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THE EARLY OPERATIONS OF THE EIGHTH AIR FORCE AND THE ORIGINS OF THE COMBINED BOMBER OFFENSIVE

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THE EARLY OPERATIONS OF THE EIGHTH AIR FORCE
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17 August 1942 to 10 June 1943

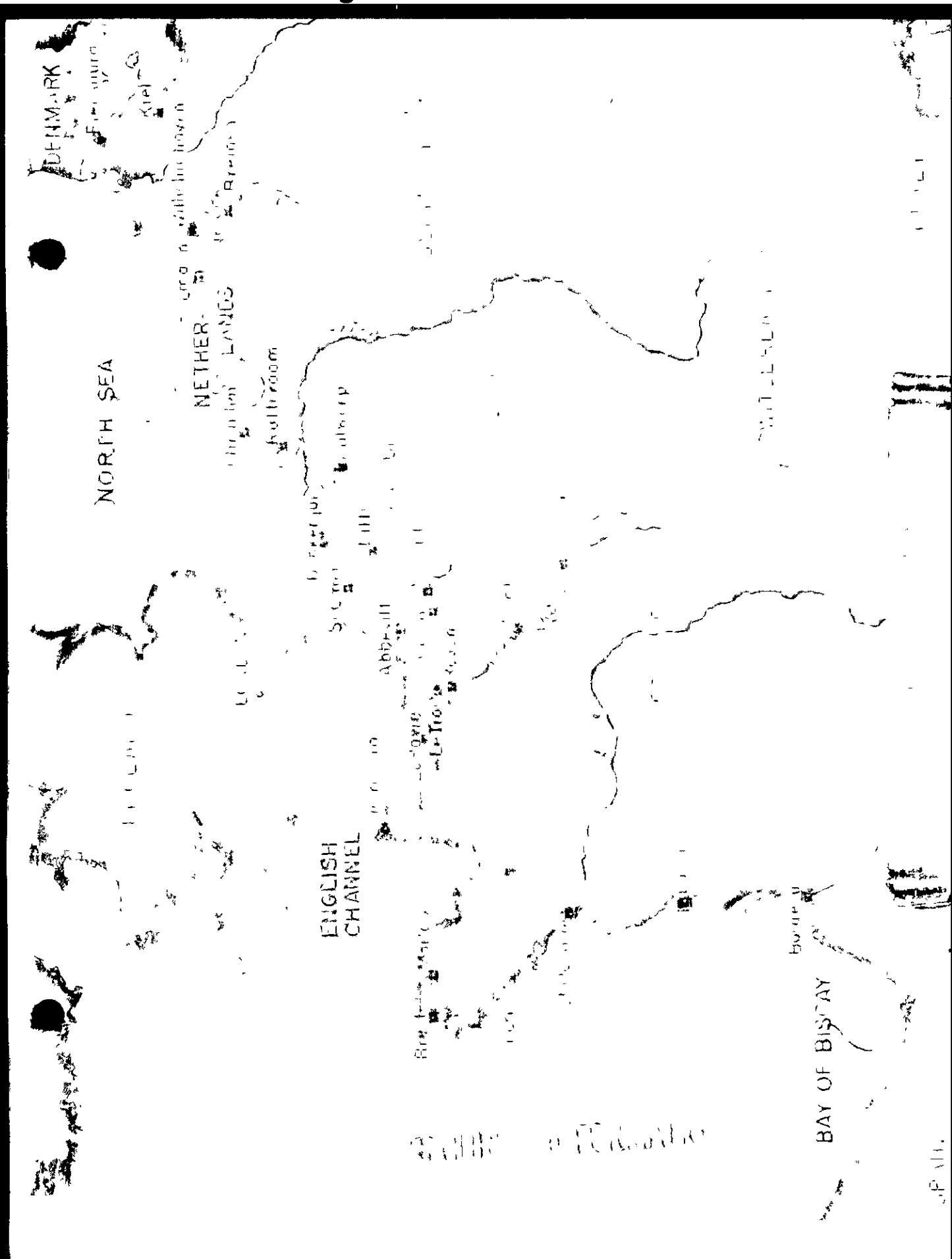
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FOREWORD

This monograph recounts the development of the Combined Bomber Offensive Plan during the early months of Eighth Air Force bomber operations (17 August 1942 to 10 June 1943). The subject covered here is related to several other histories prepared by the AAF Historical Office: AAFRH-2, Origins of the Eighth Air Force: Plans, Organization, Doctrines to 17 August 1942; AAFRH-19, The Combined Bomber Offensive, April through December 1943; AAFRH-22, Strategic Bombing of Europe, 1 January to 6 June 1944; and other studies which narrate operations of the various air forces against European targets. The present study was written by Lt. Arthur B. Ferguson of the Combat Operations Branch.

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

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Eighth Air Force Targets, 17 August 1942 to
10 June 1943 Frontispiece

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The Early Operations of the Eighth Air Force
and the Origins of the Combined Bomber Offensive

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Chapter I

THE PROBLEM

When 12 B-17's of the VIII Bomber Command took to the air on 17 August 1942 for a high-level daylight attack against the Sotteville Marshalling Yard at Rouen, they carried with them much more than a bomb load of trouble for the enemy. They carried with them a long heritage of debate and controversy. And they began an experiment in strategic bombardment which was to answer a number of questions vitally affecting the entire course of the war in Europe. The campaign began in an atmosphere of skepticism concerning the ability of U. S. heavy bombers to carry out daylight operations at high altitude in the face of powerful enemy fighter defenses, and of indecision concerning the precise nature of the bomber offensive toward which these American forces were supposed to contribute. It was not even clear at that date exactly how strategic bombardment from the United Kingdom should fit into the over-all strategic picture. By June 1943, however, the American bomber force was prepared to take its part in the Combined Bomber Offensive,* an operation possible only after all major doubts and indecisions, both tactical and strategic, had been for practical purposes removed. Toward the attainment of this end, the early operations of the Eighth Air Force contributed a vital, perhaps a determining influence.

* The CBO Plan, approved late in May 1943, outlined four phases for the combined operation, the first beginning with April of that year. Some reports on the progress of the CBO follow the plan and consider the offensive to have begun in April. The CBO Directive, however, was not issued until 10 June, and it is considered in the present study that all operations prior to that date are preparatory to the CBO proper.

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It would be a large labor of small value to trace in detail the story of these first 60-odd missions conducted from August 1942 to June 1943, or to treat them as if they constituted in themselves more than a minor, if highly effective, part of a vast undertaking. Those who are interested in the detail will find the mission reports voluminous, well arranged, and available. It will therefore be the purpose of this study to show how these operations became an active element in the strategic planning of the period and to follow the debate which, with constant reference to the doctrines and achievements of the Eighth Air Force, culminated in a plan for the full-scale Combined Bomber Offensive.

Among the controversial questions affecting the use of air power in the European Theater were certain strategic issues involving decisions on the highest policy-making level. By August 1942 these issues either had barely been settled or were still in the open forum. Although basic Allied war plans had indicated Germany as global enemy number one, it was still an open question to what extent U. S. heavy bombardment should be committed to operations in the European Theater at the expense of those in the Pacific. To the men in charge of the Pacific war, especially to the U. S. Navy, it seemed by no means clear that the war against Germany should receive unquestioned priority in air equipment, if indeed it should receive priority at all.¹

The Combined Chiefs of Staff had, in July 1942, decided that U. S. commitments to BOLERO (the build-up of U. S. forces in the United Kingdom) should be readjusted for the purpose of furthering offensive operations in the Pacific.² Accordingly 15 combat groups, including 3 heavy

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bombardment and 2 medium bombardment units, were to be diverted. It appears, however, that not all the groups were sent as planned, and the problem of diversion to the Pacific remained a source of considerable argument, much of which turned on the ability of the U. S. heavy bombers to do a job in northwest Europe of sufficient strategic value to justify the degree of priority required by a major aerial offensive in that area.

There was also the question of priority in production, a question by no means settled in August 1942, even on paper. Faced with the necessity of using limited resources to meet demands which seemed virtually unlimited, the higher authorities had to allot priorities carefully in accordance with very long-term strategic concepts. There was a very natural tendency in weighing the relative importance of air, ground, and naval equipment to give a relatively high place to those items--tanks and battleships--which had long tradition behind them, and to view with some caution the claims of air power to first priority. A bombardment offensive from the United Kingdom had been envisaged in the war plans as a necessary prerequisite to the invasion and ultimate defeat of Germany. The Air Corps had, in 1941, contended that, with adequate forces, they could carry out a bomber offensive which would make an assault on Festung Europa relatively cheap in men and ground materiel. But they had to have the aircraft, and have them in unprecedented numbers. That meant, in effect, first priority in production. The question again arose in the fall of 1942, this time in connection with a new statement of air requirements (AMPD-42) which once more

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postulated a large-scale bomber offensive against the heart of Germany and which bore the same implications with regard to priority. This time the estimate became the center of a very critical debate.

The AAF argument on both these issues, priority for the European Theater and priority in production, rested on the assumption that it was feasible for U. S. forces to join the RAF in a bomber offensive against Germany's industrial and military system on a scale sufficient to weaken the enemy's ability to wage war to such an extent that a land invasion could be undertaken with a minimum of losses. Both American and British air men gave a heartily affirmative answer. But the answer given arose out of deep faith in the potentialities existing in long-range heavy bombardment aviation rather than from any fund of actual experience. The German efforts to cripple Britain in 1940-41 and the subsequent bombardment of Germany by the RAF had provided inadequate indications of what might be done. Both campaigns had been projected on too limited a scale to do more than hint at the possibilities inherent in the employment of really large bombardment forces. And so, the proportion of the total war effort to be invested in the bomber program, was the crux of the argument; for no one denied that bombardment of the enemy's vitals would be a very beneficial thing, considered in the absolute, or that it would constitute a necessary part of the plan for the ultimate defeat of Germany. Moreover, the particular method of bombardment advocated by the AAF remained entirely an article of faith as far as tests in combat, under European conditions, were concerned.

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Thus the answer to the question regarding the feasibility of a full-scale bomber offensive against Germany in turn depended on the answer to another question essentially tactical in character. Since participation by the IAF was necessary to such an offensive, and since the AAF had become committed for the immediately foreseeable future to a policy of daylight bombing of precision targets from high altitudes, it was of the utmost importance to know whether the American bombers could really do this kind of job. Could they hit the targets accurately enough and often enough under European conditions, and with a sufficiently low percentage of losses, to make their contribution to a combined bomber offensive worth the necessarily huge investment? That is why, on 17 August 1942, the Eighth Air Force found itself being watched from all sides with a degree of intensity quite out of proportion to the extent of the actual operation undertaken.

They were being watched also for another and somewhat less fundamental reason. There was a strategic problem under consideration in August of that year which did not directly affect the concept of strategic bombardment of the European Axis but which did very definitely affect the method by which the heavy bomber forces were to be employed and for a time even jeopardized the entire project for a day offensive from the United Kingdom. It had been tentatively decided in July that BOLERO, including the air build-up, could no longer be given unquestioned priority. By midsummer the key to the strategic situation in Europe lay in the ability of the Russian Army, generally admitted to be potentially the greatest asset to the Allies in that critical year, to withstand the weight of German attacks. Something had clearly to be done,

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and very soon, to relieve this pressure on the Eastern Front. But the Allied invasion of Western Europe, projected for 1943, might well come too late, and might also prove to be a premature and dangerous undertaking, especially should the situation on the Eastern Front continue to deteriorate. The only remaining way of forcing substantial diversion of German forces, short of a costly and inconclusive minor action in northwest Europe (SLIDESHOWER), was to conduct a combined operation in North and Northwest Africa. But it was clear that any such campaign would necessarily postpone the full scale invasion of Europe (ROUNDUP) and, as a corollary, the prosecution of BOLERO.

The British were glad enough to defer the risks of a premature cross-Channel invasion, but they were concerned that the bomber offensive, in which they had invested both faith and forces, should not be abandoned. The U. S. Joint Chiefs of Staff assured them, however, that, although air units for the African invasion would have to come from BOLERO, it was planned that the AAF should operate against Germany from any suitable base and that, owing to the unfavorable weather in northwest Europe, Africa might offer a more suitable base of operations than England, at least for the winter months. It was accordingly decided late in July to continue BOLERO as the main Allied effort only so long as no other invasion effort became imperative, thus making ROUND-UP impracticable for 1943. If by 15 September 1942 the Russian situation still appeared critical, the decision to launch the African operation should be made at the earliest possible date before December 1942.³

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The decision to mount FORCE, as the African invasion was called, would mean the diversion from the Eighth Air Force of a major proportion of its strength, both actual and planned. The combat units needed in Africa could hardly be obtained elsewhere, because all other active theaters had been allocated only enough to meet a minimum defensive requirement. It would also mean that a really effective day bomber offensive from the United Kingdom would have to wait until an African victory released the diverted combat units. If this course of action were to be pursued (and there was every reason in August to believe that it would) it would involve serious questions as to the advisability of continuing the U. S. bomber offensive from the United Kingdom at all, at least for the time being. There was some doubt whether the day bomber force, necessarily small in view of the proposed diversions, could produce results commensurate with the risk involved in exhibiting vitally important equipment prematurely to the enemy.⁴ And it came in the fall of 1942 to be seriously debated whether, in view of the unfavorable weather conditions in northwest Europe, it would not be wise to shift the entire bomber effort to African or Mediterranean bases.⁵ Here again the arguments could only be answered by operational data; and again it was up to the Eighth Air Force, even though handicapped by inadequate strength, to furnish the required information.

Although at this date the concept of daylight, precision bombing was on trial, and in some degree that of strategic bombardment as well, much had been done to prepare for a bombing offensive by the combined British and American air forces against the sources of Germany's war effort. After much negotiation with the British, plans had been laid

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to organize, base, and equip a force of ~~air~~ units in the United Kingdom as part of the BOLERO operation. By the end of the summer of 1942 the Eighth Air Force, as the units in the United Kingdom came to be called, had become a functioning organization under the leadership of Maj. Gen. Carl A. Spaatz, with appropriate subordinate commands--bomber, fighter, composite (for training purposes), and service. Under Brig. Gen. Ira C. Eaker, the bomber command (the one with which this study is almost exclusively concerned) had been organized in three wings: the first, under Col. Newton Longfellow, with headquarters at Granston, the second, under Col. J. P. Hedges, with headquarters at Old Catton, and the third, under Col. C. A. Philips, with headquarters at Alvedon Hall.⁶ Of the heavy groups allocated to the Eighth Air Force, only one had become operational by 17 August, although several more were in training, at staging areas, or en route from the United States.⁷

The RAF had, of course, been employing much larger forces in an offensive of its own. On the night of 6/7 March 1942, for example, the British bombers had been able to hit the Renault works, at Billancourt, on the outskirts of Paris, with 400 tons of high explosives in an operation which had very lasting effects.⁸

But in August 1942 the Allied air forces in the United Kingdom--even the RAF--were considerably better equipped with ideas than they were with aircraft. Both U. S. and British air men were adequately stocked with faith in the virtues of strategic bombardment. In this regard, as in that of air strength, the British were in a position somewhat senior to the Americans. They had been carrying on a bomber offensive against strategic objectives for many months, and, more significant,

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they had faced since 1917 a military problem closely related to that with which they and their allies in the United Kingdom were confronted in 1942. In the U. S. a doctrine of strategic air operations had been developed largely since 1918 by a few forward-looking military thinkers who followed in the path dramatically indicated by General Mitchell.⁹ And it had been modified with particular reference to problems of hemisphere defense. To a considerable extent it remained an academic theory, the practical application of which was directed by logic and scientific experiment rather than by combat experience. British doctrine, on the other hand, stemmed directly from the cataclysmic experience of 1917-18 and had matured under the threat of just such conditions as had materialized since 1939.

In world war I, Britain had, for the first time in her history, been forced to commit a huge citizen army to land operations on the Continent of Europe. She had found it a costly policy. Strictly limited in her manpower, she had risked disaster in a land battle such as that in which the combatants were by 1917 engaged on the stabilized Western Front. In October of that year Winston Churchill had expressed his concern in a memo to the War Cabinet.¹⁰ This was, he said, a battle in which maneuver was no longer possible; the enemy could not be outflanked for the simple reason that there were no flanks in lines stretching continuously from the Alps to the sea. Only the Germans, by means of their submarine fleet, had succeeded in circumventing the rigidity of this fixed front. The answer was to him clear and compelling. Air power could strike at the life lines of Germany's war machine even more effectively than Germany's submarine offensive could operate

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against the sources of Allied power. It was becoming apparent, in view of the progressive exhaustion of manpower among all the combatant nations, that the character of the war was about to change from one of men to one of machines.¹¹ In this industrial war the nation that commanded the air could destroy the industrial power of the enemy and in the long run win. And the British Empire, relatively richer in material resources and industrial means than in available manpower, could if it wished, seize control of the air by a large program of air production, thereby redressing the balance of potential power in its own favor.

The plan for the bombardment of the interior of Germany by an Inter-Allied Bombing Air Force, maturing as it did in the autumn of 1918, came too late to have much effect on the course of that war. But the principles upon which it was built deserve some attention, for they became firmly rooted in British thinking. Apparently largely the work of British strategists, among whom Maj. Gen. H. E. Trenchard seems to have been the leading spirit, this plan was conceived on an ambitious scale. Germany's economic situation was analyzed and objectives chosen which would paralyze the chemical industry, the iron and steel industry, and the vital centers of transportation.¹² The targets to be attacked were, however, the city areas rather than the particular plants and facilities that gave them their strategic importance. Undoubtedly the planners came to this decision because the imperfect technical equipment available would place any more precise tactics out of the question. But it is also worth noticing that they had in mind the demoralization of the population in these areas as an end in

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itself.¹³ There was a concept of total aerial warfare that reflected a keen insight into the complexity and totality of all modern war effort.

Yet for all their belief in the interdependence of the parts in a combatant society, they insisted on the absolute necessity of concentrating their efforts on a few key objectives rather than spreading their attacks indiscriminately among a large number. Objectives "must be as small in number as is necessary for effective action to be taken on each one";¹⁴ and with limited resources effective action could not be taken on all or even on the majority of individually worthwhile objectives. Moreover, once attacks had been begun on a key area they must be pressed relentlessly.¹⁵

The policy intended to be followed is to attack the important German towns systematically. . . . It is intended to concentrate on one town for successive days and then to pass to several other towns, returning to the first town until the target is thoroughly destroyed, or at any rate until the morale of the workmen is so shaken that output is seriously interfered with.

Needless to say, results of this sort could be obtained "not by a few specially trained men but by whole bombing groups."¹⁶

Here, in essence, were the principles of strategic bombardment which the British developed, with little alteration during the early years of World War II. And they are the principles on the basis of which the British entered into the Combined Bomber Offensive.

The situation in 1942 was in some respects different from that of 1918, but the major differences were entirely in favor of strategic bombardment. Whereas in 1918 first priority had to be given to the use of aviation in direct support of ground operations, with residual

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power alone invested in long-range bombing, by 1942 long-range bombardment had become the only means by which the Allies could strike at the heart of the German war effort. So it was a convinced group of men who were entrusted with the deployment of the RAF in 1942, a group convinced by experience and by long study. Their program had its opposition from those whose faith in the other armed services equalled that of the air men in theirs and who, like their counterparts in the U. S., feared the investment of too great a proportion of the total national resources in the equipment of a bombardment force. But, from the Prime Minister down, there was a general feeling that Germany could only be effectively defeated after having first been subjected to a systematic aerial pounding at the nerve centers of her industrial system. And it is neither surprising nor accidental that Trenchard (now Lord Trenchard) should be found urging in a widely circulated state paper the necessity for investing to the utmost in heavy bombardment aviation rather than in the weapons of land and sea warfare. To do otherwise, he warned, would be to engage in a battle on the enemy's own terms. In short, it would be to return to 1918, which would be disastrous.¹⁷

It would be difficult to estimate the degree of influence exerted by these British strategists on the U. S. proponents of strategic bombardment. But in reconstructing the climate of opinion out of which the Combined Bomber Offensive emerged it would be dangerous to minimize the significance of their ideas both as to content and historical priority.

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To be sure, the British and U. S. air forces differed radically in their conception of the methods by which strategic bombing should be carried out. The former remained convinced of the virtues of area bombardment. This decision was dictated in part by a deeply rooted conviction that the social structure and morale of industrial populations constituted a primary objective. While admitting an objection on military and humanitarian grounds to indiscriminate bombing of non-military objectives, they hoped by means of widespread destruction of housing, utilities, and transportation so to disrupt the social system that the war economy which ultimately depended on it would crumble. Nor did they overlook the intangible element of nerve strain induced by the confusion, uncertainty, and fatigue that would inevitably accompany bombardment of populated areas. In part the decision to conduct area bombing was dictated as in 1918 by the necessity, given limited aircraft strength and productive capacity, of hitting the enemy immediately where attacks could do most damage; hence a preference for the great industrial concentrations in the Ruhr Valley and for target systems consisting of communications centers and the industrial communities surrounding them.¹⁸

Objectives of this sort could be hit with just as good effect at night as by day and with considerably less risk. The RAF had therefore developed night bombardment as their main tactical policy. They had carried on daylight attacks on precision targets, but these were small raids and exceptional. Generally speaking, British experience had indicated that day operations were costly with the equipment at hand;

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and limited experience with the early B-17 and B-24 types had not convinced the British observers that the Americans had solved the problems of daylight bombing. They admitted that they might some day turn to daylight bombing, but for the time being they remained committed to night operations.

The USAAF, on the contrary, was just as irrevocably committed to daylight precision bombing. The B-17, equipped with its special bomb-sight, had been developed to operate against small targets, particularly such naval targets as might conceivably be encountered in defense of the United States. It was hoped that, with their heavy armor and armament and their ability to fly at high altitude, the B-17 and B-24 bombers could be used just as effectively and with a minimum of loss in the European theater. It was readily recognized that the weather conditions and the antiaircraft defenses in that area would seriously test the American bombers; but U. S. air men were unwilling to discard the best day bombers in the world in favor of night operations from the United Kingdom, especially since they had profound faith that, with careful handling and some modification, these planes could be made to do a job quite beyond the capabilities even of the Lancaster.

So it was that, when AAF planners first outlined the part to be played by U. S. heavy bombardment forces in an offensive against Germany,¹⁹ they selected target systems consisting mainly of small, precision objectives--the electric power grid, the transportation system, oil and petroleum plants, aircraft factories, aluminum and magnesium plants, submarine installations, and naval bases. They contemplated turning to

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area bombing of populous centers only after it had become evident that civilian morale was ready to crack.

It would be easy to misinterpret this divergence of method as a conflict of purpose. Some journalistic observers made this mistake in the summer of 1942.²⁰ Actually, while there remained some understandable doubt concerning the ability of the American heavy bombers to carry out daylight missions successfully, it was generally accepted in RAF and AAF headquarters that the day and night bomber programs would be mutually supplementary rather than in opposition to each other. They would relieve the congestion on British airfields by dividing the operating time between the two forces. And they would make it possible to subject German towns to 24-hour bombardment which would greatly increase the effectiveness of a combined offensive. General Laker had made these points clear in a report dated 20 March 1942, in which he had emphasized the essential compatibility of the two tactical doctrines.²¹ In so doing he implied the principle of the coordination of mutually supplementary day and night attacks which became an explicit and essential element in the Combined Bomber Offensive Plan.

That principle received its first formal definition in a "Joint/American/British Directive on Day Bomber Operations involving Fighter Cooperation," dated 20 August 1942, which stated that "The aim of the day bombardment by Allied Air Forces based in Great Britain is to achieve continuity in the bombing offensive against the Axis."²² In order to bring this continuous pressure to bear on the enemy, night bombardment would remain the responsibility of the British Bomber

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Command, leaving day operations primarily up to the Eighth Air Force. Specifically, "the method of achieving the aim of day bombardment is by the destruction and damage of precise targets vital to the Axis war effort."

This directive, then, set forth the official basis upon which the Eighth Air Force and the RAF were to implement the project for a bomber offensive. The day offensive was to be developed in three phases marked successively by the presumably progressive ability of the American force to provide its own fighter protection and "to develop the tactics of deep penetration of the enemy day fighter defense." The selection of objectives for day operations would be made by the Commanding General, Eighth Air Force and "A.C.A.S. (Assistant Chief Air Staff) (Cpn.) as occasion demands." Operations would be initiated by the Commanding General of the VIII Bomber Command until such time as the American fighter forces had been built up sufficiently to assume their full share of activity, at which time the Commanding General of the VIII Fighter Command would share with his colleague of the VIII Bomber Command the responsibility for developing tactical plans. In all phases of the offensive, it would be the duty of the commanding general of the American fighter command to coordinate any combined fighter operations with the Air Officer Commanding-in-Chief, RAF Fighter Command. In the first phase this latter officer would share responsibility for detailed plans relating to the British fighter participation. By the time the last phase had been inaugurated, in which the American force would provide its own fighter cover, all tactical planning was to be

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the responsibility of the American commanders.

It should be noted that this directive dealt almost exclusively with the machinery for the tactical employment of the American force, especially its fighters. Because all early missions, and presumably a good many others, would have to be flown under extensive FAF fighter cover, the problem of most immediate concern was naturally that of coordination on the tactical level. The question of target selection, ultimately the crucial one, was left undefined.

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EIGHTH AIR FORCE OPERATIONS, 17 AUGUST 1942 TO 20 OCTOBER 1942

The First 14 Missions

The first combat mission flown by the Fortresses of the VIII Bomber Command¹ could not have been more fortunately timed. Considerable "polite doubt" regarding the potentialities of the American bombers had existed in the minds of British observers in the summer of 1942, and on 16 August Peter Masefield, Air Correspondent to the Sunday Times, gave voice to an unqualified opinion in words which bristled with "plain speaking."² He expressed British satisfaction at the prospect of American aid in the bombing of Germany. But he also made it perfectly plain that he considered the B-17 and the B-24 quite unsuited to the job of bombing over heavily defended enemy territory:

American heavy bombers--the latest Fortresses and Liberators--are fine flying machines, but not suited for bombing in Europe. Their bombs and bomb-loads are small, their armor and armament are not up to the standard now found necessary and their speeds are low.

It was not simply, this correspondent made clear, that the American bombers could not perform the day bombardment mission for which they were being developed. They were likewise unsuited to night operations over Germany, and, in spite of the general desire in the United Kingdom to see these aircraft take part in the night offensive, it would be unfair to the American flyers to send them into a type of action for which, according to British experience, they were not equipped. Masefield found the answer to this seemingly insoluble problem of using bombers that were good for neither day nor night operations, by advocating that they be sent out on patrol missions over the Atlantic

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submarine and shipping lanes.

The appearance of this article by one who presumably reflected opinion in at least some official British circles gave rise to a certain amount of concern in USAAF Headquarters. The following day General Arnold, on receiving the London dispatch which covered the Masefield article, wired General Spaatz for a statement of the facts in the case as he saw them.³ General Spaatz was hardly spared from having to fall back on tedious and at best none too convincing apologetics, for, as a result of the mission against Rouen on 17 August, he was able for the first time to offer a combat report.

The attack on Rouen had, he wired on 18 August, far exceeded in accuracy any previous high-altitude bombing in the European Theater by German or Allied aircraft. Moreover, it was his understanding that the results justified "our belief" in the feasibility of daylight bombing. As for the B-17, it was suitable in speed, armament, armor, and bomb load for the task at hand. He would not, he asserted, exchange it for any British bomber in production.⁴

The target for this first heavy bombing mission was the Sotteville Marshalling Yard, which was one of the largest and most active in northern France. Concentrations of more than 2,000 freight cars had been photographed there. It possessed for the enemy a two-fold importance. It was a focal point for traffic to and from the Channel Ports and the west of France; and it comprised extensive repair installations, including a large locomotive depot (capacity estimated at 200 to 250 engines) and the Buddicom rolling-stock repair shops.⁵ Germany's shortage of locomotives and rolling stock had become acute since April 1942.

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In or about that month a change had been noticed in German war production which involved raising the construction and repair of locomotives and freight cars to a priority equal to that of aircraft, tanks, and submarines.⁶ Moreover, strict regulations were in effect throughout the Reich and the occupied countries requiring the most expeditious handling of traffic in order to make the best possible use of the inadequate equipment available.⁷ Consequently, any attack which would damage or destroy the servicing and repair facilities of the Sotteville Yard or interfere with its normal operations would contribute to the mounting strain under which the Axis railway system was laboring. The actual aiming points were the large locomotive workshops and the Buddicum repair shops.

Twelve D-17's of the 97th Group (the only group in the VIII Bomber Command at that date on operational status) took off late in the afternoon to attack the target while six others from the same unit flew a diversionary mission under heavy fighter cover. Four RAF squadrons of Spitfire IX's provided close cover for the attacking planes flying with them to the target area. Five RAF squadrons of Spitfire V's gave withdrawal support. Visibility was excellent and all twelve planes bombed the target, dropping a total of 36,900 pounds of general purpose bombs from an altitude of 23,000 feet. Three of the bombers had been loaded with 1,100-pound bombs intended for the locomotive workshop, the rest carried 600-pounders air-marked for the Buddicum shops.⁸

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The bombing was fairly accurate, especially for a first effort. Approximately half of the bombs fell in the general marshalling yard area. One of the aiming points was hit, and several bombs burst within a 1500-foot radius. The bombs intended for the other fell for the most part about 2,000 feet to the south around the transshipment sheds, indicating that some of the crews may have mistaken these buildings for one of the two aiming points.⁹ Fortunately the yard and adjacent facilities presented a large target, so that even technically inaccurate bombing might still be effective.

And it was effective enough, considering the small size of the attacking force. Direct hits were scored on the two large transshipment sheds in the center of the marshalling yard, and about 10 of the 24 tracks on the sorting sidings were damaged. A quantity of rolling stock on the tracks or near them had been destroyed, damaged, or derailed. As it happened, activity in the yard was not at its peak when the attack occurred, or destruction of rolling stock might have been much greater. Damage to the tracks no doubt interfered with the flow of traffic, but a sufficient number remained intact to deal efficiently with the relatively low-pressure traffic then moving through the yard. The bottlenecks at each end of the sidings were not damaged. The locomotive workshop received one direct hit which probably slowed up the movement of locomotives and other rolling stock in and out of the building in addition to achieving constructional damage resulting from blast.¹⁰ Despite the inconvenience that this attack undoubtedly caused the enemy, it was clear that a much larger force would be required to do lasting damage to a target of this type.¹¹ But for the

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time being the extent of the damage inflicted was less important than the relative accuracy of the bombing.

