high command an agreement to limit Air Corps planes to a distance of 100 miles offshore. How this ban was achieved remains something of a mystery. General Arnold, touching the subject in his memoirs, has attributed the Navy move specifically to a striking Air Corps navigational success in the spring of 1938. As a GHQ Air Force test maneuver, three B-17's took off from Mitchel Field, New York, on 12 May to intercept the Italian liner *Rex* on its normal Atlantic run. With only the general location of the ship known to them by radio, the Fortress pilots were able, in spite of heavy cloud cover, to sight the *Rex* 725 miles east of New York, fly over her, and return to base. Arnold believed that shortly thereafter the Navy brass communicated with some one on the General Staff, following which an order came down limiting all Air Corps activities to a 100-mile zone off the coast—"one of the most dampening orders the War Department ever issued." The most curious thing about this directive was that it was never seen in writing by any member of the Air Corps (if, in fact, it was ever put on paper).⁸² Maj. Gen. Frederic H. Smith, Jr., who has made a special investigation of the matter, states that air leaders were convinced that an Army-Navy understanding on the ban existed, but "I do not believe that we found good sound documentation substantiating the agreement."⁸³ General Eaker is perhaps the nearest surviving witness to this remarkable episode. He says that he was present in the office of General Andrews, who was commanding the GHQ Air Force, when a telephone call for Andrews was put through by the Chief of Staff, Gen. Malin C. Craig. According to Eaker, Craig issued the order verbally to Andrews at that moment, and Andrews placed a memorandum of the call in his personal file. After the death of General Andrews in May 1943, the memo could not be found in his papers;

Eaker infers that someone had removed it. There remains, so far as Eaker knows, no other documentary proof of the order.⁸⁴

While the Navy moved to check long-distance flights by the Air Corps over water, it also made progress in opening the way to long-range, land-based flights by naval craft. In November 1938 a significant change was incorporated in the Joint Action agreement. In connection with provision for naval air action in coast patrol and in protection of sea communications, the change stipulated that naval aircraft "may be required to operate effectively over the sea to the maximum distance within the capacity of aircraft development."⁸⁵ Thus was specifically authorized the development which the Navy had sought and the Air Corps had feared. By the early part of 1939 the Navy had six major air bases preparing to handle some 25 heavy bombardment squadrons.⁸⁶

Andrews presses for exclusive procurement of four-engine bombers

While the contest was proceeding with the Navy regarding the Air Corps' function in coast defense, General Andrews endeavored to persuade the War Department that future bomber procurement should consist of four-engine types only. The General Staff had gone forward with approval of experimental development of the large planes, as a means of meeting the Army's responsibility for defense of the shore line. It balked, however, at the proposal to limit bomber procurement to such planes; the General Staff saw in such a suggestion the danger that the Air Corps would concentrate entirely on strategic operations, to the neglect of ground support. Andrews argued forcibly in favor of the four-engine craft on grounds of all-around efficiency for either function, but in the ensuing bitter debate the General Staff harbored the suspicion that the real reason was a predilection for independent, long-range missions.⁸⁷

As early as July 1935, Andrews set forth the advantages of large planes over those of more limited size and range. He advised his Army superiors that long-range aircraft offered greater efficiency, economy, and usefulness. They could perform mis-

sions beyond the capability of smaller ships: direct air reinforcement of overseas possessions and observation and attack of offshore targets up to a distance of 1,500 miles. While carrier-borne planes could compete in range with medium bombers, they were far out-reached by the heavy bombers. Futhermore, asserted Andrews, the large ship was no more vulnerable to attack than the smaller one. The fact that it formed a large target for enemy pursuit and anti-aircraft artillery was compensated for by its greater strength and defensive firepower. In view of these considerations, the commander of the GHQ Air Force recommended that the War Department purchase bombardment reconnaissance planes of the greatest capacity and range available, in such numbers as funds would permit. Future bomber development, he added, should be in the direction of still greater range and size.⁸⁸

When procurement of additional bombers for the Air Corps was pending in the War Department in June 1937, Andrews pressed again for exclusive purchase of four-engine planes. In a letter to The Adjutant General, he gave a broader explanation of his position than he had presented earlier. Andrews related his argument for the big ships to the unique strategic position of the United States; he accepted the national policy of defense and assumed that any serious threat to this country must come across the oceans. The best way of meeting such attacks, launched from carriers or from bases seized and prepared in the Western Hemisphere, was to strike the enemy bases and naval forces at the maximum range possible. Andrews saw the heavy bomber as the most efficient means for accomplishing this aim, as well as for the direct reinforcement of overseas possessions. Once again, therefore, he urged that future procurement of bombers be restricted to four-engine types. It is interesting to observe that Maj. Gen. Oscar Westover, coordinate in authority with Andrews, did not concur in this recommendation. Westover, who was more inclined to compromise in order to avoid friction with the General Staff, suggested delay of the purchase of

any additional four-engine planes until a War Department study of the subject could be concluded.⁸⁹

General Andrews, however, was willing if necessary to fight alone on this issue. In October 1937 he expressed opposition to a General Staff proposal to order 91 two-engine bombers out of funds for the fiscal year 1939. He declared simply that there were available no two-engine planes suited to carrying out the mission of the GHQ Air Force. Studies had demonstrated, said Andrews, that successful coast defense required aircraft with a 1,000-mile radius of action. No two-engine plane approached this capability, while the B-17 had an effective radius of 750 and the B-15 was expected to have 1,000. On the basis of these figures, Andrews recommended procurement of B-15's if available for FY 1939; otherwise, B-17's.⁹⁰ The General Staff continued to ignore Andrews' repeated protests and exhortations. The following year, in June 1938, the GHQ Air Force commander opposed another move to purchase additional two-engine bombers. This time Andrews changed tack somewhat and based his opposition on the assertion that the plane under consideration, the Douglas B-18, was unsatisfactory and obsolete in combat performance. After referring to seven previous letters on this subject, Andrews pointed out that the B-18 had a top speed of only 215 miles per hour (compared with 315 for the B-17) and a considerably slower speed at altitude above 10,000 feet. Since speed and altitude were regarded as the chief defenses of a bomber, it was clear that the B-18 was deficient in this respect. All the major nations, said Andrews, were developing pursuits with speeds in the neighborhood of 400 miles per hour; a bomber like the B-18 would be at their mercy. Warming up to the issue, he went on to charge that the purchase of such planes would handicap the national defense and would be without justification since better planes (B-17's) were available.⁹¹ The General Staff politely acknowledged receipt of Andrews' protest and replied that the matter had been given "most serious consideration" by the War Department. However,

the high command held to its decision to purchase the B-18's and stated that the action was believed to be "for the best interests of national defense."⁹²

Air Corps demands for unlimited development of the bomber

While the chief argument of air leaders for development and procurement of long-range bombers was related to the Army's mission of coast defense, the more fundamental reasons for their development began to find expression after 1935. The Air Corps saw in the hemisphere defense concept a strong justification for the use of big planes, but American air doctrine would have called for them even if the defense issue had not been present. It was simply a matter of believing that superiority in the air, regardless of shifting strategic requirements, would always depend upon maximum development of air weapons. America could not afford to be outranged by any possible enemy; and since range was chiefly a function of size, America must lead the world in building large planes. The air leaders were not quite sure what the strategic consequences of this development might be. But whether air forces were striking across short distances, between continents, or around the globe, the power with the largest planes would have the advantage. Fundamentally, it was a question which ground officers might well have appreciated in analogous terms of insistence on development of the best gun or the best tank. What complicated matters for the Air Corps and created such strong opposition was the enormous cost of developing super-planes. The very expense of it frightened the other arms, for it threatened to deprive them of their own required equipment. In addition, of course, the General Staff feared that the big bombers would divert Air Corps funds and attention toward strategic operations and away from the ground support which they regarded as indispensable to military success.⁹³

Maj. Carl Spaatz was among the first in the OCAC to emphasize a mission for large bombers beyond mere defense of the coast. He wrote in January 1935 that long-range planes would be required by the United

States for operations against the homeland of potential enemies. Any war in the Orient, explained Spaatz, would necessitate the use of long-range bombers operating from Alaska, the Philippine Islands, and Hawaii. Similarly, he thought, America needed such planes for action in the Atlantic. Aircraft of at least one European power, England, could attack the United States in a one-way ocean crossing and land on controlled territory in this hemisphere. In order to be able to retaliate, America would require planes of twice the range, capable of making a round-trip flight across the Atlantic. Spaatz saw bomber development moving properly, therefore, in the direction of greater range—as a means, ultimately, of striking at the vital centers of enemy nations. The same reasons which dictated long cruising ranges for naval vessels, he concluded, now applied to aircraft.⁹⁴

General Westover, replying to a General Staff request for comments on the advantages and disadvantages of long-range bombers, expressed a similar view in July 1935. Aside from the greater operating economy and efficiency of large planes compared with small, their superior range made them essential to defense of the United States. America, to be safe, needed planes whose range outdistanced the striking ability of potential enemies. Drawing aside the curtain on the hopes of the Air Corps for unlimited development, Westover declared that, if technically feasible, the United States should build planes with up to 10,000 miles, or even greater, operating range.⁹⁵ No wonder the General Staff began to doubt the concurrent professions of air leaders that they wanted big bombers solely for coast defense (the only discreet position which could be taken publicly). The just suspicion grew that the Air Corps had unlimited desires for ever-larger planes and that the defense argument was simply an expedient for obtaining the biggest planes then available.

Within a few years the air leaders dropped the defense pretext altogether and began to speak their minds more openly. One reason for this change, perhaps, was the fact that the Navy threatened to usurp the

function of coastal air defense from the Army, and the Air Corps believed it necessary to justify its development program on broader strategic grounds.* Also, the ominous Axis aggressions were quickly transforming the defense-mindedness of the country and opening the way to consideration of more powerful offensive weapons. In January 1938 General Andrews made a forthright presentation of his position to the Secretary of War. He sought to free Air Corps development programs from limitations related to surface forces. In the past, said Andrews, the air arm had been built mainly on the principle of maintaining a certain ration of support for the Army and Navy. This remained correct to a certain extent, he conceded, but airpower was also a new mode of warfare and required consideration for development beyond the sphere of support. Airpower was as vital to the military efficiency of a great nation as were land and seapower, and bombardment represented the backbone of air strength. Hence, limits should be removed from the Air Corps in its struggle with rival air forces for bases and equipment.⁹⁶ A few months later, in May, Andrews asked for the development of a bomber weighing 250,000 pounds (the B-17 weighed 36,000). In justification, he wrote: "Until a point is reached wherein world stabilization in approximate size of aircraft is attained, the United States cannot afford to be behind in aviation development and experimentation. We cannot afford ever to find ourselves subject to air raids which cannot be replied to in kind."⁹⁷

In January 1939, shortly before completing his tour as commander of the GHQ Air Force, Andrews made a public declaration of the Air Corps' demand for unlimited development. Addressing the National Aeronautical Association meeting in St. Louis, he put into expression the extreme doctrine of offensive airpower that had been developing for some years at the Air Corps Tactical School. America must be strong in the air to survive in "this world of 'might makes right.'" And airpower, said Andrews, was primarily a means for direct attack on the national structure of an enemy. The big

bomber was, of course, the basic weapon of such an attack; the strategic advantage rested with the country whose bombers could reach the enemy while the enemy could not reach back. Defining the development issue very sharply, Andrews observed that America had two air problems: for "today" the nation required bombers which could establish a defensive sphere around the Western Hemisphere; for "tomorrow" the nation must be prepared for intercontinental air warfare. The United States should be the first, he urged, to span the oceans in a non-stop, round-trip flight. "I believe," concluded Andrews, "that any of our large airplane companies would be glad to large contract to build a bomber capable of a tactical range of 10,000 miles."⁹⁸ Col. Hugh Knerr, Andrews' chief of staff, hoped that the commander would make a strong statement of airpower in his final report to the War Department. Knerr wanted air strength sufficient to "control any situation that may arise from Alaska to Cape Horn and from Guam to Nova Scotia - Bermuda."⁹⁹ Such a program would call for the most vigorous development and procurement and was a far cry from the earlier talk of pure defense of the coast.

The General Staff blocks the way

Andrews, Knerr, and other air leaders could present their statements and arguments; but however compelling they might appear, it was the General Staff that wielded the power. Until about the middle of 1936 the General Staff seemed sympathetic, if not enthusiastic, toward Air Corps requests for long-range bomber development, but from that time until the end of 1938 the Army high command imposed successive restrictions upon four-engine procurement and development that slowed down and nearly strangled the Air Corps' bomber program. If it had not been for the unrelenting efforts of airmen like Andrews and Knerr, the program might indeed have been fatally damaged. As it was, the immediate results of the struggle were a stinging temporary defeat for the principles and career aspirations of the leading Air Corps protagonists. General Andrews, at the termination of his four-year tour as commander of the GHQ

*For discussion of the Navy's moves in this direction, see above, pp. 90-91.

Air Force, was assigned to a minor post and allowed to fall to his permanent rank of colonel. Knerr, having suffered considerable physical wear-and-tear in the contest, was retired from the service on grounds of ill health. Both had persistently opposed the clearly stated policy of their military superiors on a crucial issue; their personal careers appeared, at least for the time being, to be determined by the necessities of service discipline.¹⁰⁰ Within a few years, however, both officers were to be fully vindicated, promoted, and given positions of high authority in the Army.*

While commanding the GHQ Air Force, Andrews regarded its primary mission as strategic, while the General Staff wanted it to be tactical support of ground forces. Perhaps in his desire to develop the strategic capabilities of his force in the face of heavy opposition, Andrews went too far; perhaps in its desire to preserve the tactical emphasis, the General Staff went too far the other way. In any event, the high command had the power; and fearing the tendencies toward strategic operations, it determined to crack down and impose its concept on the air force. The key to the issue was seen to be the question of procurement and development of long-range bombers, since the type of equipment furnished would dictate the function of the air arm.

The new and restrictive policy of the General Staff began to unfold in the fall of 1936. The leading figures in this move, the antagonists in the drama with the air leaders, appear to have been the Deputy Chief of Staff, Maj. Gen. Stanley D. Embick, and the Assistant Chief of Staff, G-4, Brig. Gen. George R. Spalding. Both of these officers were appointed to their positions at about the same time in 1936, and both worked for what they hoped would be a balanced and economical military force, ready to defend the nation's shores. One aspect of their policy was to reduce to a minimum throughout the Army, funds, and personnel devoted to research. This attitude naturally was opposed to the expensive projects desired by

the long-range bombardment proponents. But Embick and Spalding agreed that an effective military force in being could be created out of the meager funds appropriated by Congress only if research funds were diverted to procurement of equipment. As Spalding explained it, he would put an end to development of "unessential" items when "the Army needs large quantities of excellent equipment that has already been developed. The amount of funds allocated to Research and Development in former years is in excess of the proper proportion for the item in consideration of the rearmament program."¹⁰¹ In brief, he preferred some equipment immediately, rather than better equipment later.

With the same kind of reasoning, General Spalding decided that no equipment should be purchased, even if available, unless it could be economically employed in presently assigned missions of the Army. On 25 June 1936 he submitted the results of a War Department staff study, which stated that no mission could reasonably be foreseen requiring the use of the B-17 or the projected XB-15. The latter plane was at the time under development and test, construction having been authorized by the War Department in 1934. Similar in design to the B-17, it was an all-metal, mid-wing monoplane, with a span of 149 feet (compared with the B-17's 103 feet). The B-15 had an operating range of 3,500 miles, compared to 2,000 for the B-17. But its speed was to prove much too slow for service use—less than 200 miles per hour at maximum.¹⁰² Spalding concluded, notwithstanding the contrary judgment of the Chief of the Air Corps, that no additional four-engine planes should be procured by the Army except for experimental purposes. Furthermore, the study indicated that sufficient funds to keep abreast of world aviation had already been appropriated for planes of super range. The bomber recommended for procurement was the Douglas B-18 (range of 1,200 miles) which Spalding believed could fulfill all reasonable requirements and could be justified in initial cost, maintenance, and operating facilities. The interested sections of the General Staff

*Andrews, upon his untimely death in Iceland in May 1943, held the rank of lieutenant general and commanded the European Theater of Operations, United States Army, during World War II. Knerr, as major general, served as deputy commander for administration of the United States Strategic Air Forces (USSTAF) in Europe.

concurrent in Spalding's recommendations, and the study was approved for the Secretary of War by General Embick on 2 July 1936.¹⁰³

Shortly after this blow to the Air Corps' procurement program, an even more serious threat developed in connection with experimental work. Project D had been approved by the War Department in 1935 as an experiment in the problems of maximum aircraft range. The final product, the giant B-19, was not completed until 1941; but if Spalding had had his way, it would never have been finished at all. And while neither the B-15 nor the B-19 were to prove successful operationally, their construction provided the engineering experience which made possible the later B-29, B-32, and B-36.¹⁰⁴ On 8 August 1936 Spalding submitted a staff study on the question of proceeding with Project D by exercising the Army's option to procure the airplane at a cost of about \$1,100,000. The Douglas Aircraft Company had already invested considerable funds preparing for construction of the super-plane, and the Chief of the Air Corps had requested that the War Department take the necessary action to authorize Douglas to go ahead. Spalding, reviewing the facts bearing on the question, believed that the project should be canceled. He pointed out that the Air Corps had under construction 13 B-17's, which equaled or exceeded in range the bombers of any other nation. In addition, the Project A plane (XB-15) promised a range of 5,000 miles and was superior to any plane known to be under development elsewhere in the world. In view of these facts, thought the G-4, there was no justification for purchasing, even for experimental purposes, the Project D aircraft (B-19), with a proposed range of over 10,000 miles. What the Army needed, he urged, was procurement of standard, available bombers, such as the B-18, which Spalding described as comparing favorably "with any bomber in the world." It was necessary to have these bombers on hand, assigned to squadrons, so that crews could be trained in their use, powers, and limitations. Research and development must proceed, Spalding granted,

"but not at such a rate as will give us new aircraft before we have learned to operate those under procurement, nor should it proceed in a direction contrary to our national and military policies." The Project D airplane was a weapon of aggression, declared Spalding, and he proposed that action on the option be deferred until a top-level conference could be held to reconsider the whole question of big bomber development in relation to War Department policy. The study and the suggestion were approved by the Chief of Staff, Gen. Malin Craig, on 10 August.¹⁰⁵

The top-level conference proposed by Spalding met on 28 August to consider the larger problem and the specific issue of proceeding with Project D. Representing the air arm were Generals Westover, Arnold, and Andrews, and Lt. Col. Oliver P. Echols, chief of the engineering section at Wright Field. The General Staff was represented by Brig. Gen. J. H. Hughes (G-3), Spalding (G-4), Col. A. R. Chaffee (Budget), and Col. Sherman Miles (WPD); Lt. Col. J. H. Burns (OAS/W) represented the Secretary of War. The air leaders presented their standard arguments concerning the greater economy and efficiency of large airplanes. Westover stressed that the Project D ship would meet the strategic requirement for flexibility—the ability to carry large loads, to conduct long surveillance missions, and to move by its own power to any theater of operations. However, he stated that two groups of super-range aircraft should fulfill defensive needs, and that the remainder of the bombers should be of medium size. The General Staff officers were apparently unimpressed by these arguments and emphasized the need for more bombers to fly in close support of the Army. They reckoned that a plane with an effective radius of action of 800 miles would cover all needs for Army support, including missions against enemy communications and production. Most Army bombers, they thought, should be even smaller, small enough to use improvised landing fields in forward areas. While agreeing that a "few" long-range ships were needed for direct reinforcement of overseas possessions, the ground generals

concluded that the bulk of the bombers should be of the size of the B-18 or smaller. All members of the conference agreed that the War Plans Division (WPD) should prepare a directive to clarify the situation; it should state the national defensive policy and the role of the Air Corps, and make consideration for continued technical developments in aviation.¹⁰⁶

Following the conference, General Spalding drew up his final recommendations on the Project D question and submitted them to the Chief of Staff. In a preface to these recommendations, he stated flatly that the Project D airplane was distinctly a weapon of aggression and that no requirement existed for such a plane in the national defense. Spalding next pointed out that the government had no legal obligation to exercise the option to have the plane constructed. However, recognizing that Colonel Echols had given verbal assurances to Douglas Aircraft and that Douglas had made a considerable investment in the project, Spalding recommended that the option be exercised in order to maintain good faith and to support the Army's authorized representatives. At the same time, he emphasized that this move should in no way be interpreted as representing War Department policy on long-range bombardment. Thus, the B-19 squeaked through when General Craig accepted the recommendation and approved it for the Secretary of War on 4 September 1936.¹⁰⁷

The clash in viewpoint and doctrine between the air arm and the General Staff were clearly illuminated by the words and actions of Spalding and his superiors in 1936. In spite of the continued appeals of Andrews and other long-range bombardment supporters, the General Staff moved steadily to throttle the program. The general line of this action was to attempt to limit or cut off entirely the procurement of B-17's and to block the development of planes larger than the B-17. While, for example, Andrews was pleading for exclusive purchase of four-engine bombers in 1937,* the General Staff succeeded in obtaining a directive from the Secretary of War, limit-

ing procurement to two-engine planes exclusively.¹⁰⁸ But the crisis in this matter, as well as in development, was to be reached in the summer and autumn of the following year.

In May 1938 the Chief of the Air Corps (Westover) requested that the B-15 be replaced by the B-20 as the Project A airplane. One model of the B-15 had been delivered, tested, and found to be too slow. Westover now desired to apply funds set up for two additional B-15's to the purchase of one B-20; the latter was a speedier, somewhat more expensive modification of the B-15. General Embick, upon receiving the request from Westover, decided to make it (and the whole long-range bomber question) the subject of another staff study. Accordingly, he sent a memo to Brig. Gen. George P. Tyner, who had succeeded Spalding as G-4. Embick made the following general statement in his communication: 1) national policy contemplated defense, not aggression, 2) the defense of sea areas beyond the coastal zones was a function of the Navy, 3) the military superiority of large planes over smaller ones remained to be proved, 4) the Air Corps, in carrying out the functions assigned to it under Joint Action, appeared to need no ship larger than the B-17, and only a very few of them, for reinforcing Oahu and Panama.¹⁰⁹ The nature of the crisis for the Air Corps is especially clear in this statement by Embick, for it was given at the very same time when the Navy succeeded in banning Army flights beyond the 100-mile limit.† It is apparent that the Navy and the General Staff, for reasons and policies of their own, were exerting a common pressure to restrict the development, procurement, and operation of long-range bombers by the Air Corps.

General Tyner, however, in his reply to Embick offered a dissenting judgment. He observed that the characteristics of a four-engine plane of range superior to the B-17 had been officially approved by the Secretary of War on 27 November 1937. Before that approval was given, all interested divisions of the General Staff had concurred in the proposal. Likewise, continued the new

*See above, pp. 92-93.

†See above, pp. 90-91.

G-4, the Woodring program of aircraft procurement had been indorsed by the General Staff and approved by the Secretary on 18 March 1938; it provided for a total of 2,320 planes, including 144 of a type larger than the B-17. The general statements in Embick's memo, thought Tyner, raised questions of policy not in accord with the Woodring program, so recently approved. Tyner apparently believed that the Woodring program should stand, and he recommended approval of Westover's request for substitution of the B-20 for the B-15.¹¹⁰

Embick received support for his point of view from Col. A. R. Chaffee, chief of the Budget and Legislative Planning branch of the General Staff. Chaffee used a strictly financial approach to the issue. He stated that the Woodring program to build and maintain a force of 2,320 aircraft involved a planned annual procurement expenditure of \$24,000,000. In order to produce the correct number of bombers, Chaffee calculated, the unit bomber cost would have to be about \$350,000. But the B-20, costing initially more than \$1,000,000, could hardly be had, even in quantity, at the required figure. Therefore, he concluded, either the contemplated appropriation would be exceeded, or bombers would be procured in insufficient numbers to make up their proper proportion among the 2,320 planes authorized.¹¹¹

On the basis of the staff study, General Embick reluctantly decided to approve substitution of the B-20 for the B-15. All of his reasons are not known, but the ones given were the shortage of time remaining in which to obligate funds (out of FY 1938) and the extent to which experimental development had proceeded on Project A. In his memo to the Chief of Staff, however, Embick used the issue as a springboard for checking further development of long-range bombardment. He presented his conviction that the development program was not being directed toward proper strategic ends. If long continued, Embick warned, the Army would find itself with a few very large and vulnerable planes, of limited use (for lack of prepared bases) and best adapted to a role which could be filled with

"greater success, greater certainty, and at far less cost by our own naval forces." Having in mind:

our strategic situation and the functions relative thereto for which we maintain a Navy, it seems obvious that there is a point beyond which development of our bombers should not be directed toward increased size and range, but instead should be directed toward the perfection of types that meet our strategic needs, in the way of greater efficiency, lessened complexity, and decreased cost.

Then, in a shrewd stroke, Embick recommended that this general subject be studied by the Joint Board.¹¹² Aware of the Navy's desire to restrict Air Corps bombardment, Embick doubtless anticipated that the naval officers would support the view of the Army high command on this issue, thus presenting a powerful united front at the highest level, against which the Air Corps might not prevail. The paper was approved for the Secretary of War on 16 May, the same day that it was submitted by Embick to the Chief of Staff.¹¹³

On 2 June 1938 General Craig, Chief of Staff, sent the recommended request to the Joint Board for study of the problem. It is most interesting to note that Craig's letter was actually drafted in WPD, under the specific direction of Embick. Attached to the draft was a pencilled note to Craig, signed by Embick. It recommended signature and stated, "I am convinced that definite action by the Joint Board is imperative." The letter itself, unchanged in any part by Craig, was virtually a duplication of the statements sent by Embick to Tyner in his original memo of 9 May. In addition to making the point that the responsibility for sea defense belonged to the Navy, the letter stressed the responsibilities of the Air Corps as a part of the Army as a whole. Large planes did not contribute to fulfillment of those responsibilities, and the letter concluded:

Aside from their undemonstrated utility, the relatively high cost of the large, long-range planes must be considered in relation to the effect of that cost on the other requirements of the Army Air Corps. The total funds made available to the Air Corps must, in turn, be integrated with those apportioned to other Army requirements, in

order that the Army may fulfill its potential role against all enemies. . . .

The letter requested that the Joint Board recommend limits beyond which Army planes should not be developed.¹¹⁴ The Navy leaders must have smiled, indeed, to see the Army, in effect, asking the Navy to place limits on Army development. The letter and the request serve to illustrate how seriously the General Staff regarded this issue with the Air Corps and the lengths to which it might go in order to check the long-range bomber program.

The General Staff got what it wanted, and what it expected, from the Joint Board (whose senior member was the Chief of Staff himself). On 29 June the Joint Board informed the Secretary of War that it saw no probable military requirement for aircraft larger than the B-17. On the other hand, the Air Corps would be called upon to perform many missions which could be executed successfully by planes of lesser range and lower cost than the B-17. Accordingly, the Joint Board recommended that no service planes larger than the B-17 be procured and that most of the bombers purchased be smaller, less expensive planes. It was specified, however, that these recommendations were not to be construed as limiting experimentation and development. On 30 June, the day following its dispatch, the letter, with its denying ordinances, was approved by the Secretary of War.¹¹⁵

Even before the board acted, the Secretary of War moved to reverse authority previously given to substitute the B-20 for the B-15 in Project A. Embick had reluctantly approved the proposal on 16 May, and the Secretary had indorsed it on the 17th. But on 9 June, several days after Craig's request was submitted to the Joint Board, the Assistant Secretary of War (acting for the Secretary) advised the Chief of the Air Corps that he could purchase neither the two B-15's previously authorized nor the substitute B-20. Funds set up for that purpose would be applied, instead, to procurement of B-18's.¹¹⁶ Apparently, the Secretary was sufficiently certain of the outcome of the Joint Board study that he felt justified in stopping the procurement in anticipation of the new limitation.

After the board action the General Staff moved swiftly to impose the new restrictions by all possible means. The Chief of Staff directed G-4 to revise the aircraft requirements schedule for FY 1940 in light of the Joint Board statement. General Tyner accordingly recommended that all four-engine types be excluded and that funds originally set up for them be diverted to procurement of attack and light bomber types.¹¹⁷ This move went beyond the recommendations of the Joint Board, which had conceded that at least some of the Air Corps bombers should be of the B-17 type. But that was not all. The revised estimates, contrary to the inferential recommendation of the Joint Board, confined experimental funds to medium and light bombers, pursuit, and other light aircraft. All divisions of the General Staff concurred with Tyner, and the Secretary of War on 3 August approved these paralyzing restrictions on long-range bomber development. Attached to the paper was a highly significant, handwritten note from Craig to Colonel Burns, the executive of the office of the Assistant Secretary of War. It said laconically, "This is O.K. and solves the problem of 17-B's & the maximum bombers. . . ." ¹¹⁸ Craig and Embick apparently believed that they had the big bomber in a sack and had pulled the cord. Indeed, if the cord had held, the United States would have had even fewer Flying Fortresses than it had when war came in 1941, and it might never have had the B-29 or B-36.

After General Westover, as Chief of the Air Corps, received the new directives from the War Department, he drew up a carefully prepared letter urging reconsideration of the recent General Staff decisions. Westover expressed grave concern over abandonment of the Woodring "balanced" Air Corps program, and reminded his superiors that it had been adopted after protracted study by both the General Staff and the Air Corps. He stated that the four-engine, long-range bomber had likewise been fully approved after lengthy consideration of its merits. Even the the Joint Board, wrote Westover, accepted the B-17 and left the way open to experimental development of still larger

bick as Deputy Chief of Staff, led the way in promoting the new program at the General Staff level. On 29 November 1938 Marshall wrote to Craig that he fully supported the effort of General Arnold (who had become Chief of the Air Corps on 29 September after Westover's death) to build up a powerful bomber force. He listed reasons favoring increased procurement of B-17's: safer operation, ability to reinforce the overseas possessions, extensive sea patrol range—all the arguments that had been set forth for years by Andrews, Knerr, Westover, Arnold, and the rest. Since the B-17 was considered the outstanding bomber in the world, Marshall urged its procurement in maximum quantities in order to meet the program for increased airpower called for by President Roosevelt.¹²²

The President himself soon made public his attitude on the airpower question. On 12 January 1939 he sent to Congress a special request for immediate additional defense appropriations to meet the rising threats from abroad. Referring particularly to aviation needs, he declared that complete revision of estimates appeared necessary, and that, "Increased range, increased speed, increased capacity of airplanes abroad have changed our requirements for defensive aviation." He was undoubtedly giving the green light to the B-17's when he stated that the additional planes recommended would considerably strengthen the air defenses of the United States and its overseas possessions.¹²³

Although the intervention of the President had the effect of rescuing the long-range bomber program, the earlier opposition of the General Staff had already resulted in irreparable damage. It is difficult, if not impossible, to estimate the extent of this damage; some of the effects were more subtle than the body blows administered by Spalding and Embick. Brig. Gen. A. W. Robins, chief of the Materiel Division, advised General Westover in August 1938 that insufficient funds for personnel and equipment had hampered the research functions of his division. Because of this, reported Robins, the Air Corps had fallen behind certain technical developments abroad. War

Department economy policies had forced the acceptance of planes with obsolete military characteristics and discouraged aircraft manufacturers from developing superior designs.¹²⁴ Slowness of action by the General Staff, resulting from lack of interest or from desire to withhold funds, definitely retarded the development of ordinance, radar, and other auxiliary equipment.¹²⁵ But the most obvious result of the restrictive policy was in planes delivered, or rather not delivered. From October 1935 until 30 June 1939, the Air Corps requested 206 B-17's and 11 B-15's. Yet, because of cancellations and reductions of these requests by the War Department, only 14 four-engine planes were delivered to the air force up to the outbreak of World War II in September 1939. The failure to obtain the heavy bombers severely handicapped training, development of tactical doctrine, and the building of a strong, ready-to-go offensive organization.¹²⁶

THE INFLUENCE OF FOREIGN WARS UPON AMERICAN AIR DOCTRINE

Although development of air theory was hampered by lack of airplanes and equipment, it continued to show progress, as related earlier in this chapter.* As foreign wars began to spread and deepen, the air theorists looked abroad for possible guidance and lessons. The evidence suggests, however, that combat in foreign countries during the period 1935-1939 exercised relatively little influence upon the evolution of air doctrine in America. That doctrine was largely an indigenous affair, based on projections of World War experience and plans, the visions of Billy Mitchell, and the notion of precision operations developed by the Air Corps Tactical School. In general, the American theorists saw little in the overseas wars to modify their conceptions and a good deal which appeared to confirm them. Most observers agreed that the struggles in China, Ethiopia, and Spain were in no sense major wars or real tests of modern airpower. They were regarded as limited proving grounds for the weapons and techniques of support aviation.¹²⁷

*For section on air theory at ACTS, see above, pp. 77-88.

tion, because of their effect or implication. Major Stearley, in his lesson devoted to the Spanish war, made particular reference to the successful Loyalist air attack on an Italian motorized column during the Guadalajara offensive of March 1937. Virtually unaided, the Russian-built attack planes by this action turned the Rebel offensive into a rout and temporarily saved Madrid.¹³³ Another significant mission was the Rebel bombing of Barcelona, which, while not carried out in heavy force, offered a taste of what a serious attack upon civilian centers might be like.¹³⁴ As to tactics and types of aircraft, the principal observations made in Spain were concerned with attack aviation.*

General Arnold used the Spanish War to illustrate various points of American air doctrine. While agreeing with other commentators that the powers and capabilities of bombardment had not been put to test, he felt justified in drawing conclusions, chiefly negative, regarding other phases of the air war in Spain. It had been demonstrated, Arnold asserted, that aircraft must be used for their designed purpose if they are to be successful. The converted Junker transports, for instance, showed themselves easy marks for the Russian Chato fighters. Also, combat tactics must be modified to suit the types of airplanes engaged. While pursuit normally attacked from the rear, it was found advantageous to approach the Junkers frontally since they carried no forward-firing machine guns. Finally, the weakness of both Loyalist and Rebel airpower showed that an air force was more than a mere collection of planes. It must have adequate numbers of aircraft of the proper types, be correctly armed, and be flown by trained crews under centralized command.¹³⁵ These statements by Arnold suggest the readiness of Air Corps leaders to draw upon combat action abroad for support of their theories and programs.

Munich

The effects of airpower not used, but available as a threat, proved even more influential on American thought than the lessons of combat. As the diplomatic struggle involving Germany and Italy on the

one hand and England and France on the other moved swiftly to a crisis in September 1938, it became apparent to all competent observers that the German Air Force was the decisive power behind the negotiations. It has already been noted that President Roosevelt perceived the lesson and accordingly took vigorous steps to build American airpower.† Maj. George Fielding Eliot referred to the Munich agreement as an extortion based on Germany's threat of air war. "It is blackmail which rules Europe today, and nothing else: blackmail made possible only by the existence of air power."¹³⁶ Within the Air Corps, General Andrews seized upon the Munich episode as proof of the influence of military aviation,¹³⁷ and at the Tactical School Maj. Muir S. Fairchild made a thorough analysis of the affair for the benefit of students in the Air Force course. He called attention to this "astounding spectacle"—three of the world's leading powers bowing to the imperious will of recently vanquished Germany. England, France, Russia, and Czechoslovakia, argued Fairchild, had far greater economic, military, and naval power than Germany. Yet they sacrificed basic principles, national self-interest, moral obligations and solemn treaties in order to appease the Axis powers. Why? The answer lay in German air strength: 3,350 bombers on hand in June 1938 and a rate of production of 12 bombers per day. Here, then, concluded Fairchild, was true airpower and what people thought it could do. At Munich, he said, it had brought what President Roosevelt aptly called, "peace by fear."¹³⁸ And when the Nazis marched into Prague the following spring (March 1939), there was no thought of resistance against this act of cold aggression. The conquest of Czechoslovakia was "covered" by the mere existence of German airpower.

ADJUSTMENTS IN AIR ORGANIZATION

The establishment of the GHQ Air Force on 1 March 1935 had temporarily quieted demands for greater air autonomy and provided the basis for several years of relative stability in air organization.†† Agita-

*See above, p. 87.

†See pp. 100-101.

††For discussion of this accomplishment, see above, pp. 73-75.

unity of control. Westover concluded, "The air force is an essential weapon, but, the Army with its team of forces, including aviation, remains the ultimate decisive factor in National Defense."¹⁴⁶

General Andrews, commanding the GHQ Air Force, could not refrain from bringing some obvious inconsistencies and distortions to Westover's attention. Andrews, as has been shown, also desired to support the organization of the air arm within the War Department, but he could not accept the picture presented by the Chief of the Air Corps. Commenting in polite terms on an article of Westover's, entitled "The Army Is Behind Its Air Corps," Andrews stated that the write-up credited the War Department for all Air Corps accomplishment, without mentioning certain faults and deficiencies in past and present Army policies. Stating the case in bald terms, Andrews told Westover that the development of materiel was accomplished through Air Corps efforts and in spite of the War Department's lack of initiative.

In fact, my experience in the Air Corps indicates that every reform and progressive forward step has been forced through, in the face of lack of interest, inertia, and some cases, active opposition of the War Department. Take for example the Air Corps Act, and the formation of the GHQ Air Force. I do not think that anyone can claim that these were freely initiated by the War Department.¹⁴⁷

Andrews turned to the question which was then at issue with the General Staff—the procurement of four-engine bombers. He stated that the War Department's procurement of obsolete B-18's, instead of the new B-17's would not contribute to fulfillment of the Army's mission of coast defense. If and when the War Department truly recognized the need for adequate personnel and suitable bombers, and sincerely fought for their provision, then it could be said, concluded Andrews, that "the Army is behind the Air Corps."¹⁴⁸

At the Tactical School the feeling against

Westover's position and continued control by the General Staff grew steadily stronger, although it was not expressed in public. Col. W. G. Kilner, lecturing at the school in April 1938, pointed out that the Air Corps Board, the GHQ Air Force, and the school had made good progress in developing tactical doctrines since the organization of the GHQ Air Force, but that the state of personnel (in strength and ratings) left much to be desired.¹⁴⁹ Lt. Col. Donald Wilson, director of the Department of Air Tactics and Strategy, believed it was of the utmost importance that the air arm be given autonomy. Writing to his colleague, Major Fairchild, in August 1939, Wilson stated that only improved organization could keep the military abreast of changing conditions. There was, in the existing structure, too much of a time lag between the development of good air force ideas and their application to national defense:

The things being done now we advocated years ago—it will never be thus with our present set-up of two departments each charged with only a part of military action and neither basically interested in the most critical form of military action... witness the constant furore caused by every attempt to increase the range of military aircraft—witness the failure of either department to have any conception of the possibility of the use of air forces as a new *method* of warfare rather than as auxiliaries to help the army fight an army or navy fight a navy.¹⁵⁰

Notwithstanding their private dissatisfaction with the subordinate position of aviation, the air officers made no open move for greater autonomy during the period under consideration. One significant change in top-level relationship was made by the high command, but this did not affect the position of the air arm as a whole. When the GHQ Air Force had been created in 1935, its commander was placed on a level coordinate with the Chief of the Air Corps, and he reported directly to the Chief of Staff. This arrangement of divided authority proved unsatisfactory, as might be ex-

pected, and to correct the situation the Chief of the Air Corps on 1 March 1939 was given jurisdiction over the GHQ Air Force as well as OCAC. This restoration of unity of command within the air arm proved

very beneficial at a time when accelerated expansion was getting under way. Unfortunately, the move was shortly to be undone and the earlier division restored on 19 November 1940.¹⁵¹

PREPARATION OF AIR DOCTRINE FOR WORLD WAR II, 1939-1941

It was apparent to all thoughtful observers of international affairs that the major European powers were heading for a showdown in 1939. The Munich agreement represented a stopgap appeasement of the Axis; a more decisive test of strength lay ahead as England sought to catch up in air strength. There might have been a full capitulation to Hitler's bid for hegemony, but it appeared more likely that the next German move would provoke an armed reaction. In this atmosphere of tension and expected war, the development of air doctrine went forward in a more realistic and grim spirit. The American air planners were more than ever conscious that their theories might soon be put to the test of life-and-death action.

GENERAL INFLUENCE OF THE EUROPEAN WAR UPON THE THEORY AND POSITION OF AIRPOWER

The electric effect of Munich and President Roosevelt's reaction to that event upon the development of American airpower has been indicated in the preceding chapter.* During the months which followed, right down to Pearl Harbor, events in Europe and Asia continued to add pressure to the demand for powerful military aviation. Those events also gave support to the doctrines of airpower and warfare which had been developing in the Air Corps. As the real threat to national security began to take shape, it became increasingly clear that the answers of the airmen offered greater promise than did those of the traditional infantry-artillery school. The General Staff itself underwent a remarkable

metamorphosis in this respect. Instead of parrying and blocking Air Corps suggestions as they came up from below, the staff turned increasingly to request the views of the air leaders in their areas of competence and to treat with greater respect such views as were presented. The Air Corps, naturally, took full advantage of this opportunity to influence opinions and judgments at the higher level. In March 1939, for example, General Arnold laid down certain principles of air action and related them to the strategic situation facing the United States, with a view toward submitting this total picture to the Chief of Staff. He stressed the following points:

1. Initial air objectives of an enemy would be the air bases at Hawaii, Puerto Rico, Panama, and other exposed areas.
2. A well-led and determined air attack could not be stopped by the defenses, although serious losses might be inflicted.
3. It was the duty of the Air Corps to provide a powerful striking force and the necessary strategic bases, so that an actual or potential enemy could be attacked at his bases before launching an air assault against the United States.

All of the views expressed by Arnold had been stated previously by such leaders as Mitchell, Andrews, and Westover, but they were now given a more favorable reception by the General Staff. Individual opinion was to a large extent submerged as the War Department buckled down to the task of building and training an effective air force before the anticipated European war broke out. An illustration of progress along

*See above, pp. 100-101.

this line was the approval in August 1939 of the procurement of 45 heavy bombers for the GHQ Air Force.¹

Hitler's attack on Poland in September 1939 gave new impetus to the armament program, but the subsequent "phony" war on the French front encouraged some skeptics in this country to believe that the conflict would not spread substantially. Hitler's smash through the Low Countries and across France in the spring of 1940 dispelled all such illusions. Aggression was now pointed in the direction of the Western Hemisphere, and a heightened sense of apprehension and urgency gripped the United States. President Roosevelt, addressing Congress on 16 May, emphasized the new threat of attack from the air. The doctrines of Mitchell, Andrews, Arnold, and other advocates of airpower now came from the mouth of the Commander in Chief as he declared that the oceans no longer represented defensive barriers. Speaking the language of air warfare, he told of the high speed and ranges of modern aircraft—giving in dramatic form the air timetable from potential enemy bases to New England and the Middle West. He concluded by calling for a program to provide 50,000 planes and a production capacity for at least that many each year.² The facts of war abroad had established a situation which gave support to the theories and requirements of the Air Corps.

Air Corps leaders fully appreciated the situation. All of the probable military eventualities would call for powerful long-range forces: hemisphere defense, offensive action in the Far East, or an offensive in Europe as an ally of England. But hemisphere defense had already become an actual undertaking; hence, air leaders were inclined to gear their doctrines and requirements primarily to that consideration.³ General Arnold, for instance, in preparing a statement for presentation to Congressional committees in 1940, defended his requests for long-range bombers strictly on the basis of hemisphere defense and the Monroe Doctrine. He pointed to European infiltration into the industrial and political life of

South American countries, particularly in Brazil and Argentina. Arnold declared that the situation presented the constant threat of internal disorders, which might result in transforming those states into European satellites opposed to the United States and its democratic ideals. Quick arrival of air assistance by the United States would be a vital factor, thought Arnold, in case of disruptive action by European conspirators. It was advisable, then, that the nation maintain long-range planes, not only for the defense of Panama, but as the first line of defense for the Monroe Doctrine. And for this purpose the Air Corps needed planes having a radius of action of 2,000 miles (well beyond that of the B-17).⁴ The high command of the War Department was soon found to be embracing and disseminating these arguments. The Assistant Secretary of War, Robert P. Patterson, justified the need for B-17's to William S. Knudsen, head of the Office of Production Management. Patterson explained in October 1940 that the range of the four-engine plane was mandatory for the distances involved in hemisphere defense. In addition, there was the possibility of operations in the Far East, where the long-range bomber would be the only weapon which could exert immediate pressure. As a consequence of its situation, concluded Patterson, the United States, more than any other world power, required four-engine airplanes.⁵

TACTICAL LESSONS FROM THE AIR WAR ABROAD

As soon as the European war broke out in earnest, the Air Corps sent observers abroad to ascertain what lessons could be learned in air tactics. Shortly after President Roosevelt proclaimed a state of limited national emergency on 8 September 1939, General Arnold selected two of his ablest officers, Carl Spaatz and George Kenney, for this purpose. They sent back reports on the fall of France and the Battle of Britain.⁶ Additional officers of various grades were ordered across during 1940, and in May of that year the War Department established the Special Observer

Group in London. By this means and by other special missions, the Air Corps was kept informed of significant tactical and technical developments in the air war.⁷

The interest of the Air Corps in the expanding European war was revealed in an orientation lecture for students at the Air Corps Tactical School, in the winter of 1939-40. Maj. M. S. Fairchild explained that close attention had been given to the minor conflicts in China, Ethiopia, and Spain, and that many important lessons had been learned and incorporated in school instruction.* He pointed out, however, that the major concepts of modern air employment had not been tested in those campaigns. With the Germans having conquered Poland and having turned toward the West, Fairchild anticipated a major airpower showdown between the principal contending forces in Europe. When these forces became locked in battle, the results should definitely prove or disprove the validity of the doctrines developed at the school.⁸ Fairchild was particularly anxious to learn what would happen when German air warfare was directed against the British. If and when this happened, he declared, American airmen could witness "a demonstration of the final and ultimate method of employment of Air Power in modern war."⁹

While Fairchild and others waited for Hitler to begin the deadly experiment in strategic air warfare, they could draw positive conclusions from what the GAF had accomplished in Poland. The Air Corps was in general convinced that, insofar as these operations tested American air theory, the results constituted a strong confirmation. Lt. Col. Donald Wilson, director of the Department of Air Tactics at ACTS, was particularly enthusiastic in this connection. Writing in September 1939, he stated, "He [Hitler] is our greatest booster—without even so much as a request from us he has voluntarily undertaken the job of demonstrating our theories. So far the coordination between our theories and his practice is so marked that someone is going to be accused of collusion."¹⁰ Although the

theories proved in Poland were related primarily to ground support operations, they involved such concepts as unified control of the air force, achievement of air control, and isolation of the battlefield. Major Fairchild, in reviewing this success of the Luftwaffe, could say,

We have observed with pardonable satisfaction that the German air force has actually been employed exactly in accordance with the School's concept of proper employment to accomplish such a mission. That this employment has been eminently successful is attested by the startling rapidity of the German penetration into the interior of a desperately defending nation.¹¹

Generals Arnold and Eaker, writing two years later, agreed that the Germans had followed American principles in attacking first the enemy air force: when dawn broke on 1 September 1939, all the airdromes in Poland were burning. It was in accord with the "best modern air teachings." American airmen, hearing the reports from Berlin, said, in effect, "They have done it according to the book."¹²

The daring operations of the Germans in Norway further demonstrated what the proper use of airpower could do. The reactions of air leaders were well summarized in the observations of Maj. Al Williams, former Marine Corps pilot and aviation commentator. Writing in June 1940, he pointed to the effect of German airpower upon British seapower: the British had failed to cut enemy sea communications through the narrow Skagerrak and had failed to protect landings in Norway because of the dominance of German aviation. This situation and the evidence from the land war on the continent convinced Williams that no surface force could operate safely within the range of hostile airpower—unless control of the air were first obtained.¹³

But the most impressive lesson of the air war during 1940, in the view of Air Corps theorists, was the proved need for long-range striking power. Strategic operations were of foremost importance according to American doctrine, and the observers were especially eager to find support for their beliefs from the test of war.

*For discussion of these lessons, see above, pp. 101-3.

While admitting that German aviation had clearly demonstrated the capability of well-organized tactical operations, they were quick to point out that no belligerent had thus far made satisfactory use of strategic bombing forces. Maj. Gen. Delos Emmons, who had succeeded General Andrews as commander of the GHQ Air Force, drew attention to the British weakness in this respect. He believed that England had made a serious mistake in concentrating on defensive airpower (interceptors and light bombers) when offensive power (heavy bombers) was needed. The lack of a sufficient number of large bombers cost the British a grand opportunity when the Germans dashed across northern France, for the enemy lines of communication were highly vulnerable and were jammed with troops and materiel. The RAF possessed some planes of the required range to reach such targets, but not enough of them to effect a major disorganization of the German supply system. Spaatz confirmed Emmons' view of the British deficiency and suggested that the lesson applied to the United States with even greater force, since the ranges involved in hemisphere defense were far greater. As soon as air warfare became serious, Spaatz observed, "the demand was always for heavy bombers."¹⁴

Turning to the Germans, Spaatz believed that they lacked not only proper equipment, but the proper theory of airpower as well. Serving as an observer in England during the Blitz (May to September 1940), he quickly reached the conclusion that the attack would fail because of misuse of aviation by the Germans. Their leadership, thought Spaatz, was wedded to the old concept that airpower was restricted to support of fast-moving ground troops and that it did not have an independent mission of its own. This tactical concept had been successfully implemented in Poland and France by the Stuka-Panzer combination under conditions of air supremacy. The bombing of Britain, however, was a strategical task which the Luftwaffe proved it prepared to accomplish. The German bombers were inadequately armed and had no capability for precision attacks; the

German pursuit forces, operating in close support of the bombers, failed through such tactics to gain the general control of the air which was required. If the Germans had "understood" strategic bombing, Spaatz declared, and had constructed appropriate weapons and tactics, they could have reduced Britain to a shambles in 1940.¹⁵

Alexander de Seversky, the civilian aeronautical expert, fully endorsed this view. He explained the ultimate victory of the RAF in the Battle of Britain as the result of superior theory and equipment. The lesson concerning equipment, he emphasized, was the importance of quality, rather than quantity. The German fighters were no match for the eight-gun, high-performing Spitfires. German bombers were designed for tactical support rather than strategic operations and therefore were deficient in range, armor, and firepower. Control of the air was the overriding necessity in a struggle of this sort, and second-best planes were not good enough.¹⁶

FINAL SHAPING OF AIR DOCTRINES ON THE EVE OF AMERICAN INVOLVEMENT

With an eye on Europe, with a renewed conviction of the soundness of its own theories, and with a feeling that they might soon be tested directly, the Air Corps moved to sharpen its doctrinal thinking during the period 1939-1941. Particularly at the Air Corps Tactical School, study and analysis were applied to the purpose and nature of warfare, the role of airpower in war, and the mission and tactics of the individual branches of aviation. In July 1941 the air planners in Washington were required to transform their theories into a practical plan for air action against the nation's potential enemies. The resulting document, designated AWP/D/1, was submitted in August and approved by the War Department. It represented the final development of American air doctrine prior to the U.S. entrance into World War II and was to serve as the actual blueprint for air operations against the Axis.

Purpose and nature of warfare.

At the Tactical School discussion of the

aims and methods of warfare followed the line of development which had unfolded there during the early 1930's.* The ideas were buttressed, however, by the signal events overseas. Colonel Wilson told officer-students at Maxwell Field in October 1939 that the course of the European struggle had underlined the fact that conventional and smug concepts of the nature of war must be banished. He pointed to lessons from history, in both the distant and the proximate past, to show that the "conservative majority" had always failed to appreciate the significance of new weapons and new methods. The military high command must learn from the fatal mistakes of defense-mindedness and ground-mindedness; the new kind of warfare called for flexible thinking and a high degree of air-mindedness.¹⁷ Major Fairchild spelled out the idea of the purpose and method of war, as seen by the Tactical School. The aim was to further national policy by imposing the national will upon hostile powers; the national will might be directed toward physical acquisition, securing "political acquiescence" of other nations, or physical or political defense. The method of accomplishing the aim in all cases was by overcoming the will of the enemy nation. Ground forces traditionally overcame the enemy will after destroying opposing armed forces; but airpower, insisted Fairchild, allowed a "new method of waging war." It was a means of striking directly at the ultimate objective in war, which was the enemy will. This doctrine was essentially what the school had been preaching for some years, but Fairchild was able in 1939 to drive home particular points, based upon the recent European happenings. Conceding that ground forces might still be the best means of achieving one of the aims of national will—physical acquisition, he held that the United States was not likely to have such an aim since it already possessed sufficient territory. The most likely national needs were defense and the securing of "political acquiescence" by other nations to our policies. Munich, argued Fairchild, had demonstrated the power of aviation to

accomplish political acquiescence, and aviation also promised the best means of insuring defense of the United States. Therefore, he concluded, America should think chiefly in terms of air warfare and should make plans accordingly.¹⁸

The role and employment of airpower in war

While the Air Corps made steady progress in obtaining indorsement of its doctrines in War Department manuals and policy statements, a gap persisted between the most advanced theories taught at the Tactical School and the officially approved doctrines. The gap was based on a difference in emphasis, rather than content, but the difference was so great that the two points of view appeared in marked contrast. The contrast becomes immediately evident in a comparison between the lectures at the Tactical School during this period and the official statements printed in Army Field Manual 1-5, "Employment of Aviation of the Army," published on 15 April 1940.

Major Fairchild, considering the question of the proper employment of airpower, told students in October 1939 that the optimum way to use airplanes was "to conduct AIR WARFARE." He agreed that airpower was flexible and could be used in many ways, but he insisted that every weapon should be employed in a manner which would make the maximum contribution to victory. The most effective stroke that airpower could make was against the enemy heartland. Consequently, Fairchild urged, "Let us make our preparations now—in advance—to wage Air Warfare, rather than to employ our valuable Air Force to reinforce the supporting fires of the artillery."¹⁹ In the concluding lecture on the air warfare section of the Air Force course, Fairchild summarized the school view of proper strategic employment of aviation. The basic question, he submitted, was target selection; it was a most difficult question since air forces had the capability of attacking every type of armed force, as well as the national structure itself. He saw four categories of objectives: the hostile air force, ground force, naval force, and national structure. Which of these was primary and decisive? On what

*See above, pp. 51-52.

basis could a decision properly be made? Fairchild answered quite simply that employment depended upon the strategic situation, that no general statement could be made without reference to a specific set of circumstances. Factors entering into a decision at any given time were: consideration of national security, whether the nation was on the strategic offensive or defensive, the nature of the opposing military power, and whether the enemy national structure was vulnerable and within range. The national structure, Fairchild hastened to stress, was the ideal target, but other objectives might be the only feasible or logical ones in a specific situation. For example, if the United States were fighting Mexico, the best target would be the Mexican ground forces, because Mexico had no important economic structure. On the other hand, the Germans might properly concentrate their air attack upon the British navy in order to break an effective sea blockade. Should enemy airpower establish itself within range of the American national structure, then the first priority target would be the hostile planes and bases.²⁰

Fairchild observed that the strategic offensive was the only means of winning a war, but that the United States appeared unable, because of its geographical position, to conduct such an offensive. The only way that it might be done would be by building super-range aircraft or by securing air bases from possible allied powers, located nearer potential enemies. It seemed clear that even if this were arranged, sea and land forces could not be successfully employed offensively outside of the Western Hemisphere unless the United States were joined by active allies in Europe or Asia. Of course, should America become entangled in another struggle similar to that of the first World War, she might wage an offensive from France or England. Fairchild concluded, however, that the actual situation faced by the United States in November 1939 compelled it to assure the strategic defensive. Such a program, he thought, put airpower into the primary military role; the only effective attacks on the nation, at least initially, would have to come by air,

and these could not be checked by seapower. If the air force could prevent establishment of enemy air units contiguous to North America, it would succeed in defending the country against all types of enemy armed forces, since air control was indispensable to other kinds of operations. Accepting this mission for the air arm, Fairchild saw three priorities for air employment in national defense:

1. Prevention of establishment of hostile air forces in threatening positions and the defeat of such forces as might have become established.
2. Destruction of enemy surface expeditionary forces at sea and defeat of such elements as may have gained a beachhead.
3. Defeat (in cooperation with Navy, or independent thereof) of enemy sea forces within range, so as to protect sea lanes.²¹

It may be noted that the last two priorities stipulated by Fairchild involved air *versus* sea action. This led to a broader discussion of the impact of airpower upon seapower generally. Regardless of the still unresolved argument between the bomber and the battleship, Fairchild believed that far-reaching adjustments were already required in thinking about the capabilities of seapower. In the first place, because of the threat of land-based aircraft, naval battles of the future would take place farther from shore than had formerly been the case. Surface fleets might be forced occasionally to run the risk of operating in zones of hostile airpower, but even the Naval War College had agreed, said Fairchild, that future engagements would probably occur on the high seas. In the second place, regardless of the location of major surface engagements, the prerogatives of naval victory were now limited by airpower. Historically, the victor at sea enjoyed freedom of the seas for his own shipping and denied it to the defeated enemy; he could also escort an invading force to enemy shores while the enemy could not strike back. Modern airpower, however, could control the sea lanes within its radius of action—could keep out the sea victor and pro-

tect the commerce of the vanquished. Seapower, concluded Fairchild, was still a substantial reality, but it no longer carried with it the traditional prerogatives. Complete freedom of the seas required air, as well as surface, dominance.²² On the morning after Pearl Harbor the air leaders in Washington felt impelled to go beyond Fairchild's assertion. The Air War Plans Division advised the Chief of Staff that "Sea Power is no longer reliable as a primary instrument of American defense. Air power must replace it as the principal means of defense. . . ." ²³

Fairchild and the air planners were spokesmen of the advanced air doctrine. A more conservative statement of the role of aviation, or at least a different emphasis, was carried in the highly influential Air Board Report of September 1939. The Air Board was appointed by order of the Secretary of War in March for the purpose of studying the entire question of air force employment and making recommendations to the Chief of Staff concerning appropriate organization and doctrines. General Arnold, as Chief of the Air Corps, presided over the board, which included the Assistant Chief of Staff (G-3), the Assistant Chief of Staff (WPD), and the commander of the GHQ Air Force.²⁴ In its final report, the board stated that airpower was indispensable to national defense, especially in the early stages of war, and that the bomber was the basis for airpower. The importance of range was also emphasized by the board. National security demanded that American bombers have a longer radius of action than any possible enemy bombers, so that the enemy could not strike with impunity against vital U.S. installations. The requirement of bases was set forth as a part of the total mechanism of effective airpower; bases must be located so that aviation could cover all land and sea areas from which a decisive attack might be launched.²⁵

The conclusions of the Air Board, accepted as a representation of the views of the Army as a whole, had great influence at all levels and in all branches of the service. The Air Corps Board, which had been engaged for several years in the prepara-

tion of an Air Corps field manual, adopted the views of the Air Board and incorporated them in large measure in the final version of Field Manual 1-5, Employment of Aviation of the Army, issued on 15 April 1940. This manual was the first of a series designed to cover all phases of Air Corps tactics; it was devoted to over-all employment, while later manuals (FM 1-10, 1-15, etc.) were concerned with specific aviation branches, such as pursuit. Completion of an Air Corps field manual such as FM 1-5 had been repeatedly delayed by "rapidly changing organization and marked conflict of views of all concerned in its preparation." It was finally approved (superseding TR 440-15, 15 October 1935) only after coordination with the Air Corps agencies concerned, interested combat arms, and WPD.²⁶ Consequently, as might be expected, the manual represented a considerable attenuation of the air doctrine which had been distilled at the Tactical School, conforming rather to the more conservative general principles of airpower enunciated by the Air Board.