Important also was the fact that the bombers had come through with no losses and with a minimum of damage. Enemy opposition had been slight. Antiaircraft fire was observed at two places, but from it only two planes sustained damage, and that of only slight extent. Lighter opposition was negligible. Inco Me-109's attacked the formation and several others put in a silent appearance. Of those attacking, one was claimed as damaged by fire from the B-17's. The bomber crews suffered no injury at all from enemy action, the only casualties having occurred when a plane hit a pigeon and the shattered glass in the nose slightly injured the bombardier and navigator.¹²

General Baker himself led the mission and made some interesting observations on the operational problems uncovered by this initial combat test.¹³ The crews were enthusiastic and alert, but nonchalant to the point of being blasé. It had all been possibly too easy, but confidence was a good fault. Crew drills, especially in the handling of the oxygen equipment, appeared to be indicated and air discipline needed improvement. A better, tighter defensive formation would offer more protection against enemy fighters. The critical items in missions of this sort General Baker considered to be the split-second timing for rendezvous with the fighters (the timing in this instance had been a few minutes off), navigation to the target (there would not always be weather so fine that the target would be visible for ten miles), training of bombardiers (the Sottenville Yard was, after all, considerably larger than a pickle-barrel), pilotage of such a high order that

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a tight yet manueverable formation might be flown, with the shortest possible level run on the target (anything less would court disaster from flak and fighter opposition, both of which might be expected to improve greatly), and, finally, accurate gunnery, the sine qua non in self defense for bombers.

Like General Spaatz, General Baker was impressed with the performance of his B-17's. Yet he was unwilling to say that they could make deep penetrations into Germany without fighter escort and without excessive losses, even though it was apparent that the German fighters would approach them gingerly.¹⁴ General Spaatz shared his caution on this point, asserting in his cable of 18 August that American bombers would not be sent indiscriminately into Germany, and that depth of penetration would increase only as experience dictated. Meanwhile, pending determined enemy fighter attacks, no definite conclusions could be reached regarding the feasibility of bomber attacks unsupported by fighters.¹⁵

The first mission had given a great boost to morale, not only in headquarters but among the operating personnel.¹⁶ The next mission did nothing to reduce that warm feeling of accomplishment, for on the 19th 24 B-17's made an attack on the Abbéville/Druceat airdrome which called forth a letter of commendation from Air Marshal Sir Trafford Leigh-Mallory.¹⁷ The mission had been planned as a part of the air operations undertaken in connection with the Dieppe raid. According to Leigh-Mallory it appeared "that the raid on Abbéville undoubtedly struck a heavy blow at the German fighter organization at a very critical moment during the operations" and thus "had a very material effect

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on the course of the operations." RAF fighter pilots flying over the airdrome on the day following the attack reported the main dispersal area to have been apparently "completely demolished." Subsequent reconnaissance indicated somewhat less devastation, although a hangar had received a direct hit and 80 fresh craters had appeared on or in the neighborhood of the airdrome.¹⁸

It was not until Mission 9, on 5 September 1942, that the Bomber Command again equalled the force sent out on the 19th. The intervening six missions saw an average of only 12 aircraft take off, and of the 72 B-17's dispatched on these missions 10 had been forced to turn back or were unable to bomb, mainly as a result of mechanical failures. The targets consisted of the Longueau Marshalling Yard at Amiens, a vital focal point in the flow of traffic between France and northern Germany; the Wilton Shipyard in the outskirts of Rotterdam, the most modern shipyard in Holland and one used to capacity by the Germans for servicing surface vessels and submarines; the shipyard of the Ateliers and Chantiers Maritimes de la Seine, at Le Trait; the well-equipped airplane factory of Avions Potez at Leaulte, an installation used extensively by the enemy as a repair depot for the near-by fighter base; and the Courtrai/Nevelghem airdrome, in use by the Germans as a base for their Fw-190 fighters. All lay within easy fighter range and required at most only shallow penetration of enemy-occupied territory. Only two, Le Trait and Courtrai/Nevelghem, had been subject to RAF attacks, in each case on a small scale.¹⁹

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These six missions followed the pattern laid down by the preceding two. The B-17's flew under heavy fighter escort, provided largely by the RAF, and bombed from 22,000 to 26,000 feet in circumstances of generally excellent visibility. They encountered for the most part only slight enemy opposition. No B-17's were lost. Nine of the bombers were slightly damaged and a few of the crew members injured by flak, which at this date varied greatly both in intensity and accuracy. With one exception the bombers encountered few enemy aircraft, although the fighter escort tangled with several, claiming two destroyed, nine probably destroyed, and nine damaged, at a cost of four of their own number lost.²⁰

The exception referred to took place on Mission 4 when, on 21 August, the bombers made an unsuccessful attempt to attack the Milton Shipyard. It appears that the B-17's were 16 minutes late for their rendezvous with the RAF fighter escort and that as a result the escort was able to accompany them only half way across the Channel. The formation received a recall message, but by that time it was over the Dutch coast. While unescorted it was attacked by 20 to 25 Me-109's and Fw-190's. A running fight ensued which lasted for 20 minutes, during which time both the pilot and co-pilot of one B-17 were wounded, the co-pilot so seriously that he died soon after. The gunners claimed two enemy fighters destroyed, five probably destroyed, and six damaged. It was the first time the Fortresses had been exposed to concerted fighter attack without the protection of friendly aircraft, and the results no doubt impressed the enemy pilots with the ability of the

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Fortress to defend itself.²¹

Bombing accuracy continued to be good, for as yet inexperienced crews. In each case enough high-explosive and incendiary bombs fell in or near the target areas to prompt General Baker to predict that 40 per cent could in the future be expected to fall within a radius of 500 yards from the aiming point.²² These half dozen missions demonstrated again, however, that bombing which might be considered fairly accurate might not produce a corresponding measure of damage to the target. On the mission to Le Trait, for example, although 12 bombs out of a total of 43 dropped were plotted within 500 yards of the aiming point, no material damage was apparently done to the shipyard installations themselves. Again in the attack on the Potez aircraft factory ten craters were made which paralleled the target, close enough to it to be considered fairly accurate, but far enough to land for the most part harmlessly in open fields. On the other hand, the mission against the marshalling yard at Amiens/Longueau and that against the Milton Shipyard (Mission 6) did significant damage to vital target installations.²³

In Mission 9, mentioned above as occurring on 5 September 1942, the American bombers again struck at the Rouen-Sotteville Marshalling Yard. It was a significant mission for two reasons: it dealt more lasting damage to the enemy than had any previous attack, and it had certain other effects, less tangible but none the less important, involving public opinion in occupied France. It was also a larger

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mission than any hitherto staged. Thirty-seven S-17's took off, 25 from the now experienced 97th Group and 12 from the 201st, the latter on their first combat mission. Thirty-one bombed the target (the locomotive depot), the remainder having been unable to drop their bombs on account of mechanical failures. The bombers met little enemy opposition, although the RAF fighters supporting them had a few combats with Fw-190's.²⁴

A large percentage of the bombs, almost one-fifth of the high-explosive bombs dropped, burst within the marshalling yard installations.²⁵ Large numbers of "wagons" and several tracks were destroyed. Of particular importance were direct hits on the locomotive depot and surrounding tracks, and on the transshipment sheds, both of which had been hit on the mission of 17 August. Photo reconnaissance accomplished almost a month later, on 2 October, indicated that, while practically the entire damage to the running lines throughout the yard had been repaired, the transshipment sheds and the locomotive depot were in only very restricted operation. On 8 August, 40 locomotives had been observed on the tracks around the latter; now only 18 could be detected. It is also probable that several engines had been destroyed or seriously damaged.²⁶

To the French population the success of the mission appeared less marked than it had to observers in the United Kingdom. Actually, a large number of bombs had fallen outside the marshalling yard, many of them in the city itself, and several far enough from the target to seem to a ground observer to have borne little relation to any precise

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aiming point. As many as 140 civilians, mostly French, had been killed, and some 200 wounded.²⁷ One bomb was reported to have hit the city hospital, penetrating from roof to cellar, but fortunately not exploding.²⁸

Beginning with the tenth mission on 6 September, the VIII Bomber Command encountered greatly increased fighter opposition. Indeed it was during that day's operations over occupied France that the command suffered its first loss of aircraft in combat. Hitherto it had appeared that the B-17's bore charmed lives; but then the enemy attacks had been light in weight and tentative in character. From now on, the Fortress had a chance to show what they could do in the face of relatively heavy and persistent fighter resistance. As a matter of fact, it was difficult to avoid the fighters if they were deployed in such a way as to be available for interception and if the enemy wished to commit them to combat with the bombers. Diversionary sweeps could be counted on to draw off some of the fighters and to confuse the dispatchers, but every operation was still pretty much an open book to the Germans. Their RDF could tell when the bomber force took off and the approximate numbers; and they could consequently put up whatever force they had available to meet the attack.²⁹

On 6 September, the heavy bombers of the 97th Group, augmented to a strength of 41 by elements from the newly operational 92d Group, were sent out to strike the ^{aircraft} Avions Potez/factory at Beaulte. In order to keep enemy fighters on the ground and provide a diversion for the main force, 13 B-17's of the 801st Group attacked the German fighter airdrome at St. Omer/Longuenesse. Probably for a similar reason,

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12 DB-7's of the 15th Bombardment Squadron (Light) attacked the Abbeville/Drucat airdrome.³⁰ Apparently these diversionary efforts failed, however, for all crews on the primary mission reported continuous encounters from the French coast to the target and from the target to the French coast. As a result of possibly as high as 45 to 50 encounters, mostly with FW-190's, the B-17 crews claimed 4 enemy aircraft destroyed, 19 probably destroyed, and 20 damaged. Two of the heavy bombers failed to return: one was observed going down over enemy territory, the other was apparently lost in the Channel. Many encounters also took place between FW-190's and the supporting RAF fighters, the latter claiming two of the enemy probably destroyed and five damaged. In all, three Spitfires were lost.³¹ The bombing at Meaulte seems to have suffered little in accuracy from the distracting fighter attacks, for it was, if anything, more accurate than on the previous attack against the same target, and probably more effective.³²

A similarly bitter aerial battle resulted when, on 7 September, a force of 29 B-17's made an ineffective attack on the Wilton Shipyard near Rotterdam, but it was the weather rather than the enemy that frustrated the bombers. Again the claims registered by the bomber crews were surprisingly high: 12 destroyed, 10 probably destroyed, and 12 damaged.³³ Yet, even discounting the enthusiasm of the gunners, it was evident that the Fortresses could take care of themselves in a surprisingly competent fashion.

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They did not again have the opportunity to test their ability in this direction until 2 October. Meanwhile some persistently bad weather, together with a directive ordering all combat activity of the Light Air Force to take second place to the processing of units destined for North Africa, discouraged further operations. The only bombing effort attempted during the intervening period had to be abandoned on account of impossible atmospheric conditions.³⁴

On 2 October, 62 B-17's and 12 B-7's were dispatched on four separate missions. The light bombers attacked a German raider in the drydock at Le Havre. Forty-one B-17's, nine of which aborted, were detailed to administer a third pounding to the Avions Potez aircraft factory at Caule. Six of the heavies attacked the German fighter airbase at St. Omer/Louvenesse for the second time. And 13 B-17's made a diversionary sweep to the coast of France. All bombers returned. The forces attacking Potez and St. Omer met constant and stubborn fighter opposition. So many encounters took place that crews had to be interrogated a second time and even then the results were apparently considered too high.³⁵ The figures cabled from London on 3 October credited the B-17 crews with 10 enemy aircraft destroyed, 25 probably destroyed and 11 damaged. More conservative estimates placed the results at 9 destroyed, 9 probably destroyed, and 5 damaged.³⁶ This aerial battle was all the more remarkable because the heavy bombers had flown under the cover, direct or indirect, of a total of some 400 fighter aircraft, in spite of which the Germans had been able to drive home their attacks on the bombers. Whatever damage was inflicted on the aircraft repair and airframe facilities, and several direct hits were scored, was swallowed up in the

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enthusiasm engendered by the remarkable defensive power displayed by the Fortresses. Eighth Air Force officers believed this engagement showed that they could penetrate beyond the tactical radius of operations of the supporting fighters provided sufficient numbers of bombers were employed to force dispersion of the enemy's fighter force.³⁷

The day-bombing campaign reached something of a climax in the mission against Lille on 9 October. It was the first mission to be conducted on a really adequate scale and it marked, as it were, the formal entry of the American bombers into the big league of strategic bombardment. Then, for the first time, the German High Command saw fit to mention publicly the activities of the Flying Fortresses, although they had already made 13 appearances over enemy territory. Lille's heavy industries contributed vitally to German armament and transport. The most important of these industries, the steel and engineering works of the Compagnie de Fives-Lille and the locomotive and freight-car works of the Ateliers d'Hellemmes, constituted one composite target. These contiguous objectives, among the most significant of their kind in France, had been attacked on three previous occasions by the RAF. Though conducted on a modest scale, these British raids had dropped over 46 tons of bombs and had done a fair amount of damage, especially to Fives-Lille.³⁸

The mission had been planned on an unprecedented scale. One hundred and eight heavy bombers, including 24 B-24's from the newly operational 93d Group, were detailed to attack the primary target at

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Lille, and seven additional B-17's flew a diversionary sweep to Cayeux. Of the total aircraft detailed, 60 attacked the primary target,³⁹ 2 bombed the alternative target, the Courtrai-Nevelghem airbase in Belgium, 6 attacked the last resort target, the St. Omer airbase, 2 bombed Roubaix, and 33 (including 14 of the B-24's) made abortive sorties. Approximately 147 tons of 500-pound high-explosive bombs and over 8 tons of incendiaries fell on Lille.⁴⁰

The bombing on this mission did not demonstrate the degree of accuracy noticeable in some of the earlier and lesser efforts. Of the 588 H3 bombs dropped over Lille, only nine were plotted within 1,500 feet from the aiming points. Many fell beyond the two-mile circle, some straying several miles from the target area.⁴¹ This fact may be explained in part by the fierce fighter attacks sustained by the bombers over the target, but it no doubt also resulted from the inexperience of at least two of the groups participating and from the high wind velocity (100 miles per hour) at bombing level.⁴² A large proportion of the bombs fell on the residences surrounding the factory of Fives-Lille. Civilian casualties were estimated by a ground observer as amounting to 40 dead and 30 wounded.⁴³

Yet, despite this scattered bomb pattern, several bombs fell in the target area--enough, in any event, to cause severe damage to at least three of the Fives-Lille buildings and lesser damage to a dozen more. Four textile factory buildings, including one belonging to Hellemmes, received varying degrees of structural damage. In addition

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to damaging two additional unidentified small industrial structures, the bombers scored some eight direct hits on the railway yards, mostly involving siding tracks.⁴⁴ Ground observations made by Fighting French informants credited the U. S. forces with completely stopping work at the Delcamas textile factory and with doing severe damage to the power station, the boiler works, and the turbines at the Fives-Lille establishment. A branch line to another power station apparently relieved the enemy's situation, however, for work in the factory was resumed after a relatively brief time, one account indicating two days and another 17 days. Estimates regarding the length of time it would take to repair the power plant varied from two to six months, and probably represent no very profound knowledge of the industry.⁴⁵

The high priority given to locomotive production in Axis Europe made the direct hit on the boiler-making shops the most important single item, according to British estimates. Resumption of locomotive output, it was believed, would depend on the speed with which this damage could be repaired, for boilers constituted a principal bottleneck in the locomotive industry. Moreover, since all boiler plants in German Europe were known to be working to capacity, it appeared unlikely that Fives-Lille could get boilers elsewhere. British observers believed that repairs to heavy industry in German Europe were being made with increasing difficulty, and they estimated that all production at Fives-Lille would probably be halted for one month as a result of this mission and that subsequent output would be slowed down to such an extent that, instead of 20 to 25 locomotives being delivered as scheduled in the last quarter of 1942, only

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4 to 6 would likely be forthcoming.⁴⁶ Considering the emphasis placed by the British on transportation as the Achilles heel of the Axis, an attack of this sort no doubt proved welcome news to British ears.

The results of the mission were also telecast, and heartily, in the circles, but for a different reason. Again, as in the Potez mission of 2 October, the question of bomb damage came to be overshadowed by that of the day bomber's ability to defend itself against fighter attack. As in the previous mission the attacking Me-109's and Bf-100's concentrated on the bombers to the practical exclusion of the combined British and U. S. fighter escort, which in this instance numbered 156 aircraft including 36 P-51's from the VIII Fighter Command.⁴⁷ As a result of the unusually heavy fighter opposition numerous combats were reported. Three of the B-17's and one B-24 failed to return, although the crew of one Fortress was picked up at sea. In all, 31 crew members were reported missing and 13 wounded, four P-51's suffered serious damage, and 32 B-17's and 10 B-24's were slightly damaged by fighter action. But if the bombers took the worst beating in their short career, they also inflicted on the German fighters the heaviest losses to date.⁴⁸

As was commonly the case during these early months of Eighth Air Force operations, claims tended to be somewhat exaggerated. It was hard for crews in a large formation to determine which bomber had been responsible for an apparently destroyed or damaged German fighter; and the fact that a decoration had been awarded to each

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gunner credited with shooting down his first plane naturally made the gunners press their claims with considerable energy. Then, too, the interrogating officers had not yet had experience enough to disentangle thoroughly the complicated reports received from the crews.⁴⁹ Initially it had been reported that the bombers on this mission had destroyed 56, probably destroyed 26, and damaged 20. According to these figures they had accounted for a total of 102 out of action, which intelligence sources estimated to have been equivalent to over 15 per cent of the total German fighter strength in Western Europe. British intelligence, however, believed that no more than 30 enemy aircraft could have intercepted. By 24 October the claims had been scaled down to 23, 28, and 41. In January, 1943, a general review of early combat reports reduced the figures for this engagement to 21 destroyed, 21 probably destroyed, and 15 damaged.⁵⁰

Even when estimated in the most conservative terms, the Lille mission was impressive. It was hailed in US Headquarters as convincing evidence that the day bombers "in strong formation can be employed effectively and successfully without fighter support." It was considered all the more remarkable because most of the pilots and crews lacked experience in aerial combat and because the force involved, though smaller than such operations required, represented over 50 per cent of the total strength of U. S. bombers in the theater.⁵¹

The results of these first 14 missions had been on the whole very encouraging. Targets had been attacked with reasonable frequency, especially during the first three weeks, and with a fair

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degree of accuracy. The enemy had been met and repulsed with losses more than commensurate with the damage suffered from his attacks. During the first nine missions, the Germans had evidently refused to take the day bombing seriously. The American forces had been small and the fighter escort heavy, and so the Germans had sent up few fighters, preferring to take the consequences of light bombing raids rather than to risk the loss of valuable aircraft. And when the German fighters did take to the air, they exhibited a marked disinclination to close with the bomber formation.⁵² But the bombing had been surprisingly accurate, especially in relation to what had been accomplished in Europe either by British or German bombers.⁵³ It was, therefore, a tribute of sorts to the accuracy of the Americans that after the ninth mission enemy fighter opposition suddenly increased. And it was a source of warm satisfaction to the AAF commanders that the B-17's and the B-24's could more than hold their own against fighter attacks, even with a minimum of aid from the escorting aircraft. As for antiaircraft defenses, at no time had they offered a serious threat to the bombers. After the tenth mission a marked increase in damage became apparent, but as yet the day bombers had suffered nothing to compare with the losses reported by the RAF on their night raids at lower altitudes.⁵⁴ No heavy bombers had been lost from flak, and only minor damage had been sustained. On the other hand, six aircraft were destroyed by enemy fighters. It began to look as if altitude would provide decisive protection against antiaircraft.

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Eighth Air Force commanders were therefore in an optimistic mood by 9 October 1942, and, in a measure, justifiably so. Possibly the early expression of opinion, made after the first week of operations, had been a little too sanguine. On 27 August, for example, General Baker had informed General Spaatz that the operations to date of one heavy group indicated that high-altitude bombing would be at least ten times as effective for destroying precision targets as night area bombing. Actual plots of British Bomber Command results showed an average of only five per cent of bombs dropped to have fallen within a circle of one-mile radius from the aiming point; and the best results to date had raised this figure only to 10 per cent. The U. S. bombers, on the other hand, gave promise of being able to place 90 per cent within the one-mile radius, 40 per cent within 500 yards, 25 per cent within 250 yards, and 10 per cent dead on the aiming point, or within a "rectangle 100 yards on the side." While admitting the fact that the British did not attempt to hit point targets, he argued that a force of 100 high-altitude day bombers could do as much damage to specific industrial targets as 1,000 night bombers. Therefore, given a force of 10 groups of heavy bombers, enemy aircraft factories could be destroyed to the point where they could not supply the field forces, and submarine activity could be "completely stopped within a period of three months by destruction of bases, factories and docks." Granting that weather would be bad in the United Kingdom for day bombing, he believed that at least 10 missions per month would be possible. As far as airdromes, supply

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and communications facilities, and organization were concerned, the VIII Bomber Command could at once operate 10 to 20 heavy groups and by April of 1943 could accommodate 50 heavy and medium groups. But for practical purposes 10 groups in 1942, and 10 additional by June 1943 would be adequate, "coupled with the British night bombing effort, completely to dislocate German industry and commerce, and to remove from the enemy the means for waging successful warfare."⁵⁵ General Spaatz declared himself entirely in accord with this estimate, and spoke of the "extreme accuracy" of the American bombers.⁵⁶

AAF Headquarters in Washington received these reports with some reservations. Rather than "extreme accuracy," headquarters agencies preferred to speak of the "fair accuracy" achieved in the first missions. Bombing had been accurate in relation to European standards rather than according to any absolute standard, an opinion which General Spaatz himself expressed on more sober reflection.⁵⁷ The over-all average errors had been small enough to permit good results on the kind of target attacked--airdromes and marshalling yards--but had been too large to promise consistent results on small point targets. It was even suggested that a system of coordinated attacks should be worked out in which the first element would destroy or neutralize the antiaircraft on the ground and so make it possible for the main bombing force to operate at a more effective altitude than 23,000 to 26,000 feet; for it had been established that relative accuracy at 12,000 feet would be approximately twice as great as at 22,000 feet. It was further argued that the forces suggested by General Spaatz

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and Baker were too small to do the job.⁵⁸

Nevertheless, it was possible for AC/AS, Intelligence, looking back over the entire 14 missions, to paint a most encouraging picture, accepting General Baker's earlier estimates regarding both accuracy and force required.⁵⁹ Attention was directed to certain significant considerations. Fighter escort, though essential to successful operations, was more helpful in aiding cripples and in diverting enemy fighters at the approach to the target than in protecting the main bombing force. To date the engagement of supporting fighters in combat had been only incidental. Antiaircraft artillery had been ineffective and might be expected not seriously to impede bombing missions in the future. Although the current loss rate of 1.6 per cent could not be expected to continue as the range of operations became extended farther into enemy territory, it could increase four times and still barely exceed the British rate of 5.67 per cent. The German rate of attrition might be expected to rise correspondingly, and, as deeper penetrations were made into German Europe, enemy fighter defenses, now deployed in a narrow arc of at most a 150-mile radius surrounding Great Britain, would be dispersed both in breadth and depth. Given the necessary force, it would thus be possible for the day bombing offensive, combined with the British night effort, to accomplish the destruction of the enemy's three essential war systems: his air force, his communications network, and his submarine power.

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These early missions had also made a noticeable impression on British opinion. If not as enthusiastic as their American allies, British observers in September and October were at least ready to admit that theAAF day bombers and the policy of day bombardment showed surprising promise. As early as 21 August, General Spaatz reported a significant change of mind on the part of theRAF. In a statement which, among other things, indicates how tentative had been the British official acceptance of the American bombardment doctrine, he stated that theRAF was now willing to alter its conception of the nature of daylight bombing operations from one wherein the bombers were to be used mainly as bait to lure the enemy fighters into action to one in which the bombing had become the principal mission and the supporting fighters were employed to further that effort rather than to attack the German Air Force.⁶⁰ General Baker wrote at about the same date that the British "acknowledge willingly and cheerfully the great accuracy of our bombing, the surprising hardihood of our bombardment aircraft and the skill and tenacity of our crews."⁶¹

A review made by the Air Ministry of the B-17 operations from 17 August to 6 September substantiated this interpretation. It referred to the high standard of accuracy attained, considering the inexperience of the crews. It pointed to the fact that in ten missions only two aircraft had been lost, owing to the ineffectiveness of the flak at high altitude and to the ability of the Fortress to take care of itself against fighter attack. "The damage caused, commensurate with the weight of effort expended, is considerable" the report read,

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adding that complete destruction of any of the targets attacked with the forces at present available could not have been expected. But, it concluded--with considerable enthusiasm though little appreciation of what the AAF hoped to accomplish in its bombing offensive--if only these Fortresses were employed on night operations the accuracy and effectiveness of the area bombing program could be raised from its current rate of 50 per cent to 100 per cent, and a decisive blow could be dealt to German morale during the coming winter!⁶²

British press opinion which in mid-August had been cool, if not hostile, to the day bombing project showed a similar change of tone. On 1 September, Colin Connall wrote in the Daily Mail as follows: "So remarkable has been the success of the new Flying Fortresses operated by the USAAF from this country that it is likely to lead to a drastic resorting of basic ideas on air warfare which have stood firm since the infancy of flying."⁶³ Early misgivings concerning the American bombers had been entertained without reference to two vital factors. First, instead of the ten .303-caliber machine guns carried by the Lancaster, the new Fortress was armed with no fewer than twelve .50-caliber machine guns. And, secondly, the B-17 could bomb from such heights that it avoided much of the damage from flak which had embarrassed British daylight attempts.

Peter Laszfeld, whose comments on the eve of the first Fortress mission had been decidedly critical of the American bombers and patronizing toward their capabilities, revised his judgment frankly, but somewhat more gradually. On 23 August he admitted that "The Fortress

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bombers have done particularly well in their tuning-up sorties during the past week, flying by day on strongly escorted bombing attacks of a type for which they are ideally suited."⁶⁴ Prior to the Lille mission of 9 October, however, he stoutly maintained that the B-17 needed escorts, and that, therefore, their effective range was limited absolutely to the range of the escorting fighters. "There is no doubt he concluded. . . that day bombing at long range is not possible as a regular operation unless fighter opposition is previously overwhelmed or until we have something too fast for the fighters to intercept." Then, he believed, but only then, the entire Allied bombing force might well be turned to day bombing.⁶⁵

After the U.S. operation of 9 October he declared that the question "Can we carry day air war into Germany?", which had hitherto been answered in the unqualified negative, was now subject to a new assessment. In that engagement the bomber appeared to have gained a significant victory at short range. And it might be that altitude and fire power might some day make deep penetrations of enemy territory feasible. Several factors, however, still limited the range of the U. S. bombers: any raid to Germany would as yet have to be conducted beyond effective fighter range; long distance flights would give the enemy warning system time to work at maximum efficiency; bomber ammunition would likely run low in protracted encounters with enemy aircraft which would be free to attack in the most effective manner, unhindered by escort fighters; and finally weather over Europe between November and March was "not particularly favourable for high-flying operations." Thus true air superiority was still

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confined to the range of the fighter, and cloud and darkness still offered the best cover for bombing attacks. He ended his article of 18 October in a pliable frame of mind. "The Americans have taught us much; we still have much to learn--and much we can teach."⁶⁶

This cooperative attitude on the part of the British the Eighth Air Force found encouraging in itself, for it was absolutely essential to the success of any combined campaign that the two partners should work together without friction, each possessed of a certain faith in the other's doctrines and equipment. General Spaatz was keenly aware of this fact. After the first week of operations he reported confidently that the American air forces had demonstrated that they could conduct operations in close cooperation and harmony with the RAF. And, somewhat later, he expressed concern over what he believed to be an increasingly evident habit among Americans of belittling the RAF and its bombing effort. Without underwriting everything done by the British, he pointed out that they were in a position to speak with authority on bombing operations and that, in point of fact, the RAF was the only Allied agency at the time steadily engaged in "pounding hell out of Germany."⁶⁷

Factors Limiting Operations

If, as General Baker said, both the RAF and the Eighth Air Force were more cheerful over the daylight bombing offensive "than had been thought possible a month ago," many problems had yet to be faced before that offensive could be declared a success, or before it could be given an unquestioned place in the military scheme of things. Some of these problems could be solved, others could at

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best be only borne with hopefully and patiently: together they contributed an undertone of solemn seriousness to the chorus of official optimism. Among those which might presumably be solved in time was that of training; but it was still a major problem. The 97th Group had begun operations with inadequate preparation, and the new groups as they arrived in the United Kingdom and became operational found themselves in little better position. Weather in the British Isles discouraged training in high-altitude flying, and facilities were lacking there for conducting realistic practice in aerial gunnery. In addition, the available time for training units in the U. S. had in many cases not permitted adequate training before shipment to the U. K. The result was that much of the training in high-altitude flying, in high-altitude bombing, and in aerial gunnery had to be done on combat missions against a real enemy. Once combat operations had been begun, the lack of an adequate flow of replacement crews made it necessary to alert the same men on every mission scheduled, which was normally as often as weather permitted. It was consequently hard to keep up a regular schedule of training. It soon became evident that the place to conduct thorough training was in the United States, not in the United Kingdom, and efforts were accordingly made to shape training in the Zone of the Interior along lines indicated by experience in the theater.⁶⁸ As time went on, the units in the United Kingdom received much experience and their commanders learned many tactical lessons in the exacting school of combat. The nature of these tactical lessons will be described in a later chapter.

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Another problem was involved in developing U. S. fighter support for the day bombers. Although of slight immediate importance to the activities of the Eighth Air Force in the fall of 1942, the concept of U. S. fighter support was fundamental to the notion of a day bomber offensive. No matter how well the bombers had done in their early missions in combat with fighters, it was still a matter of the utmost urgency to provide them with as much protection for as great a distance into enemy territory as possible. According to the "Joint Directive" of 20 August 1942, American fighters were gradually to assume a larger share in the joint fighter operation, and as their experience and force increased, they were to take over the major portion of this activity.⁶⁹ Moreover, for missions deep into Germany it was essential to develop a suitable long-range fighter, and great things were hoped from the P-38. The priority given to TORCH for all such equipment and the operation of the fighters for the time being, however, of academic interest only, for they were virtually all withdrawn to the North African project in October. But, in view of plans then evolving, and in view of what actually took place, the problem of the fighters remains one of considerable significance.