Following closely the recommendations of the Air Board Report of September 1939,²⁷ the FM 1-5 statement of general employment and missions for the Air Corps was moderate, but not contradictory to the dominant point of view in the Air Corps as a whole. General Andrews (who had been appointed by General Marshall late in 1939 to be G-3 of the General Staff) approved the manual and pointed out, with apparent satisfaction, that it did not indorse the radical theory of air employment.²⁸ As a matter of fact, FM 1-5 called for the kind of employment that the doctrinal developers at the Tactical School would have fully accepted, given the national strategic defensive. It has been noted above that Major Fairchild assumed that the strategic defensive was the only role that the United States could take at the time. He had established three priorities of air employment, given such a situation, and none of these included strategic bombardment operation.* The missions specified in FM 1-5 were virtually those required by Fairchild's defen-

*See above, p. 112.

sive priorities. The reason why FM 1-5 seems out of line with the trend of thought at the Tactical School is that the manual concentrated upon this assumption of a national defensive role, while instruction at the school concentrated upon the assumption of the offensive as a strategic ideal.

Relatively little emphasis was given in FM 1-5 to the offensive air warfare that so excited the imagination of Fairchild, Wilson, and their colleagues. Naturally, then, while they regarded the manual as acceptable, they considered it rather tame stuff compared to their more theoretical conceptions. Four basic missions were assigned to the Army air arm by FM 1-5; of these, two were purely defensive. The remaining two were extremely vague suggestions of possible offensive action: operations outside the United States and its possessions "as required by the situation," and "other operations in which the Army engaged."²⁰ The manual agreed with Fairchild's view that actual employment would depend upon the situation. But no mention was made of the enemy "national economic structure" as the ideal target. The manual merely stated that when operations were carried on beyond the sphere of surface forces, "selection of objectives . . . is governed by the strategic plan and may have only an indirect bearing upon the tactical operations of these [surface] forces." Important objectives "may be found," explained the manual, in vital centers, in lines of communication, and in "establishments in the economic system."²⁰ In a later section the manual gave further consideration to possible strategic operations. It proposed air attacks against enemy objectives in the following order: air forces, ground forces, naval forces, joint forces, and materiel. Action against materiel, the manual emphasized, had to be based upon a detailed analysis of target systems and had to be methodical and sustained.²¹ Thus, it may be observed that FM 1-5 contained the basic rudiments of the air doctrine developed at the Tactical School, but the leading ideas were vaguely suggested or tucked away in inconspicuous places. Thus, in 1940, although official doctrines of the Army set forth the defensive functions of the air arm

in terms with which most airmen could not argue, those same doctrines failed to give a very accurate picture of the strategic theories held and taught by the Air Corps leaders.

Probably the most significant provisions in FM 1-5 were concerned with the designation, assignment, and control of various groupings of military aviation. These were based upon the recommendation of the Air Board, which had attempted, by functional grouping of aviation, to insure the proper fulfillment of the various responsibilities of the air arm. The four general groupings established in FM 1-5 were: training and special purpose aviation (noncombat), reconnaissance and liaison (assigned permanently to ground units), overseas garrison aviation, and GHQ aviation. GHQ aviation was defined as including all aircraft not assigned to the other three groupings and consisted of combat, reconnaissance, and transport types. According to the manual, four kinds of forces would be drawn from GHQ aviation for the conduct of offensive and defensive air operations. The first of the four types listed was designated striking forces; these elements would be expected to carry air attacks to great distances beyond their operating bases, and would aim chiefly at enemy aviation. Defense forces, mentioned second, would provide the necessary close-in air defense of the most vulnerable and important areas within the zone of the interior. Support forces were described as those which would "form a nucleus of aviation, especially trained in direct support of ground troops, and designed for rapid expansion to meet war requirements." Finally, FM 1-5 spoke of special forces—to meet miscellaneous requirements for bombardment and reconnaissance in minor operations or coastal defense. The manual remarked that the various functional groupings would at times overlap or supplement one another. Reinforcement of overseas garrison aviation with elements of support or special forces would be regarded as normal, while "one or more" striking forces might be used in support of surface forces when the situation demanded.²²

The chief motivation underlying the provision for functional forces of aviation by the Air Board was no doubt the fear that the GHQ Air Force, as previously organized, would give insufficient attention to its ground support mission. Andrews had built the force around bombardment, and his general attitude seemed to be that bombardment could handle all missions that were assigned to his command. Although it had been generally assumed that, in case of war, task forces would be provided by the GHQ Air Force,* no provision had been made for preparing such forces on a specialized, functional basis. FM 1-5, clearly reflecting the Air Board report on this question, provided that GHQ Aviation should develop functional forces, which would then (in case of war) be attached to large territorial or tactical commands for the accomplishment of certain missions. When the necessity for their attachment was ended, their control would revert to GHQ. General provision was made in FM 1-5 governing the relationship of an attached task force to a larger command. While so attached, the air unit (commanded by its air officer) would receive from the higher commander an assignment of general missions to be performed within designated time periods. Support aviation would normally be handled as a theater of operations weapon, but allowance was made for attachment to those units of all or a portion of the assigned air strength. "Support aviation may thus act with greater promptness and better understanding in meeting the requirements of the supported unit."³³ The new manual while providing for definite support forces, did not provide fully enough for successful ground support operations. The designated peacetime forces within GHQ were referred to as a nucleus and as a laboratory for development of methods;³⁴ they did not constitute a strong, tested force in being. The complicated and perplexing questions involved in effective air-ground cooperation were insufficiently answered, and it was not until World War II that satisfactory doctrines for tactical aviation were worked out on the field of battle.

*See above, pp. 53-54.

Bombardment aviation

In Air Corps theory during the period under study, the bomber continued to be regarded as the basic element of airpower. At the Tactical School, Maj. F. M. Hopkins developed the argument that, at least theoretically, it was impracticable to provide sufficient pursuit defense to stop bombing attacks. He supported the conclusion generally accepted at the school that the only effective defense against bombers was to attack them at their bases.³⁵ This vestige of Douhet theory, shortly to be disproved by experience in the European war, was the basis for continued emphasis on production and training for bombardment, to the neglect of pursuit.

The leading concept, nurtured at the school during the 1930's, of bombardment attack on the enemy national structure, was fully developed by the end of the decade. Major Fairchild gave perhaps the classical explanation of this concept in a lecture on 9 November 1939. He asked what was meant by attack on the national economic structure. Did it mean bombing and gassing of the civilian population? This, he answered, was one recognized method of attack on an enemy nation, and the European powers appeared to be preparing for such action. Fairchild raised certain objections, other than the obvious humanitarian ones, to this method. Most important, said he, was that no one knew how hard such an attack had to be in order to break civilian morale. The experience in China suggested that Japanese bombing had actually strengthened, rather than weakened, the Chinese will to resist. At best, Fairchild concluded, such methods seemed likely to achieve results that were temporary and noncumulative. "For all these reasons the School advocates an entirely different method of attack. This method, is the attack of the National Economic Structure." It had the virtue of reducing the enemy's war producing capacity and putting pressure on the civilian population at the same time and with equal effectiveness. Furthermore, the results of damage to the economic structure were cumulative and lasting.³⁶

The theory underlying the importance of economic targets rested on the fact that a nation's economy was extremely intricate and sensitive. Fairchild showed how, even in peacetime, a minor supply interruption could hold up an entire industry; under the strain of war, the economic system was even more vulnerable.* Selection of targets required careful, prolonged, and professional analysis. It was necessary to gather information, by all possible means of intelligence, during peace, so that a systematic plan of attack could be evolved for use in war. Fairchild stated it as the opinion of the school that a properly planned campaign of bombardment would cause the breakdown of successive links in the economy of an enemy nation and would represent the maximum contribution that airpower could make toward the ultimate aim in war.³⁷

The dark question-mark that still hung over the plan for strategic bombardment was related to the defensive capability of the bombers themselves. Could they accomplish precision attacks in daylight without prohibitive losses to themselves? † The official doctrine, as expressed in FM 1-10, Tactics and Techniques of Air Attack (20 November 1940), favored daylight attack but did not rule out the contingency that night operations might prove necessary. It also indicated that fighter support would be needed wherever strong opposition had to be overcome and that it should be provided when possible.³⁸ However, the dominant view at the Tactical School prior to America's entry into World War II was that daylight bombing was essential to the whole precision idea, that bombers would usually have to fly without escort (because of the limited range of pursuit), and that they could provide sufficient defensive fire to permit them to accomplish their missions without high losses.

Although it is not surprising that the Air Corps theorists developed such ideas in the absence of actual tests, what is remarkable is the tenacity with which they held to them even when these ideas were dis-

credited by the experience of the war. The British had shifted to a preference for night tactics even before 1939 and the design of their heavy bombers showed that they were intended chiefly for such operations. Wartime experience strengthened the view of RAF officers that day bombing was too costly, and their initial efforts with the American B-17C, designed as a day bomber, only confirmed their opinion. The judgment of the RAF was based upon the defeat of the Luftwaffe in 1940 as well as their own missions over the continent in 1940 and 1941.³⁹

The Air Corps held to its theory of daylight, unescorted operations by heavy bombers in spite of criticism from the British and reports from its own observers and tactical units. One is tempted to believe that the only important lessons "learned" from combat abroad were those which suited the mind of the Air Corps; experience which contradicted American doctrine was generally explained away by various kinds of rationalizations. General Arnold himself repudiated the "doctrine widely propounded in certain Air Corps circles for many years" that fighters could not shoot down bombers in formation. Experience abroad, he believed (in November 1939), had proved that doctrine wholly untenable.⁴⁰ A little later, Arnold noted with grave concern reports from abroad of tremendous losses of bombers, particularly when attacked by pursuit. He directed that a searching analysis be made of American methods, with a view toward improving the tactics and equipment of both bombers and fighters; specifically for this purpose he called a conference of representatives from the GHQ Air Force, the Materiel Division, the Plans Division, and office of the Chief of Ordnance.⁴¹ Prior to this meeting a conference of experienced pursuit pilots was called by the commander of the 8th Pursuit Group to discuss the problem raised by General Arnold. These pilots were unanimous in their opinion that existing types of bombers, either singly or in formation, were extremely vulnerable to pursuit. They estimated that day bombers opposed by pursuit were subject to the possibility of

*This fundamental argument had already been elaborated at the Tactical School during the 1930's. See above, pp. 57-58.

†For discussion of this vital question during the early '30's, see above, pp. 58-60.

a 50 percent loss and concluded that the only safety for long-range bombers lay in operating at night or under heavy cloud cover.⁴² Leaders of bombardment units shared the view of the pursuit pilots on this question. On 26 December 1939 Maj. Harold L. George advised General Emmons, the commander of the GHQ Air Force, that **“THERE IS NO QUESTION IN MY MIND BUT THAT AMERICAN BOMBARDMENT UNITS COULD NOT TODAY DEFEND THEMSELVES AGAINST AMERICAN PURSUIT UNITS.”** George recommended additional gun installations for the bombers and better training of crews, especially in flexible gunnery.⁴³ Emmons, reporting to the Chief of the Air Corps on his findings, indorsed the above expression of views. Said Emmons, “Aerial operations of the present European conflict confirm the results of the World War; that is that the present bombardment plane cannot defend itself adequately against pursuit attack.” He gave the essential advantages of pursuit over bombardment, which accounted for this fact: concentrated firepower, greater accuracy of fixed guns, smaller size of vulnerable parts, and protection of the pilot by the engine.⁴⁴ Arnold appeared convinced after the Battle of Britain that day bombardment could not succeed when strongly opposed: “During daylight in good weather, when pursuit aviation is present in strength in an area, it can pretty nearly bar the air to the bomber.”⁴⁵

But in spite of these pronouncements, no suggestion was made by Arnold or other American air leaders that the doctrine of daylight, precision bombardment should be dropped or modified. Here is a striking illustration of the momentum of an idea. So persuaded were the Air Corps planners that their theory of attack was superior that they refused to abandon it even in face of the hard facts of experience. A switch to night tactics would have undermined the whole idea of precision and key target selection. The leaders chose, instead, to hold stubbornly to their principles and to make all possible efforts to carry through day operations successfully. They gave attention to improving bomber armament,

defensive formations, armor, and gunnery. They searched German and British daylight tactics for weaknesses which might explain their failure and point the way to American success. Maj. Gen. J. E. Chaney, representing the AAF in the Special Observer Group in England, reported on 5 September 1941 that the Luftwaffe's failure to crush British industry and morale had been due to German errors rather than any inherent weakness in the airpower idea. Goering, said Chaney after a careful study, had never put enough bombers over England, nor had he concentrated them on the proper targets.⁴⁶ This report confirmed the observations of Spaatz regarding the shortcomings of German strategic aviation.* Arnold repeated these views in a summary some years later. He listed the following as the causes of German failure in the air in 1940: poor fighter tactics, inadequate armament of bombers, collapse of air force replacements, and friction between bombardment and fighter leaders in the Luftwaffe.⁴⁷ As for the British, the Americans argued that they, too, had not made proper use of the daylight bomber. The ineffective performance by the B-17C's under RAF control had been due to incorrect procedures (bombing from too high altitude and in too small formations), mechanical and maintenance difficulties, and inadequate training. The Air Staff in Washington was convinced that improved equipment and training would solve the problem and was determined that the British “lessons” should not alter the fundamental American conception.⁴⁸ The fact remains that although the air leaders might, with good reason, have rejected the negative evidence of air combat with respect to their theories, they went boldly into the war with no positive evidence of any kind in their support. What they had was a fervent conviction—a faith—in the effectiveness of precision bombing and in the defensive power of the bomber formations.⁴⁹ That faith produced ultimately a striking force which astonished the military world. However, it is only fair to say that the force was employed at a heavy cost in men and

*For Spaatz's comments, see above, p. 110.

matériel, and that it would have failed of ultimate success had effective provision not been made at last (1943) for long-range fighter escorts.

During the period 1939-1941 the Air Corps was not hampered by the restrictions on bomber development and procurement that had been imposed during the lean prewar years.* President Roosevelt had flashed the green light in September 1938,† and in May 1940 had called for a force of 50,000 airplanes.†† Thereafter, manufacturing facilities, not the opposition of the General Staff, were the principal limiting factor. The standard heavy bombers under production were the B-17 and the B-24 (Liberator); the latter had been established as a kind of "running mate" for the Fortress. In January 1939 General Arnold had asked the Consolidated Aircraft Corporation to build a four-engine heavy bomber with an operating range of 3,000 miles, speed in excess of 300 miles per hour, and a ceiling of 35,000 feet. Preliminary designs were presented by Consolidated to the Materiel Division in March, and in the following December the XB-24 was successfully flown at San Diego. It was of approximately the same weight as the B-17 (35,000 pounds), had a span of 110 feet, a tricycle landing gear, and twin vertical stabilizers. The B-24 featured a high, thin, narrow wing of exceptional aerodynamic efficiency. The fuselage, considerably larger than that of the B-17, provided more room for the crew. The Liberator was to prove a capable companion in arms to the Fortress.⁵⁰ In the early fall of 1940 the Materiel Division let contracts to Boeing for 500 B-17's and to Consolidated for 500 B-24's. This move marked the opening of the Air Corps' heavy bomber production program. In the spring of the following year, President Roosevelt announced that production of the big ships would be stepped up to a rate of 500 per month and indicated that this was aimed at achieving command of the air for the democracies. The Assistant Secretary of War for Air told Arnold, "the job is now up to us." The Air

Corps doctrine that the four-engine bomber was the basic weapon of airpower was now fully accepted by all agencies concerned, and implementation proceeded as rapidly as physical facilities would permit.⁵¹

The only remaining threat to the build-up of the Air Corps bomber force was the lingering possibility that the Navy would succeed in building its own land-based bomber force at the expense of the Air Corps. Lt. Col. Harold L. George wrote in October 1941 that the Navy would make every effort to gain control of land-based bombardment and that steps must be taken to counter-act such moves. Spaatz was equally sensitive to this threat, for he saw that diversion of heavy bombers to the Navy would mean an equivalent loss to the strength of the Army air arm. He pointed to the fact that, in spite of planes on order, there were actually only 83 B-17's in the United States in October 1941 and only 31 at bases overseas. The issue with the Navy persisted right on through the war, but the Air Corps successfully defended its priority on long-range, land-based bombers.⁵²

The Air Corps had reason for satisfaction over the favorable climate for bomber procurement during this period; it also made substantial progress in the matter of developing still larger aircraft. The Air Board report of 15 September 1939 called for a standard reconnaissance-bomber having a radius of action of at least 2,000 miles (compared with less than 1,000 for the B-17). The report stated, further, that no performance characteristics could be regarded as a static requirement; the underlying necessity always was to build planes which could checkmate the air efforts of potential enemies and which would enable the United States to carry the air offensive into enemy territory.⁵³ During this period the War Department and Congress took a favorable view of requests for air research and development. In the year following the fall of France (June 1940), branches of the Army other than the Air Corps spent \$25,000,000 on research. The Air Corps alone spent \$102,000,000; of this amount nearly half was used for service tests of the heavy bomber.⁵⁴

*For discussion of the struggle over the long-range bomber, see above, pp. 89-101.
†See above, p. 100.
††See above, p. 108.

The recommendation of the Air Board for a bomber with a 2,000-mile radius of action was supported by Colonel Spaatz in a study submitted on 1 September 1939. This study led ultimately to production of the Boeing B-29, the super-bomber which would spearhead the final air assault upon Japan. Spaatz advocated immediate development of heavy bombers with greater range and better high-altitude performance than those of existing types. Such planes, he believed, were essential to the performance of any strategic air operations in the potential Far Eastern theater.⁵⁵ Shortly thereafter, the Air Corps requested that Boeing develop such a bomber. In the summer of 1940 the company submitted a design to a board of officers headed by Col. Oliver P. Echols; this design, which conceived a plane of about twice the weight of the B-17, was approved as the XB-29. In some respects its successful construction may be regarded as the outstanding aerial engineering triumph of the war. So clean was the aerodynamic structure of the B-29 that this ship, much larger than the B-17, nevertheless offered no greater air resistance. On the basis of impressive wind-tunnel tests with models, the Air Corps ordered three full-size ships in August; the first of these was successfully flight-tested on 21 September 1941. It had a new-type wing of maximum efficiency, with a span of 140 feet, pressurized compartments for the crew, remotely controlled machine-gun turrets, and extensive electronic equipment. The four radial engines gave the plane a top speed of 370 miles per hour and a ferrying range of 4,400 miles.⁵⁶ In appearance as well as performance, the B-29 (Superfortress) was truly superb.

Just as the Air Corps had obtained the B-24 as a companion to the B-17, it sought another super-bomber as insurance for the B-29. Shortly after opening negotiations with Boeing, the Air Corps made similar overtures to Consolidated. A mock-up of the resulting XB-32 (Dominant) was delivered in April 1941, but flight tests of actual models did not begin until 7 September 1942.⁵⁷ The ship had performance characteristics similar to the B-29, but it was never to

prove successful for combat operations. The Air Corps, wisely, had two "super-eggs" in the nest before the American entry into World War II; one of these, the B-29, proved the value of such a precaution.

But air leaders did not rest content with the procurement of B-17's and B-24's, or with the development of the B-29 and B-32. In keeping with the doctrine that performance is always relative and that research must go on continuously, requests were made for experimentation with still larger ships. In June 1940 General Chaney wrote a letter to General Marshall, emphasizing the urgent need for development along this line. The primary basis for Chaney's argument at the time was that the United States should have weapons which would permit the conduct of strategic offensive action against potential enemies. He saw as the ultimate objective a bomber capable of carrying the war to Berlin from the United States, in retaliation for any aggressive acts which the Germans might make against America. Possession of such planes, thought Chaney, would do more to insure the security of the Western Hemisphere than any other measure within the power of the nation.

What Hitler and his people really feared was attack upon their homeland. Possession by the United States of super-bombers would deter Germany from encroaching upon America, unless in the meantime the Luftwaffe outbuilt and outranged this country in the air.⁵⁸ Chaney was strongly supported in his point of view by Arnold, who, even at the time he was approving the initial trial order of B-29's, wrote to Marshall asking for bigger planes. Arnold urged quantity procurement of B-29's and experimental development of a larger ship as soon as the aeronautical industry reached the point where it could produce it. This pressure for development by the Air Corps was to lead to production of the Consolidated B-36, the inter-continental bomber. Although the B-36 was not available until after the close of World War II, it was to serve as an important weapon in the post-war struggle with the Soviet Union. It would not have been available then,

had it not been for the Air Corps doctrine of dynamic development. Part of the actual experimentation leading up to the B-36 was connected with completion of the giant Douglas XB-19, test-flown in June 1941.⁵⁹ This ship, the largest military plane ever built, was the culmination of Project D, approved by the War Department in 1935.* The interval between the inception and completion of that project gives some notion of the time factors involved in the building of airpower.

Pursuit aviation

In the preceding chapter it was shown that increasing recognition was given to the importance of pursuit, following an all-time low reached during the early 1930's.† The air war in Europe, particularly the Battle of Britain, served to point up even further the vital role of the fighter. Unfortunately, the emphasis was upon the interception function; the role of fighter escort, which is what the Americans were to need most in the skies over Europe, continued to be neglected. And the development of equipment to fill the escort need proved to be misconceived. The multiseater fighter, developed on faith rather than experience, was unsuccessful; and the eventual provision of long-range single-seaters was a desperate adaptation, improvised in the heat of battle.

General Arnold, alarmed by bomber losses overseas, took a personal hand in the pursuit question as early as November 1939. He directed General Emmons, commander of the GHQ Air Force, to make a careful study of the problem and to submit a plan for adequate development of pursuit tactics and planes. Arnold expressed the feeling, which had been sensed by pursuit leaders several years before, that the tactics and development of fighter aviation had not received their proper share of attention and support. He suggested some interesting explanations for the neglect of pursuit: the "bomber invincibility" doctrine propounded for some years at the Air Corps Tactical School; the fact that senior air officers tended to shy away from pursuit flying;

and the failure of top-level commands and agencies to realize the importance of pursuit and the urgent need for its development.⁶⁰ Emmons replied with an historical account of the status of pursuit from the time of World War I. He concurred fully in Arnold's feeling that pursuit had been neglected during the past decade and characterized the situation in these words: "For a number of years thought has been centered principally upon bombardment. Pursuit has been a sort of stepchild. . . there has grown up a general opinion throughout the Air Corps that pursuit is a sort of necessary evil and without much value." Emmons declared that the air leaders must correct the situation and drive home the facts of the air lessons from abroad. Especially needed for improvement of pursuit, he thought, were more careful selection of fighter pilots (as a specialty) and more realistic training in maneuvers and gunnery.⁶¹ After the dramatic air spectacle of the summer and fall of 1940 in Europe, Arnold became more than ever convinced of the importance of air fighting. He asserted that the generally recognized theory that air forces were most vulnerable on the ground had been disproved by the war abroad. Attacks on dispersed airdromes had been shown to be inefficient and unsound. "We are back," concluded Arnold, "to recognition that an air force in being must be destroyed in the air or in factories." Fast pursuit planes had proved to be the best destroyers, and the RAF Fighter Command had shown that a strong defense could make bomber attacks expensive and uneconomical.⁶²

The mission of pursuit, as officially defined in FM 1-15, *Tactics and Techniques of Air Fighting* (9 September 1940), was to "deny the hostile air force freedom of the air." This was clearly a defense-oriented statement, which indicated that the mission was to be achieved in the following ways: destruction of enemy formations in flight; breaking the enemy's power and will to attack through attrition of his forces; and limiting the striking capability of his bombers by the threat of pursuit opposition.⁶³ The latter referred to the limited aim theory of antiaircraft defense, which had

*For discussion of Project D, see above, pp. 96-97.

†For discussion of the recovery of pursuit, see above, pp. 83-84.

been taught at the Tactical School for some time.* Its purpose was to reduce the effectiveness of enemy bombers and ultimately to prevent their attacks by infliction of heavy losses. Tactics for successful air defense also followed the principles established at the school. They were based upon an effective ground information net and a flexible system of alert. Readiness of aircraft and pilots on the ground was regarded as the most efficient kind of alert, circumstances permitting. In special cases, air alert or defensive air patrol might be called for. Formation flying, based on the element of two or three planes, was standard procedure for all fighter operations.⁶⁴

Although the mission of pursuit was seen as primarily one of air defense by interception of enemy bombers, it included also the function of escort into hostile skies.⁶⁵ These two employments of pursuit called for two types of planes: the interceptor and the long-range fighter. The "compromise" type of single-seater, represented by planes like the standard Curtiss P-40, did not appear to satisfy either of these requirements. Hence, development continued in the direction of the two separate types: for the interceptor, the Bell P-39 and Lockheed P-38 seemed the most promising models.† The long-range fighter represented by all odds the greatest problem. FM 1-15 specified that it would be a multiseater ship, designed for patrol, interception, and escort. The manual conceded that this was a newly-created type, "for which combat tactics have not been evolved. The development of effective tactics . . . is contingent on their availability for tactical flying tests."⁶⁶ This last was a reference to the controversial and experimental Bell XFM-1. Serious doubts about the usefulness of this type of plane had been expressed years earlier, and a conference of experienced pursuit pilots in December 1939 agreed that a multiseater fighter would present nearly the same defensive problems as bombers.⁶⁷ Nevertheless, the Chief of the Air Corps, the Tactical School, and the Air Corps Board continued to support the multiseater fighter idea. As

late as the summer of 1940 they concurred in recommending approval of the development of such a plane as a long-range escort fighter, and it was approved by the Secretary of War.⁶⁸ But no mention can be found anywhere of any serious effort to convert single-seater fighters into escorts by extending their range. Hence, America entered the war with no proved type of long-range fighter to perform the important escort function.

Attack and light bombardment aviation

The recommendation of the Air Board in September 1939, which led to provision for support forces as a part of GHQ aviation, has already been discussed.†† The specified mission of the support forces, as outlined subsequently in FM 1-5, was practically the same as the mission traditionally assigned by the air arm to attack aviation. Proper targets were vulnerable surface installations and forces, principally in rear areas, and included logistical establishments, communications, supplies, fortifications, and vehicles or troops. It was not thought profitable, however, to attack equipment and personnel when they were well dispersed.⁶⁹ At the Tactical School more precise conceptions of ground support operations were explained in the Air Force course of instruction. Maj. F. M. Hopkins declared in November 1939 that the method of support would depend upon the nature of the land battle and the phase of operations. For theoretical purposes, Hopkins related his lesson to the four phases of battle, concentration, advance from concentration, battle, and pursuit, recognized and taught in the service schools of the Army. During the period of concentration, it appeared that attack on enemy rail lines would be the most effective way of disrupting mobilization. Marching formations seemed very vulnerable, especially at defiles and chokepoints, during the period of advance from concentration. During the battle phase, Hopkins favored concentrated use of support aviation against movements of enemy troops and supplies; he considered such action to be more efficient than attack against personnel on the battlefield proper. Perhaps the great-

*See above, p. 84.

†For discussion of pursuit types and the development of interceptors, see above, pp. 85-87.