The Eighth Air Force began operations with two single-engine and two twin-engine fighter groups. The single-engine groups were equipped with spitfires, according to an agreement between the AAF and the RAF. The twin-engine units consisted of P-38's.⁷⁰ In addition, many American pilots had been serving in Eagle squadrons under

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the RAF. These units were formally taken over by the VIII Fighter Command on 20 September 1942, and organized into the 4th Fighter Group.⁷¹

Elements from the Eagle squadrons, and to a lesser extent the U. S. Spitfire units, took part with the RAF on numerous occasions in support of the heavy bombers. The Spitfire pilots, though operating machines some of which (the 5-2) were inferior to the Fw-190, went into combat with confidence in their planes.⁷² The situation was not nearly so simple with the P-38. The RAF did not at first like the P-38. As in the case of the American bombers, early showings in the U. K. had been unfortunate. When, however, certain modifications had been effected, the P-38 became potentially as good a plane as any in the theater, a fact which the British themselves admitted.⁷³ Yet suspicion of the P-38 still lurked among the U. S. pilots, fostered in part by hearsay and in part by a couple of bad accidents involving improperly manipulated power dives.⁷⁴ Some press publicity had been given to remarks made by American pilots which compared the P-38 unfavorably with the Spitfire, and this served only to heighten the tension over the fighters.⁷⁵ Actual combat experience was alone likely to dispel doubts both in AAF and RAF minds.

General Spaatz was therefore very anxious to get the P-38's into action as soon as possible without committing them prematurely. Any fighters that went out over enemy territory ran the risk of tangling with the best of the German Air Force pilots. It was therefore necessary to give the Lightning pilots careful training in cross-Channel flights before sending them into a real battle.⁷⁶ Bad weather and mechanical failures delayed their entry into combat, but after 16 September they became fully operational and flew on several missions

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before being removed to the North African project in October.⁷⁷ Their contact with the enemy was, however, slight, and no very important conclusions could be drawn. On 14 September the four RAF fighter groups of the VIII Fighter Command were transferred to the III Fighter Command for shipment to North Africa. They continued to operate under the VIII Fighter Command until 10 October. Only the 4th Group, consisting of former Eagle pilots, remained in the United Kingdom.⁷⁸ It was many months before a significant force of RAF fighters was able to operate consistently from the British bases.

The development of a self-sufficient U. S. fighter force may have been essential to the plan of 20 August for the day bomber offensive, but it was not essential to the immediate prosecution of the operation itself. If the basic fighter units were removed for TORCH, RAF units remained to provide cover for the American bombers, but TORCH constituted nevertheless a threat to bombing operations from the U. K. the gravity of which can hardly be exaggerated. As soon as the decision was made to mount TORCH (1 September 1942 was the deadline), it became evident that preparation for the North African operation would for an indefinite period take priority over all other air activities in the U. S. On 2 September General Spaatz issued specific orders to this effect, and for a brief time it appeared that tactical operations of the Eighth Air Force, including combat missions, would be completely suspended.⁷⁹ Each command in the Eighth Air Force and each section in its headquarters was given

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responsibility for processing corresponding agencies in the new Twelfth Air Force, now generally referred to among Eighth Air Force offices as "Junior." In addition to the four fighter groups contributed directly to the Twelfth, the older air force was scheduled also to lose two heavy bombardment groups after the first week in November and two more at a later date.⁸⁰

Thus the drain on the combat strength of the Eighth Air Force caused by the TORCH operation was both direct and indirect. The loss of the 97th and 501st Bombardment Groups (H) would reduce the bomber strength by one-third--and combat effectiveness by an even larger proportion, because these were the two oldest and most experienced bomber units in the VIII Bomber Command. The indirect effect involved in processing the Twelfth Air Force units was even more devastating. VIII Bomber Command staff officers were devoting fifty per cent of their time to supervising the training, supply, and maintenance of the XII Bomber Command. The Combat Crew Replacement Center, from which the fighting units were supposed to draw necessary replenishment, now gave first priority to the TORCH units which had to be up to strength at once.⁸¹ The Twelfth Air Force also enjoyed priority in organizational equipment, spare parts, and aircraft replacements; and the VIII Air Force Service Command was spending an estimated 95 per cent of its efforts on the TORCH units, in addition to contributing large numbers of trained men and quantities of equipment.⁸² As a result, servicing and maintenance for VIII Bomber Command aircraft became slow and uncertain, preventing the most effective employment of such bombers as were on hand, and increasing the likelihood of

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abusive sorties. faced with shortages in almost every category, the VIII Bomber Command ground crews often had to resort to dismantling badly damaged aircraft, declared "hangar queens" for this cannibalistic purpose. It was the opinion of some group commanders that, if crews had not shown extreme energy and ingenuity in this regard, at least half of the bombers maintained on operational status would have been out of combat.⁸³ The VIII Bomber Command had been assigned the specific task of dispatching units to Africa, and this effort, in addition to the loss of four out of five groups, promised to render it practically useless as far as operations from the U. S. were concerned until the movement had been completed.⁸⁴

Almost more depressing than the demands of TORCH to those whose duty it was to keep up a bombing offensive against Germany, was the weather. Favorable weather was an absolute prerequisite to successful day bombing, at least until more efficient methods of blind bombing had been discovered than any yet in sight. It had been with the full knowledge of this fact that the USAAF had projected its scheme for a day bombing offensive from the U. S. But the weather in the fall of 1942 seemed--and British observers claimed that it was--unusually bad.⁸⁵ Fewer operational days had turned up in September than had been hoped for, and as October progressed the situation only grew more disheartening.⁸⁶

By early October it was seriously debated whether it was feasible to conduct a full-scale offensive of this sort from British bases, especially since a successful North African campaign might be expected

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to open up a very attractive alternative in that quarter.⁸⁷ It may have been to offset such a defeatist attitude that General Baker wrote on 6 October that weather should not cause too much alarm. There were, he maintained, five to eight days in every month favorable to maximum effort at high level, which was about all the current rate of replacements would allow in the best of circumstances. This represented a more cautious estimate than that of ten missions a month made in August, but General Baker hoped to keep the enemy from resting during the interim periods of relatively bad weather by developing a highly trained and skilled intruder force, capable of exploiting bad weather as a cloak for small blind-bombing operations.⁸⁸ Plans were in fact already made for these "looting" missions which, it was hoped, by the use of the most advanced navigational and bombing devices, would make it possible for single C-24's to keep enemy air-raid systems and defensive establishments on the alert and so interrupt enemy industrial production. By 24 October approval had been secured from both British Bomber Command and Eighth Air Force.⁸⁹

But both had the Eighth Air Force commanders lost about both the diversion to TOCII and the bad British weather was that, for a successful day bomber offensive, time was of the essence; and on both counts vital time seemed likely to be lost. Every month of delay in mounting a full-scale offensive against German industry gave the enemy just that much time in which to redeploy his forces and to readjust his techniques in order to counter the Allied attack. For the moment the RAF had its hands full. The British night

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offensive had, by August 1942, apparently forced it to use up its initial reserves and to reduce its stored reserves in order to keep a strong front-line defense. The 8-17 attack, no doubt had served to accelerate that tendency. At any rate, by October 1942 it was estimated that first line strength had been maintained only at the expense of the entire initial reserve.⁹⁰ Following the 8-17 missions, it was noticed that two of the three fighter groups (about 60 planes) maintained by the Germans in Norway had been moved down to protect Kiel and Lenzing. This was believed to indicate a determination on the part of the Germans to make the Allied bombers fight in greater depth than heretofore. But German strength in single-engine fighters on the Western Front remained concentrated along a narrow stretch of coastline, a few twin-engine fighters being maintained in the back areas for use as night fighters. And it was felt that, if the fighter defense against both British and American raids were to be increased, aircraft would have to be brought back from Russia.⁹¹ In all, probably 180 single-engine and 10 twin-engine fighters were being kept in the coastal regions in late September.⁹²

In general, the German aircraft situation appeared encouraging and there was some reason to believe, as certain authorities did, that the GAF was actually on the wane.⁹³ This, if true, would by itself have been a strong argument for pressing any attack which would further strain the enemy's air forces. But the Germans had it in their power to do either of two things: they could increase their production of fighter aircraft at the expense of other types

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(already there was evidence of a noticeable increase in the proportion of total monthly production allocated to twin-engine fighters)⁹⁴ or they could try to build up a strong force of heavy bombers in order to strike back at the British cities. In either case time would be required to reorganize production. One of the alternatives seemed, however, inevitable; and it occurred to General Spatz that the Germans might well profit by the lessons in daylight bombing, delivered so recently and convincingly by the Eighth Air Force. By adding fire power and armor to their four-engine He-200's they might act against the United Kingdom before the American forces could exploit their current technical advantage. "Daylight bombing," he wrote on 16 September, "with the same accuracy as we have gotten and with the same casualty ratio in air fighting would raise hell with this island. We must hit their aircraft factories before Spring and it requires a large number of P-17's to attempt this."⁹⁵ With this danger in mind, he further urged that the P-38 should be developed for use against heavily armed and armored bombers, although their primary mission remained that of escorting allied bombers.⁹⁶

Thus the picture presented by the day bombing offensive just after the mission against Lille on 9 October was one of sharply contrasting lights and shadows. During the rest of the month the shadows tended, in a sense quite literally, to lengthen. On the 25th General Arnold requested a full explanation of the small number of missions recently carried out--an average of barely one per week. The answer merely recounted the problems and obstacles that had been faced increasingly during the previous weeks: the weather, the demands of

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the TORCH movement, and the inadequate training status of the remaining units.⁹⁷ Only one mission had been accomplished since 9 October owing to unfavorable weather. It proved to be an effective enough attack on the submarine base at Lorient on 21 October, the results of which will be described more fully in the following chapter; but even then, of 90 aircraft dispatched to the primary target, only 15 from the most experienced group were able to outmaneuver the elements and bomb their objective.⁹⁸ The British reported that no PRU photographs of any value had been turned over to Bomber Command since the middle of September as a result of the consistently poor visibility.⁹⁹

By 1 November, too, the inroads made by the Twelfth Air Force on the strength of the older organization had become more apparent. In addition to four fighter and two heavy bomber groups, the Eighth Air Force had turned over trained personnel to the extent of 3,198 officers, 24,124 enlisted men, and 31 warrant officers, of whom 1,098 officers, 7,101 enlisted men, and 14 warrant officers came from the VIII Bomber Command alone.¹⁰⁰ The remaining heavy bombardment groups suffered considerably from loss of such essential equipment as bomb-loading appliances and transport vehicles. They suffered even more from the complete lack of replacements, both crews and aircraft, a fact which made it impossible to keep a large force in the air even when weather conditions permitted; and no prospect was in sight of receiving any during November.¹⁰¹

Of the heavy bombardment groups scheduled to be left in the United Kingdom (three groups of B-17's and two groups minus one squadron of B-24's), only two were by the end of October in fully

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operational status.¹⁰² It had been found necessary to give two to three weeks extra training to all new units in formation flying at high altitude, in radio operation, and in aerial gunnery. And even as the crews gained in experience it was the policy of the Eighth Air Force to send them out only in circumstances for which their state of training had made them fit. General Baker believed that nothing could be gained by dispatching green units when conditions of weather or enemy defenses would only cause inordinate loss. For the same reason it was not thought wise to undertake missions that would require landing or take-off in darkness. Therefore, when a target was four hours distant, there were only about two hours of daylight during which it could be struck.¹⁰³

Furthermore, the scope of Eighth Air Force missions had been restricted to a relatively narrow area in occupied France and the Low Countries which could be reached in a short time, which subjected the bombing formation to attack only for brief periods, and which, presumably, did not as yet possess such strong defenses as might be expected in Germany proper. Unfortunately, this otherwise excellent restriction prevented the Bomber Command from making use of occasional streaks of fine weather over more distant targets and over Germany proper at times when France and the Netherlands were completely closed in. It was confidently expected that, when a force had been built up with sufficient training to make deeper penetrations into German Europe and with the ability to mount missions large enough to withstand more intense and more sustained

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fighter attack, the weather would prove a much less serious handicap.¹⁰⁴

Meanwhile it was a question either of committing valuable crews and aircraft prematurely to operations over heavily defended territory and in bad weather, or else of proceeding cautiously as training status and rate of replacements would permit effective operations of wider scope. General Laker preferred the latter alternative, for to adopt the former would be not only to incur crippling losses but to ruin "for ever" the "good name of bombardment."¹⁰⁵

It would [he wrote to General Stratemyer somewhat earlier in October] have been very easy for us [Generals Spaatz and Laker] to commit the force in such a way that improper conclusions would have been drawn from day bombardment. We knew the critical aspect of our task and the fact that it might affect the whole future of day bombardment in this war The way we are doing it we are going to draw conclusions--some have already been drawn--which will be entirely favorable to the power of bombardment. Please do not let anybody get the idea that we are hesitant, fearful, laggard or lazy.

In other words, these early missions were less important for what they contributed directly to the Allied war effort than for what they contributed indirectly by testing and proving the doctrine of strategic daylight bombing. In either instance it was as difficult and dangerous to strive for quick results as it was natural for observers, especially those at some distance from the scene of operations, to look impatiently for them.

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On 20 and 29 October 1942, the Eighth Air Force received two significant directives governing the scope of its operations and the priority of its targets. It is not clear from the documents at hand just what directive, if any, has hitherto dictated target priority. According to the "Joint Directive" of 20 August 1942, target selection had been made the responsibility of the Commanding General, Eighth Air Force and the Assistant Chief of Air Staff, Operations (British), to be determined "from time to time . . . within the existing strategy." Presumably, existing strategy meant the decisions of the Combined Chiefs of Staff regarding the bomber offensive. As far as heavy bombardment was concerned it would also mean existing British strategy, since apparently no specific directive had been issued by the Combined Chiefs of Staff governing target priority for a combined offensive. It is therefore reasonable to suppose that, in concentrating their efforts mainly on targets of importance either to the enemy's transportation system or to his air force, the Americans were following an essentially AIF policy, adapted to fit the peculiar powers and limitations of the American day bombers.

The new directive of 29 October did not, however, attempt to clarify strategic policy underlying the day bombing and its place in a joint British-American offensive. Like several other factors affecting Eighth Air Force operations in the fall of 1942, this directive arose in principal part out of the special requirements

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of the project TORCH. In order to move the huge amounts of supplies and equipment from the United Kingdom to North Africa it was necessary to protect the movement from both submarine and aircraft attack. Accordingly, the theater commander required the Eighth Air Force, as a matter of first priority, to attack the submarine bases on the west coast of France from which the major portion of the German Atlantic U-boat fleet operated: Lorient, St. Nazaire, Brest, La Pallice, and Bordeaux. Secondary targets for missions against the above bases would consist of shipping and docks at Le Havre, Cherbourg, and St. Lolo. In second priority came the aircraft factories and repair depots at Caule, Cosmelles, Antwerp, and Courcelles, and the airfields referred to as Courtrai/Levalghem, Abbeville/Druent, St. Omer/Fort Bouge, Cherbourg/Auger-tus, Beaumont/Le Roger, and St. Omer/Longuenesse. Transportation targets, marshalling yards in occupied countries, were left in third place.¹⁰⁶

It must be remembered, of course, that in allotting the German submarine bases the position of first priority, General Eisenhower was not acting merely to ensure the success of the North African invasion, however essential it was to that project to clear the sea routes of U-boats. The increasing submarine menace threatened the entire logistical plan for Allied operations in Europe and Africa. It constituted Germany's most powerful offensive-defensive weapon against the Allies' necessarily ocean-borne forces and supplies. It had, as a result, figured conspicuously in strategic planning during the fall of 1942. On 15 October General Eisenhower

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wrote to General Spantz that he considered the defeat of the submarine "to be one of the basic requirements to the winning of the war." He added, "In fixing priority of air targets from this theater, I realize that the German Air Force must be constantly pounded, in order to give our own Air Forces freedom of action in carrying out fruitful missions. Of these missions, none should rank above the effort to defeat the German submarine."¹⁰⁷ During the course of the North African operation this antisubmarine activity was naturally of particular importance, and General Spantz planned to coordinate it closely with the British Coastal Command which was charged with the specific duty of fighting the submarines.¹⁰⁸

All of which did little to advance the cause of the strategic bomber offensive. However unavoidable the diversion may have been, and however well conceived, the fact remained that it removed the American heavy bombers from their primary strategic mission of crippling the German economic machine to what in the narrower sense was a tactical operation in support of the North African invasion. Attacks on submarine bases, airfields, and airplane factories carried important strategic implications, mainly of a defensive nature; but it was also true that in executing them the Eighth Air Force would be engaged for an indefinite period in a project of secondary significance in relation to that to which the force had originally been assigned.

On 29 October, the Eighth Air Force received another directive, this time regulating its missions against targets in occupied

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countries. The problem with which this paper dealt was a delicate one. Objectives vital to Germany's war effort existed in occupied France and the Low Countries, and it had been a point of tactical policy to restrict American bombing effort to these areas. But it was impossible, even with greater precision than the U. S. bombers were as yet capable of, to ensure the safety of civilian life and property in the neighborhood of the targets. Thus there arose a political problem which might radically affect bombardment plans.

French opinion had been deeply stirred as a result of the bombing at Rouen, at Lille, and again at Lorient, in each of which civilian French casualties had been impressive if not always extremely numerous: at Rouen some 140 were killed, at Lille approximately 40, and at Lorient a few Frenchmen were numbered among the 150 dead, more than half of whom were Germans, the rest Belgian and Dutch.¹⁰⁹ Naturally the French viewed the bombing of their cities with mixed emotions, the mixture varying pretty much according to the severity of the loss suffered. Although generally happy in a grim sort of way to see any damage dealt the Nazis, even in their own land, many Frenchmen found it hard to take a long-term view of the situation when American bombs fell on French property and took French lives. The Germans leaped at this opportunity to poison French minds against the Allies, covering walls with posters which featured the civilian deaths and civilian sufferings attendant upon the American bombing. Except at Lorient (for reasons which will be discussed in the next chapter), the controlled press

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did its best to keep the bitterness alive. Even those who understood better than the average of their countrymen the strategic necessity for the Allied bombing felt that, in planning such missions the sorrow and destruction suffered by the French should be carefully weighed against the doubtful results to be attained from bombing at extremely high altitudes. It was on this point that most French criticism seemed to be concentrated in the fall of 1942. French observers could not help believing that as long as bombing attacks were made at 25,000 feet only a small percentage of bombs would hit the target; and results had not as yet been such as to persuade them to the contrary.¹¹⁰ Some also urged, quite seriously, that bombing of factories and shipyards should be done only on Sundays and holidays when French workmen would be absent.¹¹¹

It was in an effort to bring up to date a code of rules for operations in this delicate but unavoidable situation that the Air Ministry, to whom the responsibility for such political matters was customarily left, issued the directive of 29 October. Bombardment was to be confined to military objectives. The intentional bombardment of civilian populations, as such, was forbidden. It must be possible to identify the objective. The attack must be made with reasonable care to avoid undue loss of civilian life in the vicinity of the target, and, if any doubt existed as to the possibility of accurate bombing, and if a large error would involve the risk of serious damage to a populated area, no attack was to

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be made. The provisions of Red Cross conventions were, of course, to be observed. Military objectives were defined broadly to include any sort of industrial, power, or transportation facility essential to military activity, which obviously included any desirable objective, except civilian morale as such. The only other important restrictions were against attacks on passenger trains during daylight hours and on power stations in Holland, the destruction of which would cause extensive flooding of the land by putting out of action electrically-driven pumps. Special consideration was to be given to the Channel Islands, should attacks on enemy installations there become necessary. In conclusion, the directive stressed that none of the foregoing rules should apply in the conduct of air warfare against German, Italian, or Japanese territory, except that the provisions of the Red Cross conventions were still to be observed, for "Consequent upon the enemy's adoption of a campaign of unrestricted air warfare, the Cabinet have authorized a bombing policy which includes the attack on enemy morale."¹¹²

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Chapter III

OPERATIONS AND OPERATIONAL PROBLEMS,
21 OCTOBER 1942 TO 13 JANUARY 1943The German Submarine Bases

Submarines became the primary concern of the Eighth Air Force after 20 October 1942, and continued to preoccupy that organization for many months. In the fall of 1942, however, it was not at all clear whether striking the submarine operating bases on the coast of France, as the directive of 20 October stipulated, was an efficient method of reducing the submarine menace; nor was it clear that the day bombers could do that job effectively. The entire antisubmarine campaign constituted, in fact, a highly controversial problem, and one in which the essential data came too often to be obscured by the mysterious activities of that most mysterious of the enemy services.

To those who had to cope with the steadily increasing submarine threat several alternative courses of action suggested themselves, no one of which seemed by itself entirely satisfactory. It would have been very natural for strategic bombing forces to have concentrated their efforts on the sources of the submarine fleet, as they planned to concentrate on the sources of the entire German war machine. The submarine construction yards and the component-parts manufacturing plants provided tempting objectives, the complete destruction of which would eventually solve the U-boat problem. The RAF had already expended considerable and sustained effort in

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this direction. Although few and light in the fall of 1942, British Bomber Command attacks during the 15 months from April 1941 to June 1942 had seriously damaged the ports of Rostock, Lubek, and Lunden, and had dealt heavy blows to facilities at Bremen, Hamburg, Wilhelmshaven, Kiel, and Bremerhaven. In addition, the submarine Diesel factory at Augsburg and the component parts factories in Cologne had suffered in the attacks on those cities.¹

The British effort had, however, been directed primarily against the towns themselves rather than against the port facilities and factories, in accordance with the RAF policy of area bombing. It was the opinion of the Ministry of Economic Warfare in July of 1942 that, apart from damage to the plant at Augsburg which was supposed to be producing up to 50 per cent of the total submarine Diesel engine requirements, little severe damage had been inflicted on component factories. In that instance probably one month's output had been lost, amounting to the Diesel requirements for ten submarines. As for the construction yards, repeated attacks on Wilhelmshaven, Kiel, Hamburg, and Lunden resulted in no detectable decrease in U-boat production, although the estimated schedule appeared to have been delayed by a few weeks as a result of a variety of factors, not all of which could be identified with the bombing offensive. This same agency even contended that these objectives were not well suited to aerial bombardment. Component parts plants were numerous, widely scattered, often inaccessible from the United Kingdom, hard to identify, and of a type difficult to destroy except by attacks of

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"exceptional weight and concentration." Moreover, it was reported that a surplus of suitable, but at that time unused, productive capacity existed which acted as an effective cushion to ease the over-all shock of bomb destruction. The shipyards presented targets too small, too isolated from other suitable objectives, and of a type not easily enough put permanently out of action to warrant a major share of the bombing effort. It was true, on the other hand, that their proximity to the British air bases made them always useful secondary objectives.²

Undoubtedly the increased accuracy possible with precision day bombing would increase the effectiveness of attacks on targets of this nature. And so, however, there was little hope of securing immediate results. It was estimated in August 1942 that the submarine fleet consisted of some 240 operational craft, with 120 training in the Baltic. Production at that date was believed to be in the neighborhood of 20 per month, 10 to 15 a month becoming operational; and sinkings by Allied agencies were currently at the rate of from five to seven a month. In the light of these figures it appeared that no amount of damage done to the submarine construction yards and factories could reduce the operating fleet during the ensuing nine months. Indeed, if losses in production were made up regularly from the U-boats in training, the fleet would probably increase by eight to ten a month during that period.³

Moreover, the Allies could not wait until the U-boat fleet perished from attrition. The submarine situation had reached a

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crisis by November of 1942. The submarines themselves were increasing: whereas in January of that year not more than 15 or 20 submarines had been deployed by the Germans in the Atlantic, by November the total was nearing the 100 mark. This fact, by itself, was serious enough in view of the tremendous problem of ocean-borne transport and supply. With the opening of the African campaign in November, that ocean increasingly valuable. If the Allies were effectively to supply the United Kingdom, the Middle East, and North Africa, it was clear that something drastic would have to be done about the submarines which during that month increased their number operating in the Atlantic to an estimated 114.⁴

The alternatives remained: the submarines could be hunted at sea, or their operating bases could be rendered more or less unusable. Since the middle of 1942 the RAF Coastal Command had been operating a considerable force in the neighborhood of the British Isles, concentrating their effort especially in patrols over the Bay of Biscay. It was well known that most of the U-boats operating in the Atlantic were based at ports on the western coast of France. In order to leave these ports for action in the Atlantic shipping lanes and to return for necessary periodic servicing, practically the entire German submarine fleet had to pass through the Bay of Biscay, thus producing a constantly high concentration of submarines in the Bay and its approaches. By covering this transit area with long-range aerial patrols, Coastal Command hoped either to destroy a significant number of submarines by direct attack or,

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by forcing them to remain submerged for long periods, to make their passage to and from their bases so slow that their effective time in the open sea would be substantially reduced. Prior to November 1942, however, the effort to strike the submarines in their operating areas suffered from lack of enough long-range aircraft, lack of a "balanced" antisubmarine force capable of attacking both by day and night, and lack of adequate radar equipment and special weapons. Actual "kills" had as yet been relatively few.⁵

The operating bases appeared to offer certain distinct advantages as bombardment objectives. As previously stated, almost the entire Atlantic submarine fleet depended on the French bases, which had consequently become the nerve center of the whole complicated U-boat organization. The Germans had begun, immediately after the defeat of France, to develop facilities at Brest, Lorient, St. Nazaire, La Pallice, and Bordeaux in order to place the submarines as close as possible to the Allied supply lines and as far as possible from British airfields. Conversely, the coastline from Brest to the north coast of Germany had been virtually abandoned by the submarines. The Germans had constructed elaborate pens to house and protect these craft during their stay in port, a period normally of 21 days duration, and had built elaborate repair and servicing facilities. Elaborate also was the schedule of turn-around by means of which a limited number of pens could be made to accommodate a large and growing fleet of submarines.⁶ It was considered practically impossible to penetrate the dozen feet of reinforced concrete that formed the roof of these pens with any bombs then available.⁷

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But so integrated were the facilities at these bases, and so carefully adjusted the time schedule for repair and refitting that any damage to the installations surrounding the pens would, it was believed, cause serious delay in turn-around, and so in effect reduce the number of submarines in operation. Locks, floating docks, storage depots, railway yards, power houses, foundries, barracks, and submarines not actually in the pens, all presented vulnerable targets for bombing aircraft--especially for bombers equipped for precision operations.⁸ It was, to be sure, very probable that much of the servicing had been put under concrete along with the submarines themselves; and alternative power installations no doubt existed which could be used to relieve most emergencies affecting the power system. Moreover, it was fully expected that the bases would be given adequate antiaircraft protection.⁹ Yet the prospect of disorganizing the U-boat campaign by harassing these vital points and eventually neutralizing them, seemed reasonably bright.¹⁰

By 20 October, then, opinion was divided as to the best way of immediately reducing the submarine threat. All four alternative methods--attacking construction yards, component parts plants, operating bases, or the U-boats at sea--had been tried, with only distinctly qualified success in each case. All four would necessarily contribute to the final defeat of the submarine, but at the moment time was of the essence. British observers recognized this fact. The Air Ministry, in August, had declared itself in favor of operations against the U-boats at sea and against their operating bases, in preference to the long-term policy of attacks against building

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yards and factories. Meanwhile, the RAF area bombardment of German industrial cities would incidentally contribute steadily to the long-term objective.

Opinion in Washington was somewhat more divided, especially on the use of long-range, land-based aircraft in antisubmarine operations. The U. S. Navy urged extended convoy cover. Those most interested in the AAF Antisubmarine Command argued for employing as many B-24's as possible on such projects as that already being conducted by the RAF Coastal Command in the Bay of Biscay. However, Brig. Gen. C. W. Russell, AAF coordinator for antisubmarine activity, on 3 November placed considerable emphasis on attacks against the operating bases and construction yards by heavy bombers of the Eighth Air Force, a policy which AC/AS Plans endorsed.¹²

When it came actually to employing the Eighth Air Force bombers in the antisubmarine counteroffensive, the problem of choice became simpler. A considerable weight of opinion in both British and U. S. quarters favored action against the bases on the coast of France, and a campaign against those objectives was, for the time being at any rate, especially well suited to the capabilities and limitations of the American bomber force. Not only were the targets much better adapted to daylight, precision methods than to those of the RAF night bombers, they were also within the area of occupied France to which Eighth Air Force operations had been temporarily restricted. Accordingly, General Spaatz ordered the maximum use of his force against the five French bases. In addition, however, he made available to Coastal Command 12 B-24's to help cover the movement of

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shipping to Africa by expanding the system of long-range air patrols over the sea lanes.¹³

On the 21st of October, the VIII Bomber Command flew its first mission against the submarine bases, dispatching 90 bombers (66 B-17's and 24 B-24's) to attack the base at Lorient-Meromun. Bad weather forced all but the most experienced group to return, leaving only 15 B-17's of the 97th Group to bomb the target. The objective was an important one, for the Germans had developed the small fishing port, situated about one and one-half miles southwest of Lorient on the Brest Peninsula, as a major submarine base that was considered, along with St. Nazaire and Brest, as one of the three most important submarine bases used by the enemy. An estimated total of 20 U-boats, all of the large 750-ton type, was believed to be in port at any given time. The principal targets were the U-boat shelters, both the 12 completed ones and the block of seven pens then under construction. These shelters, typical of their kind, had been built on dry land and provided with heavily reinforced concrete roofs 11 to 12 feet thick. Immediately adjacent to the pens were lighter and smaller buildings believed to contain workshops, transformers, oil storage, offices, and other installations directly connected with the servicing of U-boats. As in all the improved bases, however, many of the vital facilities were housed under the massive pen roof itself. Lorient had not been attacked by the RAF during 1942, nor had the British ever attacked the area of the submarine pens. In 1941 they had made 33 night raids, dropping 390.1 tons of bombs, mainly on the town itself.¹⁴

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The bombing was unusually good. From a 17,500-foot altitude--a considerable departure from the 22,000 to 27,000-foot level usually reached--the bombers dropped 80 high-explosive bombs, each weighing one ton. With the exception of a few which fell some 1,100 yards from the piers, most of the bombs fell in the immediate target area. Of the 80 dropped, 21 fell within a radius of 1,000 feet from the aiming point.¹⁵ Five bombs were reported by ground observers to have hit the central block of shelters. But, according to underground information, they did not penetrate more than five feet despite their weight. Among the surrounding buildings, the results were somewhat better. Three general workshops and a pair of floating docks were pretty thoroughly destroyed, and two submarines were damaged by blast. About 40 French were reported killed among the total of 150 dead, more than half of whom were German workmen.¹⁶

Although little major damage was done to the base itself, the bombing made a great impression on both French and German opinion. For one, the French population appears to have compared an attack by U. S. forces favorably to those made by the British. They seem to have been greatly pleased with the whole affair, standing in the streets watching and smiling and applauding the accuracy with which the Americans dropped bombs on the German installations. It was, they felt, too bad that Frenchmen had also to be killed, but the victims had in a sense asked for their fate in accepting employment at the base for the sake of the high wages paid there. As for the Germans, they appear to have been taken completely by surprise.

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The alarm was not sounded, and the bombs had fallen before the anti-aircraft guns went into action. The Germans were said to have been convinced that a formation of such size--15 aircraft--could only have been their own planes. The mission temporarily discredited the wislings, who had insisted that Allied attacks were being made deliberately against the civilian French population, and that the base was too well defended to be attacked. The controlled press remained silent.¹⁷

Despite the fact that the aerobics at Orient were caught napping, and although the attacking force encountered no effective flak, they did run into stiff resistance from enemy fighters. As the formation crossed the enemy coast en route to the target, it met 36 Fw-190's which gave it continuous battle to a point not far from the objective. As a result of these engagements, according to conservative estimates, four enemy fighters were destroyed, six probably destroyed, and one damaged. But the 15 attacking P-17's lost three of their number, and suffered damage to six others.¹⁸

With this mission and these heavy losses in mind, General Spaatz wrote in pessimistic vein to General Arnold on 31 October: "Whether or not these operations will prove too costly for the results obtained remains to be seen. The concrete submarine pens are hard, maybe impossible nuts to crack."¹⁹ "However," he added, "the bombing of the surrounding installations should seriously handicap the effective use of the bases." General Spaatz had, in fact, undertaken this task with more determination than either realism or optimism. It was not only a regrettable, even if necessary,

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diversion of effort from the main mission of the force; it was also a job that would very probably require the use of tactics very different from those for which his units had been trained. As early as 15 September 1942 he had expressed concern over this problem. Assuming that the bombs themselves would be virtually invulnerable to normal high-altitude bombing, and that they constituted the vital spot in the base installations, he predicted that no one method could be counted on to put the bases out of operation. Sowing harbor waters with mines, launching torpedoes at the sub slips, lobbing bombs in from low altitude, or a combination of all three might, he felt, become necessary. At that date he even toyed with the possibility of experimenting with glide bombing attacks from an altitude of 6,000 feet.²⁰

By the end of October, although he apparently did not for the time being contemplate using these extraordinary tactics, he nevertheless was determined to operate against the submarine bases from lower altitudes. Evidently convinced that bombing from above the 20,000^{foot} level, as practiced heretofore, was not likely to yield accurate enough results to neutralize small targets, he planned to operate at altitudes possibly as low as 6,000 feet. In such event, he warned, much higher casualties than any so far sustained would have to be faced, for the objectives would certainly be heavily defended by antiaircraft. Other factors, he believed, would also lead toward a higher casualty rate. Low altitudes would favor enemy fighters. Since the French bases were beyond the range of available fighter escort (no P-51's or P-47's were on hand) the bombers would

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be without fighter support over the objective. And, finally, the crews left after the recent departure of the 37th and 391st Groups were by no means seasoned, especially the gunners.²¹

On 9 November, after an attack of indifferent accuracy and effect against Great two days earlier, the VIII Bomber Command flew a mission at very much reduced altitude against the submarine installations at St. Nazaire. If it had been seriously expected that attacks at lower altitudes would increase effectiveness without at the same time producing prohibitively losses, such hopes were dampened by this experiment of 9 November.²² Thanks to a well-planned course and a clever diversionary mission flown by the 1st, the fighter threat, heretofore the more serious, was circumvented. The same could not be said of the antiaircraft batteries concentrated in the neighborhood of St. Nazaire. Probably 60 to 70 heavy guns guarded that area, to say nothing of numerous light batteries.²³ The attacking B-24's, 12 in number, flying at 17,500 to 18,500 feet, suffered little, one group reporting intense, heavy flak well below the formation. The 31 B-17's, flying at 7,500 to 10,000 feet, faced much worse. In the neighborhood of St. Nazaire they ran into very intense flak, extremely accurate both in altitude and direction. At 10,000 feet both light and heavy fire was reported, of considerable intensity and accuracy. As a result of this barrage, three aircraft were lost and 22 others damaged in some degree.²⁴

It was a costly experiment, the lesson of which became all the more impressive in comparison with the relative ineffectiveness of

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flak hitherto encountered at higher altitudes. It was clear that the cost of low-altitude bombing could at this rate only be justified by appreciably improved accuracy. It is difficult, however, to make an exact statement of the accuracy achieved during this mission. Only some 75 of the 214 bombs dropped could be plotted from strike and reconnaissance photographs. Of these, eight burst within 600 feet of either of the two aiming points, which consisted of the shops of Chantiers et Ateliers de Penhouet and the lock at the entrance to the Bassin de St. Nazaire.

The importance of the former target lay in the construction and repair facilities it contained which were being utilized to the maximum for the overhaul of submarines based there. The lock provided the only remaining entrance to the two basins in which all port facilities and U-boat installations were located. The others had been rendered unserviceable by the British in a commando raid during the spring of 1941. The attempt was made to hit the 30-ton submarine shelter itself. Like its pachydermous counterparts at Lorient and Brest, it did not lend itself to destruction. In the machine workshops, direct hits severely damaged the plate shops and mould loft. Several bombs fell within a radius of 1,000 feet from the strategic lock, but none scored a direct hit. Severe damage was also done to various buildings and facilities in other areas. Of considerable incidental importance was the apparently complete destruction of the locomotive depot north of the Gare d'Orleans. Reconnaissance two days later indicated that, while damage to railway lines had been repaired, the locomotive

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depot lay unharmed and the usefulness of the yards appeared to have been seriously reduced. It appears likely, in fact, that the attacks had more effect on Axis transportation than on the submarine campaign.²⁵

This mission apparently convinced those in charge of Light Air Force operations that attacks at low altitude would not yield results commensurate with the losses likely to result from such undertakings. Subsequent attacks on submarine bases were made at altitudes ranging from 17,000 to 22,000 feet which, up until the mission against St. Nazaire on 3 January 1945, effectively foiled antiaircraft fire.²⁶

Prior to 3 January the VIII Bomber Command conducted six more missions against the submarine bases, concentrating on St. Nazaire and Lorient, with one relatively light and ineffective attack devoted to La Pallice. A total of 199 heavy bombers, in missions varying in strength from 11 to 53 aircraft, attacked according to a fairly consistent pattern. They approached the target area over land across the Great Peninsula, and, in order to elude enemy fighters, returned over water, skirting wide around the French coast. RAF fighter forces provided support in the form of short-range escort and of diversionary sweeps over enemy territory. In no instance did the bombers enjoy fighter cover over the target area. Flak accounted for only one of their number although in many instances it caused minor damage. On four occasions, however, the bombers encountered stiff opposition from enemy aircraft which resulted

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directly in the loss of five more planes. In addition, two bombers crashed and two were lost to unknown agencies.²⁷

This over-all loss rate of less than five per cent of the attacking force justified, from a defensive point of view, the decision to abandon attacks at lower altitudes. And over against these losses could be placed the damage done to the U-boat installations. By the end of December St. Nazaire and Lorient were both showing the cumulative effect of repeated bombardment. Although the accuracy achieved still left much to be desired,²⁸ enough bombs had fallen within the target areas to cause embarrassment to the enemy. St. Nazaire suffered especially heavy damage in the course of the five missions from 9 November to 26 November. In all, 138 aircraft dropped a total of 771,000 pounds of high-explosive bombs on or in the vicinity of the port facilities.²⁹ At the important repair and construction works of Chantiers et Ateliers de Penhoet, the machine shop, mould loft, plate shop, light sheet-metal shop, boiler-makers' shop, pipe and tube shop, paint shop, and rivet shop all suffered repeated hits and work on several cargo vessels, tankers, etc. was believed to have ceased. This damage no doubt also slowed up essential repairs to the submarine fleet. A floating dock was hit and sunk, the railway tracks were badly derailed, and hits were scored on the locomotive depot and the station buildings. The gas, electric, and water services in the port were reported cut, leaving work in the submarine pens to be carried on by means of kerosene brought from some distance.³⁰

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According to one account, obtained from a German naval prisoner of war, work continued after the U-boat raids only in the submarine shelters which, though hit at least six times, apparently suffered no lasting damage. This same informant spoke of large-scale evacuation of the working population which left barely enough hands to continue the restricted scale of work required in the U-boat shelters. In one shop, he said, 200 apprentices had been killed and, owing to the lack of labor to remove them, the bodies had been left in the rubble.³¹ Apparently as a result of some damage to the lock gates during the attack of 9 November, though possibly also because of subsequent damage to other facilities, all submarines normally based at St. Nazaire seem to have been moved for a while to Lorient. On 18 November reconnaissance revealed an unusual concentration of U-boats at that port. It was believed that, in addition to the 15 or 16 craft already based there, as many as 15 or 20 were forced to use the base at Lorient.³²

Lorient itself suffered severe damage as a result of four raids on 21 October, 16 and 22 November, and 15 December. The shelters under construction had been hit three times with undetermined results. It was estimated that the canal slip had been so seriously damaged that it would be unusable for four months. Several auxiliary buildings, including the "offices," were completely destroyed. But it is quite possible that what interfered most with the efficient operation of the submarine service at Lorient was the congestion of U-boats forced upon that base by the bombing of St. Nazaire.

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Air Ministry experts could not detect any evidence that bomb damage at Lorient had operated directly to delay the turn-around at that port.³³

The repeated attacks made by the U. S. forces at St. Nazaire in November--on the 9th, 14th, 17th, 18th, and 23d--had demonstrated the virtue of concentrated effort in this type of bombing. Undoubtedly St. Nazaire, the most important of Germany's U-boat bases, had suffered crippling effects. But the rapid recovery of that port after 26 November also demonstrated that, if such crippling effects were to last, attacks of similar weight would have to continue at a similar rate. No mission was conducted against St. Nazaire between 25 November 1942 and 3 January 1943. During the breathing period the servicing facilities were apparently put once more into some kind of running order. British observers even believed that by 6 December the port was again in full commission. In order to retrieve the earlier successes, the VIII Bomber Command struck St. Nazaire on 3 January in the largest attack made against the submarine bases to date. Some 66 aircraft bombed the port, dropping 342 x 1,000-pound high-explosive bombs.³⁴

Accuracy on this mission was better than on most of those since the first attack on Lorient. The points of burst of 107 bombs could later be identified, and of this number, 26 were located within 1,000 feet from the aiming point, in this instance a small torpedo warehouse which was hit and demolished. Considerable damage was done in the dock area, especially to the north and northwest of

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two submarine pens, where many bombs fell on the railway, at least 16 resulting in destruction of tracks and wagons. A number of buildings, including the goods station and the customs house, were damaged or destroyed. The new boiler-plate shop suffered additional damage.³⁵ A ground report claimed that, for the time being at any rate, the works of Penhouet had been put completely out of action. Several bombs fell on and around the submarine base itself. According to the same source none penetrated the reinforced concrete roof, and except for some windows, doors, and electrical apparatus being damaged by blast inside the shelter, the base escaped serious damage and work proceeded without let or hindrance. So impervious, in fact, were the concrete shelters that the extensive German naval administrative offices, hitherto lodged in the customs building, were said to have been transferred after the raid to quarters "beneath" the submarine pens.³⁶

Significant as the results of the bombing appear to have been, the nature of the opposition encountered during the mission gave Eighth Air Force observers even more to think about. Heavy resistance from fighters, which was met chiefly over St. Nazaire itself, accounted for three of the bombers lost. In return for these losses, bomber crews were finally credited with 14 of the enemy destroyed, 15 probably destroyed, and 4 damaged. But what surprised them most was the intensity and accuracy of the flak which, unlike that previously experienced, was thrown up in a "predicted barrage" rather than in a "continuous following." This unprecedented fire destroyed three more of the attacking planes and hit

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an additional 39. In personnel, the mission cost 70 men missing, 5 killed, 9 seriously wounded, and 21 slightly injured. In terms of aircraft it cost seven destroyed and 47 damaged. Although the most successful mission to date against the submarine bases from the standpoint of destruction to enemy installations, it was fully as costly as the ill-fated low-altitude attack of 9 November against the same objective.³⁷ Quite clearly, the submarine bases presented problems of defense which the U. S. bombardment experts had yet to solve.

Looking back over this first phase of the effort against the U-boat bases, those most concerned with it could come to few sound conclusions regarding its effectiveness, either in terms of specific damage to the U-boat campaign or in relation to the other forms of antisubmarine activity. It was easy enough to compile and quote certain operational data. In 10 operations from 21 October 1942 to 3 January 1943, the Eighth Air Force, out of an effective total strength of 570 aircraft, had dispatched 663 against the submarine bases, of which 357 actually attacked the target, dropping 855.2 tons of bombs on or in the vicinity of the objective. Of this total of bombs dropped, photographic estimates indicated some 96 tons to have fallen within effective range of important installations. All of these results were obtained at a cost of 17 men killed, 90 wounded, and 211 missing, and 23 aircraft lost. Claims originally registered included 31 German fighter planes destroyed, 10 probably destroyed, and 38 damaged. Subsequent review revised this score to 24/34/12.³⁸

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In addition, ground reports and aerial reconnaissance pointed to certain specific effects which have already been summarized. But it was much more difficult to say precisely how many U-boat months had been denied the enemy through these operations or to what extent, if any, the American attacks had affected the number of U-boats operating in the Atlantic. That number has apparently declined in December from its peak in November, but it was obviously problematical to what extent the operations of the Eighth Air Force had contributed to that result. Bad weather and the necessity for temporary retrenchment in submarine operations after a period of unrelenting activity no doubt accounted in large measure for the decline in the number of U-boats operating in the Atlantic. Indeed, according to a U. S. Naval Attaché report, the Admiralty Tracking Unit claimed that no substantial change in the rate of U-boat departures from the Biscay bases had resulted from the USAAF raids.³⁹

It was equally obvious that a series of relatively concentrated and destructive attacks must have had some deleterious effect on the efficiency of the enemy submarine fleet. Opinion as to the extent and relative importance of that effect varied. Admiralty agencies seemed to have been hardly appreciative of the U. S. attacks, if necessarily vague in specifying their reasons. After the attack of 23 November against St. Nazaire, the Admiralty sent the following message to the Commanding General of the VIII Bomber Command: "Your attacks against the U-boat operational ports are greatly appreciated and are a valuable contribution to the offensive

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being carried out by Coastal Command in the Bay."⁴⁰ Coastal Command volunteered a similar statement.⁴¹ Late in November, Sir Dudley Pound, First Lord of the Admiralty, wrote General Baker, referring to the "fine achievement of the U. S. A/C employed in the precision bombing of the U/B bases in the French discard ports."⁴²

It is too early to ~~he continued~~ to say with certainty what effect these raids have had on the German U/boat campaign. The existing evidence suggests, however, that although the direct damage to the U/Boats and their shelters may not have been very great, the raids have caused a dislocation of the ports and the delicate organization of the U/Boat service which is only just becoming apparent. If this is so, and I personally believe that it is, the U. S. aircraft will already have performed a valuable service and discovered one of the few chinks in the enemy's armour so far as the U/B campaign is concerned.

Generally speaking, the Admiralty recommended intensifying the day offensive against the submarine bases, concentrating on the installations in the neighborhood of the pens rather than on the pens themselves.⁴³

Curiously enough, at first glance, Air Ministry and RAF Bomber Command opinion was comparatively lukewarm. An Air Ministry analysis, while granting that the U. S. attacks had undoubtedly harassed the enemy rather in dislocating facilities at the bases than in damaging the submarines or their pens, placed greater confidence in direct sinkings of submarines by surface and air attack and in

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long-range antisubmarine air patrol in the areas where the U-boats operated. If sinkings at sea could thus be increased from 5 to 7 per month to 10 per month, results of current efforts against the bases and yards would become proportionately more decisive. "Certainly," it concluded, "the effort required to attain a similar result by bombing of bases and building yards alone will be quite disproportionate to the results."⁴⁴

This attitude disturbed General Arnold. Yet, as General later undertook to explain to him in a letter of 11 January 1945, the situation was less serious than it appeared. If the Allies were to admit that air submarine gas bombing was the answer to the submarine problem, they knew their own forces would be taken off bombing of installations in Germany and put to work on the U-boat bases. This, he declared, was a perfectly sound position, for it was of the utmost importance that the Allies continue to bomb German industry in Germany. It would therefore be necessary to put up with criticism, understanding the reason for it.⁴⁵

USAF headquarters had other misgivings about the submarine base bombing. While generally pleased over the fact that positive action was at last being taken against enemy installations by American heavy bombers, and although especially pleased with the fine series of attacks executed during November,⁴⁶ headquarters agencies felt that the weight and nature of the attacks remained inadequate for the task of doing "something drastic" about the menace that still threatened Allied supply lines.⁴⁷ When there

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was the matter of the relatively high losses sustained during the last two missions (10 aircraft out of a total of 100 attacking).

Probably in an effort to allay doubts in all Headquarters, General Baker maintained a consistently optimistic tone when referring to the campaign against the submarine bases. The losses, though unfortunate, were, he insisted, to be expected in operations conducted repeatedly over the same objectives and in such a way that the enemy could tell by the hour or daylight and by the flight time to and from the target just when the bombers would arrive, even if their RDF had not already given fighter and flak defenses sufficient warning. Over against these losses, which are not actually prohibitive, should be placed the heavy toll taken of the enemy fighters by the American bombers. "We are still able," he wrote on 8 January 1943, "and shall continue to knock down better than C-1 enemy fighters for our bomber losses. This is, to feel, an excellent exchange." Furthermore, improved tactics might in the future be expected to improve the situation materially.⁴⁸ The successful operations of November had more than ever convinced him that with ten heavy bomber groups he could eliminate a large part--possibly 60 per cent--of the submarine menace in the Atlantic. Later he added that as soon as it became possible for him to put 100 to 120 bombers in the air he hoped to be able to hit submarine building installations in Germany proper whenever weather over the West Peninsula was unfavorable for operations against the bases.⁴⁹

The U. S. Navy added its opinion to the confusion of a picture already far from clear. A Naval Attache's report from London compared

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the to him of the Biscay pens and base facilities unfavorably with other antisubmarine air operations, especially the escorting of threatened convoys. It maintained, moreover, that the only signs of success obtained in the attacks on operating bases had been the destruction of two docks at St. Nazaire and the report that some U-boats had moved from that port to Lorient. In which event, and assuming that this condition prevailed for a month or so, perhaps 10 to 15 U-boat months were lost as a result of the entire Eighth Air Force effort.⁵⁰

By January 1945, two things about this bombing program had become clear. In the first place, what had been suspected regarding the perforability of the pens was now borne out by experience. Even with the use of heavier armor-piercing ammunition it was considered doubtful whether significant damage could be done to the pen blocks. Consequently all that could be expected from bombing of bases would be disorganization of the turn-around and servicing schedule.⁵¹ Secondly, in order to paralyze the operating bases, and so in effect to deny them to the Germans, it would be necessary to employ much larger forces much more frequently than had hitherto been feasible. In answer to a direct question from Washington, Headquarters, Eighth Air Force replied that, in order to neutralize these five bases completely, 25 sorties against each base per week for eight weeks would be required, and that this scale of effort was, in fact, recommended.⁵² Both Air Ministry and Admiralty agreed on the necessity for increased frequency of attack by increased forces, for it was not an easy matter to inflict permanent damage

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on ports, as the U.S. has found out at Benghazi and the Germans at Malta.⁵³

The rest of the problem remained in the realm of opinion. Did results justify the effort expended against the submarine bases and the diversion from true strategic bombing which it involved? Was bombing of submarine bases the best, or even a reasonably profitable way of reducing the submarine menace? These vital questions could not as yet be answered with any degree of finality. Involving, as they did, comparisons between divergent and even opposed schools of thought regarding the employment of heavy bombers, any tentative answers were unavoidably colored by the interests of the evaluating agencies. It was, however, generally recognized that no one method was likely to provide by itself the solution to the submarine problem. And opinion still gave the efforts of the Eighth Air Force a prominent, if somewhat indefinite, place in the antisubmarine campaign. The bombers may not as yet have affected the submarine situation in any major way, but they had done their job well enough with inadequate forces to make most observers believe that, properly equipped, they could do it decisively.

It was not until the end of 1945 that official USAAF surveys of strategic bombing results tended to confirm doubts hitherto hesitantly expressed regarding the value of bombing submarine bases. By that time the submarine had for the time being been defeated, and it had become apparent that attack from the air against the U-boat at sea had been the most effective single factor in reducing

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the German submarine fleet, and that bombing of bases had contributed relatively little in that direction. Grand Admiral Doenitz, who, as one-time commander of the U-boat fleet, was in a unique position to know whereof he spoke, further confirmed this opinion in an interview with Allied intelligence officers after his capture in 1945. Not only were the pens themselves impervious to anything but the heaviest type of bomb, he asserted, but they housed virtually all necessary repair and maintenance facilities. Bombing of surrounding installations did not therefore seriously affect the rate of turn-around. That slow turn-around was effectively, he claimed, was the necessity for repairing the damage done to hull structure by aerial-bomb and death-charge attacks delivered at sea.⁵⁴ Undoubtedly the "U" raids harassed the enemy by destroying auxiliary construction plants and neighboring railway facilities, and in a variety of minor ways, but these were not the primary object of their attention.

Other Objectives: Enemy Aircraft and Transportation

Not all Eighth Air Force effort expended during November, December, and January was directed toward the submarine bases. Those installations enjoyed, or rather suffered, first priority; and, in fact, 10 of the 13 operations undertaken by the Eighth Air Force during those months involved attacks on the U-boat ports. But the U. S. command has also been instructed to strike at the German Air Force and enemy-operated transportation facilities in occupied countries as matters of second and third priority respectively.

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Of the 401 bombers dispatched against targets other than submarine bases, 261 were detailed to attack airdromes and 176 to bomb targets of importance to German transportation. Owing to the vagaries of the weather, which on 12 December turned a prior effort against the air installations at Comilly-sur-Seine into a minor attack on the Rouen-Bottreville Yard, only 89 of the 236 planes that completed their mission dropped bombs on aircraft installations, leaving, by far the heavier weight of attack for transportation. As it happened, only one target in each category sustained any considerable pounding. Three missions against Lille accounted for almost all the damage inflicted on transportation, only one other attack having been executed, and that the slight and ineffective one against Rouen-Bottreville on 12 December. In the aircraft category, although planes were sent three times to the Abbeville-Drucourt airdrome, and one to Cherbourg-Mauger, only the single raid on Comilly-sur-Seine on 20 December can be classified as effective.⁵⁵

At Lille the locomotive and rolling stock repair and construction works of the Ateliers d'Ellemaes and of Fives-Lille had been severely damaged in the USAAF attack of 3 October 1942, but had since been extensively repaired.⁵⁶ They still constituted a composite objective of the utmost significance to Axis transportation chiefly because they were the principal railway repair depots in France. All attacks on locomotives had created a serious repair situation. In November, for example, the Fighter Command aircraft carried out 56 attacks by night and 20 by day in France and the Low

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Countries against trains and marshalling yards. In addition to destroying nine locomotives or trains, they stopped 51, a large percentage of which undoubtedly had as a result to pay a visit to the repair shops. Consequently the Mill shops were being taxed to the limit of their capacity, repairing an estimated 30 to 40 locomotives per month.⁵⁷

In addition, Paves-Lille has capacity in 1939 to produce 100 to 150 locomotives per annum. For immediate purposes, however, it was apparently believed possible to hamper axis transportation more effectively by still further constricting the bottleneck already imposed by limited repair facilities than to destroy the means of new production. For the inability of the U. S. C. F. to provide locomotives for the railton service and operation in the region du Nord and the region du Nord-Ouest depended very largely on the speed with which locomotives could be repaired and overhauled.⁵⁸ Thus the U.S.M.F. attacks on Mill appear to fit into a coordinated plan, according to which all fighters attacked rolling stock and the Eighth Air Force periodically reduced the capacity of the principal repair depot.

On 2 June 1944, 30 heavy bombers dropped 230 or 200-pound high-explosive bombs intended primarily for the Mill shops, which has hitherto been the major damage. The repair shops and the machine shop both are damaged. A "reliable source" claimed that this raid destroyed 13 locomotives and damaged 40 more, in addition to causing confusion by a direct hit on the turntable. These figures

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appear high and it is impossible to check their accuracy. Another attack, on 6 December, by 50 planes against the same target added materially to the damage already inflicted, but it is impossible to say to what extent it further retarded repair activities.⁵⁹

The heaviest attack against Lille came on 13 January 1943, when 64 heavy bombers dropped up approximately 120 tons of bombs on or in the neighborhood of the objectives. Two groups were to attack Hellennes and two the Fives-Lille establishment. Severe damage was inflicted on the former, where hardly a building escaped. Many were partly destroyed by direct hits, others by blast or by fires resulting from explosions. Some 12 workshops received damage. Bombs also fell on railway sidings and storerooms nearby. At Fives-Lille, the steel foundry, iron foundry, and forging plant sustained damage. The main group of workshops did not, however, suffer further injury.⁶⁰

At the repair shops of Hellennes, where locomotives waiting overhaul had been piling up since the American raid of 8 November, work appears to have come to a virtual standstill for some time. At Fives, such less interruption took place. Ground reports disagree, but after their conflicting testimony has been sifted, it appears that these works did not resume locomotive construction until the end of April 1943. It cannot, however, be said that bomb damage alone was responsible for so long an interruption. There is evidence that this hiatus in production came in large part as a result of a considerable switching of repair work to

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first explosion at the Millers' store in the vicinity of
10 January 1945. British observer estimated that the combined
explosions on 11th and 12th January cost the Germans 12 locomotives.⁶¹

By 10-11 January 1945, both the city of Millers' and the
area to the locomotive shed and on 11 January, the town-works-
ville, as close to the tracks on 11 January, together, had
created a situation in which there was no longer a single rail
railway facility to deliver the fuel to the locomotives of the
deportment on the railway traffic--as a source of reinforcements
into the air and over-cast 11 January. On 10 January 1945, the
British Ministry of Economic Warfare estimated the situation
but the Germans had been forced to return to the U.S.S.R. 10 January
for 11th locomotives previously requisitioned for use in the area.
It was believed that the situation then existed in which the
Germans would find it difficult to surrender requisitioned rolling
stock in order to maintain the ability of the German railway system
to meet actual or potential military demands.⁶²

Inevitably, bombing of objectives in populous areas such as
Millers' involved destruction of civilian lives and property. The
above-mentioned U. S. attacks on Millers' were not only costly in this
regard but also on other French cities prior to 10 January
1945. Reports had to agree, and it would appear that, on 6 January
especially, a considerable loss of life and civilian property
took place. According to one French report, 69 bombs fell

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during that raid on private houses, destroying 31, partially destroying 33, and killing 23 persons.⁶³ Although this source sharply criticized the Americans for carelessness, possibly even a calculated, bombing of a population 80 per cent of which was pro-British and pro-de Gaulle, morale appears in other French reports to have remained high, the population tending to excuse the American pilots on the grounds of their "inexperience" in comparison to those of the U.S.⁶⁴ One report tells the story of U. S. airmen who landed by parachute in the districts of Lille. The Germans began a systematic house-to-house search for them, only to be systematically thwarted by the French house holders.⁶⁵

On 20 December the Eighth Air Force made its one effective attack on the German Air Force in a relatively large-scale mission against the aircraft park and repair depot at Bouilly-sur-Seine. This aircraft depot and airfield, situated near the river Seine some 65 miles northeast of Paris, held the reserve aircraft of all types for the German Air Force in France and the Low Countries. They were held there for issue to operational units as required, and even repair and re-equipment at a central depot workshops. British intelligence placed one hundred of new planes at Bouilly on the date of this attack at 120--two in addition to some 30 to 50 currently undergoing repair. The only previous British bomber attacks had occurred in June 1940 during the Battle for France and before the Germans had begun using it as an air depot.⁶⁶

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of the 101 command (80 L-17's and 21 L-24's) watched on this mission, 72 (30 L-17's and 42 L-24's) to all the target area, releasing 150,000 pounds of high explosives and 25,000 pounds of incendiaries. Results were reasonably good. Damage was inflicted on hangars, barrack huts, and aircraft, and its ordnance was made on the landing ground, two of them on the perimeter or taxi-tracks.⁶⁷ Of considerably greater historical significance, however, was the fact that, in the course of this deepest penetration yet made by USMC planes into German-occupied territory, the bombers had contact with almost the entire force of enemy fighters located in northeast France. The ensuing air battle developed epic proportions and provided an important test of the American heavy bombers' ability to carry out unescorted missions deep into enemy territory.