††See above, pp. 113-15.

est exploitation of attack forces was possible during the pursuit phase of operations, after an enemy had been broken. All available planes should be thrown against the retreating columns, in order to turn their defeat into a rout. Hopkins pointed out that in all phases of the battle, one target—supply—should be kept constantly in mind.⁷⁰ Specified targets singled out by air leaders as especially suitable to strikes by attack aviation were airdromes, mobile columns, light bridges, and supply depots.⁷¹

Perhaps the most significant development during this period, affecting the execution of ground support missions, was the changing idea about equipment. The attack airplane and its tactics had been under question and study for some time.* When the Air Board undertook a general study of aviation employment in March 1939, it went into the problem of the proper airplane for ground support operations. In its report the following September, the Air Board eliminated the attack and attack-bomber types from its requirements and recommended the light bomber as the basic unit of support forces. This move was based upon the conclusion of the board that bombs were the most valuable weapons against the usual targets of support aviation and that the proper type of plane would therefore be one built especially for bomb-carrying. The machine gun was regarded as of limited effectiveness as a ground attack weapon because of the ready dispersion of targets suitable to destruction by that weapon, the ineffectiveness of fire at high aircraft speeds, and the proved vulnerability of aviation in low-altitude attacks. The board believed that light bombers, supported by the necessary pursuit, reconnaissance, and transport aircraft, would best fulfill the mission of ground support.⁷² In line with this recommendation, FM 1-5 established light bombardment as the striking element of support forces; the principal offensive armament specified was the bomb, with chemical spray and machine guns relegated to secondary importance.⁷³

The issue was not definitively settled, however, by the Air Board report or by

FM 1-5. Controversy over the type of equipment continued, and in June 1941 the issue of the dive-bomber and diving techniques was pushed forward by Robert A. Lovett, the Assistant Secretary of War for Air. He advised General Arnold that, in his judgment, insufficient attention had been given to close cooperation of air with ground troops. Pointing to the success of German tactics, especially in Greece and Crete, Lovett stated that he believed the number of dive-bombers on order was inadequate. He therefore asked Arnold to reopen consideration of the quantities of dive-bombers for the Air Corps. While recognizing the usefulness of the Douglas A-20 as a light bomber, Lovett saw the need for a complementary form of close-up attack. The Air Corps had always been cool toward dive bombing as a technique of ground support, and there was no change of heart at this time. Arnold, however, politely replied that a conference of interested War Department agencies should be called to consider the general problem raised by Lovett.⁷⁴

The dive bomber suggestion made little headway, but reports from the Russian front in the fall of 1941 revived interest in the traditional type of attack plane. The two-engine A-20 was now accepted as the standard weapon for ground support, but there was a growing demand for a smaller, more maneuverable plane, armed with cannon, machine guns, and small bombs for use against enemy armor. In November the Operations Division of OCAC called for development of such a plane, indicating that no suitable type existed. It was stated that the discarding of attack aviation had resulted from observations of the Spanish Civil War, in which such aviation had appeared unsuccessful. The more recent operations in Russia had shown, on the contrary, that attack aviation could be very effective in ground support. The Air Force Combat Command, successor to the GHQ Air Force, urged that light bombardment be redesignated attack and that procurement of attack-type planes be expanded. It observed that the A-20 could not dive and that the converted Navy dive bomber (designated A-24) had insufficient

*See above, pp. 87-88.

armament for attack of armored vehicles and grounded aircraft. The Combat Command reported, however, that it had requested delivery of Brewster A-32's and believed that they would be satisfactory.⁷⁵ The A-32 was considerably heavier than the A-24 and carried four 20-mm. cannon. As it turned out, the A-32 did not prove very successful, and it was replaced during World War II by the North American A-36 (a converted P-51). Other standard pursuit models were to see service as fighter-bombers. With planes of this type the Air Corps adhered to its traditional attack tactics of low-altitude, level attacks in formation, with fighter cover provided when available.⁷⁶

Blueprint for action: AWPD/1

Earlier in this chapter references have been made to the influence upon air doctrine of the war overseas, the growing sense of possible American involvement, and the moves to prepare tactical theory and equipment for such an ordeal.* On 9 July 1941, with the threat to the security of the United States clearly manifest, President Roosevelt made a request for logistical information which called forth a definite articulation of American air doctrine. This doctrine, contained in a paper designated AWPD/1, received official approval at the highest level; and when Pearl Harbor plunged a reluctant nation into the abyss, that statement was on the books as the American air war plan. As a top Air Force general has remarked, "when the time for critical decision arrived the American concept [of air warfare] was wholly indorsed, completely accepted, and officially implemented in the approval of a paper entitled 'AWPD-1.'"⁷⁷ In very large measure the far-flung action by the Army Air Forces in World War II was the execution of AWPD/1.†

The events leading up to the President's request of July 1941 had resulted in the establishment of a clear strategic picture for the United States. It will be recalled that air doctrine during the '20's and '30's had been developed in something of a vacuum; existing notions regarding national military policies and prospects were, at best, vague

and unrealistic.†† By 1937 a more definite strategic outlook was possible, and the successful aggressions of Adolph Hitler after September 1939 sharpened the focus beyond doubt for military observers. As the danger to the free world became increasingly evident, especially after the summer of 1940, the United States and Great Britain drew ever closer together. The leaders of each nation were well aware of their interdependence, and planning on both sides of the Atlantic was geared to the concept of common interest and mutual aid. Thus, specific doctrines could be shaped to a rather precise military prospect; American plans during 1941 were drawn on the premise of cooperation with Britain and her allies in the war against the Axis.†††

The first and most important statement of common strategic principles was arrived at early in 1941 after a series of conversations in Washington between a U.S. staff committee and representatives of the British Chiefs of Staff. The final report (ABC-1), which offered a plan whereby the United States and the British Commonwealth might defeat Germany and her allies "should the United States be compelled to resort to war," was submitted on 27 March.⁷⁸ It was assumed that an American war would involve Italy and Japan as well as Germany; hence, strategy was conceived on a global basis. Essentially, it called for defensive measures to protect the Western Hemisphere and the United Kingdom; maintenance of strong positions in the Near East, India, and Far East; and protection of sea communications. Offensive strategy was based upon the belief that since Germany was the predominant member of the Axis, "the Atlantic and European area is considered to be the decisive theatre." The main effort was to be made there, and operations elsewhere would be subordinated to that end. Measures against Germany were to include economic pressure by blockade, "a sustained air offensive against German Military Power," raids and minor offensives against the continent, and the build-up of

†See above, pp. 30-31, 52-53.

†††For a concise but comprehensive account of Anglo-American strategic planning in 1941, see *The Army Air Forces in World War II, I*, (Chicago, 1948) 135-44. A more comprehensive treatment of the subject can be found in M. Matloff and Z. M. Snell, *Strategic Planning for Coalition Warfare* (Washington, 1953).

*See above, pp. 107-10.
†See below, p. 124-26.

forces for an eventual land offensive against Germany. All agreements were, of course, tentative and subject to approval by the respective governments. When war did come, the over-all strategy adopted was essentially that of ABC-1. Months before that time the War Department had developed its own detailed war plan, RAINBOW No. 5, in conformance with the strategy of ABC-1; on 14 May 1941 the Joint Army and Navy Basic War Plan RAINBOW No. 5 was approved by the Joint Board.⁷⁹

Strategy and Plans were therefore well advanced when President Roosevelt requested the secretaries of War and Navy to prepare for him "over-all production requirements required to defeat our potential enemies," so that the Office of Production Management would have a realistic guide in planning facilities for national production. In compliance, the secretaries presented on 11 September a "Joint Board Estimate of United States Over-all Production Requirements."⁸⁰

The Joint Board correctly believed it impracticable to arrive at any realistic figures concerning men and munitions needed for war without first establishing an agreed-upon strategic policy for United States forces. Consequently, the first part of the Joint Board reply to the President was a report on the strategy best calculated to defeat the enemy; this was followed by separate estimates by the Army, the Navy, and the Army Air Forces of their respective needs in personnel and materiel. The strategic view of the Joint Board was essentially that of ABC-1. In spite of the entrance of the Soviet Union into the war on 22 June, the board was convinced that Germany and her allies could not be defeated by the powers then opposing them. In order to insure their defeat it would "be necessary for the United States to enter the war, and to employ a part of its armed forces in the Eastern Atlantic and in Europe or Africa." The services, however, were in some disagreement as to how these forces should be applied. The Navy favored a concentration on the use of sea and air forces and the employment of land forces only in regions where Germany could not exert the full

power of her armies. The Army, however, tended toward the belief that such measures would not bring about the defeat of Germany and that a major showdown with German armies on the continent of Europe would be necessary.⁸¹

Within the War Department it was decided that the Army air arm, while still a part of the War Department, would prepare independently the estimate of air needs required by the President's directive. The Air War Plans Division, newly created within the Air Staff, was assigned this task, and it operated as an Air Staff agency, rather than as subordinate to the General Staff's War Plans Division. Thus, the plan was wholly an airman's document. The members of the AWPD at this time were fortunately well qualified for the crucial job, and the committee which put the plan together consisted of graduates of the Air Corps Tactical School, deeply imbued with the school's concept of airpower. The committee consisted of Col. Harold L. George, division chief, Lt. Col. Kenneth N. Walker, and Majors Laurence S. Kuter and Haywood S. Hansell.⁸²

Work on the plan (AWPD/1) began on 4 August and continued under pressure of time until 11 August. It was approved in rapid succession by G-3, WPD, General Arnold, General Marshall, Mr. Lovett, and Mr. Stimson, and was included in the Joint Board's report of 11 September. Probably the demand for speed influenced the situation; but in any case, the air plan was accepted by the high command virtually without change although the views expressed in it were not entirely consistent with those of the War Department. On this occasion the Air Staff tacitly assumed a position of equality with the Army and Navy staffs.⁸³ Such independence had a significant bearing upon the nature of the doctrine enunciated and the means proposed for its implementation.

Analysis of the strategic concept in the Joint Board portion of the report reveals a substantial difference from the air view, as stated in AWPD/1. The Joint Board, reflecting predominantly the Army attitude, emphasized the ultimate necessity for decisive action on the ground.

Naval and air power may prevent wars from being lost, and by weakening enemy strength may greatly contribute to victory. By themselves, however, naval and air forces seldom, if ever, win important wars. It should be recognized as an almost invariable rule that only land armies can finally win wars.

Accordingly, the Joint Board thought that an economic blockade was, for the time being, the most effective weapon available against the Axis. Maintenance of British control in the Middle East and logistical support of the Russian front were regarded as essential, because they offered the best opportunities for a successful land offensive against Germany.⁸⁴ The board envisioned a strategic defensive in all theaters until the build-up of forces permitted a final offensive action. Then, after enemy air and naval forces had been worn down by attrition, and enemy governments had been weakened by subversion and blockade, a decisive task force would be launched in Europe, and the defensive would be continued in the Far East. It was anticipated that the defending German forces would be weakened as a result of prolonged air attack on their lines of production and communication, but the knock-out blow would be scored on the ground.⁸⁵

The strategic view of the air leaders varied considerably from the more traditional military concept just described. According to AWPB/1, the air mission in Europe would be offensive from the start; operations in support of a ground attack were seen as a subsequent mission only "if it becomes necessary to invade the continent." The analysis of the situation and the proposed plan of air action read like a Tactical School lecture. The German offensive against Russia, the paper explained, had placed an additional strain upon the Nazi economic structure. "Destruction of that structure will virtually break down the capacity of the German nation to wage war. The basic conception on which this plan is based lies in the application of air power for the breakdown of the industrial and economic structure of Germany." The conception involved, the paper continued, selection of a system of objectives and con-

centration of all bombing toward their destruction. Precision tactics would be called for at first, but as morale began to crack, area bombing might prove effective.⁸⁶

Strategic bombardment theory had developed to the point where it was possible for the planners to specify in AWPB/1 the exact target systems, and numbers of targets, which it would be necessary to destroy in order to achieve the general objective. Four key systems were delineated: electric power, transportation, oil, and aircraft production; and the number of precision targets to be destroyed in connection with each system was given. No specific number was given for the attack on civilian morale. At the proper psychological time the entire bombing effort could be shifted to that purpose.⁸⁷ It is notable that the target systems delineated in AWPB/1 more nearly approximated the postwar recommendations of the United States Strategic Bombing Survey than did the target program actually followed by the Army Air Forces during the conflict.⁸⁸

Since the targets tagged for destruction were nearly all precision targets, it was clear that the planners would have to call for daylight precision attacks. They posed the next logical question: "Is it feasible to make deep penetrations into German territory and conduct precision bombing without prohibitive losses?" After discussing the problem briefly, in light of RAF methods and the proved effectiveness of German fighters and antiaircraft artillery, AWPB/1 stated that, "by employing large numbers of aircraft with high speed, good defensive fire power, and high altitude, it is feasible to make deep penetrations into Germany in daylight." Hedging a bit, the paper conceded that escort defensive fighters, to close off the rear avenue of approach on the bombers, might be necessary. It concluded, further, that the degree of reliability of conducting sustained offensive air operations would be "greatly enhanced" by development of an escort fighter.⁸⁹

On the basis of contemplated daylight operations, the air planners determined what force of aircraft would be required to accomplish the strategic objectives.

AWPD/1 called for 10 groups of medium bombers (B-25, B-26), 20 groups of heavies (B-17, B-24), and 24 groups of very heavy bombers (B-29, B-32). In addition, provision was made for 44 groups of super-bombers (4,000-mile radius), which would operate from bases outside of the United Kingdom. These latter, which were only in the early stages of design,* were seen as an ultimate requirement, although it was believed that operations should and could be carried on with smaller planes as an expedient. Only 10 pursuit groups were specified in AWPD/1 for defense of bases in the United Kingdom; this small number was based on the assumption that the RAF would continue to provide the main defense of the British Isles and on the fact that air base facilities were severely limited there. A striking feature of AWPD/1 was the absence of provision for long-range escort fighters. Although some of the authors of the plan doubted the need for them, a stronger reason why they were not included was the fact that no suitable type existed. The planners stated that it was mandatory that an escort fighter be developed without delay—a fighter “with range comparable to the bomber it supports. . . .”⁹⁰ The fact remained that the fighter was not there, and this lack was the principal flaw in AWPD/1. The authors of the plan were not primarily to blame; mistakes in doctrine and judgment in the high echelons of the air arm during the preceding decade appear to have been responsible for this shortcoming.†

Although General Arnold was to write later that attention had been given to developing escorts before the war, and that he would have preferred never to have sent an unescorted bomber over Germany, General Hansell has stated that the reference in AWPD/1 (12 August 1941) was the “first recognition of the need for escort fighters.”⁹¹ Even at that, it proved to be a belated recognition of the wrong type of escort. The plane whose development was urged in AWPD/1 was conceived as a large, heavily gunned, multiseater. Among the requirements proposed were range equal to the

bomber it supported, slightly higher speed, heavy armament in machine guns and cannon, and armor for each crew member. The escorts would normally take position on the flanks and rear of the bomber formations. When enemy fighter attacks developed, the escorts would maneuver to defend at the points under fire; in short, they would attempt to form a screen between enemy fighters and the bombers. The maximum number of escorts required was placed at one squadron for each group of bombers.⁹² This “destroyer” type of escort was to prove unsound in conception; the answer to the problem had to be improvised during the war—single-seaters with extended range.††

Establishment of Army Air Forces (1941)

The war not only put Air Corps theories to the test, but it added pressure to the swing toward greater independence for aviation. Col. Follett Bradley had predicted privately in 1940 that only a major war could bring about a change in the dependent status of the air arm; several months before Pearl Harbor a major step in that direction was taken by the establishment of the Army Air Forces, and soon after the close of hostilities, the long-awaited Department of the Air Force came into being.††† Bradley, not anticipating a war right away, had favored the policy of building up the air arm within the Army, rather than agitating for separation. In this view he differed with Col. Hugh Knerr, who urged air leaders “to aggressively go after our convictions hammer and tongs and never give an inch to the War Department.” Bradley argued that diplomacy might win more for aviation than belligerency and suggested “more patience and a smoother turn of expression, combined with envelopment tactics instead of a frontal assault.”⁹³ No doubt the great majority of officers shared Bradley’s view; after the air expansion program began in 1940, attention was largely shifted to the problems of equipment, training, and growth.

*For initiation of this super-bomber development in June 1940, see above, pp. 119-20.
†See, especially, pp. 34-36.

†It is surprising to note that the air planners were even more oblivious to this shortcoming in their tactics after actual experience in bombing Europe. AWPD/42 (9 September 1942) made no reference even to the need for escorts and gave a highly optimistic picture of the ability of unescorted bombers to knock down enemy fighters. This view was shortly upset by later raids over Germany; in one big mission, for example (Schweinfurt, 14 October 1943), 60 unescorted Fortresses were lost, 17 suffered major damage, and 121 others were hit. (Hansell, lect., 19 Sept. 1951, p. 31; AAF in World War II, II, 704.)

†††Provided by terms of the National Security Act of 1947.

Even during the hectic period of wartime expansion, however, the idea of greater autonomy was not forgotten. The relationships between the GHQ Air Force (created in 1935) and OCAC continued to be unsatisfactory. Reference had been made in the preceding chapter to the fact that administrative unity between the two had been established on 1 March 1939, only to be taken away again on 19 November 1940.* By the latter act, the GHQ Air Force was placed under control of the Army commander of field forces; soon afterwards it was placed under GHQ, an agency established at the Army War College in 1940 to assist the Chief of Staff in his capacity as commanding general of the field forces. The splitting off of the GHQ Air Force from the Air Corps was balanced in some degree by the appointment of General Arnold as Acting Deputy Chief of Staff for Air. On this higher echelon it became possible for Arnold to insure greater coordination in aviation activities.⁹⁴ Another assist came from the British, but with no deliberate aim on their part. As mentioned earlier in this chapter, staff conversations between the British and American forces began early in 1941, as a means of making common plans against the Axis threat.† When these conferences took place, there was always a separate officer to represent the RAF, which was an independent service. The practice began of having Arnold attend and sit as the equal of his RAF opposite number. In this manner, although the air chief was legally subordinate to General Marshall, who also attended these conferences, he nevertheless sat with him and Admiral King (Chief of Naval Operations) as a virtual equal. The same arrangements were to prevail in meetings of the Joint Chiefs of Staff and Combined Chiefs of Staff.⁹⁵

Secretary Henry L. Stimson, following continued protests from the air arm regarding divided authority and the need for greater autonomy, decided in the early part of 1941 to correct the situation. Acting upon general instructions from the Secretary, the Army succeeded in reaching an agreement which took specific form in AR

95-5, 20 June 1941. This regulation created the Army Air Forces, which was to be directed by a chief, who would also be the Deputy Chief of Staff for Air. His job, virtually the one Arnold was already filling in practice, was to coordinate all the activities of military aviation. Under the jurisdiction of the Chief, Army Air Forces, were placed the Chief of the Air Corps (still charged primarily with training and materiel) and the Commanding General, Air Force Combat Command (a redesignation for GHQ Air Force). The Chief of the AAF was provided with his own Air Staff, over and above the staffs attached to the two major headquarters on the echelon below. In addition, there was established an Air Council, whose function was the periodic review and coordination of major aviation projects of the Army; it consisted of the Assistant Secretary of War for Air, the Chief of Army Air Forces, Chief of the War Plans Division (General Staff), Chief of the Air Corps, the Commanding General of the Air Force Combat Command, and other members as appointed by the Secretary.

Establishment of AAF gave the air arm the organization that it was to carry into World War II.†† It was a significant advance toward autonomy from the less satisfactory provisions of 1935; General Arnold, filling several positions in the military hierarchy, was able actually to give strong direction to the entire air effort. Some difficulties remained, of course. Division of functions was still not clear between OCAC and AFCC, which continued in a coordinate relationship. Likewise, delineation of duties was not clear between the Chief, AAF, and the Chief of the Air Corps, and considerable duplication existed among the various staff agencies.⁹⁶ As the war progressed, some of these difficulties were straightened out. After the war came the last step on the ladder to air independence, achievement of the Department of the Air Force. Thus was to be fulfilled one of the earliest and hardest fought principles of American air doctrine: unified control of military aviation by the air leaders themselves.

*See above, pp. 105-6.
†See above, pp. 123-24.

††In March 1942 the internal structure of the AAF was changed; OCAC and AFCC disappeared, being replaced by a Policy Staff, an Operational Staff, and the various commands.

CONCLUSIONS

CERTAIN CONCLUSIONS concerning the development of American air doctrine in the period 1917-1941 may readily be drawn. They may be summarized as follows:

1. The view of air leaders regarding the underlying aim and purpose of war showed considerable evolution during the period under study. In 1917 the view corresponded to the traditional military concept: war was seen as an extension of politics, a means of final resort, whose aim was to crush enemy resistance by physical occupation. By 1941 the Air Corps teachings described war largely as the result of the persisting economic conflict among modern industrialized nations. Its purpose was seen as the elimination of rival production by destruction of economic facilities or by alteration of the enemy will to produce.

2. The air view of the nature of warfare also underwent substantial change. In 1917 the air leaders accepted the view of Napoleon and Clausewitz: warfare consisted properly of the destruction of the enemy's armed forces. As the potentialities of airpower unfolded, the air leaders began to see new possibilities. At first they saw the air becoming a major sphere of combat, in support of the surface struggle. Then, within a few years, they saw a vision of war almost exclusively in the air; land and sea forces could be disregarded while air forces struck directly against the hostile will and productive capacity. The pioneers in this concept of warfare were Mitchell and Douhet. By 1941 the Air Corps theory had refined this view; the air offensive would take the form of a precise attack upon carefully chosen key points in the enemy's national structure. Collapse of the structure, it was thought, would lead the enemy population to surrender.

3. As early as World War I, the air leaders saw the potential role of airpower in war. The doctrine for actual employment was geared largely to technological developments. However, all during the period under study, there was a continual argument with the War Department. The latter viewed airpower primarily as a means of independent, strategic operations. By 1941, air doctrine heavily emphasized the strategic offensive role (against enemy airpower and the enemy "national structure") and slighted other functions of airpower (although from 1939 on there was an increasing emphasis on the development of close-support doctrine). The air arm also held that no limits should be placed on the range and area of operations of military aircraft; in this latter connection the Air Corps fought a running battle with the Navy for the right to fly over the sea.

4. On the question of organization and control of airpower, there had been agreement from the beginning on this principle: airpower should be developed and controlled by airmen, independent of restraints by the older services. The majority of air leaders did not favor immediate air independence after 1918, but they saw it as ultimately necessary and worked strenuously in that direction. Much of their effort during the period under study was directed against the powerful resistance of the War and Navy departments to any such changes. Logic and the course of events were on the side of the air arm, and virtual autonomy was achieved in 1941 with the organization of the Army Air Forces. So far as operational control was concerned, air leaders consistently put forward the view that air units should be held in large, mobile organizations—for flexible employment in mass as

the situation required. They opposed the permanent attachment of combat aviation to surface armies and the dispersion of striking elements. While recognizing the need for general coordination of all forces by a superior command, they insisted that immediate control of air units always be vested in air commanders. Unfortunately, all of these doctrines were not placed immediately in effect when American expeditionary forces began major operations in North Africa during World War II. It was not until 1943 that the Army placed in operation the Air Corps doctrine concerning the control of aviation in connection with ground campaigns.

5. Doctrines governing employment of the particular branches of aviation have been affected to some extent by national strategic policies and the state of technological development. Air Corps theorists, however, did not restrict their thinking to such limiting factors. They developed offensive concepts even when such ideas were in opposition to national policies. They developed plans of employment which could be executed only by airplanes not actually in existence. The air leaders, if anything, sacrificed application of principles to the practical situation, in favor of development of tactics and materiel for the future.

6. Doctrines governing bombardment aviation showed steady evolution during the period under consideration. By the early 1930's the bomber replaced pursuit as the basic arm of the Air Corps. This resulted largely from the technical advance of the large planes over the smaller ones. At one point, theory reached the extreme of asserting bomber invincibility, and other types of aircraft were relegated to unimportant roles. The method of strategic bombardment developed in the air arm was that of precision attack in daylight upon pinpoint targets in a predetermined system

of objectives. This represented a shift from the earlier, World War I idea of major attacks at night in a modified area pattern. According to the developed theory, heavy bombers would attack from high altitude and in large formations; it was generally believed that their defensive firepower in crossfire would render fighter escort unnecessary. While Mitchell and Douhet envisioned mass, indiscriminate bombings of enemy centers, the developed Air Corps theory was highly analytical, selective, and precise.

7. During and immediately after World War I, air doctrine gave primary place to pursuit aviation. However, as noted in paragraph 6 above, pursuit was supplanted by bombardment as the basic arm after 1930. Whereas pursuit had been conceived originally as a general-purpose, offensive-defensive weapon for air control, it later was reduced to little more than a weapon of local defense. While some attention was given to fighter escorts, the type of plane conceived for this function in the late 1930's proved unsuccessful. The judgment of pursuit experts was largely ignored, and the development of the disappointing multi-seater was allowed to proceed. In this instance, the Air Corps leaders showed a tendency to refuse to face the facts and the opinions of the men best qualified by experience to judge. Consequently, while America was to lead the world in bombardment, she was to fall behind in fighter development.

8. Attack aviation at the close of World War I appeared to have a promising future, but the promise was not wholly fulfilled. Air Corps theory gave a strictly secondary place to support aviation, and insufficient stress was placed upon the development of appropriate doctrines and materiel. Air leaders held consistently to the notion that support forces should be concentrated at

the highest level of operational command, that they should be employed in mass, and that they should be used only against vulnerable targets in the rear, beyond the range of ground fire. However, they did not succeed in working out the precise relationships and practical arrangements between ground and air commanders, or the

detailed composition and employment of support units. There was failure also to reach clear-cut agreement on the optimum type of equipment and tactics for ground support. The United States, as a consequence, entered World War II with inadequate preparation in this important branch of military aviation.

NOTES

INTRODUCTION

1. George F. Eliot, *Bombs Bursting in Air* (New York, 1939), pp. 11, 13.

CHAPTER I

1. R. Earl McClendon, Air University Documentary Research Study, The Question of Autonomy for the U.S. Air Arm, 1907-1945, I, 1, 6-7 [herein-after cited McClendon Study].
2. *Ibid.*, I, 99-100.
3. *Ibid.*, I, 33, citing ltr., Breckenridge to Col. Geo. P. Scriven, 7 Aug. 1913, and 63 Cong. 1 Sess., H.R. Hearings on H.R. 5304, pp. 22-23.
4. *Ibid.*, I, 34, citing Hearings on H.R. 5304, pp. 6-9.
5. *Ibid.*, I, 35-37, citing Hearings on H.R. 5304, pp. 38-40, 50-53, 76-85, 89.
6. *Ibid.*, I, 40, 43-44, citing 3d ind. (basic unknown), CSigO to AG, Feb. 1916.
7. *Ibid.*, I, 45-46, citing 64 Cong. 1 Sess., H.R. Hearings on Army Approp. Bill, 1917, pp. 838-40.
8. General Services Administration, National Archives, "Preliminary Inventory of the Records of the Army Air Forces" (Washington, 1950), List of Commanding Generals of Air Arm.
9. McClendon Study, I, 46-48.
10. Interview by author with Col. Marshall H. Quesenberry, Ret., 22 July 1952.
11. Interview by author with Brig. Gen. Thomas D. Milling, Ret., 4 June 1952.
12. John J. Pershing, *My Experiences in the World War* (New York, 1931), II, 337.
13. 1st ind. (memo for C/S GHQ AEF from C/AS, 29 May 1918), C/S to C/AS, 18 June 1918, included in *Air Service History, American Expeditionary Force, Series B, VI*, in World War I Orgn. Records, Air Serv. Hist. Records, Natl. Archives, Wash., D.C.
14. Henry H. Arnold, *Global Mission* (New York, 1949), p. 52.
15. *Ibid.*
16. Milling interview, cited in n. 11.
17. Mason M. Patrick, *The United States in the Air* (New York, 1928), pp. 49-50.
18. Air Service, *Final Report of the Chief of the Air Service, A.E.F.* (Washington, 1921), p. 37.
19. Maj. Ralph F. Stearley, ACTS lecture, History, Development, Organization, Training, 3 Jan. 1939, pp. 8-10, in USAFHD 248.2208B-1.
20. William Mitchell, "Air Service at St. Mihiel," *World's Work*, XXXVIII (August 1919), 361-64.
21. *Ibid.*, pp. 364-65.
22. William Mitchell "Air Service at the Argonne-Meuse," *World's Work*, XXXVIII (Sept. 1919), 555-58.
23. *Ibid.*, p. 558.
24. William Mitchell, Tactical Application of Military Aeronautics, 5 Jan. 1919, pp. 8-9, in USAF HD 167.4-1.
25. *Ibid.*, pp. 9-10.
26. Arnold, *Global Mission*, p. 55.
27. Maj. James E. Parker, ACTS lecture, History and Development of Pursuit Aviation, 3 Nov. 1938, p. 9, in USAFHD 4646-65.
28. *Ibid.*, pp. 10, 12, 20, 23.
29. ACTS, Pursuit Aviation, Sept. 1933, p. 111, in USAFHD 4778-6; Air Service Information Circulars Nos. 72, 73 (12 June 1920), No. 84 (20 Sept. 1920), No. 88 (30 June 1920); ASFOS, Training Reg. No. 440-14, 1922.
30. Air Service Information Circular No. 73 (12 June 1920); ACTS, Pursuit Aviation, Sept. 1933, p. 111.
31. Ltr. AAS Comdr., 2d Army to C/AS AEF, 18 Dec. 1918, in World War I Orgn. Records, Natl. Archives; Air Service Information Circular No. 84, 20 Sept. 1920.
32. ACTS, Pursuit Aviation, Sept. 1933, pp. 84-85.
33. *Ibid.*, p. 10; *United States Army in the World War, 1917-1919* (Washington, 1948), XVI, 229; Mitchell, Tactical Application, p. 2; Air Service Information Circular No. 72 (12 June 1920); AFSOS Training Reg. 440-14, 1922.
34. Mitchell, Tactical Application, p. 3.
35. AS Bul., vol. III, No. 101, 9 Apr. 1918, in *Air Service History, AEF*, ser. L, VII.
36. Bul. of the Info. Sec., Air Service, AEF, vol. III, no. 132, 16 Apr. 1918, in *Air Service History, AEF*, ser. L, VII.
37. Gen. Carl Spaatz, Ret., and Dr. Bruce Hopper, "Strategic Bombing," in *Ten Eventful Years*, ed. Walter Yust (Chicago, 1947), IV, 176; interviews by author with Brig. Gen. Thomas D. Milling, Ret., 4 June 1952; Lt. Gen. Ira C. Eaker, Ret., 31 July 1952; Lt. Gen. Harold L. George, Ret., 31 July 1952; Gen. Joseph T. McNarney, Ret., 5 Aug. 1952.
38. Maj. Gen. Sir H. M. Trenchard, "Report on the Independent Air Force," *Tenth Supplement to London Gazette*, 1 Jan. 1919, pp. 134-35.
39. *Ibid.*, pp. 134-36.
40. Eaker and George interviews cited in n. 37.
41. OC/AS, Night Bombardment Section, June 1918, in *Air Service History*, June 1918, in *Air Service History*, ser. B, VI; AS Bul., vol. III, no. 101, 9 Apr. 1918, in *Air Service History*, ser. L, VII.
42. *Air Service History*, ser. M, II, 35-66.
43. William Mitchell, *Skyways* (Philadelphia, 1930), p. 278.
44. Brig. Gen. Haywood S. Hansell, Ret., lecture at Air University, The Development of the U.S. Concept of Bombardment Operations, 16 Feb. 1951, p. 4.
45. Maj. Gen. Laurence S. Kuter, Air Power—the American Concept, n.d., p. 12, in USAFHS Ln. Off., Washington, D.C.
46. Col. E. S. Gorrell, "Early History of the Strategic Section, Air Service," 1919, *Air Service History*, ser. B, VI, 371-72.
47. *Ibid.*, pp. 373-75.
48. *Ibid.*, pp. 376-77.
49. *Ibid.*, p. 380.
50. *Ibid.*, pp. 386-87.
51. *Ibid.*, pp. 398-400.