According to British intelligence estimates, the German single-engine fighter force in northeast France at the date of the attack was distributed as follows: 12 were based in the Cherbourg area, 12 east of Cherbourg to the Seine, 60 between the Seine and the de Orlain, 20 in Belgium, and 60 (including 20 used for training purposes) in the Paris area. Of this total of 175 planes, 150 were in all probability in a serviceable order. Eight Bf 109 and three C. 53 fighter squadrons, all flying Spitfires, conducted four diversions over areas where the German aircraft were known to be based. Heavy reaction to these efforts amounted to probably 20 aircraft, but no encounters took place. In addition, 35 Spitfires half of the 107 escorted the bombers as far as possible, and 107 provided cover for

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then on their return trip. ~~CONFIDENTIAL~~ Operations also proved uneventful for the friendly fighters.⁶⁶

It was against the center force that the Germans concentrated the full weight of their attack. It may have been that they were prepared for just such a mission at this time, for on 12 December, the date of the preceding American raid, our experts had flown to and locally, intending to attack that objective, but, on finding it closed in by another, they had fallen back on a target of lower priority. At any rate, the reports this time had surely turned back (at 1100 hours) when 60 German fighters, mostly F-109's from the 2nd Luftwaffe, attacked the location.⁶⁷ They came in well above, peeled off upside down, and closed in from the front, either slightly above, slightly below, or slightly below. One F-17 of the 91st Group was observed to hit the ground at Vaucouill, and a few minutes later another F-17 from the same group began to lose altitude rapidly with a number of enemy fighters following it down. At about 1205 hours, the enemy planes were relieved by 50 to 60 fresh fighters from the 2nd Luftwaffe, Paris, and possibly Evreux. These planes continued the fight almost to the target, which was reached between 1240 and 1245. During this phase of the battle a number of F-109's joined in the attack, some approaching from above at 10 or 11 o'clock, flying through the formation and diving out at 6 o'clock. One F-17 of the 203rd Group was hit about six minutes before the target, but it was not until a few minutes later that it started down.⁷⁰

On the return trip the enemy formation suffered almost continuous attack from fighters, most of which had apparently taken part

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in the earlier stages of the campaign and were now adding second sorties. The 1-17's of the 301st Group went down in the vicinity of Paris. Over the Channel another bomber, the sixth to be lost on the mission, went down and did not last so much as being badly and approaching the English coast at very low altitude. In all, six bombers were lost, and it is reported so early that they crash-landed in England. Twenty-nine others sustained damage in some degree.⁷¹

These losses probably all resulted from enemy fighter action, for the first account received consistently inaccurate and ineffective. The losses were heavy, and they reflected the success of the German fighter pilots in adjusting their tactics of attack to the peculiarities of the American bombers. It was on 25 November, during the attack on St. Nazaire, that the observer crew and first reported a change in the direction from which the fighter attacks were launched.⁷² Hitherto, attacks had come mainly from the rear. As soon as the enemy found out that the 8-17's and 8-44's were weaker in forward fire power than in any other respect, they changed abruptly to head-on attacks which during December and January seriously embarrassed the U. S. force.⁷³

The bombers suffered heavily, but they did not suffer alone. In fact, they gave more than they received. Seven of the enemy were seen to crash. It was reported that 10 broke up in mid-air and 27 more went down in flames as a result of the concentrated fire from 84 .50-caliber guns. Total claims originally announced reached 53 destroyed, 15 probably destroyed, and 9 undamaged.⁷⁴

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At this point the British Air Staff again raised its disconcerting head. Over the division of last battle on 9 October, when the first really large air battle had taken place, VIII Bomber Command claims had been questioned by observers both in British and U. S. Headquarters.⁷⁵ Now, on the daily operations, claims of bomber crews seemed again to be excessive in view of the number of aircraft--not over 120--which could have intervened. As for a serious matter, this business of scoring reliable claims of enemy losses, for it reaches far beyond the simple problem of preserving the integrity of the record and of giving credit only where credit was due. It affected the entire U. S. plan for air operations, which was necessarily being developed on a large part on the basis of data received from the American bomber.⁷⁶

To deal with the daily mission, Headquarters, British Bomber Command sought for his considered opinion on the subject and for that of the British as well.⁷⁷ General Spang reported that, although some of the claims still occurred, British intelligence was now more reasonably accurate. Figures for reports of enemy losses were still based on the word of the crews. As for the British, he continued, as a senior officer had at first expressed his opinion but reached to their insistence of later evidence. The British "fight" which had been too close to the American bomber for either side to claim a victory. The plan had been hit by the American at range of over 1,000 yards. British fighter pilots had then reported a victory in the air.

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It is stated that destroyed aircraft are to be considered as being completely enveloped in flames, but not if the aircraft are seen merely lying out from the engine. It could be considered as destroyed if the aircraft disintegrates in the air or when the cockpit, wing or tail assembly has been seen shot away from the fuselage, but not if the aircraft had been shot off, or if some other part of the airplane had been seen shot away. It was considered possible, and had actually happened in the case of one, German plane, for an aircraft to have been badly shot up and yet to have flown a long distance and landed safely at its base. An enemy airplane could also be considered as destroyed if the pilot had been seen to bail out, provided the aircraft was a single-seater. In the case of one of those probably destroyed, it could come from enemy planes believed to have been sufficiently in flames to preclude the possibility of the pilot bailing out, then, or to have been damaged to such an extent that they were believed inevitably to have crashed, although certainty of destruction could not be established absolutely. If a part of the enemy airplane had been shot away, it could be claimed as destroyed. Further, it would be in the future of the Air Force to cut down on claims and to eliminate the possibility of two or more aircraft being claimed as shot down by German fighters.⁶¹

In accordance with these principles, claims for destroyed aircraft beginning of operations were reviewed. Under previous standards, claims for all missions up to and including east of 6 January 1943 had totaled 225 destroyed, 35 probably destroyed, and 110 damaged.

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The newspaper established that it destroyed (in violation of
US law) the, the probably destroyed (in violation of US law),
and it destroyed (in violation of US law).¹² This newspaper
apparently a biased critic in the newspaper.¹³

Despite all efforts, however, the problem of civil aviation
to be a training one. As long as the training of the shooting,
as a single plane, a situation that has been to occur in large and
tight to our formation, where a soldier might be possibly intricate
that of evolution. But it is clear in the future are one inaccuracy,
and it is clear high, it is not enough to cause of conservatism
was not being instilled into the minds of the Air Force crew
members. The story is told of a pilot on the 10th Air Force raid
of 27 January 1943 who, on observing a large plane up in the
air not a hundred yards from the target, suddenly stopped and
said, "You just had to climb that one", to which the other runner
replied, "No, I didn't see it crash."¹⁴

Operational, Tactical, and Political Problems

It was not enough to evaluate the Air Force operations in
terms simply of the results obtained. From the very beginning it
had been apparent that the limitations would have to be introduced
in relation to the future that would limit both the scope of its
operations and the degree to which those operations were effective.
These limiting factors were especially large during the early months
of it with in this study, for it was found that long-term plans were
being laid for the Air War against Germany. The problems themselves

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fell into two large categories: (1) tactical problems, and (2) those of logistics, maintenance, and operations. Most of them had not their proper answer and had received initial consideration in one way or another prior to November 1, 1942. During the period covered by this chapter they developed rapidly and much thought and effort went into solving them.

Basic, of course, among these factors was the size of the operating force itself, essentially a problem of logistics. The departure of the Twelfth Air Force in early November had left the parent organization with combat units amounting to a few heavy bombardment groups less one squadron (two of which groups were scheduled for transport at a later date), one single-engine fighter group, minus its ground echelon, and one observation group scheduled eventually for North Africa. Of the heavy bomber units, three were by 9 November not as yet in operational status and one was only recently become operational. By 1 January the situation had not improved materially. Although all heavy groups had become operational, and although the fighter groups had been added, neither of the new fighter units was as yet fit for combat, and one heavy bomber group (the 93d) had on 3 December been ordered to move its air echelon, minus one squadron, to North Africa for a temporary tour of duty which lasted until the end of February 1943. Meanwhile one squadron of the 93d Group had been on antiaircraft duty from 23 October to 23 November, and another from the same outfit had been detailed as an aerial unit to work on the blind-bombing project. During

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above air, bomber, and fighter, therefore, they could never count on a fully operational force of any kind to carry out projects.⁸⁵ The Twelfth Air Force had also left one light bomber in air force service elements. Chief General Spatz in November expressed doubts whether sustained operations could be maintained by the remaining combat units.⁸⁶

Moreover, the prior demands of TORCH made it impossible to keep up so full strength those units that were regularly available. The problem of replacements received most direct attention during the fall and winter of 1942 both in Washington and in the quarters, Twelfth Air Force. According to General Spatz the Twelfth Air Force units were under strength to begin with, after the repair units of the Twelfth Air Force had been hit, and their strength was likely to be further reduced until replacements for the African force had begun to flow regularly from the United States. Early in November he urged that the rate of replacement for units in the United States be stepped up to the level proposed by the War Department in July 1942. The plan then presented had provided for 20 per cent replacement in heavy bombers per month, additional aircraft for reserve and for the augmentation of units through December 1942 at the rate of two per month per group, and combat crews for 75 per cent of the aircraft then provided for attrition.⁸⁷ On 2 December 1942 he cabled from Algiers urging that replacements for the African theater be expedited in order that no further drain would be necessary on the already strained units of the Twelfth Air Force. Further withdrawals, he warned, would seriously affect operations from the

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United Kingdom, which was of vital importance not only in terms of morale, but because, by occupying a considerable portion of the German air defenses, they prevented the enemy from diverting his air strength to the Mediterranean.⁸⁸

A-10 Headquarters, while sympathizing fully with the plight of the Eighth, was apparently unwilling to jeopardize more critical projects in order to build up the force in the United Kingdom, especially in view of the fact that shipping space was no less at a premium than was maintenance material.⁸⁹ Moreover, the estimate of Eighth Air Force requirements in London seems not to have coincided exactly with that made by General Spaatz and General Eaker, for records in A-10 Headquarters did not indicate so serious a situation as that reported from the theater.⁹⁰ So that as it was, by the end of January 1945 the Eighth Air Force was not receiving replacement planes and crews as fast as it was expending them.⁹¹

The result was that under existing operational conditions the force employed in the day bombing program was inadequate to accomplish any major item of the task it had undertaken, a fact which had become apparent during the campaign against the submarine bases. The size of the operational force also limited the choice of targets, for it was felt that only a force large enough to protect itself readily should be dispatched over the Reich. Yet, on the other hand, the necessity of restricting activity to a single, relatively narrow area in occupied France made it impossible to diversify the enemy's fighter defenses and so tended to increase combat losses. In any event, it was obvious that a lower rate of loss might be expected

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which a force could be dispatched indicated a large enough to saturate any given sector of defense.⁸²

Regardless of the number of aircraft and crews on hand, the number that could be sent out on any particular mission depended on the ability of the maintenance crews and depots to keep the aircraft in operational order, to repair battle damage, and to make such modifications as combat experience demonstrated to be necessary. That ability, in turn, depended on an adequate supply of parts and a force of trained personnel large enough to be in a position to locate enough time to this sort to keep up with the requirements of the operational units. In the fall and winter of 1942, neither of those conditions prevailed, and so it was not possible to realize fully the potential strength of the bomber force available. On the 15 missions studied in this chapter the VIII Bomber Command was able to dispatch an average force of 70 bombers with a maximum of 101, yet these figures represented a disproportionate low percentage of the total aircraft on hand in the theater. Through November, for example, only 51 per cent of this total was in combat condition.⁸³

The Eighth Air Force had lost the eighth element in service units and those left in the unit had no spare parts. Still a priority was given high priority to equipment destined for North Africa.⁸⁴ For similar reasons, the Eighth continued also to suffer from an inadequate flow of parts and tools.⁸⁵ And there appeared little likelihood that the situation would improve for some time to come, for, when shipping crews were available to carry the required personnel and

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equipment, it could probably have been used for transporting combat units. Although General Spaatz stated that "A direct reduction in the rate and efficiency of air operations must be expected until the required service elements have caught up with the combat elements," he advocated allocating available shipping to collect replacements as a matter of first priority, since the latter required more time to become acclimatized and fight, in most cases, a supported air emergency basis until normal service units arrived.⁶⁶

At the same time, the Eighth Air Force was finding a rising rate of battle damage, which placed an increasing load on the already inadequate repair facilities, with the inevitable result that a large proportion of the combat force was in heavy combat by mid-October, 15.6 per cent of the attacking planes suffered repairable damage; in October 17.7 per cent. By December this percentage in this category had risen to 18.1, with damage increasing in even higher proportion of damaged planes.⁶⁷ Still further to complicate matters, it had been found necessary to modify the heavy bombers to meet under severe tactical and operational conditions, and, moreover, to do this work to a large extent in the Theater. Until a standard model could be turned out in the Zone of the Interior, fully developed for combat in the European Theater--and even then special projects would require special modifications--changes had to be made at almost all relations of the cut-and-fit method, which again increased the load on the already inadequate facilities.⁶⁸

Intelligence difficulties were reflected in the relatively high rate of abortive sorties resulting from technical failures. Since

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October, 1912, and had increased considerably, amounting to over thirty per cent of all deportives. There was an increase in the number of deportives from all territories in arrears to the Inspector, or the Justice, or the other departments of the Government.¹⁰⁰ It is possible, of course, that the sending of young soldiers to the front in their places in the army possibly had the effect of starting, or at least, under less favorable conditions, and new recruitment on the ground for the foreign service. In any case this was a serious matter, for the total deportive rate was itself high. In the 1,033 days of detention from 21 October 1912 to 1 January 1913, 21 had died as stated.¹⁰¹ In January, General Tchernavitskiy sent to the Imperial War Office a report on the commission, on the large number of German deportives who had died in the front during the previous year.¹⁰²

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in the initial stages of the war, the British were able to maintain a high level of operational readiness, but this was not the case in the later stages of the war. The British were able to maintain a high level of operational readiness, but this was not the case in the later stages of the war. The British were able to maintain a high level of operational readiness, but this was not the case in the later stages of the war.

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On the other hand, the British were able to maintain a high level of operational readiness, but this was not the case in the later stages of the war. The British were able to maintain a high level of operational readiness, but this was not the case in the later stages of the war. The British were able to maintain a high level of operational readiness, but this was not the case in the later stages of the war.

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proved insufficient to give protection. Perversely, the weather cleared and all four returned without bombing. Twice more in January B-24's went out on expeditions of this sort, only to be foiled again by fine weather. Short of resorting to night bombing (the RAF had, after all, conducted 18 missions during January) the Eighth Air Force had little choice but to wait for favorable weather and a wider selection of targets.¹⁰⁵

The Eighth Air Force also faced certain major tactical problems, upon the solution of which depended the success of the day bomber offensive. Success depended specifically on the ability of the day bombers to hit and destroy their objective and on their ability to defend themselves against flak and fighter attack. Questions on both these accounts had been implicit in the history of Eighth Air Force operations from the beginning. During the fall and winter of 1942 they became rapidly more pressing. In order to hit such relatively small, isolated, and invulnerable targets as submarine base installations, it became evident that better offensive tactics, particularly improved accuracy, would have to be developed. And the vigorous growth of German countermeasures called attention even more urgently to the problems of defense. Prior to 21 October, neither flak nor fighters had seriously threatened the American bombers. Clearly, the Germans had been caught unprepared for a weapon such as the day bomber which not only could do real damage from extreme altitudes but could also shoot it out with the best fighters in the Luftwaffe. However, as many observers, including General Spaatz, had foreseen, they lost no time in adjusting defensive tactics to

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cope with this unprecedented attack. If they adjusted neither so rapidly nor so radically as some had feared, they nevertheless gave the Eighth Air Force grounds for serious concern and taxed the ingenuity of its tactical experts.

Except for the few seconds of the bombing run when the purpose of the heavy bomber is realized, all phases of a bombing mission are dominated by considerations of defense. But considerations of defense had to be carefully balanced against those of offense, for they were not always reconcilable; and they had also to be weighed in relation to each other, for what would offer protection against flak might increase vulnerability to fighters. For example, high-altitude bombing reduced risk from flak, but it also reduced bombing accuracy. Bombing by a single aircraft might, under ideal conditions, be best for both accuracy and protection from flak, but would not provide sufficient defense against fighter attacks. Large bombing units flying in formation would give adequate protection against fighter attacks, but would increase flak hazards and at the same time reduce accuracy by enlarging the resulting bomb pattern. As experience was gained, constant adjustment was made in multi-lateral compromise necessitated by this problem of integrating defensive and offensive tactics.¹⁰⁶ By January 1943, many of the basic lessons had already been learned, much of the pioneer work having been done by the 1st Bombardment Wing, under the successive command of Brig. Gen. Newton K. Longfellow, Brig. Gen. Larry S. Kuter, and Brig. Gen. H. S. Hansell.¹⁰⁷

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The Germans had taken some time to adjust themselves to the American rules. In the first few weeks had at first proved ineffective in opposition to aircraft flying at altitudes above 20,000 feet. And their fighter pilots were at first very unwilling to get very close, preferring to stand off just outside the range of the bombers' guns and wait for a favorable opportunity to duck quickly in and out of the formation. But, from October on, marked improvement became noticeable in both anti-aircraft fire and fighter opposition.

German fighter tactics developed in ways as mainly designed to be better force. They reflected a covering of the fighter force how to stop the bomber threat. Reports from American sources indicated that, after the first few missions during which German installations had been damaged and aircraft destroyed at practically no cost to the bombers, a change had taken place. German fighters in fighter staffels (squadrons) on the Eastern Front, with the result that larger number of German fighters were able to find the bomber formations and to make their formations too expensive for their missions prohibitively costly.¹⁰³ Any type of attack was tried, but for some time tail attack predominated. This had been the accepted angle of attack against bombers, as it was the type of attack which was most difficult to protect its bomber formations by the allocation of especially heavy fighters and other fighters.¹⁰⁴ The effort in the light of the German counter attack on the Eastern Front, that the F-109 (the F-109 was not being characteristic of

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Germany's elite fighter wing) made a series of surprise attacks from the rear in an attempt to find a blind spot each from both dorsal and ball turrets. In general, they came in, sometimes in formations of three, at flight level, opening fire at 100 yards. Four bombers were lost as a result of this action, and six others damaged. But the enemy, in turn, sustained disproportionately high losses.¹¹⁰

Beginning with the St. Nazaire mission of 26 November, German fighter tactics changed abruptly. Nearly all attacks that day came from the front. The Germans had finally discovered the relative weakness of the B-17 and the B-24 in forward fire power.¹¹¹ Some B-17's had a .50-caliber, hand-held gun, firing through one of four cyclops just off center, and some mounted two .50-caliber side nose guns. In either case a blind spot was left in front which neither the upper turret nor the ball turret could reach. The B-24's were equipped with .50-caliber side nose guns, and a single .50-caliber center nose gun, mounted to fire below the horizontal only. This arrangement also left a blind spot which the upper turret could not cover.¹¹²

After 26 November, and through January 1943, nose attacks continued to predominate, and accounted for most of the losses suffered by the VIII Bomber Command as a result of encounters with enemy fighters.¹¹³ Losses from enemy fighter fire, in turn, constituted by far the larger proportion of total losses, which had risen from an average of 3.7 per cent of the attacking force in November to 8.8 and 8.7 per cent in December and January respectively.¹¹⁴

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In addition to the high rate of losses attributable in large part to the frontal attacks, the bomber crews had to face this type of tactic very frequently just over the target when the confusion inevitably resulting would be most likely to spoil the bombardier's aim. In fact, it was believed that to break up the bombing run had now become a primary objective of the German fighters.¹¹⁵ The frontal attacks, therefore, came during these months to be the chief defensive problem of the Eighth Air Force.

It was immediately clear that the only effective countermeasures would be the addition of increased forward fire power in the bombers and an improved defensive formation which would give all planes the benefit of mutual protection. Of these remedies, the addition of nose guns was the more critical item, because it would involve a great deal of time-consuming modification both in the United Kingdom and in the United States. Meanwhile makeshift tactics were devised. One method of countering the front-quarter, level attack--the method reported in December as the one officially approved--consisted of a diving turn into the attack which uncovered the top turret, and, incidentally, tended to spoil the enemy pilot's aim. It was hoped that in this way any such attack would encounter not only the front, side-firing guns, but the top turrets of at least some bombers in the formation.¹¹⁶

Modification for nose guns began promptly. Pending the installation of a standard power-driven turret in the B-17, flexible, hand-held .50-caliber nose guns were provided in most of those destined

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for the European Theater; and the standard E-24 front nose gun was modified in such a way that it could fire above the horizontal.¹¹⁷ In the theater, similar modifications were undertaken on as many aircraft as could be accommodated in the depots. The need for such modification was so great that improvised field installations were authorized as long as they conformed to basic requirements. By mid-January, most heavy bombers in the United Kingdom were equipped with effective forward fire, if only from single, improvised, .30-caliber and .50-caliber, hand-held guns.¹¹⁸ Complete satisfaction could only result from the installation of a turret in the nose, but it was not until August and September of 1943 that the improved E-17's and E-24's arrived in the theater complete with this power-driven equipment.¹¹⁹

Although it was a standard defense against all fighter attack, the large formation of bombers so stacked as to provide mutual fire support proved especially helpful in countering the frontal attacks. Indeed, it was during the fall and winter of 1942, and primarily in answer to this particular problem, that the 1st Bombardment Wing evolved a system of formations which became the prototype for operations in the theater. When General Auter took over the wing on 6 December 1942, he found four groups, each operating according to its own tactical doctrine. No wing organization existed for tactical purposes, and consequently the groups collaborated only in the sense that they all attacked the same target roughly at the same time. No effort was made to secure additional fire support by coordinating group tactics. Squadrons and groups had developed into cohesive

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teams, but the wing as a whole had not become a combat unit. Acting on the assumption that the larger the formation, consistent with requirements of maneuverability, accuracy, and control at high altitudes, the more mutual fire support would be obtained, General Auler set about to weld the squadrons and groups into the largest practicable combat units.¹²⁰

At first the groups had bombed in elements of three aircraft, but fighter attacks demonstrated that bombing by elements, however satisfactory from the point of view of accuracy, did not provide sufficient defensive power. Combination squadrons, composed of two elements of three aircraft each, was then tried. The intensity of enemy attacks soon made it necessary to resort to bombing by groups of three squadrons. Thus a formation composed of 18 to 21 bombers, known as a combat box, became the standard minimum combat unit, and was stacked in such a way as to uncover as many of the top and bottom turrets as possible in order to bring the anti-air fire to bear on the critical forward hemisphere. It was considered the smallest unit feasible for defensive purposes and the largest that could be handled readily on the bombing run.¹²¹

But, especially on the trip toward the target and on withdrawal, it appeared that mutual fire support could be greatly increased by combining two or more combat boxes into a single defensive formation. It was not, however, considered practicable to fly the entire bombardment run in one formation. Certainly, larger than a formation of two or three combat boxes would have required deployment in such

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death that the differences in time velocity and aircraft performance at different altitudes would have complicated the tendency of any formation to telescope into less effective position. Moreover, the groups were about all that could be readily controlled in the controlled manner of a single combat commander. Accordingly the last combat wing reported two combat wings of the group each. In each of these combat wings the senior group commander assumed command and was given full authority in planning and executing the mission. This organization existed for tactical purposes only and in no way affected the administrative organization of the combat wing.¹²²

The combat wing, consisting of two or three combat boxes, thus became the maximum defensive formation. It was generally deployed in echelon up, in a vertical wedge similar in principle to that of the combat box, although in the period under review many variations occurred. In early 1943 it was apparently also planned to use the combat wing as a unit in formation leading against the fighter opposition and likely to be strong enough to prevail over the fighter to warrant its use. This despite the fact that it would be a clumsy formation to maneuver around the initial point onto the target line and that the resulting comb pattern would tend to be too large for the desired accuracy.¹²³

Winter cover, and lots of it, had originally been held a prerequisite to any combat, and the early missions had been flown under a heavy umbrella of friendly fighters. Now, in January, opinion was again turning, toward escort as one of the surest means of achieving

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As the B-17 continued to fly over the target area, the aircraft was observed to be in the process of being developed. The B-17, which was specially equipped to combat enemy fighters, it carried extra armament, along with a number of other modifications.

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240. What is the correct answer?

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1. Increase in the size of the cell population is proportional in some instances to the number of cells that are in contact with the medium. In such cases, the rate of increase in cell number is proportional to the number of cells in contact with the medium. This is the case for the growth of cells in suspension culture. The rate of increase in cell number is proportional to the number of cells in contact with the medium. This is the case for the growth of cells in suspension culture.

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The electrodes are suited for a certain length of time and are therefore disposable, but the above all are constructed in order to comply with the instructions for selection of for a given electrode length. Therefore, positive active action might be taken for as long as possible, the length of the level electrode runs is reduced to the shortest possible with careful wiring. In case of right connection on the test bench significantly on a 1000 Hz axis; only

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light contained a constitutive diffraction in elastic lattice units; and so, indeed, the entire active action was directly after release of the bomb. But even so to be taken not to be taken. It is such an interest that the bomb could fall prey to fighter attack. Finally, to assess first not effectively, the bombs had to fly at the highest altitude commensurate with accuracy to aim.¹³⁰ War, in a sense, was an extremely difficult compromise to make. It might fairly be said that, in these early months of war, the handicapped effectiveness of bombing operations was by destroying or overloading the enemy by forcing the attention given to bomb at altitudes too high for their sort or less intense reliance on the accuracy of accuracy.

The question of bomber accuracy over Europe is still open pertaining to the ultimate aspect of bombardment. Unfortunately it is not possible to say anything very precise about the degree of accuracy achieved in these days, for the information available is too incomplete, too inconsistently reported, and filled with too many variables to permit any worthwhile conclusions. Despite the fact that the Headquarters exhibited an anxious interest in the subject, it was only on data accumulated since 1 January 1943 that any systematic analysis became feasible.¹³¹ This work, however, is incontrovertible: results in the fall and winter of 1943 were disappointing to all those who, trained in the "pencil-barrel" school of bombing, knew how accurate the American bombers could be.¹³² An average of only about 10 percent of the bombs dropped could be identified by photographic reconnaissance. Although many "bombs" were reported by ground forces, it can be assumed that a large proportion of the unidentified bombs falls near a target area or

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"gross" errors.¹³³~~CONFIDENTIAL~~

It was this tendency to "gross" errors that concerned leading analysts most acutely. Under practice conditions, accuracy might conceivably be improved in directly or indirectly directing observers to set their sights more precisely and our pilots to hold fast their course during the run on the target. There was thus an implied exhortation for gross errors to continue with and for errors stemming from intrinsic faults in the equipment. Most errors were errors of adjustment alone. Things were very different in combat, where the confusion and distraction increased the incidence of gross errors to the point where they became the dominant factor governing bomb dispersion. Clearly, then, if the cause of these sizeable errors was not discovered and removed, our Jordan bombight, with its delicate adjustment, would be valueless. It was, in fact, considered possible that, in such an event, an inferior sight, requiring less careful adjustment might have to be accepted, a step which would seriously have compromised the ideal of precision which underlay the American bombardment theory.¹³⁴

Undoubtedly many gross errors resulted from mechanical failure, the bombs either running up or solving prematurely. At high altitude extreme cold, in addition to the strain on the airplane caused by the bomb-load, sometimes impaired the functioning of the release mechanism. Much more important was the fringe of failure of pilots, bombardiers, and navigators to identify the target. Although an extreme case, it is instructive to notice that on the operation of

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19 November 1912 one formation was able to bomb St. Etienne under the impression that it was bombing La Follie, 150 miles away. A more typical case occurred in the Middle East in November when some 20 to 25 bombs struck near a factory three miles short of the intended target, which was also a factory, but situated in quite different surroundings.¹³⁵ The development of perspective maps, then well under way, helped reduce the likelihood of mistakes of this sort by providing the bombardier with a picture of the target as he was likely to see it rather than as it appeared on the older type of vertically projected target map.¹³⁶ Then, too, it was often difficult to follow a set course in the face of unexpectedly strong cross winds. And many errors arose from failure to set instruments properly, either because of combat excitement or because the severe cold and the encumbrances of oxygen apparatus, heavy clothing, and parachutes prevented dexterous manipulation.¹³⁷

Just one titling of all factors leading to inaccuracy was the necessity of conducting a steady course run in the face of enemy antiaircraft or fighter action. To one observer, bombing accuracy appeared to be inversely proportional to the resistance encountered at the target. In order to guard against that, precise action was normally taken for as long as possible on the approach to the target, leaving a margin of 10 seconds for the level bombing run. Bombardiers were drilled in precise movements and to proceed with extreme caution and speed, not often under enemy attack.¹³⁸ In addition a difficulty arose from the fact that, in order to maintain an effective defense

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against fighters, the formation was likely to be too large to produce a satisfactory bombing pattern.¹³⁹ Various solutions to these bombing problems were suggested. One obvious way to increase accuracy, though not, of course, to reduce the number of gross errors, was to bomb at lower altitudes. But the experiment of 9 November at St. Nazaire discouraged further planning in that direction, and a higher probability of error was exchanged for lower vulnerability to anti-aircraft. Much naturally depended on a constantly improved state of training and experience which alone would remove many of the causes of error.¹⁴⁰ To insure a steady bomb run, and so give the bombardier time to set his sights, pilots and bombardiers were urged to use their automatic flight control equipment (AFCE) which, when it functioned properly, as at that time it did not always do, gave more precise results than manual flying.¹⁴¹

Some commanders believed that one way to get accurate aiming in formation bombing would be to have the leader in the formation set his sights accurately for deflection, even at the expense of accuracy in range, and leave the remaining crews to set theirs for range only, taking their direction simply by holding their place in the formation.¹⁴² In this way group bombing could be accomplished without the risks and confusion likely to ensue should each plane in the formation attempt to make its own adjustment for deflection. In a further effort to exploit the possibilities of group bombing, and incidentally to escape from the irregularities that seemed always to crop up when bombardiers of uneven ability bombed individually,

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some groups resorted in January 1943 to bombing entirely "on the leader," each bombardier taking his signal from the lead plane. Initial results of this method, though not at that time conclusive, proved very encouraging.¹⁴³ Finally, one of the most urgent requirements for improved accuracy was some sort of improved fire power by means of which the frontal attacks, made so consistently by the German fighters in December and January, could be effectively countered and the morale of the bomber crews be correspondingly raised.¹⁴⁴

The problem of accuracy, and indeed that of bombing in general, thus became inextricably entangled with that of defense. The method of bombing as worked out by the 1st Bombardment Wing during late 1942 tended to be dictated more by the nature of the opposition met than by the theoretical requirements of precision bombardment. The enemy practice of attacking during the bombing run, even in the presence of antiaircraft fire, made it advisable to preserve as large a formation as possible and one so arranged as to give all elements the maximum of mutual protection. A large formation (and it was tentatively suggested that bombing might be done in combat wing formation) increased vulnerability to flak and, if the bombing were done on the leader, it was likely to produce a larger bomb pattern than when the work was accomplished by smaller formations. If, on the other hand, flak defenses were known to be concentrated, it was necessary to accept higher vulnerability to fighters by splitting the formation so as to reduce risk from flak.¹⁴⁵

In this chapter and the one immediately preceding it, a story has been told of things accomplished and problems encountered by

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the Eighth Air Force prior to mid-January 1945. It was on the basis of these achievements and in the face of these half-solved problems that General Arnold took his stand on behalf of the daylight precision bombing of Germany at the Casablanca Conference in January. The record was incomplete and the conclusions it warranted were necessarily tentative; but it enabled him to state the case for the daylight bombardment campaign strongly enough to ensure for it a place, and an important one, in the plans for all at that time for the defeat of the European Axis. In the next chapter an effort will be made to trace the development of these strategic and organizational plans which culminated in the proceedings at Casablanca.