52. ACTS lecture cited in n. 19, pp. 6-7.
 53. Mitchell, *Tactical Application*, pp. 5-6.
 54. *Plan of Employment of Air Service Units*, 3d Army, AEF, by command of Maj. Gen. Dickman, sgd. Malin Craig, C/S, n.d., in Gen. William Mitchell Papers, Reports, No. 41, Library of Congress.
 55. Isaac D. Levine, *Mitchell, Pioneer of Air Power* (New York, 1943), pp. 146-48.
- CHAPTER II
1. *Annual Report of the Secretary of War to the President, 1919*, (Washington, 1920), p. 68.
 2. *Ibid.*, p. 70.
 3. Maj. B. D. Foulois, Statement on Necessity for the Creation of a Department of Aeronautics, in Jones Collection [a large miscellaneous collection of notes on flying history] Proposal for a Separate Air Force, Vol. I, in USAFHD 4726-2.
 4. *Air Service Notes on Recent Operations*, 18 June 1919, pp. 1-2, in USAFHD 167.4-7.
 5. Maj. Sherman, *Fundamental Doctrine of the Air Service*, 1922, pp. 1-3, in USAFHD 4730-76.
 6. *Air Service, Fundamental Conceptions*, 1923, pp. 1-2 in USAFHD 4729-78.
 7. Author's interviews with surviving air leaders.
 8. Interview by author with Lt. Gen. Ira C. Eaker, Ret., 31 July 1952; Louis A. Sigaud, *Douhet and Aerial Warfare* (New York, 1941), pp. iii, 129.
 9. Interview by author with Brig. Gen. Thomas D. Milling, Ret., 4 June 1952.
 10. Edward Warner, "Douhet, Mitchell, Seversky: Theories of Warfare," in Edward M. Earle, *Makers of Modern Strategy* (Princeton, 1944), p. 501.
 11. H. H. Arnold, *Global Mission* (New York, 1949), p. 122.
 12. Brig. Gen. William Mitchell, "Air Power vs. Sea Power," *American Review of Reviews*, LXIII (Mar. 1921), 277.
 13. Recommendations Concerning the Establishment of a Department of Aeronautics, prep. under direction of Brig. Gen. Wm. Mitchell by Col. Townsend F. Dodd, 17 Apr. 1919, p. 4, in Jones Collection, Vol. I.
 14. *Ibid.*, pp. 3-5.
 15. Statement of Brig. Gen. Wm. Mitchell, 4 Jan. 1921, p. 21, in Jones Collection, vol. II.
 16. Warner, "Douhet, Mitchell, Seversky," p. 498.
 17. William Mitchell, *Winged Defense: the Development and Possibilities of Modern Air Power* (New York, 1925), p. 127.
 18. *Ibid.*, pp. xvi, 126-27.
 19. Brig. Gen. P. R. C. Groves, "For France to Answer," *Atlantic Monthly*, CXXIX (Feb. 1924), 3—marked copy found in "Gen. Patrick's File, 1922-1926," Records of the Air Service, 1917-1926, Natl. Archives.
 20. Capt. Basil H. Liddell-Hart, *Paris: Or the Future of War* (New York, 1925), pp. 1-37.
 21. *Ibid.*, pp. 31-37.
 22. Maj. Gen. Mason M. Patrick, lecture at Army War College, The Army Air Service, 9 Nov. 1925, pp. 8-9, in USAFHD 4743-87.
 23. *Ibid.*, p. 9.
 24. R. Earl McClendon, Air University Documentary Research Study, The Question of Autonomy for the U.S. Air Arm, 1907-1945, I, 85-86 [herein-after cited McClendon Study].
 25. *Ibid.*, I, 75-80.
 26. *Ibid.*, I, 87-89.
 27. *Ibid.*, I, 72.
 28. *Ibid.*, I, 72-73.
 29. *Ibid.*, I, 89-90.
 30. *Ibid.*, I, 91-92.
 31. Memo for C/S from Maj. Gen. C. T. Menoher, D/AS, 28 July 1919, in Natl. Archives 9520-29, Army War College, Records of the WDGS, 1903-1922.
 32. Memo for Gen. Menoher from Lt. Col. O. Westover, 5 May 1919, in Natl. Archives 321.9, T&O Div., Div. of Mil. Aero. Records, 1918-1920.
 33. *Annual Report of the Secretary of War . . . 1919*, pp. 68-75.
 34. Gen. J. J. Pershing to Maj. Gen. Charles T. Menoher, 12 Jan. 1920, in Rpt. of D/AS to S/W, 1920.
 35. McClendon Study, I, 74-75.
 36. Comments received from General Officers in August 1919 in Opposition to Creation of a Dept. of Aero., in Jones Collection, Proposal for Separate Air Force, I, 1.
 37. *Ibid.*, I, 3.
 38. *Ibid.*, I, 83-84.
 39. Navy Dept., The Proposal for a Unified Air Service, n.s., 1 May 1924, pp. 1-3, in Jones Collection, Vol. II.
 40. WD GO 81, 28 Aug. 1918.
 41. McClendon Study, I, 97, 99-100.
 42. Interview by author with Lt. Gen. Ira C. Eaker, Ret., 31 July 1952. These conclusions are also supported by documentary evidence.
 43. All of the quotations are from Extract from Hearings before Select Committee on Inquiry into Operations of U.S. Air Services, p. 520, in Jones Collection, Vol. IV.
 44. 1st ind. (AG to C/AS, 25 Nov. 1922), Gen. Patrick to AG, 6 Feb. 1923, in AG Hawaiian Dept. (8-8-22), as cited in McClendon Study, I, 109-10.
 45. 3d ind. (AG to C/AS, 18 Dec. 1922), M. M. Patrick to AGO, 7 Feb. 1923, in Rpt of a Com. of Officers Appointed by the S/W, 27 Mar. 1923, in USAFHD 3794-107; General Statement of the C/AS, in same Rpt., app. II, p. 8.
 46. Rpt. cited in n. 45, pp. 3, 5, 6; app. I, p. 4; app. VII, p. 3.
 47. McClendon Study, I, 113.
 48. Ltr., M. M. Patrick to AG, 19 Dec. 1924, p. 3, in USAFHD 145.91-100.
 49. *Ibid.*, p. 4; Conf. on the Army Air Service, following lecture by Patrick, 9 Nov. 1925, p. 3, in USAFHD 4743-87.
 50. McClendon Study, I, 113-16.

51. *Ibid.*, I, 117-19.
52. Comments on Gen. Patrick's Proposal for an Air Corps, n.s., n.d. (stamped PLANS DIVISION) pp. 1-2, in Jones Collection, Vol. II.
53. McClendon Study, I, 119-21.
54. *Ibid.*, I, 122-24.
55. WD Air Officers on the General Staff, 19 Jan. 1926, in USAFHD 145.91-100.
56. McClendon Study, I, 132-37.
57. The Air Corps Tactical School, 1920-1931, p. 1, in USAFHD 245.01; Training and Testing, at AA FSAT, Nov. 1942-Oct. 1943, Air Defense, I, 1-3; interview by author with Gen. J. T. McNarney, Ret., 5 Aug. 1952.
58. Interview by author with Gen. J. T. McNarney, Ret., 5 Aug. 1952 and Maj. Gen. E. B. Lyon, 3 June 1952; ltr., Maj. Gen. C. L. Chennault, Ret., to author, 4 Aug. 1952.
59. Interview by author with Brig. Gen. T. D. Milling, Ret., 4 June 1952.
60. Interview by author with Maj. Gen. Walter H. Frank, Ret., 5 June 1952; Brig. Gen. H. S. Hansell, 7 June 1952.
61. William Mitchell, The Mission of an Air Force in the Military Organization of the U.S. (draft of article, n.d.), in Reports, No. 31, Mitchell Papers, Library of Congress.
62. Lyon interview cited in n. 58; Sherman, Fundamental Doctrine of the Air Service, p. 8; Air Service, Fundamental Conceptions, prep. under dir. of C/AS, 1923, p. 2, in USAFHD 4729-78. This point is also confirmed by reference to War Department field service regulations and training manuals.
63. Mitchell, The Mission of an Air Force. . .
64. William Mitchell, Tactical Application of Military Aeronautics, 5 Jan. 1919, p. 11, in USAFHD 167.4-1; Air Service, Statement of Brig. Gen. Wm. Mitchell, Asst. C/AS, 4 Jan. 1921, p. 2, in Jones Collection, vol. II.
65. M. M. Patrick, Air Force Tactics, Nov. 1923, pp. 2-3, in Natl. Archives, Gen. Patrick's File, 1922-1926, Records of the Air Service, 1917-1926.
66. Edward J. Cassidy, The Air Service Question, 1925, p. 5.
67. McNarney interview cited in n. 57; ltr., Gen. George C. Kenney to author, 22 Oct. 1952.
68. Air Service, Notes on Recent Operations, 18 June 1919, pp. 21, 63; Group Program for the Year 1921 of the T&O Group, with attached ltr. of approval by C/AS, 29 Jan. 1921, in Natl. Archives 321.9-T&O Div., Div. of Mil. Aero. Records, 1918-1920; Air Service, Fundamental Conceptions, pp. 2-3.
69. Conf. on Army Air Service, cited in n. 49.
70. Air Service, Fundamental Conceptions, pp. 8-9.
71. Memo for AC/S WPD from M. M. Patrick, 10 Nov. 1921, p. 1, in Jones Collection, vol. I.
72. M. M. Patrick, Ft. Leavenworth Lecture, 27 Mar. 1924, in Natl. Archives, Gen. Patrick's File, Records of the Air Service, 1917-1926.
73. Wm. Mitchell, Tactical Application of Military Aeronautics, pp. 11-12; memo for Capt. Maxfield, AS USN, from Brig. Gen. Wm. Mitchell, 5 Feb. 1920, in Natl. Archives 660.2 - Coast Defense, Div. of Mil. Aero. Records, 1918-1920.
74. Wm. Mitchell, "Air Power vs. Sea Power," *American Review of Reviews*, LVIII, (Mar. 1921), 273-77, and Rpt. of Bombing Maneuvers Off Cape Hatteras, 5 Sept. 1923, pp. 1, 22, in Reports No. 29, Mitchell Papers.
75. Extracts from rpt. of Joint Army and Navy Board, 18 Aug. 1921, in memo for Exec. from Lt. Col. J. E. Fechet, C/T&O Gp., 18 Oct. 1921, in Natl. Archives 660.2 - Coast Defense, Div. of Mil. Aero. Records, 1918-1920. See also Statement of Brig. Gen. H. A. Drum before House Comm. on Mil. Affairs. . . , pp. 63-64, in Reports, No. 36, Mitchell Papers.
76. Mitchell, Rpt. of Bombing Maneuvers Off Cape Hatteras, pp. 23-24; Air Service, Statement of Brig. Gen. Wm. Mitchell, Asst. C/AS, 4 Jan. 1921, p. 15.
77. Memo for AC/S WPD from M. M. Patrick, 10 Nov. 1921, p. 3.
78. Annual Rpt, C/AS, p. 89.
79. Ltr., Bd. of Army and Navy Officers relative to development of the aeronautical service to S/N, 12 Mar. 1917, in Jones Collection, Misc. File re Air Matters.
80. Air Service, Extract from Kilbourne Rpt. on Coast Defense, p. A, in USAFHD 167.4-16.
81. Ltr., M. M. Patrick to AG, [?] July 1923, in Jones Collection, Misc. File re Air Matters.
82. Ltr., M. M. Patrick to AG, 19 Dec. 1924, p. 3, in USAFHD 145.91-100.
83. Wm. Mitchell, Rpt. of Bombing Maneuvers Off Cape Hatteras, p. 24.
84. Memo for Capt. Maxfield cited in n. 73.
85. Mitchell, "Air Power vs. Sea Power," p. 277.
86. Mitchell, *Winged Defense*, p. xvi.
87. Sherman, Fundamental Doctrine of the Air Service, 1922, p. 11, 13.
88. Air Service, Notes on Recent Operations, p. 80, in USAFHD 167.4-7.
89. Mitchell, Tactical Application of Military Aeronautics, pp. 1-2.
90. Air Service, Statement of Brig. Gen. Wm. Mitchell, 4 Jan. 1921, p. 2; Mitchell, *Our Air Force* (New York, 1921), p. 46.
91. Air Service, Fundamental Conceptions, p. 13.
92. Air Service, Notes on Recent Operations, p. 81.
93. M. M. Patrick, Air Force Tactics, p. 10, and lecture by Patrick at Franklin Institute, 17 Sept. 1924, both in Natl. Archives, in Gen. Patrick's file.
94. ACTS, Pursuit Aviation, Sept. 1933, p. 12, in USAFHD 4778-6.
95. 2d ind. (ltr., Maj. W. H. Frank, Exec., OCAC to CO Ellington Fld, 20 Jan. 1922), Maj. Carl Spaatz to C/AC, 7 Feb. 1922, in Natl. Archives 452.1, Airplanes, Gen., Correspondence, 1918-1935, Records of the Air Corps, 1917-1942.
96. AAF, *The Official Pictorial History of the AAF* (New York, 1947), p. 189.
97. Air Service, Fundamental Conceptions, p. 15.
98. M. M. Patrick Air Force Tactics, pp. 14-19.
99. Air Service, Fundamental Conceptions, pp. 6-7; AAF, *Pictorial History*, pp. 196-197.

100. AHS-6, *The Development of the Heavy Bomber, 1918-1944*, pp. 63-64, 66.
101. *Ibid.*
102. Air Service, *Fundamental Conceptions*, p. 14; Patrick, *Air Force Tactics*, pp. 10-11; ltr., Maj. Gen. Claire Chennault, Ret., to author, 4 Aug. 1952.
103. Air Service, *Fundamental Conceptions*, p. 14; Air Service, *Notes on Recent Operations*, p. 95; ltr., Chennault to author cited in n. 102; ltr.; Gen. George C. Kenney, Ret., to author, 22 Oct. 1952.
104. Air Service, *Fundamental Conceptions*, p. 14; ltrs., Chennault to author, cited in n. 102, and Kenney to author, cited in n. 103.
105. TWX, Mitchell to D/AS, 6 Nov. 1919, in *Natl. Archives 472, Armanent, Div. of Mil. Aero. Records, 1918-1920*; ltr., Kenney to author, cited in n. 103; *AAF, Pictorial History*, pp. 200-201.
106. TR 440-15, 26 Jan. 1926, p. 1.
107. *Ibid.*, p. 2.
108. *Ibid.*, pp. 5, 7-8.
109. *Ibid.*, pp. 10-11.
110. ASTS, *Bombardment*, pp. 54, 67, 72, as cited in *The AAF in World War II* (Chicago, 1948), I, 45-46.
111. Maj. Gen. L. S. Kuter, *Air Power—the American Concept*, n.d., p. 21, in *Ln. Off., USAFHD, Washington, D.C.*
112. ASTS, *Employment of Combined Air Force*, 6 Apr. 1926, p. 1.
113. *Ibid.*, pp. 3-4.
114. *Ibid.*, p. 16.
115. *Ibid.*, pp. 11-12.
116. *Ibid.*, pp. 23-25.
117. *Ibid.*, pp. 27-29.
118. *Ibid.*, pp. 31-33.
- 452.1; 2d ind. (to above memo), CO 2d Bomb. Wg. to C/AC, 9 June 1928.
6. *Ibid.*, p. 9, citing memo for C/MD from C/AC, 27 June 1928, in AAG 452.1.
7. *Ibid.*, p. 9, citing memo for C/MD from CO 2d Bomb. Gp., 15 Feb. 1929 and 2d ind. (memo for C/MD from C/AC, 2 Feb. 1929), C/MD to C/AC, 15 Jan. 1930, both in AAG 452.1.
8. *AAF, The Pictorial History of the AAF* (New York, 1947), pp. 183-84.
9. AHS-6, p. 70.
10. *Ibid.*, pp. 70-72, citing *Proceedings Bd. of Officers*, 26 Oct. 1932, in AAG 452.1, *Directive; MD, Annual Report*, (1932), p. 11.
11. AHS-6, p. 72; "A Proud and Imposing Record," *Aero Digest*, vol. 54 (April 1947), 143.
12. AHS-6, pp. 72-74.
13. *Ibid.*, pp. 74-76; *Pictorial History*, p. 198.
14. Interview by author with Maj. Gen. Walter H. Frank, Ret., 5 June 1952; *Pictorial History*, pp. 78-79.
15. Henry H. Arnold, *Global Mission* (New York, 1949), pp. 154-57.
16. AHS-6, pp. 14-15, 77.
17. ACTS, *The Doctrine of the Air Force*, n.d.; ltr. of transmittal, C. C. Culver to C/AC, 30 Apr. 1928; 1st ind. (ltr., C. C. Culver to C/AC, 9 June 1928), C/AC to Comdt. ACTS, 1 Sept. 1928, in *Natl. Archives 321.9, Doctrines of the AAC, Central Decimal file, AAF, 1917-1938*.
18. Louis A. Sigaud, *Douhet and Aerial Warfare* (New York, 1941), pp. vii-ix.
19. *Ibid.*, pp. 9-10, 14.
20. *Ibid.*, pp. 20-24; Col. Charles deF. Chandler, Ret., "Air Warfare Doctrine of Gen. Douhet," *U.S. Air Services*, May 1933 (mimeographed reproduction), in *USAFHD 145.93-13*; Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (New York, 1942).
21. Edward Warner, "Douhet, Mitchell, and Seversonsky . . .," in Edward M. Earle, *Makers of Modern Strategy* (Princeton, 1944), pp. 495-97.
22. For instance, Louis A. Sigaud dedicated his book to "General William Mitchell, the American Douhet."
23. Warner, "Douhet, Mitchell, and Seversonsky . . .," pp. 498-99.
24. Mitchell, *Airplanes in National Defense*, "Annals of Amer. Academy of Pol. Science", vol. 131 (May 1927), 39, 42.
25. Mitchell, *Strategy of the Pacific*, 1928, p. 2, in *Articles*, No. 19, *Mitchell Papers*, Library of Congress.
26. Mitchell, *Skyways* (Philadelphia, 1930), pp. 253-55.
27. Mitchell, *Notes for Article*, 27 Jan. 1935, in *Articles*, No. 24, *Mitchell Papers*.
28. Interview by author with Eaker, 31 July 1952. Other officers interviewed on this question were Brig. Gen. T. D. Milling, 4 June 1952; Gen. J. T. McNarney, Ret., 5 Aug. 1952; Brig. Gen. H. S. Hansell, 7 June 1952; Maj. Gen. W. H. Frank, Ret., 5 June 1952; Maj. Gen. E. B. Lyon, 3 June 1952; Lt. Gen. H. L. George, Ret., 31 July 1952; Brig. Gen. Hume Peabody, Ret., 9 June 1952; and Lt. Gen. Delos Emmons, Ret., 12 July 1952.

CHAPTER III

1. These general statements are based upon a consensus expressed in interviews by the author with the following air officers: Maj. Gen. W. H. Frank, Ret., 5 June 1952; Brig. Gen. Hume Peabody, Ret., 9 June 1952; Brig. Gen. H. S. Hansell, 7 June 1952; Maj. Gen. Donald Wilson, Ret., 21 July 1952; Lt. Gen. Ira C. Eaker, Ret., 31 July 1952; Lt. Gen. H. L. George, Ret., 31 July 1952. See also attachment to memo for AS/W, *Procurement Program for the Air Corps from 1940 to 1945*, 24 Nov. 1937, cited in Craven and Cate, eds., *The AAF in World War II*, I (Chicago, 1948), 60.
2. AHS-6, *The Development of the Heavy Bomber, 1918-1944*, p. 67, citing memo for C/MD from C/AC, 31 Mar. 1927, in AAG 452.1 *Directive*.
3. *Ibid.*, pp. 67-68, citing 1st ind. (memo for H. C. Pratt from Lt. H. H. George, 21 May 1928), Maj. Hugh Knerr to CO 2d Wg., 2 June 1928, in AAG 452.1.
4. *Ibid.*, p. 8.
5. *Ibid.*, pp. 8-9, citing 1st ind. (memo for CO 2d Wg. from C/AC, 28 May 1928), CO 2d Bomb. Gp. to CO 2d Bomb. Wg., 2 June 1928, in AAG

29. Ltr., Foulois to McSwain, 9 May 1933, in USAFHD 145.93-13, AC/AC Plans, Misc. folder.
30. Sigaud, *Douhet*, p. viii. This was the same translation that General Foulois sent to Rep. McSwain.
31. Maj. Gen. L. S. Kuter, *Air Power—the American Concept*, pp. 2-3, in Ln. Off., USAFHD, Washington, D.C.
32. Chandler article cited in n. 20.
33. In 1941 Louis A. Sigaud published his *Douhet and Aerial Warfare*, drawing from the original writings. In 1942 the standard English edition of Douhet's major works, translated by Dino Ferrari, appeared.
34. Interview by author with Maj. Gen. D. S. Wilson, Ret., 21 July 1952; Arnold, *Global Mission*, p. 157.
35. ACTS, Air Force, pp. 2, 3-7, 9-11, in USAFHD 4633-38.
36. ACTS, *A Study of Proposed Air Corps Doctrine*, 31 Jan. 1935, in Natl. Archives 321.9, Doctrines . . . , Central Decimal File, AAF, 1917-1938.
37. Maj. Donald Wilson, Testimony before Fed. Aviation Comm., (date on mimeographed copy, May 1935), pp. 1-2, in USAFHD 4666-1B.
38. Capt. H. L. George, Brief of Testimony presented to the Fed. Aviation Comm. (date on mimeographed copy, May 1935), pp. 1-3, in USAFHD 4666-1B.
39. Wilson, Testimony . . . , pp. 4, 7.
40. This summary is drawn from study of the documents and also from interviews by the author with Maj. Gen. E. B. Lyon; Brig. Gen. T. D. Milling, Ret., Brig. Gen. Hume Peabody, Ret.; Lt. Gen. H. L. George, Ret.; Lt. Gen. Delos Emmons, Ret.; and Gen. J. T. McNarney, Ret.; as cited in notes 1 and 28; also, ltr., Maj. Gen. C. L. Chennault to author, 4 Aug. 1952; Arnold, *Global Mission*, p. 157.
41. ACTS, *The Air Force*, Apr. 1930, p. 110, in USAFHD 4775-21A.
42. Memo for the Asst. Comdt., AWC from Capt. G. W. Kenney, 29 Apr. 1933, p. 1, in USAFHD 4743-75.
43. ACTS, *A Study of Proposed Air Corps Doctrine*.
44. Wilson, Testimony . . . , pp. 7, 13.
45. These conclusions are based upon testimony of former leading instructors at ACTS: interviews with Eaker, George, Hansell, and Wilson, cited in n. 1.
46. ACTS, *The Air Force*, Feb. 1931, pp. 2-3, in USAFHD 4775-9A.
47. ACTS, Air Force, 1934-1935, p. 6, in USAFHD 4775-30.
48. ACTS, *The Air Force*, Feb. 1931, pp. 7-10.
49. *Ibid.*, pp. 13-14; ACTS, Air Force, 1934-1935, lecture on Principles of War Applied to Air Force Action, p. 5.
50. ACTS, *The Air Force*, Feb. 1931, pp. 14-15.
51. *Ibid.*, p. 16; ACTS, *Employment of Combined Air Force*, 1925-1926, pp. 6-8.
52. Mitchell, *Skyways*, p. 278.
53. Claire L. Chennault, *Way of a Fighter* (New York, 1949), p. 27.
54. This conclusion is generally confirmed even by the officers who gave the strongest support to bombardment, e.g., Wilson, George, and Hansell, as well as by Chennault.
55. ACTS, *The Doctrine of the Air Force*, n. d.; 1st ind. (ltr., C. C. Culver to C/AC, 9 June 1928), C/AC to Comdt. ACTS, 1 Sept. 1938, both in Natl. Archives 321. 9, Doctrines . . . , Central Decimal File, AAF, 1917-1938.
56. ACTS, Air Force, 1933-1934, p. 2, in USAFHD 4625-3.
57. ACTS, Air Force, Feb. 1935, in USAFHD 4624-120.
58. Chandler article cited in n. 20, p. 4; ACTS, *A Study of Proposed Air Corps Doctrine*.
59. Chennault, *Way of a Fighter*, pp. 20, 26.
60. Capt. C. L. Chennault, *Role of Defensive Pursuit*, 1933, p. 4, in USAFHD 4589-9.
61. *Ibid.*, p. 7.
62. Rpt. of GHQ AF (Prov.), 1933, in Rpt. of C/S, 1933, p. 3.
63. 1st Lt. K. N. Walker, lecture, *Bombardment Aviation—Bulwark of National Defense*, pp. 5-6, 11, in USAFHD 4633-4.
64. Capt. H. L. George, Testimony . . . , May 1935, in USAFHD 4666-1B.
65. Wilson interview, cited in n. 1.
66. ACTS, *The Air Force*, Apr. 1930, p. 70.
67. Ltr., Maj. Gen. Grandison Gardner to author, 21 Aug. 1952; Wilson interview, cited in n. 1.
68. Lecture, Brig. Gen. H. S. Hansell, *Development of the U.S. Concept of Bombardment Operations*, 16 Feb. 1951, p. 6.
69. Mitchell, "Airplanes in National Defense," pp. 40-41.
70. Interviews by author with Eaker, George, Wilson, and Hansell, cited in n. 1.
71. Craven and Cate, eds., *The Army Air Forces in World War II*, I (Chicago, 1947), 598, citing ASTS, *Bombardment*, p. 62.
72. *Ibid.*, pp. 598-99, citing memo for Col. W. J. Paul from Dr. Chauncey E. Sanders, sub.: *Relationship of the Development of AAF Bombing Doctrine to the Development of the Modern Bombsight*, 10 Mar. 1947.
73. Wilson and George interviews, cited in n. 1.
74. ACTS, Air Force, Feb. 1935, pp. 1-8, in USAFHD 4775-30.
75. *AAF in World War II*, I, 598, citing ASTS, *Bombardment*, p. 62.
76. ACTS, *The Air Force*, Apr. 1930, pp. 52, 56.
77. *Ibid.*, pp. 64-65.
78. Peabody interview, cited in n. 1; C. L. Chennault, Comments on Letter to C/AC, dtd. 26 Nov. 1934, sub.: *Employment of Tactical Units with Modern Pursuit and Bombardment Planes*, 7 Mar. 1935, p. 1, in USAFHD 4686-35 A & B, *Pursuit Aviation* folder.
79. Chandler article cited in n. 20, pp. 4-5.
80. Ltr., Chennault to author, 4 Aug. 1952; Chennault, *Way of a Fighter*, pp. 20-21, 26.
81. *Ibid.*, p. 22.
82. Ltr., H. H. Arnold to C/AC, 26 Nov. 1934, p. 17, in USAFHD 4633-111.
83. Rpt. of GHQ AF (Prov.), 1933, in Rpt. of the C/S, 1933, p. 12.
84. Chennault, Comments . . . , cited in n. 78, pp. 1-2, 4-6.
85. Chennault, *Way of a Fighter*, p. 22.
86. Memo for C/S, sub.: *Munitions Requirements for the AAF*, n.d., n.s., (attached to AWPD/1, 12 Aug. 1941), pp. 2-3, in USAFHD 145.82-1; *AAF in World War II*, I, 600.
87. Lecture at Air Univ., 19 Sept. 1951, p. 23.
88. Hansell, lecture cited in n. 68, p. 8.

89. These observations are based upon wide examination of available documents and interviews by the author with Hansell, Frank, McNarney, George, Eaker, Wilson, and Lyon. Also letters to author from Gardner and Kenney.
90. Memo, ACTS, Langley Fld., Va., sub.: Pursuit Conference, 15 Apr. 1929, pp. 1, 12-13, in USAFHD 4686-35A & B, Pursuit Aviation folder.
91. Chennault, *Way of a Fighter*, pp. 19-20, 29-30; ltr., Chennault to author, 4 Aug. 1952.
92. ACTS, Pursuit Aviation, Sept. 1933, pp. 111-12, in USAFHD 4778-6.
93. *Ibid.*, pp. 113-14, 118.
94. Summary of answers to certain questions re pursuit aviation . . . , 19 Jan. 1934, in USAFHD 4647-121, Instructors Conf. folder.
95. Memo cited in n. 90, p. 6.
96. ACTS, Pursuit Aviation, Sept. 1933, pp. 10-11, 33-34, 84-85.
97. *Ibid.*, 35-37, 45.
98. *Ibid.*, pp. 44-45, 47-48, 76-77.
99. *Ibid.*, p. 57.
100. Chennault, *Way of a Fighter*, p. 23.
101. Chennault, Role of Defensive Pursuit, 1933, pp. 14-21.
102. *Ibid.*, pp. 22-23.
103. Memo cited in n. 90, p. 15.
104. ACTS, The Air Force, Feb. 1931, p. 106.
105. *Ibid.*, pp. 12-14.
106. *Ibid.*, pp. 15-16; Chennault, *Way of a Fighter*, pp. 24-25; ltr., Chennault to author, 4 Aug. 1952.
107. *Pictorial History of AAF*, p. 191.
108. Chennault, Comments on Letter to C/AC . . . , cited in n. 78, pp. 7-8.
109. 3d ind. (Capt. Harry A. Johnson, C&GSS to C/AC, 18 Jan. 1935), Air Corps Bd. to C/AC, 15 July 1935, in Dept. Records Br. [DRB] 452.1, Pursuit Planes, Cent. Dec. File. AAF, 1917-1938, AGO, Alexandria, Va.
110. Wilson interview, cited in n. 1.
111. 8th ind. (basic missing), AG to C/AC, 19 Nov. 1935, and attached statement, in Natl. Archives 452.1 Airplanes, Gen., Security Class. Records, Correspondence, 1936-1942, Records of the Air Corps, 1917-1942.
112. Chennault, *Way of a Fighter*, p. 29.
113. This statement represents the consensus of all air officers interviewed by the author.
114. Ltr., Gen. G. C. Kenney, Ret., to author, 22 Oct. 1952.
115. Ltr., Chennault to author, 4 Aug. 1952.
116. Wilson interview, cited in n. 1.
117. Ltr., Kenney to author, 22 Oct. 1952; ACTS, Attack Aviation, 2 Jan. 1934, p. 3, in USAFHD 4775-62B.
118. Interview by author with Col. Marshall H. Quesenberry, Ret., 22 July 1952; ltr., Kenney to author, 22 Oct. 1952.
119. *Pictorial History of the AAF*, p. 200.
120. ACTS, Attack Aviation, 2 Jan. 1934, pp. 12-13.
121. *Pictorial History*, pp. 200-201.
122. *Ibid.*, p. 201; ACTS Attack Aviation, 2 Jan. 1934, pp. 13-14.
123. Mitchell, "Airplanes in National Defense, p. 39.
124. Chennault, Role of Defensive Pursuit, p. 3.
125. Min. mtg., Aero. Bd. 22 Nov. 1926, in USAFHD 145.93-9A, AC/AS Plans. Aero. Bd. Action.
126. Joint Board/349 (ser. 273), 1 Dec. 1926, approved by S/W, 8 Dec. 1926, in USAFHD, AC/AS Plans, Aero. Bd. Action.
127. Ltr., S/W to President, 22 Aug. 1930, in AAG 323.5 (Special), cited in USAFHS-6, p. 134.
128. Annual Rpt. of the C/S in Rpt. of the S/W to the President, 1931, p. 38.
129. Gen. D. MacArthur, Statement on Coastal Defense, 25 May 1932, cited in *The Army Air Forces in World War II*, I, 62.
130. *AAF in World War II*, I, 62-63; ltr., Douglas MacArthur to CG's of armies, etc., 3 Jan. 1933, AG 660.2 (7-7-32), copy in USAFHD 4633-111.
131. *AAF in World War II*, I, 63-64.
132. AHS-6, pp. 135-36 and app. A, note 18.
133. Joint Board 350 (ser. 514), Joint Action of the Army and Navy, 1935, pp. 17-18.
134. Memo for Gen. Craig from Andrews, 25 Nov. 1935, in Personal File—C/S, Andrews Papers, Library of Congress.
135. R. Earl McClendon, Air University Documentary Research Study, The Question of Autonomy for the U.S. Air Arm, 1907-1945, I, 138-39.
136. James M. Spaight, *The Beginnings of Organized Air Power* (New York, 1927).
137. 1st Lt. K. N. Walker, Testimony before Fed. Avn. Comm., (sum. dtd. May 1935), pp. 1, 3, 5-6, 9, in USAFHD 4666-1B.
138. Rpt. of Spec. Com., Gen Council, on Employment of AAC, 11 Aug. 1933, in USAFHD 145.93-47, Drum Board envelope.
139. *Final Report of War Department Special Committee on Army Air Corps* (Washington, 1934), pp. 13-17.
140. Capt. R. M. Webster, A Statement Presented to the Fed. Avn. Com., (sum. dtd. May 1935), p. 24, in USAFHD 4666-1B.
141. Capt. H. L. George, Brief of Testimony Presented to the Fed. Avn. Com., (sum. dtd. May 1935), pp. 8-9, in USAFHD 4666-1B.
142. Prepared statement of Navy Dept. in answer to general questions from Fed. Avn. Comm. (no title shown on typescript copy), Aug. 1934, p. 25, in USAFHD 145.93-97.
143. ACTS, The Air Force, Apr. 1930, pp. 22-23.
144. Rpt. of Fed. Avn. Comm., Sen. Doc. No. 15, 74 Cong. 1 sess, 31 Jan. 1935, pp. 119-20.
145. McClendon Study, II, 151-52.
146. *Ibid.*, II, 153-57.
147. *Ibid.*, II, 157-63.
148. *Ibid.*, II, 165-67.
149. *Ibid.*, II, 168-69; Andrews, The GHQ Air Force, lect. at AWC, Oct. 9, 1937, p. 1, in USAFHD 4743-61.
150. Doctrines of the Army Air Corps, pp. 5-6, attached to memo from Brig. Gen. C. E. Kilbourne, 21 Dec. 1934, in USAFHD 4633-109.
151. *Ibid.*, pp. 6-10.
152. File 321.9, Doctrines of the AAC, Jan.-Oct. 1935, in Natl. Archives, Central Decimal File, AAF, 1917-1938.
153. TR 440-15, Employment of the Air Forces of the Army, 15 Oct. 1935, p. 5, in 062.12 (8-27-30), in Natl. Archives, Central Decimal File, AGO, 1916-1939.
154. McClendon Study, II, 172-73.
155. *Ibid.*, II, pp. 169-72; interviews by author with Peabody, Milling, Lyon, Frank, and Hansell.

CHAPTER IV

1. This contingency, labeled RED or RED-ORANGE, was regarded as real enough to be recognized in basic war plans until 1938. It was officially excluded by ltr., AG to CG GHQ AF, 29 Jan. 1938, in Natl. Archives 381, War Plans, Security Classified Records, 1936-1942, Records of the Air Corps, 1917-1942.
2. Air Corps Bd, Rpt. of the Air Corps Bd, Study No. 44, Air Corps Mission under the Monroe Doctrine, 17 Oct. 1938, p. 3, in USAFHD 3794-44.
3. ACTS, A Study of Air Defense of the Western Hemisphere, 12 May 1939, Synopsis, p. 7, in USAFHD 145.93-142.
4. *Ibid.*, Synopsis, p. 10A.
5. ACTS lecture, The Functions of Air Power in Our National Strategy, 25 Sept. 1935, pp. 1-6, in USAFHD 4624-30A.
6. ACTS lecture, Mar. 1935, p. 5, in USAFHD 4775-30.
7. *Ibid.*, p. 1.
8. *Ibid.*, pp. 2-3.
9. Memo attached to ltr., H.S. Hansell to Fairchild, 15 Aug. 1939, in USAFHD 4640-16, Incoming Memos, ACTS file.
10. ACTS, Discussion-Quiz, 1936-1937, p. 2, in USAFHD.
11. ACTS lecture, The Primary Objective of Air Forces, 13 Apr. 1936, pp. 6-10, in USAFHD 4624-80; ACTS, Quiz-Air Warfare, pp. 1-4, 2 Mar. 1939, in USAFHD 4621-55.
12. Maj. M.S. Fairchild, ACTS lecture, Air Power and Air Warfare, 1938-1939, in USAFHD 4621-55.
13. ACTS, The Primary Objective of Air Forces, pp. 12-14.
14. Ltr., Capt. R.M. Webster to D/Air Tactics and Strategy, 21 Dec. 1935, in USAFHD 4640-17, Outgoing Memos, ACTS.
15. Memo for Asst. Cmdt. AWC from Maj. W. R. Carter, Employment of Army Air Forces, 12 Apr. 1938, in Natl. Archives 321.9, Doctrines of the AAC, Central Decimal File, AAF, 1917-1938.
16. Andrews lecture, 1 Oct. 1938, pp. 20-21, in Natl. Archives 352.13, Lectures, Records of the Air Corps, 1917-1942.
17. Memo for S/W from Westover, 12 Nov. 1937, p. 2, in USAFHD 145.93-23, Woodring program folder, AC/AS Plans.
18. John C. Slessor, *Air Power and Armies* (London, 1936).
19. Hansell, lecture at Air War College, Air Univ., The Development of the U.S. Concept of Bombardment Operations, 19 Sept. 1951, pp. 10-12.
20. Ltr., Brig. Gen. H.C. Pratt to Col. Harry B. Jordan, 19 Apr. 1938, in USAFHD 4640-17, Outgoing Memos, ACTS.
21. For another example, see ltr., Maj. M.S. Fairchild to Maj. G.V. McPike, 28 Sept. 1939, in USAFHD 4640-17, Outgoing Memos, ACTS.
22. Interview by author with Eaker, 31 July 1951.
23. H. H. Arnold and Ira C. Eaker, *This Flying Game* (New York, 1938), pp. 130, 135-39.
24. Lecture by Andrews, 1 Oct. 1938, p. 26.
25. Interview by author with Brig. Gen. Hume Peabody, Ret., 9 June 1951; interview with Maj. Gen. Walter H. Frank, Ret., 5 June 1951.
26. William B. Huie, *The Fight for Air Power* (New York, 1942), pp. 89-90, quoting Knerr.
27. Air Corps Bd. Study No. 35, Employment of Aircraft in Defense of the Continental U.S., 7 May 1939, annex III, p. 5, in USAFHD 167.5-35.
28. Ltr., Maj. Clayton Bissell to Capt. James E. Parker, 8 Sept. 1936, pp. 2-5, in USAFHD 4647-137.
29. See, for example, the recommendations in memo for S/W from Maj. Gen. Oscar Westover, C/AC, 12 Nov. 1937, p. 2, in Woodring Program, AC/AS Plans; exhibit "E," attached to ltr., Maj. Gen. F.M. Andrews to AS/W, 24 Nov. 1937, in Personal File, C/S, Andrews Papers, Library of Congress.
30. Alexander P. de Seversky, *Victory Through Air Power* (New York, 1942).
31. Final Rpt. of the Air Corps Bd. on Revision of the Five-Year Experimental Program, 23 June 1939, in DRB, Lyon File Book 13, AAF Records.
32. Ltr., Col. M.F. Harmon to Brig. Gen. B.K. Yount, OCAC, 25 Nov. 1939, in DRB 452.1, Pursuit Planes, Central Decimal File, AAF, 1939-1942.
33. ACTS, Pursuit Aviation, Sept. 1939, p. 67, in USAFHD 4777-113B.
34. Capt. E.E. Partridge, ACTS lecture, Support of Air Forces, 13 Dec. 1939, p. 9, in USAFHD 4646-82.
35. ACTS lecture, Pursuit in Direct Support of Ground Forces, p. 19, in USAFHD 4646-83B.
36. ACTS, Pursuit Aviation, Sept. 1939, p. 65.
37. Memo for Col. Harmon from Lt. Col. Donald Wilson, 6 June 1939, pp. 5, 7-8, in USAFHD 4633-59A.
38. *Ibid.*, p. 8.
39. Harmon to Yount, 25 Nov. 1939.
40. ACTS lecture, Pursuit Employment, 20 Feb. 1939, p. 3, in USAFHD 4646-73A.
41. Ltr., Bissell to Capt. J. E. Parker, 8 Sept. 1936, pp. 4-5.
42. ACTS lecture, Pursuit in General Defense, 12 Dec. 1938, pp. 3-4.
43. ACTS Pursuit Aviation, Sept. 1939, pp. 70-97, in USAFHD 4777-113B.
44. *Ibid.*, pp. 99-102.
45. De Seversky, *Victory Through Air Power*.
46. Description of the P-40 is given in *The Official Pictorial History of the AAF* (New York, 1947), p. 192.
47. Interviews by author with Gen. Joseph T. McNarney, Ret., 5 Aug. 1952, and Lt. Gen. Delos Emmons, 21 July 1952.
48. Ltr., Gardner to author, 21 Aug. 1952.
49. Interview by author with Eaker, 31 July 1952.
50. Emmons interview; interview by author with Maj. Gen. Walter Frank, 5 June 1952.
51. Ltr., Bissell to Parker, 8 Sept. 1936, pp. 6-7.
52. Memo for Asst. Cmdt. ACTS, from D/Dept. of Air Tactics, 30 Sept. 1937, in USAFHD 4647-111; 3d ind. (ltr., CG GHQ AF to C/AC, 16 Mar. 1938), C/AC to C/MD, 15 June 1938, in DRB 452.1, Pursuit Planes, Central Dec. File, AAF, 1939-1942.
53. Huie, *The Fight for Air Power*, 89-91, including direct quotation from Knerr.
54. 3d ind. (ltr., CG GHQ AF to C/AC, 16 Mar. 1938), C/AC to C/MD, 15 June 1938, in DRB 452.1, Pursuit Planes.
55. ACTS, Pursuit Aviation, Sept. 1939, pp. 12-13.
56. *Ibid.*, p. 2.

57. *Pictorial History*, pp. 191-92.
58. *Ibid.*, p. 195.
59. Ltr., Bissell to Capt. J. E. Parker, 8 Sept. 1936, pp. 2-3, 8, in USAFHD 4647-137.
60. Ltr., C/AC to Pres., Air Corps Bd., 18 Aug. 1937, in USAFHD 149.93-276.
61. 1st ind. (ltr., Arnold to CG GHQ AF, 18 Aug. 1937), GHQ AF to OCAC, 5 Nov. 1937, in USAFHD 145.93-116.
62. R&R, OCAC, Arnold to Spaatz, 8 Apr. 1939, in DRB 452.1, Attack Bomber, Central Dec. Files, AAF, 1939-1942.
63. Memo for C/AC from Spaatz, 11 Apr. 1939, in DRB 452.1, Attack Bomber, Central Dec. Files, AAF, 1939-1942.
64. Air Corps Bd. Study No. 35, Employment of Aircraft in Defense of the Continental U.S., 7 May 1939, annex IV pp. 4-5, in USAFHD 167.5-35.
65. ACTS lecture quoting text, 1938-1939, in USAFHD 4640-108.
66. ACTS lectures 1 and 2, History, Development, Organization, Training, 3 Jan. 1939, pp. 9-10, in USAFHD 248.2208B-1; memo for Gen. Pratt from Lt. Col. Donald Wilson, 23 May 1938, in USAFHD 4633-37; Misc. Corresp., ACTS; interview by author with Brig. Gen. H. S. Hansell, 7 June 1952; 1st ind. (ltr., Brig. Gen. G. V. Henry, Cmdt. Cavalry Sch., to CG GHQ AF, 27 July 1938), Col. W.H. Frank, C/S GHQ AF to Henry, 9 Aug. 1938, in USAFHD 4633-56, Attack-Misc., 1937-1939 folder.
67. Interviews by author with Lt. Gen. Ira Eaker, Ret., 31 July 1952; Lt. Gen. H. L. George, June 1939, p. 25, in USAFHD 4775-57B.
68. *Pictorial History*, p. 201.
69. *Ibid.*, p. 202; ACTS lecture The Attack Airplane, 9 Jan. 1939, pp. 9-11, in USAFHD 4640-108.
70. Memo for S/W from Westover, 12 Nov. 1937, in Woodring Program, USAFHD 145.93-23, AC/AS Plans.
71. Ltr., C/AC to AG, 1 Sept. 1938, and 1st ind. thereto, AG to C/AC, 17 Sept. 1938, in DRB 452.1, Attack Bombers, Central Dec. File, AAF, 1939-1942.
72. These generalizations are based on a comprehensive examination of the documents and are made by the author at this point to facilitate understanding of the detailed events to be recounted.
73. Memo for C/S from AC/ G-4, 8 Aug. 1936, in Natl. Archives 452.1, Central Dec. File, AGO, 1916-1939.
74. Address, 30 Nov. 1936, p. 6, in USAFHD 4666-6.
75. Ltr., Andrews to AG, 15 Sept. 1936, in Natl. Archives 452.1, Airplanes, General, in Security Class, Files, 1936-1942, Records of the Air Corps, 1917-1942.
76. Ltr., Andrews to Embick, 28 Dec. 1936, in Natl. Archives 452.1, Airplanes, General, in Security Class, Records, 1936-1942, Records of the Air Corps, 1917-1942.
77. Andrews lecture, the GHQ Air Force, 9 Oct. 1937, p. 5, in USAFHD 4743-61.
78. Air Corps Bd. Study No. 31, The Functions of the AAF, 29 Oct. 1936, p. 14, in 167.5-31, USAFHD.
79. Air Corps Bd. Supplement to Study No. 31, Analytical Study of Joint Action of the Army and Navy, 1936, p. 22, in USAFHD 167.5-31.
80. 2d ind. (ltr., CG GHQ AF to AG, 1 June 1937), Actg. C/AC [Arnold] to AG, 3 June 1937, found in incl. to memo for Gen. Arnold from Brig. Gen. L.W. Miller, 15 Apr. 1943, in Goldberg Notes, Ln. Off., USAFHD, Washington, D.C.
81. George F. Eliot, *Bombs Bursting in Air* (New York, 1939), p. 133.
82. Arnold, *Global Mission* (New York, 1949), pp. 176-79; *Pictorial History*, p. 85.
83. Ltr., Smith to author, 20 May 1952.
84. Eaker interview, cited in n. 49.
85. Joint Board, Joint Action of the Army and Navy, Joint Board/350 (ser. 514), Change 2, 30 Nov. 1938.
86. AHS-6, p. 137, citing memo for C/AC from C/PS, 19 Jan. 1939.
87. This conclusion is drawn from a careful study of the War Department correspondence relating to the issue of the four-engine bomber procurement.
88. 1st ind. (ltr., AG to Andrews, 18 June 1935), Andrews to AG 22 July 1935, in Natl. Archives 452.1, Airplanes, General, Security Class, Records, 1936-1942, Records of the Air Corps, 1917-1942.
89. Ltr., Andrews to AG, 1 June 1937, and 2d ind. thereto, C/AC to AG, 9 June 1937, in USAFHD 149.93-276.
90. Memo for C/AC from Andrews, 20 Oct. 1937, in Natl. Archives 452.1, Airplanes, General, Security Class, Records, 1936-1942.
91. Andrews to AG, 25 June 1938, in 452.1, Natl. Archives, Airplanes, General.
92. AG to Andrews, 22 Aug. 1938, in 452.1, Natl. Archives, Airplanes, General.
93. These conclusions are drawn from the detailed evidence which is given below. They are strongly supported, too, by the general remarks made in the author's interviews with Peabody, Emmons, Wilson, Eaker, George, McNarney, Milling, Lyon, Frank, and Hansell. See also, ltr., Chennault to author, 4 Aug. 1952.
94. Memo for Exec., OCAC from Spaatz, C/T&O Div, 5 Jan. 1935, in Natl. Archives 321.9; Doctrine of the AAC, Cent. Dec. file, AAF, 1917-1938.
95. 1st ind. (ltr., AG to C/AC, 18 June 1935), C/AG to AG, 12 July 1935, in Natl. Archives 452.1, Central Dec. file, AGO, 1916-1939.
96. Memo for S/W from Andrews, 24 Jan. 1938, in Personal file, S/W, Andrews Papers, Library of Congress.
97. 2d ind. (basic missing), Andrews to C/AC, 6 May 1938, in Personal file, C/AC, Andrews Papers, Library of Congress.
98. Andrews, Modern Air Power, speech delivered 16 Jan. 1939, pp. 5, 8-10, in Andrews Papers, Library of Congress.
99. Ltr., Knerr to W. H. Frank, n.d., copy in Personal file, Data for GHQ AF Report, Andrews Papers, Library of Congress.

100. Hansell interview; ltr., Maj. Gen. Hugh Knerr, Ret., to author, 9 June 1952.
101. Memo for C/S from AC/S G-4, 30 Oct. 1936, cited in Mark S. Watson, *Chief of Staff: Pre-War Plans and Preparations* (Washington 1950, p. 42).
102. *Pictorial History*, p. 198.
103. WD Staff Study, Augmentation in Aircraft to be included in FY 1938 Estimates, 25 June 1936, in incl. to memo for Gen. Arnold from Brig. Gen. L. W. Miller, 15 Apr. 1943, in files, Ln. Off., USAFHD. (Note supplied by Dr. Alfred Goldberg).
104. AHS-6, p. 86.
105. Memo for C/S from AC/S G-4, 8 Aug. 1936, in Natl. Archives 452.1, Cent. Dec. file, AGO, 1916-1939.
106. Memo for C/S from AC/S G-4, 14 Sept. 1936, in Natl. Archives 452.1, Cent. Dec. file, AGO, 1916-1939.
107. Memo for C/S from AC/S G-4, 29 Aug. 1936 (approved by Craig, 4 Sept. 1936) in Natl. Archives 452.1, Cent. Dec. file, AGO, 1916-1939.
108. Ltr., AG to C/AC, 19 Oct. 1937, in USAFHD 149.93-276, Bombardment folder.
109. Memo for AC/S G-4 from Embick, DC/S, 9 May 1938, in Natl. Archives 452.1, Cent. Dec. file, AGO.
110. Memo for C/S from AC/S G-4, 13 May 1938, in Natl. Archives 452.1, Cent. Dec. file, AGO.
111. Memo for DC/S from C/Bud. & Leg. Plan. Br., 14 May 1938, in Natl. Archives 452.1, Cent. Dec. file, AGO.
112. Memo for C/S from DC/S, 16 May 1938, in Natl. Archives 452.1, Cent. Dec. file, AGO.
113. *Ibid.*
114. C/S to Joint Board, 2 June 1938, in Natl. Archives 452.1, Cent. Dec. files, AGO.
115. Joint Board/349 (ser. 629), 29 June 1938, in Natl. Archives 452.1, Airplanes, Gen., in Security Class. Records, 1936-1942, Records of the Air Corps, 1917-1942.
116. Memo for C/AC from AS/W, 9 June 1938, in Natl. Archives 452-1, Cent. Dec. file, AGO.
117. Memo for C/S from AC/S G-4, 19 July 1938, in Natl. Archives 452.1, Cent. Dec. file, AGO.
118. *Ibid.*
119. Ltr., Westover to AG, 31 Aug. 1938, in USAFHD 149.93-23, Woodring Program folder, AC/AS Plans.
120. 1st ind. (ltr., Westover to AG, 31 Aug. 1938), AG to C/AC, 5 Oct. 1938, in Woodring Program folder.
121. Arnold, *Global Mission* (New York, 1949), pp. 177-80.
122. Memo for C/S from DC/S, 29 Nov. 1938, in AAG 452.1B, cited in AHS-6, pp. 33-34.
123. Message to Congress, 12 Jan. 1939, in *The Public Papers and Addresses of F. D. Roosevelt* (New York, 1941), 1939 vol., pp. 71-72.
124. 1st ind. (memo for C/MD from C/AC, 26 July 1938), C/MD to C/AC, 5 Aug. 1938, in AAG 452.1B, cited in AHS-6, p. 30-31.
125. Emmons interview.
126. AHS-6, p. 18; Emmons and Hansell interviews.
127. Gen. Carl Spaatz and Dr. Bruce Hooper, "Strategic Bombing," *Ten Eventful Years*, ed. Wal-
ter Yust (Chicago, 1947), IV, 178; Milling
interview; Lyon interview.
128. Address by Arnold to AWC, 8 Oct. 1937, p. 9, in USAFHD 4743-64A.
129. Address by Andrews to AWC, 15 Oct. 1936, pp. 19-20, in USAFHD 145.93-107, AC/AS Plans, Lectures folder.
130. ACTS lecture, The Use of Aircraft in Ethiopia, 2 Feb. 1939, pp. 10-19, in USAFHD 4640-121A.
131. Address by Westover before Reserve Officers National Convention, Oakland, Calif., 23 Sept. 1937, pp. 6-7, in USAFHS 4743-65.
132. Capt. Demas T. Craw, ACTS, An Analysis of the Spanish Civil War, 1938, in USAFHD 4721-19.
133. ACTS lecture, The Spanish Civil War, 1938, pp. 13-20, in USAFHD 4642-2A.
134. Hansell interview.
135. Address by Arnold before the AWC, The Air Corps, 8 Oct. 1937, p. 5, in USAFHD 4743-64A.
136. Eliot, *Bombs Bursting in Air*, p. 81.
137. Address by Maj. Gen. F. M. Andrews before the Natl. Aero. Assn., Modern Air Power, 16 Jan. 1939, pp. 11-12.
138. Fairchild, ACTS lecture, Air Power and Air Warfare, 1939, pp. 10-13, in USAFHD.
139. R. Earl McClendon, Air University Documentary Research Study, The Question of Autonomy for the United States Air Arm, 1907-1945, 1950, Pt. II, pp. 205-13.
140. *Ibid.*, pp. 201-4.
141. *Ibid.*, pp. 196-200.
142. *Ibid.*, pp. 194-95; ltr., AGO to C/AC, 19 Oct. 1937, in USAFHD 149.93-276.
143. Address by Westover, 23 Sept. 1937, p. 10, in USAFHD 4743-65.
144. ACTS, *Annual, 1937*, Extracts from Address of Maj. Gen. Oscar Westover, 2 June 1936, pp. 2, 4, in USAFHD 4778-104.
145. Westover, Proposed Statement of C/AC in Connection with Hearings on HR 3151, Pt. I, pp. 11-12, Jan. 1938, in Jones Collection, Misc. File re Air Matters.
146. *Ibid.*, Pt. II, pp. 7-9.
147. Andrews to Westover (personal), 27 Sept. 1937, in Personal File, C/AC, Andrews Papers, Library of Congress.
148. *Ibid.*
149. Kilner, ACTS lecture, Problems Met by the GHQ AF, 18 Apr. 1938, p. 9, in USAFHD.
150. Memo for Maj. M. S. Fairchild from Wilson, attached to ltr., dtd. 15 Aug. 1939, in USAFHD 4640-16, Incoming Memos folder.
151. McClendon Study, II, 185-86.

CHAPTER V

1. AHS-6, The Development of the Heavy Bomber, 1918-1944, pp. 35-36, citing memo for AC/AC WPD from C/AC, 14 Mar. 1939, in AAG 321.9, Employment of AC, and 1st ind. (memo for C/AC from C/MD, 24 July 1939), C/AC to AS/W, 5 Aug. 1939, in AAG 452.1C, Heavy Bombers.
2. Address delivered by Pres. Roosevelt to the Cong., 16 May 1940, in Dept. of State, *Peace and War; U.S. Foreign Policy, 1931-1941* (Washington, 1943), pp. 527-28, 530.
3. Memo for Gen. Arnold from Capt. H. S. Hansell, OCAC, 25 Nov. 1940, in DRB File OCS 16125-435, WDGS (Spec. File), 1922-1942.