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Chapter IV

THE DEVELOPMENT OF POLICY FROM 1941 TO JANUARY 1943

Basic Strategy: All and British Views

A combined bomber offensive against the European Axis was in August 1942 clearly a part of Allied plans. The strategic decisions that affected it had all been made, at least in tentative form. The Combined Chiefs of Staff had reaffirmed in July their policy that Germany rather than Japan should first suffer the brunt of Allied offensive strategy. Although the decision to Mount TROOP had seriously modified the original concept of BOLERO and CONDOR (the preparation for and execution of a large-scale invasion of the Continent from the British Isles), the latter scheme was suggested only to postpone a cross-Channel invasion in favor of a more immediately feasible plan for exerting pressure on the European Axis and for relieving pressure on the Russian front.¹ Moreover, an intensified bomber offensive by both British and American forces was still considered a prerequisite for any such major action against the European fortress.² A high priority had also been accorded to the production of the large numbers of aircraft necessary in order to implement the bomber offensive plan.³

But the fact that these decisions which were tentatively reached by the late summer of 1942 remained closely held, finally acted upon in the years following may obscure the fact, of almost equal historical importance, that every one of these decisions was subjected to the most searching criticism throughout the fall of that year. Just

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the basic strategic plans reflect a certain essential continuity is doubtless owing in large part to the momentum of operations already under way, for the war could not wait on the conclusion of interminable debate. But it was also owing in no small measure to the persistent work of the U. S. and British air planners, acting on the basis of data provided by their respective operating air forces, that the projected bomber offensive came finally into being.

Except that it was lukewarm on the subject of TORCH, which it tended always to consider a diversion from the main effort planned for the U. K.,⁴ opinion in the USAAF was in solid agreement with the basic strategic concepts stated officially by the CCS. The official AAF position, originally outlined in AAFPD-1, was reaffirmed with little essential change in September 1942. In answer to a request from the President for a statement of the requirements of the Army, Navy, and U. S. production for the Allies "in order to have complete air ascendancy over the enemy,"⁵ the AAF planners issued on 9 September a document known as AAFPD-42 which became the official air war plan and formed the basis for all AAF strategic planning prior to Casablanca.

In order to establish the air requirements as requested, the authors of AAFPD-42 had to examine the strategic hypotheses underlying the employment of air power, both current and projected. It would not, they believed, be possible to mount an effective air offensive simultaneously against both Germany and Japan with the resources conceivably available, especially since U. S. air power would have to be employed also in support of the land operations in North Africa, the Middle East, and Burma, in support of amphibious operations in the

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South and Southwest Pacific, and in connection with antisubmarine patrol and hemisphere defense. In a choice between Germany and Japan, all considerations favored Germany as the objective of first priority. Allied armed forces were not within striking distance of Japanese military strength at its vital sources. A sustained air offensive could not therefore be waged against Japan unless the Russian maritime provinces were secured, which contingency could not be relied upon. The European situation, on the other hand, presented excellent opportunities for the effective use of air power. Indeed, in the initial stages of a war against the European Axis, air power alone could be brought directly to bear against Hitler's stronghold.

As the AAF planners saw it in September 1942, the strategic situation in Europe appeared as follows. By the time the air strength contemplated in AMPD-42 would be ready for employment, large Axis ground forces would likely be released from the Russian front for action elsewhere. Thus the ground forces of the United Nations would be numerically inferior to those of the Axis on the western fronts. It would consequently be necessary to create circumstances in which Allied ground forces could defeat Axis armies. Now the only way in which this could be accomplished was by means of the numerically superior air forces of the Allies, which must be used so to deplete the air power of the enemy and so to undermine the economic structure which supported his land forces that an invasion of the Continent could be successfully performed. Fortunately, a base, England, was available, capable of sustaining the increasingly superior Allied air strength within striking distance of the sources of German air power

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and the viability of the strategic concept. For 1944 and the early part of 1945, priority should accordingly be given to this air offensive against Germany. When the operational concept is fully accomplished, as it should be by mid-1944 in the event all requirements of 66,000 combat aircraft for 1945 are met, it should be possible to mount a combined land offensive against Germany and an air offensive against Japan, either successively or simultaneously, in the latter part of 1944.

The objective is either to against Germany was to have the force of 200 bombers to be used in that offensive such as B-29, B-24 and British aircraft to be placed since the entry of the U. S. into the war. The plan, with an operational force of 2,225 planes deployed in the theater by 1 May 1944, would consist of the "most effective destruction of selected vital elements of the German military and industrial machine through a decision involving in daylight." The plan would concentrate upon "the air attack of industrial areas at night, to break down morale," and, in view of the acute shortage of skilled labor in Germany, should have a "conscious effect upon production."⁶

This, in essence, remained an official doctrinal during the remaining months of abortive debate which preceded the Casablanca Conference. Few doubts arose as to the suitability of the United Kingdom as a base for a day bomber offensive in view of the Signal Intelligence Division had full information of German positions in northeastern Europe. But, insofar as they affected basic strategic planning, these doubts were of major importance. At best they were seriously

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debated whether the heavy bomber force should, in event of a successful invasion of North Africa, be moved to bases on the Mediterranean during the next 6 months when weather conditions would be much more favorable to precision bombing than in the U. S.⁷ And, anyway, it was confidently expected that improvement in close-bombing techniques would successfully circumvent conditions of poor visibility.

The principles underlying AFCI-12 were reaffirmed by General Arnold in a memo for the JCS, dated 13 November 1942. This document, however, altered somewhat the strategic assumptions made by the authors of AFCI-12. The Russian front no longer appeared as imminent source of disintegrating. In fact, Arnold laid emphasis on Germany's mounting embarrassment rather than on her growing straits. The indecisive Russian campaign, together with the Allied invasion of North Africa, bombing from the U. S., and the prospect of a most uncomfortable winter, had, he felt, generally weakened the enemy. All of which pointed to the immediate need of intensifying, to the utmost the pressure against Germany so that she might be allowed no time for recuperation. This end could only be achieved by increasing the weight of strategic bombardment.⁸

Provision had been made to keep AFCI-12, considered as the official war plan, abreast of shifting strategic circumstances by means of constant review.⁹ On 1 October 1942, Headquarters, AAF issued a study the purpose of which was apparently to bring official policy up to date. This "Plan for the defeat of the Axis Powers" again endorsed the soundness of current strategic commitments, insisting that Germany remained the principal enemy, that the only way to

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defeat strategy was by land invasion, that a land invasion could only succeed if preceded by strategic aerial bombardment, and that the best if not the only opportunity for both land and air offensives lay in operations from the U. S. Again the nature of the strategic bombing offensive was described as a combined effort by AAF and NA, operating by day and night, and using precision area-area techniques respectively. Operations would be aimed initially against the sources of German air and submarine strength which together constituted the chief threat to Allied operations and the principal obstacle in the way of an invasion of the Continent. When the German Air Force had been sufficiently reduced to permit such a shift of tactics, the AAF would switch to day bombing in addition to their night operations, thereby accelerating the destruction of Germany's war machine. It was the optimistic hope of the authors, probably influenced by the situation on the Eastern front, which had improved since AASF-18 had been written, that a combined bomber offensive, pressed to the fullest extent of Allied capabilities, could make an invasion of Germany feasible by the fall or winter of 1945.¹⁰

Throughout AAF thinking there may be detected the well founded fear that U. S. air forces would be dispersed to all parts of the globe in answer to particular local needs but without reference to any one strategic plan according to which the strength of the AAF would be concentrated with decisive effect. As early as August 1942, General Arnold expressed serious doubts as to how a war could be won with forces scattered all over the world, and urged that theater commanders in minor theaters be instructed to get along with a

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minimum air force so that "one or two thing number" of planes could be available in major theaters. As now, he told me later, "an education job as well as an allocation job." In another connection he asserted that successful air operations depended on "the continuous application of massed air power against critical objectives."¹¹ This doctrine of the concentration of air power was fundamental to all US strategic planning.¹²

British opinion on the air war remained similarly constant. Not only were the British committed by geographical necessity to the defeat of Germany as a matter of first priority, they were also committed, in both theory and fact, to a long-term policy of strategic bombardment.¹³ Even while urging the adoption of TORCH as an alternative to an early cross-Channel operation, the British had insisted on preserving as far as possible the bomber offensive from the U. S.¹⁴ Again in November and December of 1942, when it became a question of once more postponing a Continental invasion in favor of exploiting the success of TORCH, the British, while advocating further Mediterranean operations, took the firm stand that nothing should be allowed to interfere with the strategic bombardment of Germany.¹⁵ The reason for their preference both for the bombing offensive against Germany and for land operations in the south has already been dealt with in Chapter I of this study. It was implied by Lord Frenchard when he warned that for the Allied nations to embark on an early land campaign against Germany, when their ground forces could as yet operate

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only at a distinct disadvantage in relation to the still powerful Wehrmacht, would be simply to repeat the disaster of 1914-18.

"Our strength and advantage," he declared, "is in the air--the British and American Air Force."¹⁶

Throughout the fall of 1942 this continued to be the theme of the British Chiefs of Staff. In November, at a crucial period in the history of strategic bombardment, that agency presented for the consideration of the U. S. JCS a memo which emphatically stated that a large-scale invasion against unbroken German forces was not "a practicable operation of war." Accordingly, the paper continued:¹⁷

"The creation in the shortest possible time of a great Anglo-American force of 1,000 to 6,000 bombers by April, 1944, should have high priority, qualified only by the necessity to provide adequate air forces for the maintenance of sea communications and for the support of such land operations as it is decided to undertake. Any decision to undertake offensive land operations during the period of our attack on the German industrial and economic war machine must be guided by the value of these operations compared with the consequent diversion of air effort from the principal objective--the German war machine.

It will be noted that the British Chiefs of Staff here imply the essential doctrine of concentration in the application of air effort which formed a vital part of RAF thinking.

According to a British air staff paper of 9 October 1942, the Anglo-American bomber force should be employed with great flexibility in such the manner as may be envisaged in a draft: "Initially the British force will be operated mainly by night, and the American by day; the British, however, may war between day, or alternatively the American conduct night operations in accordance with the development of the tactical situation."¹⁸ It was, however, on this point that the most serious disagreement existed between the two forces.

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the doctrine of daylight, precision bombing was never demonstrated during 1942 to the complete satisfaction of all British air observers, and at the Casablanca Conference in January 1943, Prime Minister Churchill asked bluntly to know the reason why it would not still be preferable for the U. S. bombers to turn to night operations. This was probably in part his own idea, for he had never been convinced of the peculiar capabilities of the American heavies and had exhibited considerable interest in equipping them with flame-dispensers for night operations and in assigning an appreciable portion of them to anti-submarine patrol. It was, however, an idea apparently shared by the Commander-in-Chief, U.S. Bomber Command.¹⁹

Both British and American air strategists remain a, then, in substantial agreement in origin of combined bomber offensive against Germany from bases in the U. S. But it is clear that this plan depended absolutely on the following conditions: (1) the war in Europe must remain in a position of unquestioned priority over that in the Pacific; (2) air forces must be concentrated, insofar as was compatible with the minimum requirements of essential operations elsewhere, in those places where they could bring decisive, not merely harassing, pressure to bear on the enemy; (3) production of aircraft must be accorded not merely a high priority along with other important projects, but an overriding priority in the allocation of critical materials; (4) a system of organization and control must be evolved which would secure the effective application of the combined bombing effort. In the controversies that arose over each of these issues, the burden of proof rested on the opposition.

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of air power; and so it became necessary that they, both American and British, present the case for bombardment in general, and for a combined strategic offensive against Germany in particular, in such a way as to convince those not unfavorably disposed and to overcome the opposition of those who disputed the validity of the entire air argument.

Problems of Basic Strategy

The decision to abandon an early invasion of Europe in favor of TORCH left Allied strategy in that day not in a state of surprisingly unstable equilibrium. By some, particularly by the U. S. Navy, it was apparently taken as a signal for a radical reorientation of policy, amounting even to a shift from the strategic offensive against Germany to the strategic offensive against Japan. At best the balance between the strategic offensive in Europe and the strategic defensive in the Pacific, as early agreed upon, had been a delicate one. It had not been easy for U. S. planners to choose between a powerful but relatively remote strategy and one which, though relatively weak, constituted an immediate menace to vital American positions. And in the spring of 1942 the President had in fact found it necessary to intervene in order to prevent COLLRO from being slowed down.²⁰ But as long as COLLRO-ROCK-UP remained the key to Allied offensive strategy there was no denying it. Although it was not the intention of those who advocated the North African campaign to do more than postpone COLLRO and ROCK-UP, the fact remained that, in shifting to TORCH, they had altered the basis for planning, as far as the immediate future was concerned. At the very least they had opened the subject of basic strategy to a searching review.

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There had even been some talk, while conversations were still being held regarding IGCN, of broadening the assumptions from which basic strategy emanated to include the distinct possibility of shifting to the offensive in the Pacific. The crucial issue at that point was whether Russia would continue to be an effective ally. Should she succeed in her battle to hold off the German Army, there would be no doubt about chances for maintaining the maximum pressure on Germany. If, however, Russian resistance were to collapse, Navy spokesmen urged that the main Allied effort, or that of the U. S. at any rate, should be shifted to the war against Japan. In any case they insisted that Allied strategy not become too specialized, and that production of weapons should be so planned as to meet more than one eventuality.²⁴ The 1939 decision, by taking into account the possibility of Russia's defection, put an end to this particular argument. Let the controversy concerning the floorish, in within somewhat restricted limits; and the Navy continued to speak of a "limited offensive" in one specific rather than a "strategic defensive," as most of the official papers then had it.²⁵

As far as the air war was concerned, the entire case presented by the proponents of the Pacific strategy appeared to all observers to rest on the fundamental assumptions regarding current plans--in addition of course to the Navy's highly developed sense of responsibility for a theater of operations peculiarly its own. In the first place, the Navy had to be considering the projected counter offensive from the U. S. by sea planes to be inseparable from the notion of air support for European aviation. In support of ground

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Discussion, in fact, began promptly after the tentative adoption of the TOCOW plan on 21 July 1942. In the opinion of the U. S. JCS during August and the latter part of July, representatives of the Navy had a clear task, in their estimation, Allied strategy was in the process of reorientation, not only in the direction of the Mediterranean but also toward the Pacific.²¹ Even General Marshall, who was not one to be easily persuaded by arguments stemming from the special interests of the Navy, admitted in August that the big issue to be decided was whether the major U. S. effort was to be made in the Pacific rather than in Europe and the Middle East, although for the present he believed the latter alternative must govern planning.²²

Regarding the deployment of air forces in particular, the Navy representatives argued, in effect, that the build-up of air strength in the U. S. had been an integral part of the BOLERO-RECKON-UP plan, that its purpose was to support the invasion of Europe, and that, since BOLERO-RECKON-UP no longer constituted the primary project, aircraft could now be considered as a separate feature, committed to carrier and land-based operations only insofar as they were required by TOCOW and operations in the Middle East. Admiral Leahy pointed out that, whatever commitments were contemplated in August, it would have to be understood that U. S. forces then operating in the Southwest Pacific "must and will be maintained." And Admiral Cooke referred significantly to the equipping of a large number of island air bases.²³

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It must be admitted, in justice to the Navy point of view, that the original conception of Jett-O-UP had apparently made the full-scale prosecution of a tanker offensive contingent upon an Allied landing in northern Europe. On 24 August, several groups refused to give priority to Jett-O-UP over the Jett-O-UP.

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in the initial stages of the war, and in the early stages of the conflict, it was the belief of the military that the air force was not yet ready to take on the role of a major offensive force. The military was still in the process of developing its air power, and it was not yet clear what the role of the air force would be in the future. The military was still in the process of developing its air power, and it was not yet clear what the role of the air force would be in the future.

Sub, it added, the military was not yet ready to take on the role of a major offensive force. The military was still in the process of developing its air power, and it was not yet clear what the role of the air force would be in the future. The military was still in the process of developing its air power, and it was not yet clear what the role of the air force would be in the future. The military was still in the process of developing its air power, and it was not yet clear what the role of the air force would be in the future.

In the second place, according to the military, the military was not yet ready to take on the role of a major offensive force. The military was still in the process of developing its air power, and it was not yet clear what the role of the air force would be in the future. The military was still in the process of developing its air power, and it was not yet clear what the role of the air force would be in the future. The military was still in the process of developing its air power, and it was not yet clear what the role of the air force would be in the future.

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bases of operations and a resulting flexibility of planning.³⁰ It was, they believed, an extremely dangerous mission which would require the use of all air forces not engaged in essential operations elsewhere. At the same time they regarded as being operations from the U. K., at the expense of which any diversions to TOUGH must obviously be made, to be not only of primary importance in the longer perspective but an immediately essential part of the TOUGH plan. In addition to providing air power to cover the African invasion, it would be necessary to leave a striking force in the U. K. to contain a substantial portion of the Luftwaffe in northwestern Europe, and so to prevent it from concentrating exclusively against the Allied forces in the Mediterranean and Africa. Air forces in the Middle East would also contribute toward this objective of dispersing the enemy air cover. Conversely, air operations in Africa and the Middle East would contribute to the success of the bomber offensive from the U. K., even though the latter had been so much depleted in order to make such air activity possible in the south. Although definitely a diversion, and one which dispersed U. S. air strength in still another direction, the African project would also tend to disperse German air strength, and thus make the bombing of Germany an easier matter.³¹ ✓

From this point of view, then, the European and African and Middle Eastern areas of conflict became one theater as far as air operations were concerned. And the RAF even hoped to exploit the mutually complementary nature of these operations to the fullest extent possible by uniting them under one air commander, who, incidentally, could guarantee that as his units diverted to Africa would

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be returned, when their mission was completed or during periods of minimum activity, for the major part recent campaign from the U. S. Meanwhile the AAF remained content to strike at Germany from any available bases, and recognized the obvious, in temporary, advantages to be obtained in the Mediterranean areas in the way of presumably fine bombing weather and the eventual accessibility of Italian industrial objectives.⁵²

In this way it was possible for AAF planners to rationalize TORCH without too seriously compromising their original idea of a combined bomber offensive against Germany. But it was a rationale in which the air requirements of the U. S. enjoyed a much more important position than they did in heavy thinking. As a matter of fact it is doubtful whether this interpretation of the TORCH strategy, arising, as it did, out of strictly air considerations, was at first shared by any other agency--General, Air Corps, the British air planners. Certainly General Eisenhower was prepared in September 1942 to bring bombing operations from the U. S. to a complete halt in order that Eighth Air Force resources could be devoted entirely to preparing for EUREKA. And in early September he did, in fact, issue orders to that effect.⁵³

But the Headquarters, recognizing the fact that all Allied commanders did not fully share its point of view, was anticipating a battle over the relative priorities of diversions from the U. S., took steps late in August to convert the doubtful and to assemble an impressive array of opinion in support of its strategic policy.

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General Spaatz was urgently requested to "bombard the War Department by cables and letters signed Eisenhower to Marshall and signed Eisenhower for Arnold from Spaatz, setting forth clearly the need for all possible air strength in England." Unless such support from the theater could be obtained it was feared that "we stand a chance of having our air strength there so dissipated by diversions elsewhere as to be only a token effort. Germany is not impressed by token efforts."³⁴

This was one bombardment mission which apparently succeeded very well. Probably as a result of Spaatz's missionary efforts, Eisenhower endorsed the idea of the interdependence of air operations in all African and European areas. In view of the service being performed by Eighth Air Force bombers in the U. K., he was prevailed upon to rescind his order terminating those operations. And on 5 September he sent a message to General Marshall in which he made the point that the U. K. was one of the few places in the world at that time in a position both to support operations of the TORCH forces and to strike at the heart of the principal enemy. Moreover, it was a place where continuity of action could be counted on through the air operations of the British. It would therefore be necessary, he stated, to capitalize on those advantages. He planned if necessary to use the entire air force in the U. K. in support of TORCH. They would contain a large part of the Luftwaffe in the north by operating over western Europe, and, if necessary, they could all be shifted temporarily to African bases. Accordingly he requested that a strong force, especially of heavy bombers, be maintained in the U. K., amounting by 15 October 1942 to 10 heavy bomber groups and

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five fighter groups. By 1 January, or as soon as possible before that date, he urged the deployment in the U. S. of 20 heavy bomber, 10 medium bomber, and 10 fighter groups.⁵⁵

Other resources, including ones from Generals Patton, Clark, and Spaatz, supported this estimate of the air requirements in the European-African areas, and gave substance to the idea that they be considered as mutually complementary for purposes of air operations.⁵⁶ While communications arrived in Washington, as AFM had expected, just in time for the critical debate in the JCS over the diversion of the 13 groups reallocated in July from POLARO to the Pacific.

On 26 August the Joint U. S. Strategic Committee submitted a report to the Joint Staff planners on the detailed deployment of these units. It was assumed that the provisions of COS 31 which had authorized the diversion were binding, and that official operations would unfold very much as planned, therefore no discussion regarding where the diverted air units should be deployed was necessary; but Army and Navy members disagreed radically as to when they were to be made available. The Army representatives maintained that no withdrawal should be made from POLARO, except for one heavy bombardment group already ordered to the Pacific, until FISC, on 1001 West, was the U. S., in this order, had been made up to strength in air units as indicated in COS 31, 7 July 1942. Thus in the allocation of the 33 groups originally allocated for these areas, this bulk of units should be a matter of first priority, leaving the groups for the Pacific to be dispatched as soon as available thereafter. The

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navy was willing to admit the importance of IOWA and the Middle East, but insisted that the South and South West Pacific be given precedence over the U. S., which would therefore fall into the position of fifth, or lowest priority.³⁷

To accept such a proposal as this of the navy's would, it was estimated, be to prevent any significant increase in the force of U. S. bombers in the U. S. for the rest of the year.³⁸ But it would appear that General Arnold's opposition bore to the diversion itself and to the navy's priority list was based on principle rather than on the actual effect likely to accrue to the bombardment campaign in Europe. After all, only two of the 15 groups belonged to the critical category of heavy bombers, and one of those had apparently already been irretrievably lost to the Pacific. Arnold was chiefly concerned first, to preserve the projected strategic bombardment program upon which he had set his hopes for winning the war, and second, to secure the necessary unimpeded priority for the war against Germany. It is not surprising, therefore, that he fought the early diversion of his units to the Pacific with every possible argument and with every ounce of weighty military opinion.

On the one hand he reiterated the standard air strategic doctrine: that bombing was the chief strategy, that for many months the only way of working effectively and decisively at Germany's vitalities was by aerial bombardment, and that, in view of the need for coordinated air effort in both Europe and Africa during the North Africa, IOWA campaign, these two efforts must be considered mutually complementary.

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In addition, he pointed out that, the way things had recently been going, what with diversions to the Middle East, to TORCH, and now to the Pacific, only 25 of the 54 groups originally contemplated in the BOLERO-ROUND-UP plan would be left--even on paper. On the other hand he argued not only that the Pacific areas had on hand enough aircraft to keep the Japanese at bay but that they did not possess adequate base facilities for any substantial increase in air strength.³⁹ Army intelligence sources estimated that American air forces in the Pacific, amounting to a total of some 5,000 planes (including those carrier-based), already outnumbered the Japanese air force, which would not likely reach 4,000 before the spring of 1943.⁴⁰ As for the capacity of Pacific bases, Arnold determined to inspect them personally to determine at first hand what facilities were available. JCS discussions accordingly were recessed on 15 September pending his return.⁴¹ On 6 October he registered his belief, based on personal investigation, that there were in the general area the maximum number of aircraft which base facilities could handle.⁴²

General Arnold had also to demonstrate that day bombardment, as performed by the Eighth Air Force, warranted the priority which he sought to establish for the U. K. operations. Admittedly, there was not as yet too much to go on. Prior to October only small forces of heavy bombers had been operating against enemy installations. Nevertheless, Generals Spaatz and Hansell vouched for the promising results of the early mission; and Eisenhower, in his message of 5 September, reported that "we are becoming convinced that high altitude daylight precision bombing is not only feasible but highly successful

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and that by increasing the pool of these selective results are to be obtained.⁴³ Conversely, Arnold pointed out that the J-type long-range bombers should be used entirely for its primary purposes, and not, as Admiral Leahy had once pointed out, for air-search and tracking in the Pacific, even though, as the Admiral had also said, there are better suited than the J-type for such work.⁴⁴

By mid-October it was clear that the JCS disposition had reached a virtual deadlock. Admiral Leahy was willing to concede priority to North Africa and the Middle East, although he felt that neither exceeded in the strategy the needs of the critical campaign in the South Pacific. But both he and Admiral Leahy were unalterably opposed to giving the bomber offshoots the U. S. air command over any operations in the Pacific.⁴⁵

Meanwhile, during August and September, the air command was being flooded with requests from the Pacific for additional aircraft. Nor did these requests necessarily embody only the Army point of view. For example, Maj. Gen. W. A. Brown, Commanding General U. S. Army Forces in the South Pacific, like all the commanders in active theaters, strove vigorously to reinforce his case; and, in view of the brisk fighting then taking place in those parts, he was a rather talking point than most.⁴⁶

By mid-October, too, the military situation in the South Pacific had become rapidly more critical. On the 25th, President Roosevelt addressed his annual message to Congress to the JCS. It would, he said, be necessary at all costs to hold Guadalcanal.⁴⁷

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It will soon find our lives on the active fronts and must have adequate air support in both places. We cannot it mean delay in our other commitments, particularly to the land. Our long range plans could be affected. For months it is hard to turn our full strength in our immediate and long range efforts.

Shortly thereafter an agreement was reached regarding the deployment of all units in the Pacific. It is not clear from the available records whether this agreement involved our original 15-group diversion from 101ST. But the President's order clearly gave the priority to the Pacific war, as had to be anticipated in the event of any additional diversion from the U. S., the number were operating in England and not increase during the remainder of 1942 as rapidly as had been planned.

The President's order had the effect of settling the problem of diversion for the time being on the ground of unavoidable military necessity without seriously or judging either on a case for the war against Germany or that for the strategic border offensive from the U. S. Indeed, by its silence on the subject of active strategy, it implied a strict adherence to the status quo. And so ended the first and in some ways the decisive phase of the controversy. Never again were the claims of the Pacific presented with as great determination, and when the problem of diversion again arose, it was a question of the Mediterranean rather than the Pacific.

During November and December, when our U. S. participation in the border offensive from the U. S. continued to meet competition, but on some not the other hand. The story now turned largely on the increasing importance of the Mediterranean. As will be noted

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the momentum of a major operation, its demands became more imperative, its objectives more explicit, and the prospect of exploiting its presumed success more tempting. And, in view of the continued success of the campaign, the presumption of victory became correspondingly reasonable. But any increase in commitments to the Mediterranean would, as has long been recognized, have to be paid in some measure of air forces allocated to the U. S.,⁴³ for the minimum requirements of other theaters were considered irrevocable. So it became an increasingly difficult matter to balance the needs of AFM with those of the U. S. Since the crisis was irrevocably committed to a large-scale bombing of German cities, it became a question largely of distributing U. S. air power to one or the other advantage.

The U. S. air commanders concerned had already rationalized TFM in such a way as to make it and the other offensive complementary, rather than competing. But it appears that they became more and more convinced that a rapid and decisive campaign in North Africa would contribute richly, if not decisively, to the ultimate success of the strategic bombing effort. Without for a moment abandoning his belief that the only way to prepare Germany for defeat was to bombard her from the air, General Arnold was nevertheless early on clear to admit that TFM was not the kind of a major initial operation, and would give every support possible, even though the air power so lavishly devoted to use primarily for the strategic bombing purpose. It was not until 1943 that it perfectly clear that a well-planned and executed campaign against Germany in terms of the major strategy to bring about its defeat. In particular, it was clear that the Allied

However, no learner had left his vehicle subjected him either to the
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the direction of the Mediterranean. Obviously, any success in North Africa would have to be followed by operations intended either to consolidate or to exploit the resultant position. Not to exploit a North African victory at all vigorously would be a committing the Allied Forces to further land campaign in the Middle Eastern area. The British were especially eager to do so. Mr. Churchill, in November, argued in favor of attacking the "underbelly" of the European monster; and the British Chiefs of Staff had maintained their opposition to any plan for an invasion of Western Europe even after as Germany showed definite signs of weakening. However, that and, they believed the factors would contribute: the strategic commitment of Germany from the U. S. and an amphibious campaign in the Mediterranean to exploit FORTIN.⁵³ Although Churchill and Roosevelt appear to have reached substantial agreement on the issue by 18 November, "Operations Subsequent to FORTIN" remained a primary subject for debate prior to and during the Casablanca Conference. It had also the effect of re-opening the current question of basic strategy.