4. Statement of Maj. Gen. H. H. Arnold before Cong. Committees, in Defense of LR Aircraft, 1940, in USAFHD 167.6-24A, Item No. 2.
5. Memo for Mr. Knudsen from Robt. P. Patterson, 17 Oct. 1940, in USAFHD 149.93-276 Bomb. Plans, AC/AS Plans.
6. H. H. Arnold, *Global Mission* (New York, 1949), p. 192.
7. Craven and Cate, eds., *The Army Air Forces in World War II*, I (Chicago, 1948, 109, 577.
8. Maj. Fairchild, ACTS lecture, Orientation course, 1939-1940, p. 6, in USAFHD 4633-95.
9. ACTS, Air Force, 27 Oct. 1939, I, 15-16, in USAFHD 2566-2.
10. Memo for Lt. Col. L. F. Stone, C&GSS, from Wilson, 23 Sept. 1939, in USAFHD 4633-37, Misc. folder.
11. ACTS lecture by Fairchild, pp. 6-7.
12. H. H. Arnold and I. C. Eaker, *Winged Warfare* (New York, 1941), pp. 130-31; interview by author with Maj. Gen. Walter Frank, Ret., 5 June 1952.
13. Al Williams, "Real Air Power for the Defense of the United States," *U.S. Air Services*, XXV (June, 1940), pp. 18-19.
14. AHS-6, pp. 42, 47.
15. Gen. Carl Spaatz, "Strategic Air Power," *Foreign Affairs*, vol. 24 (Apr. 1946), pp. 386-87.
16. De Seversky, *Victory Through Air Power* (New York, 1942), pp. 43-73.
17. Lt. Col. Donald Wilson, ACTS lectures, Principles of War, 26 Oct. 1939, pp. 1-22, in USAFHD 2566-2 Air Force lectures, vol. I.
18. Maj. M. S. Fairchild, ACTS lecture, The Aim in War, 28 Oct. 1939, pp. 1-18, in Air Force lectures, vol. I.
19. *Ibid.*, p. 18.
20. Maj. M. S. Fairchild, ACTS lecture, Primary Strategic Objectives of Air Forces, 7 Nov. 1939, pp. 1-17, in Air Force lectures, vol. I.
21. Maj. Fairchild, ACTS lecture, "Strategic Offense and Strategic Defense," 1 Nov. 1939, pp. 32-35, in Air Force lectures, vol. I.
22. Maj. Fairchild, ACTS lecture, Influence of Air Power on Naval Warfare, 6 Nov. 1939, pp. 3, 5-6, 9, 11-17, in Air Force lectures, vol. I.
23. AWPd, memo for C/S, Air Estimate of the Situation—6:30 a.m., Dec. 8, in USAFHD 145.81-3.
24. Memo for C/AC from AG, AG 320.2 (3-22-39) F, 23 Mar. 1939, in USAFHD 145.93-116, May 1932-May 1939.
25. Air Board Rpt, 15 Sept. 1939, tab C, pp. 1-3, in USAFHD 1116-61.
26. Memo for C/S from Brig. Gen. F. M. Andrews, AC/S G-3, 2 Feb. 1940, in Natl. Archives 062.11, FM 1-5 (12-26-39), Central Dec. file, AGO, 1916-1939.
27. *Ibid.*
28. Memo for C/S from Brig. Gen. F. M. Andrews, 2 Feb. 1940.
29. FM 1-5, Employment of Aviation of the Army, 15 Apr. 1940, p. 1, in Natl. Archives 062.11 (12-26-39), Cent. Dec. file, AGO, 1916-1939.
30. *Ibid.*, pp. 10-11.
31. *Ibid.*, pp. 29-36.
32. Rpt. of the Air Corps Bd, Study No. 3A, FM 1-5, 20 Nov. 1939, (recorrected, Mar. 1940) pp. 1-3, in USAFHD 3794-3A; Air Board Rpt, 15 Sept. 1939, tab B, pp. 1-2.
33. Study No. 3A cited in n. 32, pp. 6-9, 25.
34. *Ibid.*, p. 2.
35. Maj. Hopkins, ACTS lecture Tactical Offense and Tactical Defense, 31 Oct. 1939, pp. 1-21, in Air Force lectures, vol. I.
36. Fairchild, ACTS lecture National Economic Structure, 9 Nov. 1939, pp. 1-3, in Air Force, vol. I.
37. *Ibid.*, pp. 4-6. An extensive survey of possible target systems is given by Fairchild on pp. 7-35.
38. FM 1-10, 20 Nov. 1940, pp. 45, 50, in DRB 062.11, FM 1-10 (6-11-40), Cent. Dec. file, AGO, 1940-1945.
39. *The Army Air Forces in World War II*, I, 596, 600-602.
40. Ltr., C/AC to CG GHQ AF, 14 Nov. 1939, in DRB 452.1, Pursuit Planes, Cent. Dec. file, AAF, 1939-1942.
41. Memo for CG GHQ AF, et al., from Maj. Gen. H. H. Arnold, C/AC, 20 Dec. 1939 in Natl. Archives 337, Conferences, Correspondence, 1936-1942, Records of the Air Corps, 1917-1942.
42. Ltr., Lt. Col. W. E. Kepner, Cmdg. 8th Pursuit Gp., to CG GHQ AF, 22 Dec. 1939, in Natl. Archives 337, Conferences.
43. Maj. H. L. George, Com. 96th Bomb. Sq., to CG GHQ AF, 26 Dec. 1939, in Natl. Archives 337, Conferences.
44. 1st ind. (ltr., C/AC to CG GHQ AF, 14 Nov. 1939), CG GHQ AF to C/AC, 11 Jan. 1940, in DRB 452.1, Pursuit planes, Cent. Dec. file, AAF, 1939-1942.
45. Arnold and Eaker, *Winged Warfare* (New York, 1941), p. 176.
46. *AAF in World War II*, I, 602-3.
47. Arnold, *Global Mission*, p. 201.
48. *AAF in World War II*, I, 600-602.
49. This conclusion is based upon examination of the written evidence and upon interviews by author with Lt. Gen. Ira C. Eaker, Ret., 31 July 1952; Maj. Gen. Walter Frank, Ret., 5 June 1952; Gen. J. T. McNarney, Ret., 5 Aug. 1952; Maj. Gen. Donald Wilson, Ret., 21 July 1952; Lt. Gen. H. L. George, 31 July 1952; Brig. Gen. Hume Peabody, 9 June 1952; and ltr., Maj. Gen. C. L. Chennault to author, 4 Aug. 1952.
50. AHS-6, p. 80; *The Official Pictorial History of the AAF*, (New York, 1947), p. 199.
51. AHS-6, pp. 47-48, 81-82.
52. *Ibid.*, pp. 51, 140-44.
53. Air Bd. Rpt, 15 Sept. 1939, tab F, pp. 4-5, in USAFHD 1116-61.
54. Mark S. Watson, *Chief of Staff: Prewar Plans and Preparations* (Washington, 1950), p. 47.
55. AHS-6, p. 38.
56. *Ibid.*, p. 89-90.
57. *Ibid.*, p. 93.
58. Ltr., Brig. Gen. J. E. Chaney to Gen. G. C. Marshall, 4 June 1940, in USAFHD 149.93-276.
59. AHS-6, p. 87.
60. Ltr., C/AC to CG GHQ AF, 14 Nov. 1939, in DRB 452.1, Pursuit Planes, Cent. Dec. file, AAF, 1939-1942.
61. 1st ind. (ltr., S/AC to CG GHQ AF, 14 Nov. 1939), CG GHQ AF to C/AC, 11 Jan. 1940, in DRB 452.1, Pursuit Planes, Cent. Dec. file, AAF, 1939-1942.
62. Arnold and Eaker, *Winged Warfare*, pp. 175-76.

63. FM 1-15, Tactics and Techniques of Air Fighting, 9 Sept. 1940, p. 38, in DRB 062.11, FM 1-15 (5-20-40), Cent. Dec. file, AGO, 1940-1945.
64. FM 1-15, 9 Sept. 1940, pp. 16, 38; Rpt. of Air Corps Board, Study No. 3A, FM 1-5, Nov. 1939, pp. 44, 46; Arnold and Eaker, *Winged Warfare*, p. 181-82.
65. Rpt. of Air Corps Bd., Study No. 3A, FM 1-5, 20 Nov. 1939, p. 42, 47-48.
66. FM 1-15, 9 Sept. 1940, pp. 15-16.
67. Ltr., Lt. Col. W. E. Kepner to CG GHQ AF, 22 Dec. 1939, in Natl. Archives 337, Conferences, Correspondence, 1936-1942, Records of the Air Corps, 1917-1942.
68. R&R, OCAC, Mat. Div. to Plans Div., 14 June 1940, and ltr., C/AC to AG, 25 Apr. 1940, both in DRB 452.1, Pursuit Central Dec. file, AAF, 1939-1942.
69. Rpt. of the Air Corps Bd., Study No. 3A, FM 1-5, 20 Nov. 1939, pp. 37-39.
70. Maj. F. M. Hopkins, ACTS lecture, Influence of Air Power on Land Warfare, 3 Nov. 1939, pp. 4-18, in Air Force lectures, vol. I.
71. Ltr., Gen. G. C. Kenney, Ret., to author, 22 Oct. 1952.
72. Air Bd. Rpt. 15 Sept. 1939, tab D. pp. 1-2.
73. Rpt. of the Air Corps Bd., Study No. 3A, p. 33.
74. Memo for C/AC from AS/W, 2 June 1941, and 1st ind., 19 June 1941, in DRB 552.1, Bombers, Cent. Dec. file, AAF, 1939-1942; ltr., Maj. Gen. Grandison Gardner to author, 21 Aug. 1952.
75. R&R, Hq. AAF, 18 Nov.-30 Dec. 1941, in Natl. Archives 319.1, Reports, Misc., Security Class. records, 1936-1942, Records of the Air Corps, 1917-1942.
76. Ltr., Kenney to author, 22 Oct. 1952.
77. Maj. Gen. Laurence S. Kuter, Air Power—the American Concept, n.d., p. 1, in Ln. Off., USAFHD, Wash., D.C.
78. United States-British Staff Conversations (ABC-1), 27 Mar. 1941.
79. *The AAF in World War II*, I, 135-41.
80. *Ibid.*, p. 131.
81. *Ibid.*, p. 145.
82. *Ibid.*, p. 146.
83. *Ibid.*, p. 147.
84. Joint Board Estimate of U.S. Over-all Production Requirements, Joint Board 355 (ser. 707), 11 Sept. 1941, pp. 10-15, in USAFHD 145.81-23.
85. *Ibid.*, app. II, Pt. I.
86. AWPDP/1, Munitions Requirements of the AAF, 12 Aug. 1941, tab 1, pp. 1-2, in USAFHD 145.82-1.
87. *Ibid.*, pp. 12-13.
88. USSBS, *Summary Report (European War)*, 30 Sept. 1945.
89. AWPDP/1, 12 Aug. 1941, tab 1, pp. 10-12.
90. Memo for C/S transmitting AWPDP/1, 12 Aug. 1941, pp. 2-3; AWPDP/1, tab 8, pp. 1, 3-4; tab C.
91. Arnold, *Global Mission*, p. 149; Brig. Gen. H. S. Hansell, lect. at Air University, Development of the U.S. Concept of Bombardment Operations, 19 Sept. 1951, p. 23.
92. *Ibid.*, tab 3, Escort Fighters, pp. 1-3.
93. Ltr., Bradley to Col. W. H. Frank, Jan. 1940, in Personal file—"A," Andrews Papers, Library of Congress.
94. McClendon Study, pp. 186-88.
95. Watson, *Chief of Staff, Prewar Plans and Preparations*, pp. 280-81.
96. McClendon Study, pp. 190-93.

Bibliography

The principal sources used in the preparation of this study, with a brief appraisal, are listed below:

A. Archival materials located at the USAF Historical Division, Air University, Maxwell Air Force Base, Alabama:

1. Air Corps Tactical School textbooks
2. Air Corps Tactical School lectures
3. Service manuals and regulations
4. Miscellaneous addresses by air officers at Maxwell Field and elsewhere
5. Miscellaneous articles, published and unpublished
6. Miscellaneous correspondence files from Maxwell Field and Office of the Assistant Chief of Air Staff, Plans
7. Copies of war plans and estimates of military requirements
8. Extracts from Congressional hearings
9. Reports of commissions and Congressional committees investigating airpower and organization
10. Reports of the War and Navy Department on air subjects
11. Miscellaneous reports on Air Service, AEF; GHQ Air Force; and other major air units and organizations
12. Air Board reports and studies
13. Miscellaneous studies by individual Army officers and others concerning airpower (official and unofficial)
14. Student-officer studies prepared at the Tactical School and the Army War College
15. Miscellaneous papers connected with AWPD/1
16. Rosters of instructors and students at the Tactical School
17. Summaries of courses taught at the Tactical School
18. Minutes of proceedings of the Aeronautical Board and the Joint Board

Appraisal: The above listed materials are indispensable to any statement of air doctrine as developed at the Air Corps Tactical School, which was the leading school for advanced study of military aviation during the period under study. They constituted the largest single source from which material for this study was obtained.

B. Archival materials located at the National Archives, Washington, D.C.

1. Records of the Air Service, 1917-1926
2. Division of Military Aeronautics Records, 1918-1920
3. Records of the Air Corps, 1917-1942
4. Records of the Army Air Forces, 1918-1945

5. Central decimal file of the Army Air Forces, 1917-1938 (unclassified)
6. Central decimal file of the Adjutant General's Office, 1916-1939
7. Records of the War Department General Staff, 1903-1922
8. Records of the Office of the Secretary of War, 1932-1942

Appraisal: The proportion of bulk in the above listed record groups is very high in relation to the amount of information useful for this study. A large number of documents were located here, however, which could not be found elsewhere, and these sources are essential to a complete study of air doctrine. Especially important are the documents representing the point of view of higher headquarters; such materials were not to be found in the collection at the USAF Historical Division. In the voluminous correspondence files the chief file number used was 452.1, with numerous cross-files provided from that number.

C. Archival materials located at the Departmental Records Branch, AGO, Alexandria, Virginia

1. Central decimal file of the Army Air Forces, 1917-1938 (classified)
2. Central decimal file of the Army Air Forces, 1939-1942 (classified)
3. Central decimal file of the Army Air Forces, 1939-1942 (unclassified)
4. Central decimal file of the AGO, 1940-1945
5. Records of the Assistant Chief of Air Staff, Plans, 1942-1945
6. Special file of the War Department General Staff, 1922-1942
7. Special file of the War Plans Division, 1921-1941

Appraisal: The files listed above fall into the same general category of usefulness as those listed in B., above.

D. Archival materials located in the Library of Congress (Manuscripts Division)

1. William Mitchell Papers
2. Frank M. Andrews Papers

Appraisal: The bulk of these personal papers are of great interest in connection with the particular men involved, but they do not shed much new light on the general subject of air doctrine. On the other hand, a few items of real significance can be gleaned here.

E. Materials located in the Army Library, Office of the Secretary of the Army, Washington, D.C.

1. Annual reports of the War Department, 1917-1941
2. Congressional reports and hearings
3. Miscellaneous government publications

Appraisal: The proportion of useful material here is quite low, but it was essential to use certain of these sources, which were more readily available in this depository than in most others.

F. Interviews by the author with key air force personnel

1. Lt. Gen. Ira C. Eaker, Ret.
2. Lt. Gen. Delos Emmons, Ret.
3. Maj. Gen. Walter H. Frank, Ret.
4. Lt. Gen. Harold L. George, Ret.
5. Brig. Gen. Haywood S. Hansell, Jr.
6. Maj. Gen. Edwin B. Lyon
7. Gen. Joseph T. McNarney, Ret.
8. Brig. Gen. Thomas DeW. Milling, Ret.
9. Brig. Gen. Hume Peabody, Ret.
10. Col. Marshall H. Quesenberry, Ret.
11. Maj. Gen. Donald Wilson, Ret.

Appraisal: These personal interviews were indispensable to an accurate interpretation of

the documents and the events themselves. They provide, in conjunction with the pertinent written sources, the key to a meaningful explanation of the major trends and problems.

G. Correspondence by the author with key air force personnel

1. Maj. Gen. Claire L. Chennault, Ret.
2. Maj. Gen. Grandison Gardner
3. Gen. George C. Kenney, Ret.
4. Maj. Gen. Hugh Knerr, Ret.
5. Brig. Gen. Frederic H. Smith, Jr.

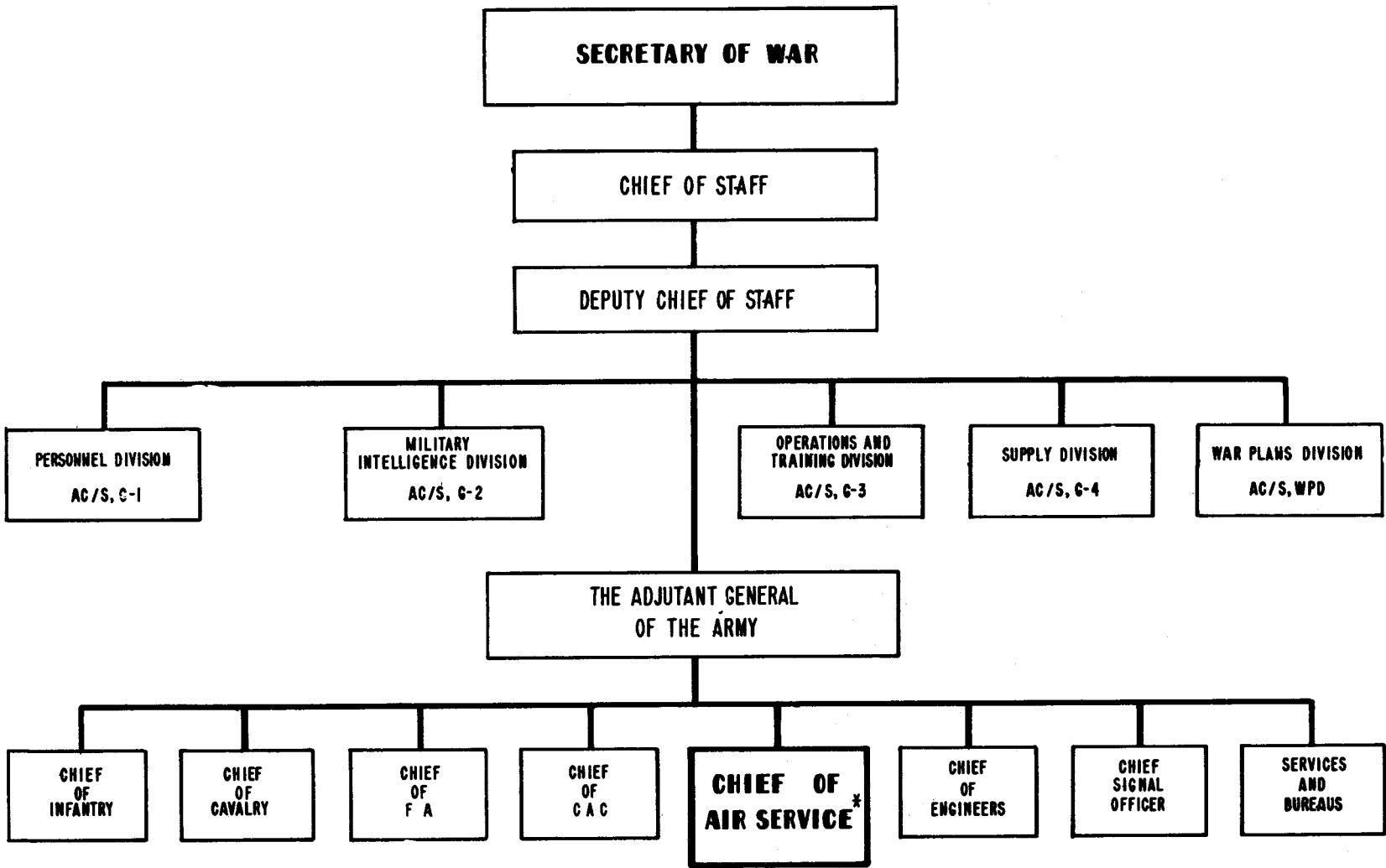
Appraisal: Letters to the above officers were sent out at an advance stage in the preparation of the study, as a means of finding answers to specific questions not clearly resolved by the documents or the personal interviews. In this respect, the replies proved to be extremely helpful.

H. Published books and periodicals

Appraisal: In general, relatively little reliance was placed upon this source, except for reference to influence outside of the services. The footnotes will reveal, however, the extent of use of this type of material.

AVIATION IN ARMY ORGANIZATION, (1920 - 1934)

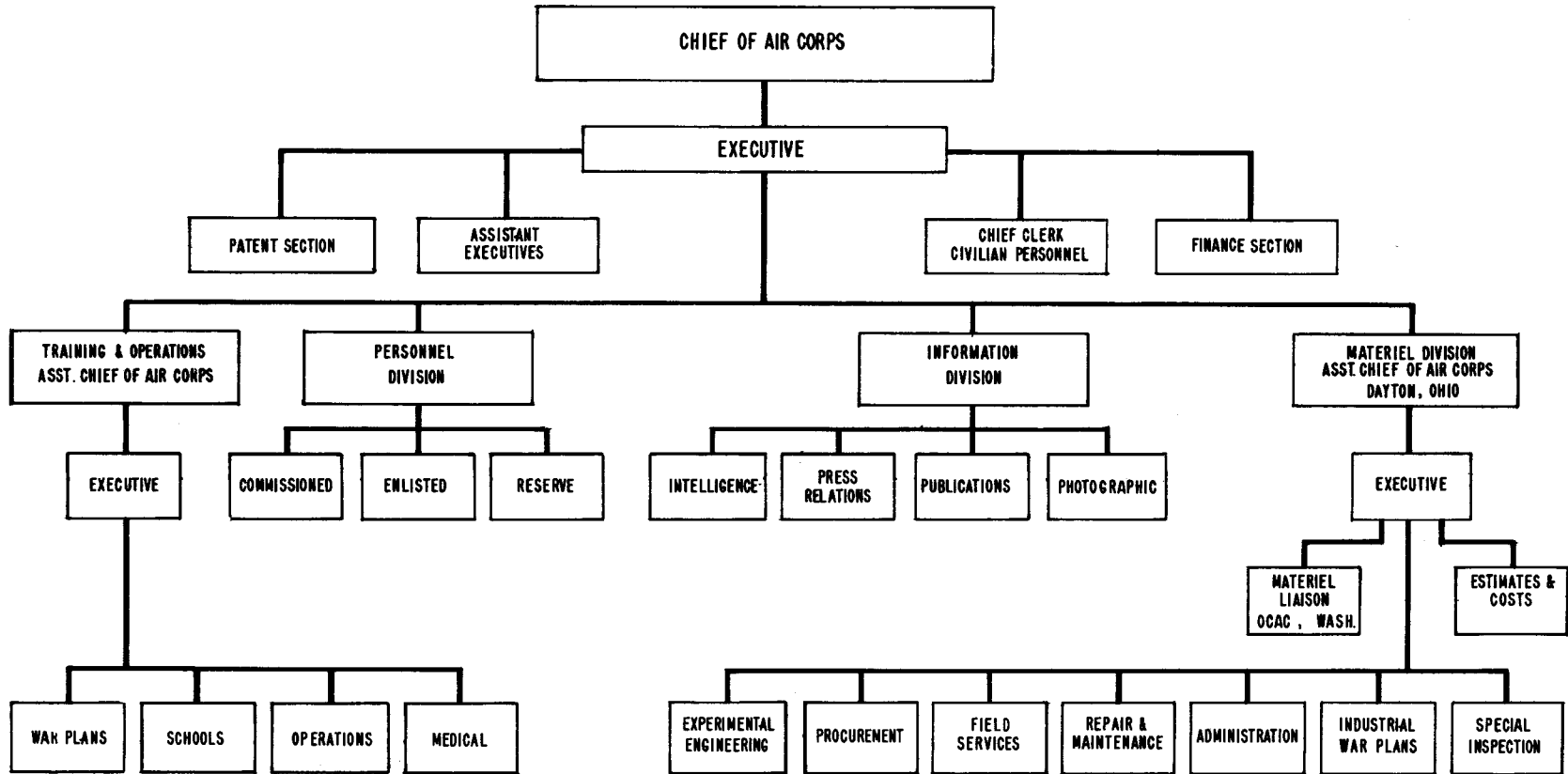
144



* CHIEF OF AIR CORPS AFTER 1926

THE ARMY AIR ARM*

145

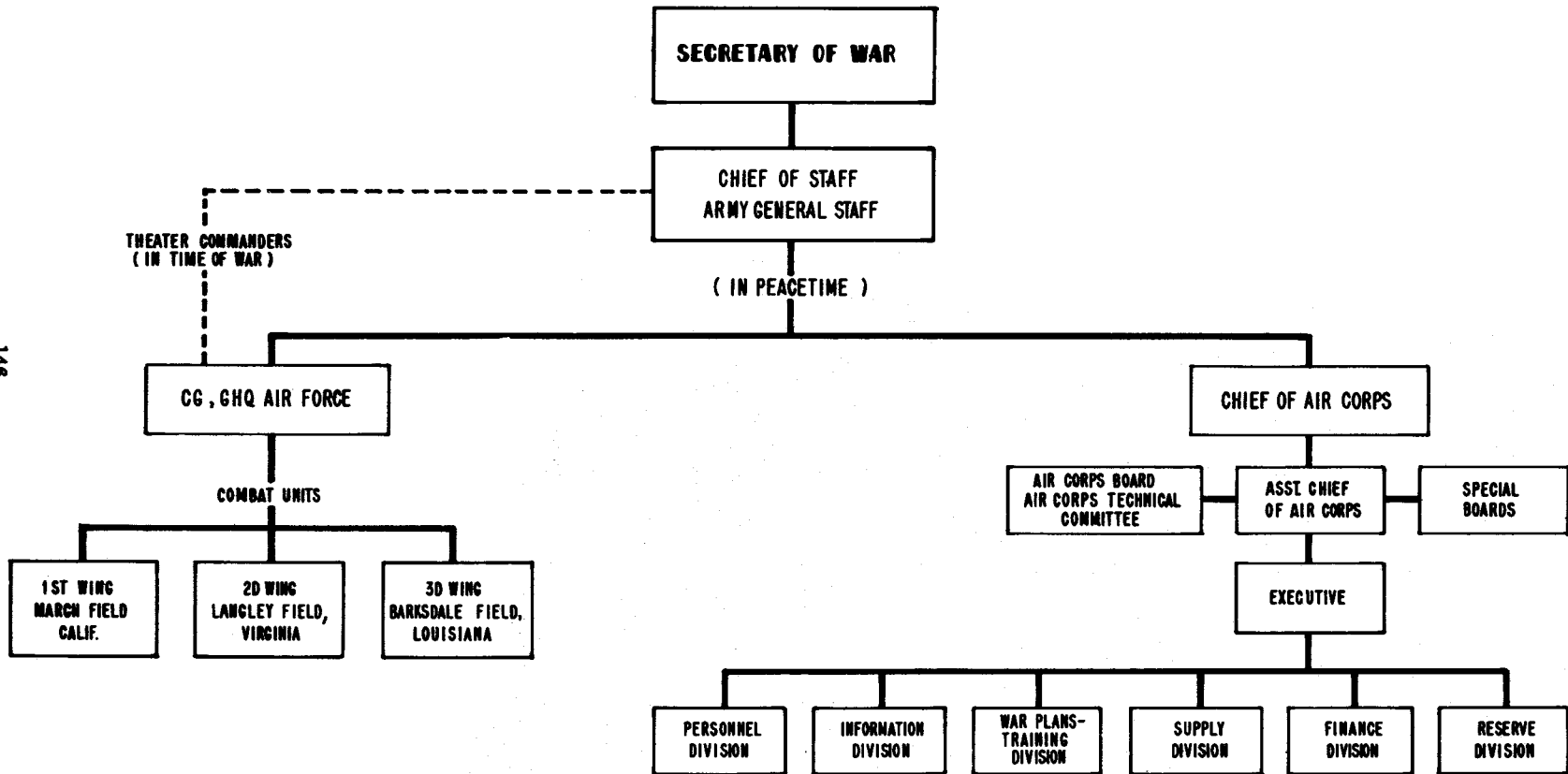


* ORGANIZATION OF THE AIR CORPS AS OF 26 NOVEMBER 1926. THE ORGANIZATION OF THE AIR ARM FLUCTUATED DURING THE PERIOD 1920-1934, BUT THIS CHART IS REPRESENTATIVE OF THE ORGANIZATION FOR THE PERIOD

THE ARMY AIR ARM

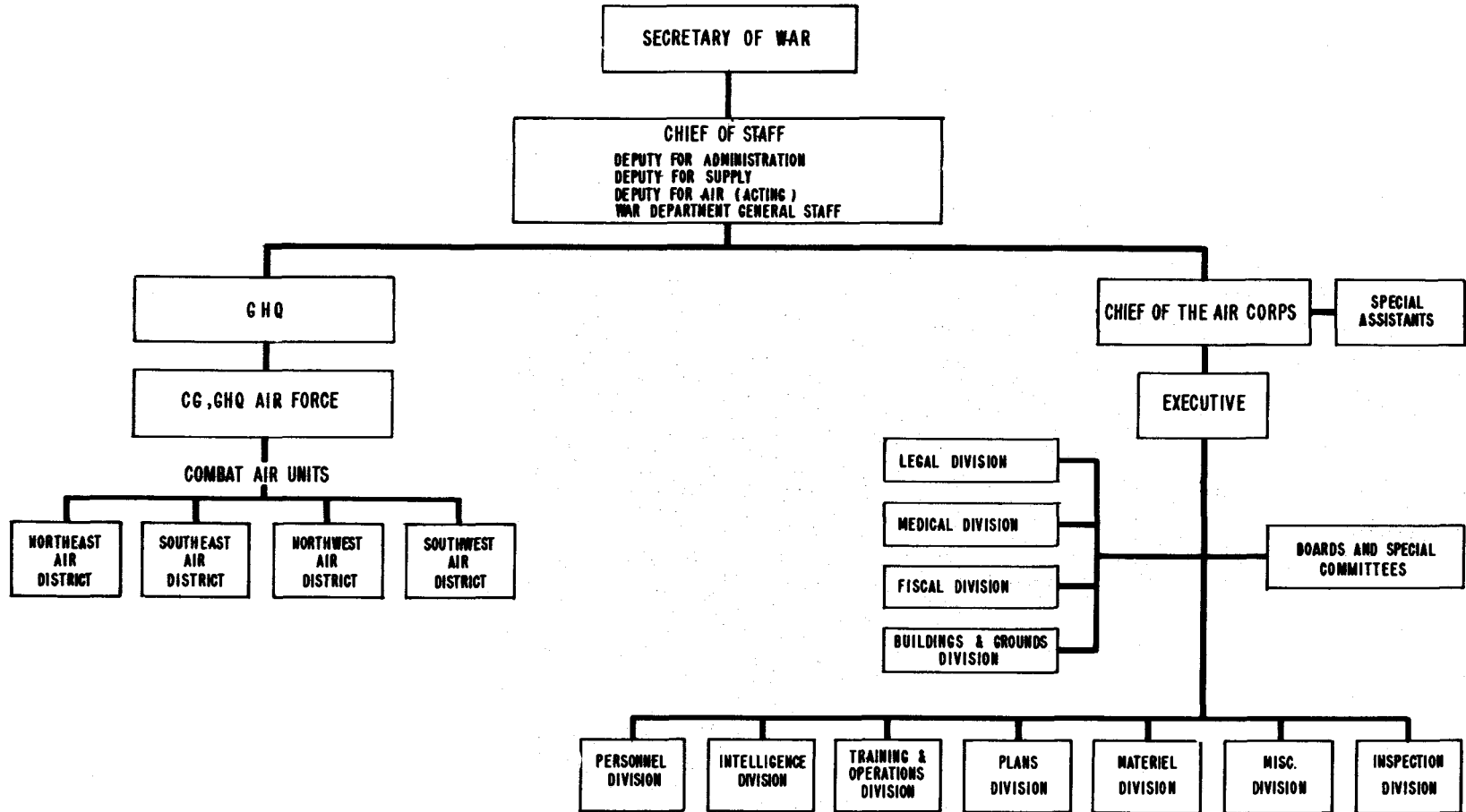
(LATE 1935)