The project for exploiting FORTIN was contemplated by the U. S. JCS with profound misgivings. It had from the beginning been a cardinal principle in U. S. strategic doctrine to defeat Germany by a cross-channel invasion of Western Europe mounted at the earliest feasible moment. That invasion had been postponed once. With operations subsequent to FORTIN in the offing, it began to look as if the cross-channel invasion would have to be postponed even beyond 1945 in favor of a campaign which, inasmuch as it did not contribute directly

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to the plans for the invasion of Sicily, had to be considered as indecisive and therefore, an inadvisable effort.⁵⁴ On 27 November the Joint Strategic Survey Committee assured the JCS that the basic United Nations strategy, as originally conceived, was sound. Yet on that same day a JCS subcommittee, appointed on 15 November to study the problem of further action in the Mediterranean, recommended exploitation of IOTCH by means of a campaign against Sicily.⁵⁵

It was Col. R. E. Williams, the JCS member on the subcommittee, who formally resisted an objection. In a minority report he vigorously restated LRP doctrine. Maintaining certain grounds as in an attack on Sicily, he still maintained that "the heart of Germany's capacity to wage war is in Germany," that the projected strategic bomber offensive alone could not that heart so effectively as that objective, and that any nonessential diversion which could reduce the effectiveness of that bomber offensive should not be undertaken. Following a sudden victory, he advocated that such forces as might be spared from the defense of Allied positions in the Mediterranean area should be made available for the strategic air offensive against the European Axis. North Africa should at the same time be developed as an efficient air operating area, auxiliary to the U. S., and capable of maintaining air units from the U. S. without a prima transfer of ground personnel. In this way, Mediterranean objectives could be projected and Italian objectives could be made to follow as a by-product, serious though not in the short term unfavorable to production to Germany. North Africa and the U. S. could accordingly be

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observed on our behavior in which we were only flexible and realistic and we might be maintained on the principle of this concept.⁵⁶

On 20 October, the representatives of the GPO, to which these papers had been referred for further study, reported to the GPO that it would be impossible to reconcile the divergent views on papers circulated until a local strategy had been thoroughly reviewed.⁵⁷

Plans for operations subsequent to HONOR had upset the equilibrium of Allied policy. And, as happened before when the balance had to be tampered with, there were cases in which the fact that the U. S. had greater possibilities also in the Pacific. This time it was in the war department that the position was raised. A planning paper, dated 10 November, which was submitted to General Marshall but apparently never acted upon, suggested that, if the British were unwilling to undertake a land offensive on the continent of Europe until German military power had been broken, then it might be well for the U. S. to turn toward the strategic offensive against Japan, maintain only enough forces in the U. S. to guarantee the safety of that strategic position.⁵⁸

But it is probable that the war department disapproved this argument so far as it was used to put pressure on the British when actually to reveal U. S. strategic considerations. The British were known to have a very strong interest in pressing the war against Germany to a decisive conclusion before the Japanese could force a decision in the Pacific; and on 7 October the British Chiefs of Staff had forwarded a memo to the U. S. JCS in which they argued strenuously in

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favor of that policy.⁵⁰ In any case, our important planners are guilty of a certain inconsistency. Any, at the time, according to existing strategy, the better offensive from the U. S. should be presented as one "to result in an exhaustive and to bring on the hoped-for collapse of the ill to resist." If it is just such an "virtuality" that the British had in mind to be a signal for a major land assault on Western Europe--the "virtuality" which says, like the war department, hopes to achieve by means of strategic bombing, their power of 7. Now we have concluded that, since a large-scale invasion of Europe "without sufficient air support is not a practicable operation of war," the main Allied strategy should be "to break German military power by the destruction of the German industrial and economic base and to prevent her from re-entering the continent."

By the early part of the war it is clear that a little notion of wide strategy is being to be seen. If the general idea of a broad offensive subsequent to ETOC was already in a formal expression of a new mission which had recognized for some time. In the light of clear strategic policy is very clearly hard to find for an operation such as the better offensive from the U. S. which has been projected according to a long-range plan and which has the means to launch to maintain requirements, and which could be carried out in a single increase in air units.⁵¹ The conclusion that cannot be drawn is that of a war to the end; but it is clear that the "virtuality" of a strategic policy has been for a wide strategic, and has a long-range plan.

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per month, had lagged behind originally stated requirements.⁶³ And by September it was possible to make a more precise estimate of equipment needed, based on strategic considerations which, being more immediate than before, could be more accurately assessed.

As soon as the TORCH decision was made, it became clear that a complete review of production programs would have to be made to keep them abreast of the newly oriented policy. Accordingly the President asked on 24 August for a statement of the needs of the Army, the Navy, and U. S. production for the Allies "in order to have complete air ascendancy over the enemy." The AA^W planners who drew up AMPD-42 in answer to this request rested their estimates firmly on the assumption that the first claim on U. S. air power was the strategic air war against Germany.⁶⁴ The requirements for air support in other theaters, being minimum and relatively easy to measure according to the nature of the land and sea action anticipated, needed little proof. But in the case of the bomber offensive it was necessary to demonstrate both the nature and scope of the projected operations in order to justify the size of force required.

It was a difficult task that the authors of AMPD-42 faced, for as yet they had little data on which to proceed concerning precision bombing under combat conditions in the ETO. When ordered to undertake it, they knew only the results of the first five missions flown by the Eighth Air Force. They finished their work in two weeks, which meant that at most they could only have taken account of the first ten heavy bomber operations flown from the U. K. by American planes. Of course, they were able to supplement this sparse information by RAF and German experience. The Germans, they believed, had demonstrated

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April 1945, the Army had a total requirement for force of 7,500 planes. This force could, by 1 January 1946, have been in the theater by 1 January 1946. In the interim it would be possible to accomplish one-third of the total of strategic bombing, thus leaving only four routes of operations by the complete force to be conducted in 1946 before a complete invasion could be attempted.

After establishing the requirements for the major offensive against Germany, the Army had to take into account the needs of air forces in other theaters. The result was an estimated 281 groups (28,000 combat aircraft) which would be needed for all AAF operations up to, but not including, the combined assault on the Continent of Europe. Of these 281 groups, approximately 78 would be necessary for operations from the U. S. and the aircraft required for training and other noncombat purposes were added to the 28,000 combat planes, the total AAF requirements for 1945 being 33,700 planes.⁶⁵

The Navy had apparently estimated its requirements to be in the neighborhood of 20,000 aircraft. But in this number it had included 1,200 Army-type land-based bombers of the long-range category. The authors of AAF-42 substituted in their calculation 2,000 trainers to meet the Navy's training needs in place of the 1,200 land-based bombers. This they did in order, to avoid duplication of procurement, bases, training facilities, and supplies; for, they noted, the training function of these Army-type bombers could be performed as a matter of course by the AAF. So they listed all land-based long-range bombers under AAF organization. In addition to the aircraft to be allocated to the Navy, some 20,400 would be required in order to meet commitments

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to the other United Nations. According to L-118, the grand total of aircraft required for U. S. operations for 1943 was 107,100.⁶⁶

These figures represent the estimate of the staff according to information available in early 1942. Subsequent events altered the basis for calculation only slightly. Then, on 1 December 1942, by operational and strategic considerations affecting aircraft requirements the national, the requirement for military aircraft was reduced. It was then possible for the analyzer to say not only that production within the "feasible," but that it "is being accelerated." And it was then claimed that the loss of the bomber fleet ratio of two to one was destroyed, rather than the considerable ratio of two to one previously suggested in L-118. These considerations, together with the improved situation on the Western front, no doubt led to the authors of this later plan to advance the date of a possible assault on Europe from the spring or summer of 1943 to the end of 1942. The estimate regarding aircraft requirements remained unaffected.⁶⁷

L-118 met stiff opposition from the staff. It was claimed that the aircraft program was too limited and would be seriously affected by the shipbuilding program, especially in the construction of the heavier vessels. And, in 1943, Admiral King, in October reiterated his objection to the plan in its entirety. He had a point of particular concern to the Navy, that all land-based heavy bombers had been allocated to the RAF.⁶⁸ It was also clear that the aircraft program could compete with the Navy's own program, especially in the construction of the heavy bombers, and the heavy bombers.

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Nevertheless, the estimates were not immediately approved or
 the report sent to General Staff.⁶⁰ In 15 October (it is not apparent
 exactly at what earlier date) the staff also accepted that in
 August 1942 and included a slightly revised figure of 151,000 planes
 as the principal item in a "Must" program of war production for
 1943.⁷⁰

At this point, estimates had been based largely on strategic con-
 siderations. It became necessary to review the aircraft production
 program in the light of available resources. Production capacity and
 the logistical factors dependent on it placed a strict limit on the
 extent to which any strategic plan could be put into effect, and the
 aircraft program was no exception. It could be noted, therefore,
 of the war production program, now already called for a limitation of
 aircraft production and noted that that the production objectives
 for 1943 were far considerably out of line with the productive capac-
 ity of the country. This point of view was presented to the Joint
 Chiefs of Staff on 15 October 1942. Against the capacity of U. S. production of automobiles,
 airplanes, and war construction during 1942, the cost of dollars
 at nearly 75 billions, had to be the total military requirements
 for that year which amounted to 52.9 billions. A substantial part
 of this military program, however, was not to be a first priority
 or essential objective. The "Must" program, comprising
 the aircraft program of 151,000 planes (50 billions), the recon-
 struction program (5.9 billions), the program for building aircraft
 vehicles of battle and support (1 billion), the action in fulfill-
 ment of the program (2.3 billions), and the total (1.7

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billions), a statistic previously held to be the highest in the world. The country, which once was a leading oil and gas exporter, will be until 1990 the largest oil importer in the world, and "most objective" estimates of its oil needs revised. /1

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nothing to be done until it is decided, and it is possible
as to whether to proceed or. It is the 107,000-plus one in
"Will it give a high priority to whatever year is needed to
insure its need, like the." It is decided to be "very, in fact,
and other to be decided on a case-by-case basis. It is possible
to be done as of this year," adding, on the "really impor-
tant thing is on the other side, the year is carried out in steps."²⁵

1. The above is, in direct and indirect relation to the following

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originally designated as "B-1" aircraft
were so outlined in A-9-48, necessitating further, and

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But in doing, the 1974 counterproposal has the effect of conceding to Florida first priority. Under Carroll's plan to phase critical 1974-1975 production, for example, the proposed program is a parallel provision under which the taxpayer can defer or discontinue the tax on dividend stock or on bonds if the taxpayer is not interested in the production of the required first quarter 1974. It does not leave, however, the question of whether the program only interferes with aircraft production, but really is the basis for objection, on which one can object in part or, possibly, completely. The program

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three of the most important programs in the history of the United States, the atomic energy program, the space program, and the defense program, have been the result of the efforts of the United States government. The atomic energy program, which was established in 1946, has been the most successful of the three programs. It has produced a number of important scientific and technological advances, including the development of the atomic bomb, the development of nuclear power, and the development of nuclear medicine. The space program, which was established in 1958, has also been very successful. It has produced a number of important scientific and technological advances, including the development of the first satellite, the first manned space flight, and the first lunar landing. The defense program, which was established in 1947, has also been very successful. It has produced a number of important scientific and technological advances, including the development of the first jet engine, the first guided missile, and the first nuclear-armed missile. The success of these three programs is a testament to the strength and resilience of the United States government.

Atomic Energy Program

The Atomic Energy Program was established in 1946, and it has been the most successful of the three programs. It has produced a number of important scientific and technological advances, including the development of the atomic bomb, the development of nuclear power, and the development of nuclear medicine. The atomic bomb was developed by the United States government, and it was used to destroy the cities of Hiroshima and Nagasaki in 1945. Nuclear power was developed by the United States government, and it is now used to generate electricity. Nuclear medicine was developed by the United States government, and it is now used to treat a number of diseases. The success of the Atomic Energy Program is a testament to the strength and resilience of the United States government.

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While much of the report is believed to be concerned with the labor relations organized unit, there is also some indication that continued to be the case, it will be necessary to proceed,

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As soon as it was ascertained that large numbers of American
airmen would be killed, it directed the U. S. to North Africa,
and planners endeavored to reconcile the British Government with their
original concept of a major air offensive against the Axis in Italy.
It was, therefore, an unfortunate circumstance, but at the same time it

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the Government not admit certain alleged failures. English
 in October 1941 the possibility of operating to our
 force from the present base is a reasonably attractive prospect.
 Had any air station been diverted from numbers of our aircraft
 for northern Africa, or which might be possible in the
 future to visit this installation in Italy, could not be considered
 a waste of space for the air force. Things would, therefore, work out
 very well indeed provided the air forces which are now, and will
 presumably continue to be, based in Africa (the air force of
 moving the whole of the air force to Africa in a big way) could be
 moved back again to the U. S. in the case of a major air effort
 there. The proposal, then, is to organize the U. S. air force in
 Europe and Africa in such a way as to make use of the flexibility
 and mobility inherent in air power. If they are placed under a
 single air command they could not only be moved where necessary from
 the U. S. to Africa with a minimum of confusion, but, when the time
 came, they could be brought back to the U. S. by the same authority
 with equally little administrative difficulty. So it seems to me
 policy to urge that the present organization of forces, and the
 middle fact as well, be considered as one factor for air purposes,
 and to advocate the creation of a better air force involving all
 U. S. air forces operating "from Iceland to Iraq."⁹⁷

It was a proposal just as well for the purposes of the North
 African campaign as for the better offensive from the U. S., if not
 considerably more so. As a result, it elicited the full support of

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General Eisenhower. At the same time, General Spatz is committed himself and his forces to the effort, in support of the 1943 operation in the Southwest Pacific. When the operation is well underway he would be able to return to the U.S. with his family and his wife in the 1943-44.¹⁰

The proposed "unified air force" and "unified air force" is further during the fall of 1943. It is also that a question of divisions to one specific area, which is in the Pacific, is looked to the prospects of the war must already be known the United States strategy, there is a serious danger of shifting, toward the Pacific. As General Spatz put it in 1943:¹¹

... one of the principal objectives of the United States in Europe is to bring the United States to the Pacific. The United States is looking for the United States to bring the United States to the Pacific.

Such a concept would be looking for the United States to bring the United States to the Pacific. The United States is looking for the United States to bring the United States to the Pacific.

In 1943, it is in connection with the United States in early 1943, the concept of the United States in the Pacific. The United States is looking for the United States to bring the United States to the Pacific.

In 1943, the United States is looking for the United States to bring the United States to the Pacific. The United States is looking for the United States to bring the United States to the Pacific.

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transfer air command. On 19 November this plan, involving the English and 17 LFB air forces only, was put into official form. The Chairman, General, told in the foregoing manner would be charged with the duty of advising the Theater Commander on all matters in which the CMC in Africa was concerned, of coordinating all U.S. units in Africa, of coordinating strategic air operations and that he plans with the staff, and preparing in detail involving operations of the CMC in Africa.¹⁰¹

General Eisenhower was inclined to postpone action on the plan until the matter of Tunisia, by providing the required air assets, and removed the problem from the question of tactical discussion. General Eisenhower decided not to initiate action on the plan.¹⁰² In the latter of November, General Eisenhower wrote to General Spotswood in his answer, expressing his concern that "and so we are careful, we will need our air effort in Europe and need the air effort in the Pacific and all around the world." Air operations in Europe must, in general, be controlled and planned by the staff, especially those "if our air effort is to be effective should get the maximum effort and the maximum use of our air, it is right now in the air." In general it is to be noted that the staff for the job, as suggested, should be to be.¹⁰³ On 1 December, Spotswood was transferred to Africa to Eisenhower's air adviser, leaving General Eisenhower, of the 17th Air Force in England.¹⁰⁴

By moving Spotswood to Africa as the air adviser, Eisenhower hoped to secure in effect the necessary coordination of air operations in the African theater, and to be able to coordinate with the other military commands in the theater the air effort in the theater and the air force in the theater.

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This stoppage was up until Mr. [redacted] hoped to take him over until such time as long-term plans could be laid out for organized air operations.¹⁰⁵

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in fact, it is the chief cause of our political, economic, and social problems. It is the basic factor in all our difficulties. To solve them we must first solve the problem of race.¹⁰³

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...by uniting Allied effort in the area at least it was going in the right direction.¹¹²

...of December events as leading points so imperatively toward a unified command of all air forces operating against the European Axis as to justify the earlier choice of IGSA. Operation in the Mediterranean area had also increasingly important. It no longer appeared likely that, upon the successful completion of the North Africa campaign, Eisenhower and Spotswood would be free to return to the U. S. for the remainder of the war, although the possibility had not been completely excluded in all quarters.¹¹³ "Operations subsequent to IGSA" had already raised its disconcerting head, and, under critical pressure, it could be said that certain of the staff could be expected to be ordered to an early campaign in Northern Europe.¹¹⁴ Furthermore, the demand for realistic planning was also being discouragingly, and the attitude of the staff for future strategy is becoming of this objective in Italy and not necessarily of the kind which would be a critical Allied air force, too many obstacles lay in its way. It required the prior attainment of a supreme commander for all Allied forces operating against the European Axis, and a ready for all organization and deployment of British and U. S. air forces, neither of which circumstances prevailed. And when all was said and done, it would be the end.¹¹⁵

Although the idea of a unified command of air forces in the U. S., North Africa, and the Middle East still flourished, especially

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therefore, on the whole, to present as completely the
case for air, as one can direct either to be desired. But,
at least to the men, of course could not be expected to be
entirely for the sake of the war and its objectives; and, in the
case of U. S. military operations during, and during the period
in question was this understood as relatively restricted goals,
they had to be presented as an "best possible" advantage not only to
the U. S. War Agency, but to the British as well.

As a result, the policy, associated to the direct character of
the air campaign, carried on by the night air force in the U. S.
and that all-consciousness was shared by the commanders in the
field. General A. H. Tamm, Jr. to the mission, work
originally to be called the "Lindbergh Little Force of
Portresses." At first, he said, "After the end of the
war, it is in this war."¹¹⁶ Accordingly, every action that could
be interpreted without falsification of fact as an air victory, or
as a demonstration of the air doctrine of strategic bombardment, was
at once relayed to Washington and there seized upon eagerly.

The initial operations of the air force were in August
and at an extremely opportune moment. The air force of the time,
and the air force of the future, were being subjected to an
increasing amount of skeptical attention. General Arnold was about
to begin his flight in the JCS to direct the integration of air units
to the Pacific, and the planners were in the process of preparing
the air requirements for 1944 preparatory to issuing them.¹¹⁷

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It is not thought simply to place the responsibility on a
letter or routine thought useful to the management. It is a
desire to solicit expressions of opinion favorable to the
and to see that information flows continuously in the most useful
form from the Chamber to Washington. During the crisis of September
and October 1938 when it was a question of providing for refuge
from the air for our citizens in 1938-1939 and 1940 the committee
officially requested to "be heard" the War Department which was indi-
cating the need for a big operation, the feasibility of future
strategic operations, and the removal of the great evacuation. 119

in connection with FD-3, which had referred to subject on
13 Sept 1944. Follows: 120

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With that of knowledge, empirically arrived at. The British, for their part, carrying out a consistently effective campaign of air attack, at accurate to or, or less thoroughly proved principles, as their was always a presumption in the minds of British staff officers in favor of the American bombing force contributing to their established conviction that the pioneering in unproved methods. For, then that, precision bombing had been specifically and largely questioned in the late summer of 1942 by the British semi-official press and by the U. S. Navy. Consequently a good deal of special pleading was done in behalf of precision bombing, and so paragon for its other drawn to the disadvantage of the British doctrine.

For instance, when the news of the first to die decision of the High Air Force arrived in Washington, the Chief of Air Staff ordered a memo prepared for General Arnold's signature to General Arnold, for the attention of Admirals King and Lodge. The subject on board, the resulting paper declared,

again verifies the soundness of our policy of the precision bombing of strategic objectives rather than mass (blitz) bombing of large, city size areas. The Army Air Forces early recognized that the effective use of air power on a world-wide basis requires the ability to hit well targets from great altitudes.

It was, furthermore, not a doctrine adopted consciously. The war experience of all nations had been gradually showing, the difficulties in accomplishing anything on the kind of training, the U. S. training, the British, and tactics modified accordingly.¹²⁷

This of similar statements were made strictly for home consumption. Minutes for staff use only. The series of special studies, dated 11 October, were run under the Director of Intelligence Service,

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and Barrett, who, which was stated to analyze the British area in the
in the context, Colonel, and the fact that the conclusion
reached was that of this sort, while it was in the
process of generalizing, it was not likely that the study of the
lyzing the strategic environment, and that, in the context, or of the
being of specific, that of the study of the context, according to
a final, but the study of the plan of the study of the context
of effecting a decision on the destruction of the target effort.¹²⁰

Apparently through the fault of the air staff, these studies
finally reached the staff with results described by General May on
6 October: "not unfortunate." Later, in fact, considered them
an unfair statement of the British effort, which was based on inadequate
information.¹²¹ Although interested constantly in presenting a genera-
ble view for precision, the staff was not the American air com-
manders in the air were still concerned over the tendency, inherent
in any American observers, both civilian and military, to appreciate
the British effort including the bombing. General May understood
that good Anglo-American relations were essential to the bombardment
program, as well as to any other combined air effort.¹²²

Nevertheless, one of the most difficult tasks that there was to
sell daylight, precision bombing to the British. British opinion had
originally been deeply skeptical of the American doctrine, and, although
British official doctrine - given relatively to the day of the attack
programmed the operational needs of the American force had been a
revelation to most observers in England, opinion in the U. S. remained

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the substance of a force

When the evidence is read in the light of January, 1964, it is clear it was important that off duty police officers against joining. It had to be clear that officers of the off duty in basic grade is that, it had to clearly the decision of the officer, usually out of the high air force, and it was to establish a system of control for the combined air operation.

an strategic decision not to discontinue a full of the plans on the basis of which it combined with a different and originally also considered. First priority was given unequivocally to the development of the program. To this end, it would be necessary to invest in the maintenance of troops in force. The army had still to be retrained in the defense of the city. The army had still to be retrained in the defense of the city. The army had still to be retrained in the defense of the city.

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STABILITY RE-ORGANIZATION

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long periods of time. For a child could not handle this.
 I went to school for a few days but I had to go to my
 hospital of refuge. I must say.¹⁸²

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from the future front which should be longer than the existing
one is shown.¹⁻³

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SEMINAR PROGRAM

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many abortive sorties? Why and where were so few missions? Why should the U. S. command not take advantage of the fact that the strategic directive had the same targets? Why have U. S. bombs not bombed Germany? In answer, Baker described the factors that had limited the activity of his command: the relative inexperience of the crews; the requirements of TORCH which had seriously tied the Eighth Air Force and which now diverted the efforts of much of the force remaining, especially of the service units; the weather during the fall and winter months which had both limited the number of missions and increased the incidence of abortive sorties; the current strategic directive which, by limiting the bombers to submarine bases and allied targets in the occupied countries, reduced the choice of operating areas, thereby intensifying the weather problem; the lack of long-range fighters for escort into Germany. All of these difficulties could, he claimed, soon be mitigated. Crew experience would automatically increase, TORCH should soon require less of Eighth Air Force strength and time, strenuous efforts were being made to develop blind-bombing tactics to circumvent bad weather, long-range escort appeared in sight, and by enlarging the scope of Eighth Air Force bombing operations to include targets in Germany proper, the CCS could do much to relieve the American force from a strategic policy which, however necessary, had proved embarrassing both operationally and politically.¹³⁸

On this latter point, Baker went on to say that, so far from avoiding German targets, he believed they should in the near future

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be given a high priority for day bombardment. Missions to Germany, by scattering enemy defenses and augmenting the present RAF effort, would contribute strategically to the success of the air war. They would also contribute to the improvement of Eighth Air Force morale, and at the same time would undermine that of the German civilian population. He would, he claimed, be ready by 1 February with a force of 100 heavy bombers and 100 fighters to carry the day bombing campaign to the enemy homeland. If TORCH no longer needed the entire strength of the Eighth Air Force in its support, then it was time another directive were issued more in line with the strategic situation in northwestern Europe. As for the idea of the Eighth Air Force operating according to the same strategic directive governing the RAF, Baker insisted that, since TORCH possessed its own adequate air force, target directives should be issued either by the Chief of Air Staff, RAF, or by the CCS, rather than by the Supreme Commander, TORCH operation.¹³⁹

Baker's defense of the day bombardment program appears to have been successful, for the program was subjected to no further question. But its future also depended to a considerable extent on the system of command under which the day bombers were placed. Baker tacitly recognized that fact when he advocated placing operational control--in the sense of determining over-all target priority only--in the hands either of the Chief of Air Staff, RAF, or of the CCS themselves. He appears to have been especially anxious to avoid complete integration of command over the American and British bomber forces such as had

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been accomplished for the TORCH air forces by Eisenhower. In that event the Commander-in-Chief, RAF Bomber Command, would naturally be placed in charge of the combined force, and Eaker had reason to believe that Air Marshal Harris would favor transferring the American bombers from day to night operations.¹⁴⁰

To ensure for the American commander full control over the methods employed by his force thus came to be the keynote of U. S. policy as far as the bomber offensive was concerned. General Marshall, speaking for the U. S. JCS, suggested that the American bombers in England should be under the operational direction of the British, who would prescribe the targets and the timing of attacks; but he insisted that operational procedure and technique for the American force should remain the prerogative of the U. S. commanders. General priorities should be prescribed by the CCS. British command, he felt, was logical until such time as the U. S. air forces outnumbered the British and until they had demonstrated beyond any shadow of doubt the efficacy of their daylight bombing methods, at which time a re-examination of command arrangements would be in order. This point of view was apparently accepted by the British without opposition.¹⁴¹

When it came to deciding the main objectives for the combined offensive, two considerations stood out in bold relief: the submarine remained the principal threat to Allied operations in the West, and the German Air Force would have to be defeated before Germany could be successfully invaded or even subjected to decisively effective strategic bombardment. The gravity of the submarine problem needed no

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new proof. The figures on shipping losses incurred in the course of this transoceanic war sufficed to make defeat of the U-boat unquestionably a "first charge on the resources of the United Nations." And it was agreed that intensified bombing of submarine operating bases and construction yards should be carried out by the combined bomber force, with immediate attention being devoted to the Biscay bases.¹⁴²

As for the Luftwaffe, it was currently believed to be in a critical state. The stamina of its crews was reputed to be decreasing, its training indifferent, and its morale low. And there was supposed no longer to be any depth of reserves behind the first line of fighter defenses. Consequently decisive action should be taken at once to reduce the GAF before it had a chance to recuperate. It was recognized that German air power could in effect be reduced by dispersion, in which case the American daylight bombers could probably be used more profitably to harass the GAF from bases in North Africa than to conduct strategic bombing operations from the U. K.; and in the early days of the Casablanca Conference it was still an open question whether the American force might not better be deployed in that direction. But the GAF could also be reduced, and ultimately more effectively, by destroying German aircraft production and base facilities and by forcing the enemy fighters to engage in a war of attrition with heavily armed formations of day bombers. For these operations the U. K. provided the only suitable base available. It was therefore decided to concentrate in the U. K. both the British and the American bombing forces.¹⁴³

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In a sense, of course, U-boats and aircraft constituted objectives of intermediate rather than of final importance. The final objective remained the enemy's total war potential. American airmen were still confidently of the opinion that, by precision attacks on "bottleneck" industries, German production could be paralyzed. British bombardment experts on the other hand continued to lay greater emphasis on enemy morale.¹⁴⁴

On 21 January 1943, the CCS issued CCS 166/1/D, usually referred to as the Casablanca Directive, for the bomber offensive from the U. K. The ultimate objective of that offensive was stated to be "the progressive destruction and dislocation of the German military, industrial and economic system, and the undermining of the morale of the German people to a point where their capacity for armed resistance is fatally weakened." The primary objectives for the time being were listed in the following order of priority: (1) German submarine construction yards, (2) the German aircraft industry, (3) transportation, (4) oil plants, and (5) other targets in enemy war industry.

In addition to these priority objectives, which were subject to alteration from time to time as the strategic situation developed, other targets were mentioned as "of great importance either from the political or military" point of view. First of the examples mentioned in this connection were the submarine bases on the Biscay coast which the Eighth Air Force had been attacking sporadically for the past three months. The CCS had decided not to include them

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in the order of priority because that list was meant to cover long-term operations only. The bases were moreover not situated in Germany, and, since the American force in the past had been severely, if uninformedly, criticised before British public opinion for devoting so large a portion of its effort to objectives outside Germany proper, it had been considered wise to treat the Discay bases in a special category.¹⁴⁵ Nevertheless, the CG- made it perfectly clear that those bases were still targets of the highest strategic value. And, should it be found that the maximum pressure applied to them for an appreciable time produced decisive results, the attacks should continue whenever conditions were favorable and for as long and as often as necessary. Provision was also made for bombing such essentially political objectives as Berlin, for attacking, when the time came, targets in northern Italy in connection with amphibious operations in the Adriatic Sea, and for action against unforeseen but important objectives. When the Allied armies re-entered the Continent, the combined bomber force would afford the all possible support in the manner best effective.

The Directive gave a specific place to the day bomber force which, it stated, should "take every opportunity to attack Germany by day, to destroy objectives that are unsuitable for night attack, to sustain continuous pressure on German morale, to impose heavy losses on the German day fighter force and so contain German fighter strength away from the Russian and Mediterranean theatres of war." In another provision affecting primarily the night force, it specified that in attacking objectives in occupied countries the

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4. Substitution of the word "authorizing" in item 1 of the letter to
Washington should be directed to "the appropriate institution in the
United States Air Force Commanders."

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Chapter V

EIGHTH AIR FORCE OPERATIONS, 21 JANUARY 1943 TO 10 JUNE 1943

The Strategic Contribution

Although the Casablanca Directive clearly stated the mission of the combined bomber force and provided for it a tentative list of priority target systems, the Combined Bomber Offensive is not customarily dated from 21 January 1943. Rather it is considered to have begun with the directive of 10 June 1943, issued after detailed plans had matured and the American force had been substantially augmented. Between these dates, Eighth Air Force operations continued to be essentially experimental. The American bombers were engaged in extending the scope of their effort into Germany proper, in feeling out the quality of German opposition, itself desperately experimental, and in adjusting their tactics and techniques to the broader plan and increased scale of the daylight operations projected by the Combined Chiefs of Staff. It is this progressive mastery of the problems of strategic bombardment over Germany that characterizes this phase of Eighth Air Force activity more than the weight or even the effectiveness of the operations themselves.

For the fact was that the strength in effective aircraft did not increase so rapidly as had been hoped in many quarters. It was not until March that a force of over 100 bombers could be put into the air with some consistency. Prior to May, General Hapner could count on an average of only six operating groups of heavy bombers. By the end of that month, however, the situation had begun to improve, with

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total operating strength up to 12 heavy groups. On 29 May, 279 bombers were dispatched against enemy objectives, a record to that date. In fighters, also, May witnessed increased strength. Prior to April, one Spitfire group, converted in March to P-47's, had been the only unit available. During April two more P-47 groups became operational and in May began to escort the bombers regularly.¹

Yet even from the strategic point of view these operations of the Eighth during the first half of 1943 were by no means negligible. The day bombers continued to devote their attention primarily to submarine installations. They were still charged with carrying out a policy which dated from the Fall of 1942 when shipping losses, especially in the Atlantic convoy lanes, had begun to assume alarming proportions.² It will be recalled that, since 20 October 1942, the Eighth had been under orders to attack the submarine operating bases as a matter of first priority. On 19 November the submarine building yards at Vegesack, Bremen, and Kiel had been added to the day bombardment program as top priority objectives,³ but before January 1943 it had not been considered feasible to attack targets in Germany proper. At Casablanca it was decided to throw the primary emphasis of the combined offensive against submarines, concentrating especially on the bombing of the building yards in the Reich. The operating bases on the French coast were to continue to be subjected to bombardment until it might be conclusively determined whether or not they constituted a profitable system of objectives.⁴ On that score both British and American observers entertained profound doubts.