146



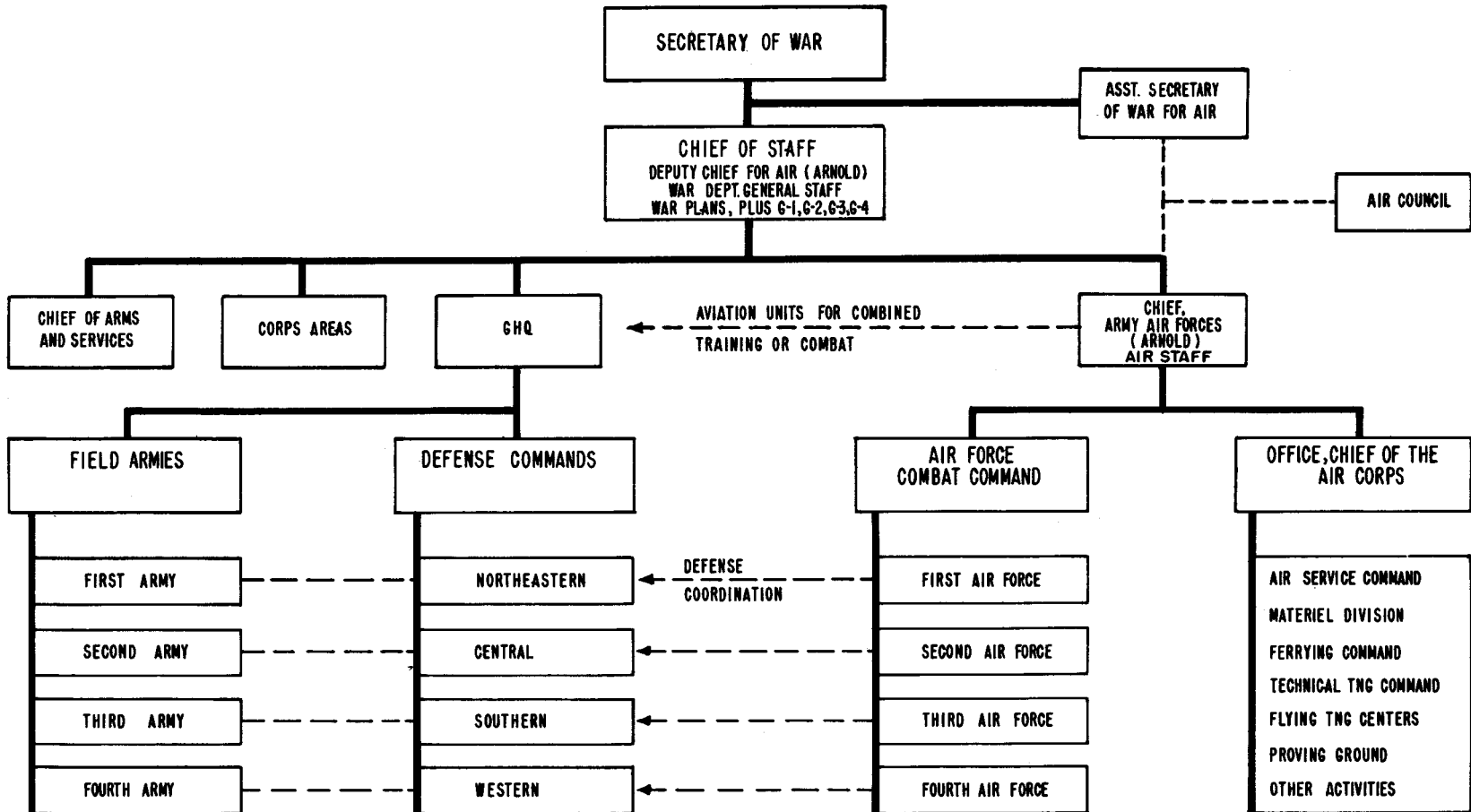
THE ARMY AIR ARM

(LATE 1940)



AVIATION IN ARMY ORGANIZATION, 1941 (20 JUNE-7 DEC.)

148



Appendix 2

REDESIGNATIONS OF THE ARMY AIR ARM, 1907-1942

Aeronautical Division, Signal Corps.

Created 1 August 1907 by Office Memo No. 6, Office of the Chief Signal Officer, 1 August 1907.

Aviation Section, Signal Corps.

Created 18 July 1914 by act of Congress.

(The law of 18 June 1914 did not specify that the official title of the section would be "Aviation Section." Hence, from July 1914 until May 1918 the aviation section of the Signal Corps had numerous redesignations, being named variously Aeronautical Division, Air Division, Division of Military Aeronautics, and others. For convenience, however, the air arm is usually referred to during this period as Aviation Section, Signal Corps).

(Air Service, American Expeditionary Forces was created on 3 September 1917 by Hq. AEF GO 31, 3 Sept. 1917 and remained in being until demobilized in 1919. Air Service, AEF, however, was distinct and apart from the evolution of the air arm within the War Department.)

Division of Military Aeronautics and Bureau of Aircraft Production.

Created as coordinate components of the air arm on 20 May 1918 by Executive Order.

(This Executive Order, issued under authority of the Overman Act of 20 May 1918, removed aviation from the jurisdiction of the Signal Corps and established the DMA and BAP as separate units under the War Department.)

Director of Air Service.

Appointed on 28 August 1918 by Secretary of War, and given supervision and direction over the Division of Military Aeronautics and Bureau of Aircraft Production.

Director of Air Service given complete control of DMA and BAP in March 1919 by Executive Order of 19 March 1919.

(In anticipation of this Executive Order, on 15 March 1919 Office of Director of Air Service was reorganized to conform as nearly as possible to the organization of the Air Service, AEF. On 11 July 1911, legislative authority was granted to continue the wartime organization of the Air Service as an independent branch of the War Department for another year.)

Army Air Service.

Given statutory recognition and established as a combatant arm of the Army by the Army Reorganization Act of 2 June 1920.

Army Air Corps.

Created by Air Corps Act of 2 July 1926.

GHQ Air Force.

Established as a coordinate component with the Air Corps on 1 March 1935 by TAG letter of 31 December 1934.

Army Air Forces.

Created on 20 June 1941 by Army Regulation 95-5.

(The AAF was to coordinate the activities of the Office of Chief of Air Corps (OCAC), the Air Force Combat Command (AFCC), (formerly GHQ Air Force), and other air units.)

Army Air Forces.

Reorganized as one of the three major army commands, and OCAC and AFCC abolished, by War Department Circular 59, 9 March 1942.

INDEX

A

- AAF: established, 127
ABC-1, 123-24
Aero Digest, 104
Aeronautical Board: 35; recommendations followed by Army and Navy, 68; and coast defense controversy, 69
Air Board: appointed, 113; membership, 113; report, 113, 118
Air Corps: proposed, 28; established, 29; versus Navy on land-based bombardment, 67-70
Air Corps Act of 1928, 29
Air Corps Board: on pursuit type, 65-66; on air defense, 76; on Air Corps mission, 76-77; on escort, 82; on bomber armament, 83; on attack aviation, 88, on Joint Action paper, 90
Air Corps Tactical School: 11; created from ASTS, 30; approval of aircraft specifications, 45; move to Maxwell Field, 47; and doctrinal development, 47-49, 51-57, 77; concept of nature of war, 48, 77-78, 110-11; influence of Mitchell and Douhet, 48-52, 58, 115; *The Doctrine of the Air Force*, 48; Air Force course text, 51, 53-56, 58, 72; *A Study of Proposed Air Corps Doctrine*, 51; Air Force course, 51-52, 79, 111-13; employment of airpower, 52-55, 78-79, 111-13, 115-16; and air defense, 52-53; texts, 54; offensive principles, 54-55, 78-79; and strategic aviation, 56-57, 60, 88-82; precision bombing, 57-58, 115-16; and ground support, 66-67, 88; observation course, 66-67; Attack course, 66-67, 88; on principles of centralized control of air force, 72; critical of Kilbourne's paper on role of GHQ Air Force, 74; divergence in teachings, 79-80; Pursuit course, 83; and attack aviation, 88; on pursuit, 120-21
Air Council, 127
Aircraft: design, 44-47, 88; development, 39, 44-47. *See also* fighter and bomber
Aircraft Board, 28
Aircraft Types:
 A-8, 67
 A-12, 67-68
 A-17, 67-88
 A-18, 88
 A-20, 88, 122
 A-24, 122-23
 A-32, 123
 A-36, 123
 B-2, 46
 B-9, 45, 47, 58
 B-10, 45, 47, 58, 60, 102
 B-12, 59-60
 B-15, 47, 69, 89, 95-96, 98-99, 101
 B-17, 45-47, 58, 83, 83n, 92-99, 101, 105, 116-19
 B-18, 83n, 92, 96, 98-99, 105
 B-19, 89, 96, 120
 B-20, 97-99
 B-24, 45, 118-19
 B-29, 47, 69, 96, 119
 B-32, 96, 119
 B-36, 47
 MB-2, 39
 NSB-4, 39, 44
 O-35, 45
 P-26, 59-60, 65
 P-35, 65
 P-36, 65
 P-38, 86-87, 121
 P-39, 86, 121
 P-40, 65, 85-86, 121
 P-51, 87n, 123
 PW-8A, 38
 XA-7, 67
 XB-1, 44
 XB-2, 44
 XFM-1, 66, 87, 121
Air Force Combat Command, 122, 127
Air Intelligence: office created, 10; functions, 10
Air officers: discipline, 2; contention with ground officers, 3-4, 14-16, 22-25; arguments, 21; divided, 21-22
Air Service: 1, 4-5, 26, 32; organization in AEF, 4-5; and pursuit tactics, 8; and industrial bombing, 10; *Air Service History*, 10; missions, 12; views on nature of war and air weapon, 15; distinction between official and unofficial doctrine, 16; contention with the General Staff, 25; 1923 manual on doctrine for bombardment, 38
Air Service Field Officers' School: established at Langley Field, Va., 29; director, 29; aim, 29; becomes Air Service Tactical School, 29; later Air Corps Tactical School, 30
Air Service Tactical School: established at Langley Field, Va., 16n; concept of war taught, 16; becomes Air Corps Tactical School, 30; Mission, 30; Air Force course, 40, 48; Air Force text, 40-43, 48; bombardment text, 41; Strategic Aviation concept, 42-43
Air supremacy, 5-9, 19
Air War Plans Division: 113, 124; membership, 124
American Aviation Mission, 20-21
Andrews, Frank M.*: 47, 95n, 96; and coast defense controversy, 70; heads GHQ Air Force, 73; on bombardment, 80, 82; on bomber development, 90-92, 94; on airpower, 94; on Italian Air Force, 102; on GHQ Air Force, 104; on Air Corps, 104-5; approves FM 1-5, 113
AR 95-5, 127
AR 95-10, 72
Army Reorganization Act of 1920, 25-26
Arnold, Henry H.: 28, 87, 96; and separate air arm, 2, 22, 104; compares air arm of WW I and WW II, 4; on Mitchell, 17; and bomber development, 47, 90, 119; bombardment vs. pursuit, 56, 59-60, 116, 120; on strategic aviation, 82, 107; on White House aviation conference, 100; on Japanese Air Force, 102; on GHQ Air Force, 104; sends observers to Europe, 109; on German airpower, 109, 117; on bombardment, 115-18; on RAF, 117; on precision bombing, 115-18; on B-29, 119; and pursuit aviation, 120
Attack aviation: concept emerges, 12; mission, 121-23; doctrinal development, 66-67; aircraft types, 67
Aviation experiments, 3
Aviation Section, 2-3
AWPD/1: 60, 110, 127-28; called for by President, 123; drawn and approved, 124; on air mission, 125; employment of airpower, 125-26; plane requirements, 125-26; and fighter escort, 126

B

Baker, Sec. of War Newton D.: appoints CSO, 2; orders investigation of aeronautics, 2; doctrine of aerial bombing, 14-15; directs Crowell to organize aviation study group, 21; establishes

*Because ranks of Army officers mentioned in this study changed frequently during the period of this study no ranks are given in this index.

Menohor Board, 21; opposed to separate air arm, 23
 Baker Board: report on employment of the Air Corps, 71, 73; appointed, 73; membership, 73
 Beck, Paul: and separate air arm, 2; bomb experiments, 3
 Benedict, Dorothy, 51
 Bingham, Sen. Hiram, 28
 Bissell, Clayton: on bombardment vs. pursuit, 82; criticizes Chennault's ground net, 84-85; on pursuit type, 86; on attack aviation, 87
 Bombardment. *See* Bomber and Precision bombing.
 Bomber: types in 1920's 38-39; delay in development, 39; design and development, 44-47, 93, 95-96, 118-19; B-12 vs. B-26, 59; light, 88; long-range, 89-101, 118-19; versus pursuit, 115-17, 120-21. *See also* Aircraft and Aircraft types.
 Bombsights: Norden Mark XV, 57
 Bradley, Follett: 47; on separate air arm, 126
 Breckenridge, Asst. Sec. of War Henry S., 1
 Burns, J. H., 96, 99

C

Carter, Warren R.: on divergence of Tactical School, 79
 Cassidy, J. Edward: on air defense, 32
 Chaffee, A. R.: 96; opposes bomber program, 98
 Chandler, Charles DeF.: machine gun experiment, 3; separate air arm, 22; on Douhet, 51
 Chaney, J. E.: on German airpower, 117; and air research and development, 119
 Chennault, Claire L.: 82; on formation tactics, 8; on bombardment vs. pursuit, 55-56, 58-59; on ground net, 59, 64; criticism of Arnold's statement, 59-60; on doctrine of pursuit, 61-66; on pursuit tactics, 62-66, 85; "The Role of Defensive Pursuit," 63-64; on pursuit types, 65-66
 China. *See* Sino-Japanese War.
 Coast defense: 31-33; Navy vs. Air Corps, 33, 67-69; Army and Navy policy, 68; Joint Board assigns, 68; and bomber program, 88
 Coffin, Howard E., 21, 28
 Cologne, 11
 Combined Chiefs of Staff, 127
 Congress: 27-28; and separate air arm, 1, 20-21; and air research and development, 118
 Coolidge, President Calvin, 26, 28
 Craig, Malin: 91, 100; and bomber program, 96-97, 99
 Crowell, Benedict C.: and Crowell Mission, 21; separate air arm, 22
 Crowell Mission: 20-21; members, 21; report, 21
 Culver, C. C.: 47; and bomber development, 45; and "The Doctrine of the Air Force," 48
 Curry, Rep. Charles F.: bill for independent air arm, 20

D

Daniels, Sec. of the Navy Josephus: and separate air arm, 24
 Dargue, H. A.: 47; aviation experiments, 3
 Defense: as basis of air doctrine, 30, 32
 de Montgelas, Gen. Max, 51
 Department of Aeronautics: 23; campaign for, 20; bill for, 20
 Department of National Defense, 25-26, 28-29
 de Seversky, Alexander: on fighters, 85; on airpower, 104; on German vs. British airpower, 110
 Dickman Board: appointed, 24; report on lessons of World War, 24
 Dickman, Joseph T., 24
 Douhet, Giulio: influence on ACTS, 48-52; writings, 49, 51
 Drum Board: report on employment of the Air Corps, 71, 73

Drum, Hugh, 71
 Dusseldorf, 11
 Duval, General: on potentialities of airpower, 25

E

Eaker, Ira C.: on Douhet, 50; on development of strategic concepts, 82; on pursuit types, 85; on the Air Corps' limited range offshore, 91, and German airpower, 109
 Echols, Oliver P.: 96-97; and air research and development, 119
 Edison, Sec. of Navy Charles, 100
 Eliot, George Fielding, 90
 Ely, H. E.: on air viewpoint, 32-33
 Embick, Stanley D.: 90, 101; opposes air force development, 95; opposes bomber development, 97-99
 Emmons, Delos: on British airpower, 110; on need for pursuit, 120
 Engineering Division: and bomber development, 39
 Ethiopian War, 102

F

Fairchild, Muir S.: 105; on Munich conference, 103, 111; on German airpower, 109; on nature of war, 111; on employment of airpower, 111-13; on bombardment, 115-16
 Fechet, James E.: yields to General Staff on bomber design, 45; and ACTS, 48; calls conference on pursuit, 61
 Federal Aviation Commission: appointed, 52; investigations, 52; and ACTS instructors, 52; on employment of air force as independent units, 72-73; report, 73
 Fickel, Jacob E.: and aviation experiments, 3
 Fighter: types in 1920's, 37-38; P-26 vs. B-12, 59; interceptors, 85-87; single seater vs. multiseater, 86, 120-21, 126; long-range, 120-21, 126; as escort, 120-21, 126. *See also* Aircraft.
 FM 1-5, 111, 113-15, 121-22
 FM 1-15, 120-21
 Foch, Marshall: approves Mitchell's recommendations, 5; on potentialities of airpower, 25
 Fokker Anthony, 7
 Formation flying: German, 7; in pursuit, 8
 Foulois, Benjamin D.: 28; and separate air arm, 2, 22; on bombing effects in WW I, 15, and bomber development, 46; and Douhet, 50
 Frank, Walter H.: 50-51; on Douhet, 51
 Frankfort, 11

G

Gardner, Grandison, 85
 General Staff: 15, 22, 28, 31, 58, 91; and separate air arm, 1-2, 20, 25; and military aviation, 2, 14; doctrine of War, 16; view reflected in Bombardment text at ASTS, 41; and pursuit types, 66; War Plans Division, 69; bomber procurement, 92-93, 97; fights bomber development, 94-95, 99-101; metamorphosis, 107-8
 George, Harold L.: 41, 124; appears before Federal Aviation Commission, 52; bombardment vs. pursuit, 56-57, 117; refutes Baker Board, 71; and Navy efforts to control bombardment, 118
 GHQ Air Force: 26, 44, 53-54, 90, 127; established, 29, 70, 73; organization, 27, 73-75, 105-6; role, 74; planes intercept liner *Rex*, 91; mission, 115
 GHQ Reserve, 4-5, 27, 72
 Gorrell, Edgar S.: exposition of bombardment doctrine, 10; study of bombing situation, 10; becomes head of Strategical Aviation Branch, 10; plans for strategic force, 11-12, 38; promoted to Air Service officer of G-3, 11; and Air Service mission, 15

Grey, Spencer, 11
 Ground support: 32; observation, 7, 32; counter-air force, 32; doctrinal development, 66-67; changing ideas of equipment for, 122
 Groves, P.R.C.: quoted by Patrick, 19

H

Hansell, Haywood S., Jr.: 124; on escort, 60, 126; on the development of ACTS strategic concepts, 81-82
 Harmon, Millard F.: on pursuit, 83-84
 Hay bill, 1-2
 Hay, Rep. James, 1
 Hines, John L., 29
 Hitler, Adolph, 100, 119, 123
 Hopkins, F. M.: 115; on attack aviation, 121-22
 Hopkins, Harry, 100
 Howell, Clark, 73
 Howell Commission. *See* Federal Aviation Commission.
 Hughes, J. H., 96
 Hurley, Sec. of War Patrick J.: on coast defense controversy, 68

I

Indiana, 34

J

Joint Army and Navy Board: conclusions from ship bombing tests, 34; on coast defense, 68, 90-91; paper on functions of Army and Navy air arm, 68-70, 89-91; and bomber development, 99; and war requirements, 124; and strategic policy, 124-25
 Joint Chiefs of Staff, 127

K

Kenney, George: 51; on air defense, 53; on ground support, 66-67; observer in Europe, 108
 Kerr, Admiral: on potentialities of airpower, 25
 Kilbourne Board: appointed, 35; report, 35
 Kilbourne, Charles E.: 35; and role of GHQ Air Force, 74
 Kilner, W. G., 28, 105
 King, Adm. Ernest J.: 127; repudiates agreement on coast defense, 69
 Knerr, Hugh: 47; and bomber development, 45, 82; on escort, 82; on pursuit types, 86
 Knudsen, William, 108

L

LaGuardia, Fiorella H., 22
 Lampert Committee: appointed, 28; membership, 28; report, 28; recommendations on air organization, 28
 Lampert, Rep. F. F., 28
 Landis, Reed, 28
 Lassiter Board: membership, 26; report, 26-27; recommendations on air organization, 27; influences TR 440-15, 40
 Lassiter, William, 26
 Liddell-Hart, Basil H.: *Paris: Or The Future of War*, 19; views on nature of war, 19; influence on U.S. airmen, 19
 Lieb, Rep. Charles: and separate air arm, 2
 Lovett, Robert A.: on ground support, 122
 Ludendorff, Gen. Eric, 51
 Luftwaffe, 83, 117, 119

Mc

McAndrew, J. W.: admonishes General Patrick, 4; on air-ground relations, 4
 MacArthur, Douglas: and coast defense controversy, 68-69; on GHQ Air Force, 74-75
 McSwain, Rep. John J., 50

M

Mannheim-Ludwigshaven, 11
 Marshall, George C.: 100; promotes Roosevelt's aircraft program, 101
 Martin, Glenn L., 22
 Materiel Division: and bomber development, 39, 44-47
 Mauborgne, J. O.: aviation experiments, 3
 Me-109, 85
 Menoher, Charles T.: Menoher Board, 21; report, 21; opposed to separate air arm, 22-23
 Meuse-Argonne, 5-6, 54
 Meyer, Prof. Andre, 51
 Miles, Sherman, 96
 Milling, Thomas DeW.: machine gun experiment, 3; comments on early aviation, 3; on doctrine, 3; in charge of ASTS, 16; on separate air arm, 17
 Mitchell, William: 14, 42, 54; and concentration of force, 5-7; and control of the air, 5-7, 31; operational plans, 5-6; flexibility of airpower, 6-7, 50; on pursuit, 9, 37; on bombardment and strategic aviation, 9-10, 38, 55; on attack aviation, 12-13, 39-40; court-martial, 14, 14n; crusade for airpower, 16-19, 50; fight for separate air arm, 2, 17, 22; inconsistent, 17; *Winged Defense*, 18; on air organization, 22; and Morrow Board, 28; on counter-air employment, 31; on air defense, 31; on coast defense, 33-34, 36, 67; and bomb-dropping tests, 34; influence on ACTS, 48-52; on GHQ Air Force, 75
 Moffett, Rear Adm. W. A.: and coastal defense, 68
 Monell, A.: succeeds Gorrell, 11-12
 Monroe Doctrine, 76-77
 Morgenthau, Sec. of Treas. Henry, 100
 Morrow Board: appointed, 28; membership, 28; witnesses, 28; report, 28-29; conclusions, 28-29
 Morrow, Dwight W., 28
 Munich Conference, 100, 102, 107
 Mussolini, Benito, 102

N

National Advisory Commission for Aeronautics, 128
 Navy Department: 22, 28, 32; opposed to separate air arm, 23-24; on coast defense, 35; General Board, 28
 Navy, U.S.: attitude of officers on separate air arm, 24; versus Air Corps on land-based bombardment, 67-70; on air defense, 31; on coast defense, 33-34, 36, 67; and bomb-dropping tests, 34; supports Drum and Baker boards, 72; fights Air Corps long-range program, 90-91, 97
 New Jersey, 34
 New, Sen. Harry S., 22
 Nieuport XXIII, 7

O

Office of Chief of the Air Corps: and ACTS, 48, 55; on The Doctrine of the Air Force, 48; and ACTS bombardment theories, 55, 59; bombardment vs. pursuit, 58; on coast defense, 69; jurisdiction over GHQ Air Force, 106, 127; and attack plane, 122; and reorganization of air arm, 127; and Kilbourne Board, 74
 Olds, Robert, 47

P

Parker, James E., 82, 84
 Partridge, Earle E.: on escort, 83; on warning net, 85
 Patrick, Mason M.: 4, 28, 32, 42, 54; on attack aviation, 12; manual accepts General Staff's doctrine of war, 16; reflects influence of Liddell-Hart, 19-20; on air supremacy, 19-20; relates nature of war to air arm, 20; symbolizes Air Service spirit, 25; on airpower, 25-26, 33; on air organization, 26-27; proposes Air Corps, 28; on air defense, 34, 36; and bomber development, 39, 44; and coast defense, 68
 Patterson, Robert P.: on long-range bomber, 108
 Pershing, John J.: 5; on airpower, 3-4; opposed to separate air arm, 23; appoints Dickman Board, 24
 Pratt, Adm. William V., 68
 Precision bombing, 115-18
 Principle of mass, 11
 Project A: 47, 96, 98; approved by WD, 69
 Project D: 89, 120; approved by WD, 96; controversy, 96-97; conference, 96-97
 Pursuit, 7, 61-62; equipment, 8; pilots, 8; organization, 8; tactics, 8, 62-66, 120-21; versus bombardment, 55-60; doctrinal development, 36-38, 66-67; single seater vs. multiseater, 64-66, 85-86, 120-21; types, 37, 85-86; need for in WW II, 120-21; mission, 120-21. *See also* Fighter.
 Pursuit Development Board, 65

R

RAF: 120, 126-27; becomes separate service, 9; opinion on day bombing, 116
 Reconnaissance, 3, 7
 Rickenbacker, Eddie, 7
 Robins, A. W., 101
 Roosevelt, President Franklin D.: 72, 103, 124; and separate air arm, 24; and aircraft procurement and development, 100-101, 118; calls White House aviation conference, 100; reaction to Munich, 107; aviation program, 108, 118
 Russian front, 122

S

St.-Mihiel, 5-6, 54
 Scott, Riley E.: bombsight, 3
 Scriven, George P.: 1; and military aviation, 2
 2d Bombardment Group, 45
 Sherman, William C.: summary of military theory, 16; "The Fundamental Doctrine of the Air Service," 16
 Signal Corps, 1-2
 Single-seater: in pursuit aviation; 7-8, 64-66, 85-86, 126
 Sino-Japanese War, 102
 Slessor, John C.: on strategic aviation, 80
 Smith, Frederic H. Jr., 91
 Spaatz, Carl: 28, 74; on pursuit, 37-38; on attack aviation, 87-88; on bomber mission, 93; observer in Europe, 108; on British, 110; on German airpower, 110; and Navy efforts to control bombardment, 118
 Spaight, James M.: on coordinate air arm, 70-71
 Spain. *See* Spanish Civil War.
 Spalding, George R.: 96, 101; opposes air force development, 95; opposes Project D, 96-97
 Spanish Civil War: influences attack doctrine, 87; air action, 102-3, 122
 Spitfire, 110

Squier, George O.: appointed chief Signal Officer, 2
 Stark, Adm. Harold, 100
 Stearley, Ralph: on Italian Air Force, 102; on Spanish Civil War, 103
 Stimson, Sec. of War Henry L.: orders changes in air organization, 127
 Strategic bombardment: 9-10; doctrine, 10
 Stuka, 110

T

TR 10-5: enumerates "Doctrines, Principles, and Methods," 16
 TR 440-15: 33, 40n, 40-43; revised to include role of GHQ Air Force, 74; superseded, 113
 Training and Operations Group: Westover criticism activities, 23
 Trenchard, Sir Hugh M.: and strategic aviation, 9; and IAF, 9; program of bombardment, 9-10
 Tyner, George P.: on long-range bomber development, 97-99

U

Virginia, 34
 von Richthofen, Baron, 7

W

Walker, Kenneth N.: 47, 57, 124; on bombardment vs. pursuit, 56; on air defense, 71
 War Department: 14, 22, 32, 44, 71; opposed to separate air arm, 23-25; Annual Report 1919, 23; favors Morrow Board report, 29; Assistant Secretary of War for Air created, 29; on air defense, 30-31; on coastal defense, 35; and pursuit types, 66; approves Project A, 69; establishes GHQ Air Force, 73-74; regards GHQ Air Force as solution, 74; limits Air Corps' off shore range, 91; bomber procurement, 92-96, 107-8; and air research and development, 118; and air arm war requirements, 124
 War Plans Division: on coast defense, 69
 Webster, Robert M.: 57; refers to Drum Board, 71; on tactics, 79; recommends change in ACTS program, 79
 Weeks, Sec. of War John: appoints Lassiter Board, 26
 Westover, Oscar: 96; on separate air arm, 23, 104-5; criticizes Mitchell, 23; bombardment, 80; and attack aviation, 88; plea for a stronger air force, 89; and bomber development, 92-93, 97, 99; on Spanish Civil War, 102; accepts subordinate position of Aviation, 104-5
 White House aviation conference, 100
 Williams, Al: 104; on German airpower, 109
 Wilson, Donald: on Douhet, 51; appears before Federal Aviation Commission, 52-53; bombardment vs. pursuit, 56; on precision bombing, 57-58; on employment of airpower, 78; on pursuit, 84; on separate air arm, 105; on German airpower, 109; on nature of war, 111
 Woodring, Sec. of War H. H., 100; bomber program, 97-100

XYZ

Zepplin raids, 9
 Zero, 86