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It was generally conceded that the roofs of the submarine shelters, constructed as they were of reinforced concrete sometimes over a dozen feet thick, were impervious to any projectiles then available. But many still hoped that by disorganizing the service installations, transport facilities, and laboring population in the port areas the turn-around of U-boats in the operating bases might be slowed down to such an extent that their numbers actively engaged in the Allied shipping lanes would be in effect reduced.⁵

Accordingly, the Eighth Air Force and the USAAF continued to strike at the Biscay bases, especially Lorient and St. Nazaire. Generally speaking, the day bombers attacked the French bases only when weather conditions made missions to German shipbuilding ports impracticable--which, of course, left them ample opportunity.⁶ As for the U-boat construction yards, it was conceded that their destruction would have only a very delayed effect on the operating strength of the U-boat fleet, but it was considered that the submarine had become so serious and chronic a menace that it warranted long-term measures. Meanwhile, attacks on the U-boats at sea were coming to be recognized in some quarters as the most direct, and possibly in the long run the most effective method of coping with the submarine counterattack, but it was felt that they needed to be supplemented by attacks on the submarines at their point of origin. In addition the British, while admitting that the component parts industry did not constitute by itself a suitable target for strategic bombardment, hoped that by means of area bombing of key manufacturing centers significant delay

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might also be effected in the delivery of essential components as well as in the production of such basic materials as steel. Also intended as of indirect significance in the antisubmarine bombing campaign were attacks on enemy transportation as a whole, especially on the vulnerable supply lines extending from the Low Countries to the Atlantic coast.⁷

It was, then, a relatively large and coordinated attack that the combined bomber forces launched at the sources of the U-boat menace during the first half of 1943. Over 63 per cent of the total tonnage of bombs dropped by the Eighth and 30 per cent of that dropped by the RAF during the first quarter of the year were directed specifically toward submarine facilities. In the second quarter, 30 per cent of the RAF and 52 per cent of the American effort were so expended. These figures do not, of course, include the weight of attack applied against transportation, civilian morale, and basic industry, all considered to have an indirect, albeit an incalculable, bearing on the main issue.⁸

Until August 1943, the German submarine industry was not a separate entity. Rather it functioned as an integral part of the shipbuilding industry, which, however, was converting a rapidly increasing proportion of its facilities to the construction and maintenance of underwater craft.⁹ In addition to heavy RAF raids against facilities at Emden, Wilhelmshaven, Kiel, Hamburg, Flensburg, Lübeck, Bremerhaven, and other construction centers, the Eighth Air Force, from 23 January 1943 to June of that year, executed 12 separate attacks against submarine construction yards. Seven of these operations resulted in appreciable damage to the target. The day bombers struck four

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effective blows at Wilhelmshaven, where the submarine construction yard at the Marinewerft constituted the most interesting of a number of important naval targets. It was not always easy to distinguish the effects of Eighth Air Force attacks from those of the RAF, but photo reconnaissance revealed heavy, though scattered, damage to installations in the port area. The last of these missions, conducted on 21 May 1943, was believed to have been especially effective, extending the areas of damage already inflicted and contributing to a general reduction of submarine construction capacity from 16 hulls to less than eight. On 14 May, 126 bombers dealt considerable damage to two of the submarine yards at Kiel--Germania Werft and Deutsche Werke. Almost every major building in the former received damage, some of it severe. Destruction at the latter concern, though less extensive, was substantial. So effective was this attack, especially to Germania, that Allied interceptors believed production at preraid level would be impossible for several months. They admitted, however, that much of the work pending at that yard might be successfully farmed out to other yards with little loss of production time.¹⁰

Probably the most significant, the most dramatic attack made during these months was executed on 18 March against the yards of Bremer Vulkan at Vegesack. Situated on the right bank of the Weser River, some seven miles below Bremen, that yard had been engaged since mid-1940 entirely in submarine building. At the time of the bombing the slipways contained 15 submarines in varying stages of construction. Photo reconnaissance after the raid revealed a most

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favorable picture of the destruction wrought. It had been an unusually accurate job of bombing, and of the 15 U-boat hulls on the slips it appeared that seven had been damaged severely, one ^{actually} having ~~been~~ ^{captured}. Six others were thought to have been slightly damaged. Judging from the extent of the destruction, Allied observers believed that, instead of completing seven submarines during the ensuing six months as apparently planned, the yard would probably only finish four; and they estimated that Bremer Vulkan would be of little importance for at least 12 months.¹¹

But this more than normally efficient attack illustrates not only the limitations of photo reconnaissance but the difficulty of doing permanent damage to shipbuilding yards. Information gained subsequently from German records indicates that, although interpretation reports were accurate enough in identifying the points of damage inflicted on the yard and on the unfinished U-boat hulls, they quite failed to measure the quality of the destruction and consequently overestimated its effect on production. Actual damage suffered by the submarines on the slipways was slight, for most of the bombs that hit the ways either broke open, with resulting low order detonations, or penetrated below the concrete and were dissipated underground. Damage to the camouflage over the submarines caused destruction to the vessels themselves to be overestimated from the air. In reality only a few holes from fragments resulted. The interpretation reports failed also to appreciate the recuperative capacity of submarine plant facilities. For, despite the admittedly

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severe damage to buildings and equipment (the company claimed compensation to the extent of \$14,365,470), considerable productive activity was resumed at the yard after one week, and within six weeks production had returned virtually to normal.¹²

A similar story may be told of the entire effort against the building yards during the first half of 1943. Although comparatively heavy, the attacks of the RAF and USAAF had in fact little effect on production of submarines. Only in the last months of the war did submarine production fall off seriously, and then the paralysis of the industry stemmed in part from a vastly increased weight of attack and in part from the general disruption of transport facilities which in those latter days affected all enemy industry.¹³

Even more frustrated were the attacks made against the operating bases on the French coast, for it now appears that they had practically no effect on the activity of the U-boat fleet at any period, no matter how much inconvenience and ultimate expenditure of material and manpower they may have occasioned.¹⁴ It is true, of course, that they were treated during the first half of 1943 as targets of secondary importance in comparison with the building yards. But they were nonetheless subject to a crashing weight of bombs. Of the total bombs dropped by the Eighth Air Force on submarine and naval objectives from 23 January to 10 June 1943--amounting to well over 3,800 tons--approximately 1,045 tons fell on the operating bases. Of 13 separate attacks, nine may be considered successful; and of these successful blows, four were inflicted on Lorient, three on Trest,

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and two on St. Nazaire.¹⁵ In addition to this weight of USAAF daylight attack, the RAF Bomber Command conducted a vigorous campaign of night raids concentrating mainly on Lorient and St. Nazaire. Between 14 January and 16 February the British bombers hurled nine night area attacks at the town of Lorient, three of which were executed by forces of from 300 to 500 planes. Late in February they turned their attention to St. Nazaire, delivering even more concentrated destruction to that unhappy town than to Lorient.¹⁶

The results of this combined effort, coming as it did on top of repeated bombardment of bases during the fall of 1942, were truly devastating. By the end of March 1943, destruction was already widespread in the town areas as well as among the port installations, railway facilities, and public utilities, and it was becoming evident that both St. Nazaire and Lorient were rapidly becoming uninhabitable by the ordinary civilian population. By the end of May not a single important building in St. Nazaire remained intact, and many had suffered serious and lasting damage. Repair work had been persistently attempted but had not been able to keep pace with the bombing.¹⁷ Grand Admiral Doenitz summed up the situation with some finality in a meeting of the Central Planning Office on 4 May 1943:¹⁸

. . . the Anglo-Saxons' attempt to strike down the submarine war was undertaken with all the means available to them. You know that the towns of St. Nazaire and Lorient have been rubbed out as main submarine bases. No dog nor cat is left in these towns. Nothing but the submarine shelters remain.

But the submarine shelters did remain, and therein lay an obstacle to Allied bombing that proved for all practical purposes insurmountable. As Doenitz went on to say, they had been built by the Todt organization as a result of the "far-sighted orders of the Fuehrer," and the

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submarines were repaired entirely beneath the protection of their concrete. Instead of abandoning the bases, the Germans had moved all essential facilities inside the pens.¹⁹ And so the hope, persistently held by the Allies, that destruction of repair shops, power plants, living quarters, and other port facilities could be counted on to increase the turn-around time necessary before a U-boat could again become operational was doomed to disappointment. In the absence of conclusive evidence (the workings of the bases were shrouded in the deepest secrecy),²⁰ that hope remained fresh and green for some time. Despite an occasional report from European sources to the effect that the submarine shelters were working uninterruptedly, an AAF intelligence report dated 1 July 1943 was able to state confidently that "it is increasingly difficult for the enemy to turn around their submarines on scheduled time." The Admiralty, it continued, had just written to the Chief of the Air Staff pointing out the great value of these attacks, and requesting that they be continued. "There is no doubt whatsoever that they have contributed materially to the marked diminution of the U-boat effort and the resultant reduction in our shipping losses."²¹ By the end of the year, however, Allied intelligence analysts had already begun to take a more conservative view of the bombing of operating bases.²² As for the pens themselves, they remained impervious to anything but the six-ton bombs dropped occasionally in the later stages of the war by the RAF.²³ But by that time the antisubmarine war had been won, and by other means than strategic bombardment.

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The submarines suffered substantial defeat in the late spring of 1943, and it now appears that their failure resulted primarily from improved Allied detection methods, convoy techniques, and sea and air antisubmarine warfare on the high seas. According to Admiral Doenitz, who, as commander of the U-boat fleet, was in a position to speak with authority, it was air attacks at sea in particular that stopped his desperate bid for victory in the Battle of the Atlantic. It is the conclusion reached by the U. S. Strategic Bombing Survey that, in wresting that victory from the enemy, "strategic bombing can at best be considered only an incidental contributing factor."²⁴

By June 1943 the submarine menace had subsided and the main effort of the Eighth Air Force was directed elsewhere. Only 10 per cent of its bomb tonnage was devoted to submarine targets during the latter half of 1943. The percentage dropped to four during the first quarter of 1944. It was not until late in that year that the intense activity noticeable in the German submarine building yards warned the Allies of the enemy plan to create a fleet of new type submarines and caused the industry to be considered once more a principal target system.²⁵ But that is another story. For all intents and purposes the antisubmarine campaign carried out by the Eighth Air Force prior to 1941--that essentially defensive phase of its activity--was completed between October 1942 and June 1943. The CBO Plan, drawn up in April 1943 and approved in May, still placed submarines in first priority, but before it could be implemented to any important extent the submarine situation had for the time being materially improved.

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Compared to the antisubmarine campaign, the remaining efforts of the Eighth Air Force during the period under review appear tentative, scattered, and light. Although second only to submarines in order of urgency, aircraft installations sustained little more than 15 per cent of the total bomb tonnage dropped by the American bombers. Of the seven attacks made on targets of importance to the German Air Force, only four can be considered successful and only three--against the Arlt Aircraft and Aero Engine Works at Antwerp, the Focke-Wulf factory at Bremen, and the airframe factory of S. S. G. A. du Nord (formerly Avions Potez) at Reaulte--were of significant weight. All three of these heavier attacks, ranging from approximately 431,500 pounds to 523,000 pounds, resulted in concentrated and severe damage. The heaviest of all was the mission executed on 17 April against the Focke-Wulf Flugzeugbau at Bremen, at the time believed to have been devoting its entire facilities to constructing F-180 fighters.²⁶ According to plant officials subsequently interviewed, this attack destroyed approximately half the factory and several completed aircraft.²⁷

Axis rail transportation, given third priority at Casablanca, suffered almost as great a weight of bombs as did aircraft installations. In a sense the enemy owed this degree of attention to contingent factors as much as to Allied plans, for with one exception all raids made during the period in question were directed against targets in occupied France which could be reached readily when weather prevented missions to Germany or to the submarine bases on the Bay of Biscay. Yet these attacks may well have caused the enemy more trouble

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than those against aircraft objectives. Of the seven major attacks made by the Eighth Air Force, four--delivered against Nann, Rennes, and Rouen--caused acute, if temporary, dislocation to marshalling yards and heavy damage to repair facilities.²⁸

On 12 and 26 March the day bombers returned to the scene of their first operation and struck a relatively heavy blow (318,000 and 413,000 pounds of high explosives respectively) against the Sotteville yard at Rouen, causing severe damage to the tracks and to the Eddicium repair shops. In addition, the latter attack almost completely destroyed the quatre-voies locomotive repair shops. Most spectacular were the results at Rennes, when on 8 March 47 bombers dropped approximately 269,000 pounds of bombs over the railway yard, cutting it at both ends and bringing all traffic to a standstill for three or four days. It was several days more, possibly two weeks, before normal traffic could be resumed. Meanwhile rail communications with West Peninsula, and in particular with the submarine bases, were seriously disorganized, for Rennes constituted the strategic key to the whole railway network of Brittany. Traffic had for some days to be routed to the submarine bases by circuitous routes, a task which the bombing of railway facilities at Lorient on 3 March, and the breaching of the Morlaix viaduct late in January by the RAF made more difficult.²⁹

It was easy, however, to overestimate the traffic delay resulting from these missions. Repair gangs were large, efficient, and ubiquitous. Consequently it appears that in no instance during the spring of 1943 was traffic held up longer than three to four days. The strain on German resources in skilled labor was, of course,

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considerable. Probably more important than track damage was the destruction of repair facilities, which undoubtedly contributed to a reduction in the number of operating locomotives and freight cars.²⁰ But, effective as they were in individual instances, the Eighth Air Force missions against rail centers were not carried out in sufficient strength nor frequently enough to produce more than a local and temporary dislocation. Although the AF made several light raids specifically on rail objectives and a few heavy night attacks, especially during March, which involved rail installations, their effort failed to alter the situation materially.²¹

Practically all the bombing of rail objectives was done in March. After March the Eighth Air Force turned its marginal effort toward factories in France and Belgium producing motor transport vehicles for the German Army. On two occasions (4 May and 14 May) it attacked the plants at Antwerp formerly operated by Ford and General Motors. Those factories, situated within a few hundred yards of each other, suffered considerable damage, especially as a result of the earlier mission when 65 bombers dropped 323,000 pounds of high explosives on them with a high degree of accuracy. More important, however, was the bombing of the Renault motor vehicle and armament works at Billancourt, Paris, on 4 April. It was the first relatively heavy attack (35 bombers dropped 502,100 pounds of high explosives over the target area) since the AF had bombed the same plant on the night of 2/1 March 1942. Almost every major building was damaged, in some instances the greater part of the shops being destroyed. According to contemporary estimates, considered conservative at the time, this attack cost the "Schacht"

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at least 3,000 troops; and it appeared unlikely that the factory could resume preraid production for more than seven months. British industrial analysts believed it to have been a more effective blow than that delivered the spring previous by the RAF, albeit the latter had done much to cast a creditable light on strategic bombardment in those days of doubt and experimentation.³²

The American bombardment campaign in 1945, as in 1942, had the unfortunate incidental effect of killing civilians and destroying civilian property in occupied territories. The Casablanca Directive had recognized the serious political implications of the problem, and had placed control over operations against strategic objectives in those areas in the hands of the British War Cabinet, which could presumably be in a position to react promptly and authoritatively to developments on the political front.³³ Generally speaking, the American bombers had been restricted in their activity over occupied territory to days when weather conditions made attacks against objectives in Germany unfeasible. Priority among the targets elsewhere was, of course, given to the submarine bases on the French Coast, the strategic importance of which was believed to justify any measures necessary for their complete destruction.³⁴

Strangely enough, however, it was not the bombing of the submarine bases, devastating as it was, that roused the severest criticism from the French population. Yet on closer observation that fact does not appear so odd. Under the crushing weight of attacks from both British and American forces, Morient and St. Nazaire virtually ceased

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to exist as civilian communities, and the French population, after they had recovered from the bewildered shock of seeing their towns systematically obliterated, took a grim satisfaction in contemplating the discomfiture of the German operatives left in the bombed areas, most of whom belonged to the unpopular Organisation Todt. The people of Brittany knew only too well the strategic importance of the great Peninsula, and despite their losses and their inevitably mixed feelings, many of them hoped an Allied invasion of the Continent would come soon, and in Brittany.³⁵

Elsewhere the bombings prompted an increasing undercurrent of protest among a population generally pro-British and pro-American. March had been an especially hard month, for it was then that the Luftwaffe made most of its attacks against rail objectives in occupied France; and, since marshalling yards were normally embedded in populous areas, it was inevitable that those areas could suffer seriously, even though accidentally. At Douanes, for example, the Luftwaffe mission of 5 March left nearly 300 civilian casualties. The French population not unnaturally felt that this was a terrible price to pay for "un si court délai et ralentissement du trafic." Opinion remained, of course, mixed, the quality of the mixture depending pretty exactly on the degree of loss suffered in each individual case. Remarks heard during showings of documentary films of current Allied bombings were reported to have been distinctly uncomplimentary to the Allied flyers; yet even so, a contemporary French source indicated, they were mild in comparison with those which the head of "notre bien-aimé"

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"Mr. Laval" elicited when it was projected on the screen.³⁶ Resistance tended to become concentrated against the Americans, whose high-altitude attacks in relatively great strength seemed inevitably and appallingly inaccurate and destructive to those on the ground. The RAF, on the other hand, was regarded as "une arme de précision remarquable." This notion is not so paradoxical as it seems in view of the British doctrine of area bombardment, for the RAF had for obvious reasons refrained from subjecting French cities to heavy night attacks except in the cases of Lorient and St. Nazaire, from which the French population had been largely evacuated, and had made a number of accurate raids with four or five planes at low altitude against specific objectives.³⁷

Criticism reached a climax in April. The Belgian Ambassador to the U. S. protested the inaccurate bombing done by the USAAF at Antwerp on 3 April which had resulted in heavy civilian casualties.³⁸ And among the French in London criticism of American bombings in France tended to increase along with criticism of U. S. policy in North Africa. Following the bombing at Paris by the Eighth Air Force on 1 April, the de Gaulle Committee, while admitting good strategic results, complained of the inaccuracy which had led to large civilian losses and recommended that the Americans either adopt different bombing techniques (it was suggested, among other things, that the bombers fly about for a couple of minutes before dropping their bombs) or else abandon the bombing of French objectives in favor of equipping the Resistance Movement to do the work of destruction by itself. Other sources expressed similar, though often less moderate

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opinions, suggesting at times that the Americans were indifferent to French welfare, that they should learn to bomb by practicing on the Germans rather than on the French, and that it would be better if the British bombed French objectives and let the Americans indulge their irresponsible habits over German soil.³⁹

Pressure had increased by the latter part of April to such an extent that the problem came before the British War Cabinet for general review. That body was unwilling to permit bombing of occupied countries except insofar as it could be accomplished without excessive danger to the civilian population, a policy which, although differing little from the position originally taken in October 1942, would, if strictly interpreted, have made it necessary to abandon all such bombing, since strays could hardly be helped even under the most favorable conditions. But strong arguments pointed toward continuing the bombardment of strategic objectives in occupied Europe. Not only were those objectives of sufficient importance to the Axis economy to warrant bombing, but to attack them periodically would be to force the Germans permanently to disperse their defensive strength. The logic of military necessity in a total war proved unanswerable; and in June the CCS agreed that objectives in occupied countries, the inherent military importance of which justified such action, would under suitable conditions continue to be subjected to precision bombardment.⁴⁰

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The Tactical Problem

To grasp the true significance of the early 1943 operations performed by the Eighth Air Force it is necessary to look at them from the point of view of the tactician rather than the strategist. For the day bombers were still learning their trade. During the months prior to February 1943 the Eighth had grappled with the basic problems of daylight strategic bombing for the first time under combat conditions, and had elaborated certain basic tactical principles. Now, during the months from January to June, the main tactical problem was to extend operations, both in scope and weight, and to adjust basic practices to the shifting circumstances of the air war. Though not intentionally so, it was a period of final experimentation before the big offensive.

The American bomber force in the U. S. had also to combat criticism of daylight precision bombardment which continued to crop up despite the official acceptance of the program by the CIG at Casablanca.⁴¹ Allen M. Tamm of the Warner's Digest staff, who had been in England for some time observing the air war, gave voice to this spirit of skepticism which lingered, principally in Britain, beneath the surface of official agreement. In a book entitled The Air Offensive against Germany, published early in 1943, he undertook to demonstrate that, while it was entirely feasible to bomb Germany into military impotence, the job was being held up seriously by the RAF, which "stubbornly" refused to abandon its dogmatic insistence on daylight bombing, a concept tactically unsound under European conditions and

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quite beyond the capabilities of available American aviation.⁴² As they were doubtless meant to do, his words prompted considerable comment in the American press, and raised questions in the minds of such influential groups as the House Appropriations Committee.⁴³ Unfortunately his spokesmen were unable to answer those criticisms effectively because as yet day bombing operations in the U. S. had not been heavy enough or extensive enough in scope to warrant any but tentatively favorable conclusions, and tentative conclusions do not make for convincing argument, especially in the eyes of the lay public. To Mr. Lehigh, on the other hand, and to those for whom he spoke, six months of actual operations in the U. S. had pointed conclusively in the opposite direction. The apostles of high-level precision bombing therefore looked forward with some concern to the spring operations against Germany for data which might more fully vindicate a tactical doctrine which had necessarily been held to a large, if happily decreasing, extent as a matter of faith.

The Eighth, however, continued to labor under certain handicaps. Its commanders would have preferred to increase the weight and range of its missions steadily and rapidly, but prior to May 1943 it received few reinforcements. Even replacement crews and aircraft arrived at a rate much slower than the losses incurred in operation or combat. In February the effective strength of the organization sank lower than it had been for many weeks. The Service Command was still devoting a substantial portion of its time to the preparation of units and replacements for TORCH; and during April and May its

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facilities were further strained by the arrival of new groups, the ground echelons of which had been left behind owing to the currently acute scarcity of shipping.⁴⁴ Finally there was that perennial bogey, the weather. In January only four out of 11 planned missions were carried out, the remainder having been cancelled because of unsuitable weather. In February five were completed. With the advent of spring, the situation naturally improved, allowing nine missions to be completed in March, four in April, and nine again in May.⁴⁵ But weather remained a serious limiting factor on all daylight operations. Experimentation in blind bombing methods continued, but "rolling" operations proved unsatisfactory and were abandoned after March. It was not until the end of November 1915 that "pathfinder" missions began to be flown.⁴⁶

It would not have been surprising had morale declined in the face of these chronic handicaps. To a certain extent it did, of course. Commanders were impatient and often discouraged at the slow rate of Eighth Air Force operations and at the delay in build-up. And combat cross came in the statistics of attrition and replacement the shining prospect of a short career. To make matters worse, commanders and crews alike were eager to strike at the German homeland, but hitherto they had been prevented from doing so by tactical and strategic considerations the validity of which they did not always appreciate. In this restlessness they were joined by a considerable segment of British opinion.⁴⁷

It came, therefore, as a tonic to all concerned (except the enemy) when, late in January, the Eighth Air Force bombed Wilhelmshaven.

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specific plans had been laid as early as November of 1942 to extend operations beyond the occupied areas, and the list of priority targets had been enlarged to include objectives in Germany proper. At Casablanca it had been decided to concentrate daylight bombardment as far as practicable on objectives in the Reich. Accordingly, on 27 January, 21 B-17's and 27 B-24's at last set out for Germany. The mission did not go exactly as planned. The Liberators were supposed to attack the dock area of Wilhelmshaven and the Fortresses were to bomb submarine building yards elsewhere in Germany. As it happened, the force of B-24's, suffering from a combination of bad weather and bad navigation, failed to locate the target and returned to base. Of the B-17's, 53 found it impossible to bomb their primary target, and went on to Wilhelmshaven which for them had been specified as the secondary. The others bombed Emden, the target of last resort.⁴⁸

The uncertain weather prevailing that day over northern Germany may well account for the fact that the mission met such less opposition than it had anticipated. Flak was encountered almost continuously over Germany and the Frisian Islands, and several of the bombers suffered slight damage; but at no time was it intense enough or accurate enough to have deterred the attacking force in any way. At Wilhelmshaven, especially, the flak defenses appear to have been thoroughly confused, their effort at a predicted barrage being that a British observer who flew in one of the B-17's called "pathetic."⁴⁹ Considering the number of guns the enemy was known to have in the area, this showing came as a complete surprise to the American force.

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The only losses that occurred during the day's mission resulted from enemy air action. Both the P-17's of the 1st Bombardment Wing and the B-24's of the 2d Bombardment Wing stirred up a sizeable force of enemy fighters, estimated in all at more than 100 aircraft. In the resulting combats the Liberators lost two of their number and the Fortresses one. Not even the German fighters proved less dangerous than had been feared, for they showed much less experience than those the bombers had encountered in France. Claims of the bomber crews against the fighters were assessed at 22 destroyed, 14 probably destroyed, and 13 damaged. All bomber claims made during the first half of 1945 must, however, be taken with a grain of salt. Despite a new and much improved method of establishing them, they were still affected by many confusing circumstances; and they continued to run high.⁵⁰

It was, if not an especially well executed mission, a very interesting one. A relatively small force of heavy bombers, their crews no more experienced than necessary, had penetrated by daylight, and necessarily without benefit of escort, well into the enemy homeland, and had, moreover, done so without prohibitive loss. Operations of this sort had generally been considered feasible only for a large force of highly trained units. But, as Eighth Air Force commanders knew only too well, they might expect heavier and more efficient resistance in the future. And so it happened. During the mission of 4 February, when the Eighth attacked Liden, the bombers stirred up a veritable hornet's nest of fighters. For the first time they were opposed by

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train-engine fighters (P-110's and Ju-38's) in addition to the usual P-109's and ME-109's.⁵¹

On 23 February, one month after their initial plunge into German territory, the day bombers revisited Wilhelmshaven. They had intended to strike Bremen, but, finding that objective completely obscured by clouds, they turned back to Wilhelmshaven where 65 of them bombed the harbor area to some effect. But it was a very different mission from that of the month previous. That was not much more dangerous than it had been on that occasion, although it may have accounted for one of the bombers lost. Enemy fighters, on the other hand, reacted in strength. Not only were the fighters of the affected area engaged, but help was called also from units as far south as Munching. In all an estimated 55 to 60 single-engine fighters and 10 to 15 twin-engine fighters (the latter probably normally used as night-fighters) flew a total of 80 to 85 sorties against the bomber force. The concentration of purpose with which the attacks were launched was clearly evident from intercepted German radio messages.⁵²

Two factors undoubtedly simplified the task of the enemy dispatchers. Almost from the point of rendezvous the bombers had been in the German ADF screen, with the result that the enemy was well prepared to intercept as soon as the bombers came within reasonable range. The danger of early interception was also aggravated by the fact that the planned route led around the coastline of northwestern Europe not far from the Frisian Islands; and the actual course clung apparently even closer to the coast. At any rate, in the ensuing

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battle the bomber force lost seven of its planes, possibly as many as six of which fell as a result of enemy air action. Over against these losses the bomber crews claimed 21 of the German planes, with nine more being probable.⁵³

Despite the determination with which the German pilots pressed their attack, they were still reported as being more cautious than the more seasoned units in France. Nor did they attack so consistently from the front.⁵⁴ The reader will recall that during the later missions in 1942 and during January of 1943 the Germans had recognized the weakness of the American bomber formations in forward fire power and had made a consistently deadly series of frontal attacks.⁵⁵ The Eighth Air Force had reacted promptly to that disturbing tendency and, by fitting as many bombers as possible with nose guns and by stacking its formations with a view to providing mutual fire power, it had succeeded at least in reducing the menace of the nose attacks. It is possible that the less experienced enemy units stationed in Germany at that time had been cautioned to respect this increased defensive power. The bomber crews had noticed a similar tendency on both previous missions to Germany.

During the mission of 26 February the Germans experimented with two new defensive techniques. The bomber crews reported encountering a box barrage of antiaircraft fire over Wilhelmshaven which contained several black bursts, each of which released a parachute bearing an explosive charge. One group also reported an unsuccessful attempt on the part of a He-109 to drop bombs on the B-17's from special

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external bomb racks. On 10 February, during the raid to St. Nazaire a report of a similar nature had been rendered, but it was thought on investigation that the missiles in that instance consisted of self-destroying ammunition. The bomber crews again reported air-to-air bombing when on 22 March they returned to Wilhelmshaven. Again the tactic failed to cause damage.⁵⁶

On 4 March an incident occurred which demonstrated, if demonstration were needed, that small formations could not hope to penetrate the fighter defenses in the Reich without crippling losses. The target for the day's mission was the marshalling yard at Hamm. It was the first time the Eighth had set out to bomb an objective in the Ruhr industrial area, and so the mission was planned with a view to reducing as far as possible the danger from enemy fighters that the necessarily long flight over enemy territory would entail. In order to confuse the enemy defenses the main force of 71 Fortresses headed out in a northeasterly direction over the North Sea roughly along the route taken on previous missions to Bremen or Wilhelmshaven. In addition, 14 B-24's flew a diversion along a similar route, but followed it for a much greater distance, keeping an eye out for incidental shipping targets. When about halfway between England and the Netherlands coast, the main force turned southeast toward Hamm. But from that point on, the weather upset these carefully laid plans, with the result that of the four groups of B-17's one returned to England without bombing and two others bombed the last resort target at Rotterdam. The fourth group became separated from

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The main formation while flying on instruments, so that, when it reached clear weather over Germany, it found itself quite alone. It continued on to the primary target, however, and succeeded in bombing with unusual accuracy. So far it had met only light opposition, and it is probable that the carefully planned route prevented the German fighters from becoming prepared far in advance. But on the route home they began to attack the 16 Fortresses with the utmost determination, coming in, contrary to their recent custom in that area, mainly between 10 and 2 o'clock and sometimes making coordinated attacks by three planes all aimed at individual bombers. In all some 60 enemy fighters, of both single- and twin-engine types, attacked the lone formation and shot down four of its planes. It was a costly operation, but considering the weight and determination of the attack, it is remarkable that none of the A-17's were lost; and in the course of the air battle the bombers may have destroyed upwards of 13 of the enemy planes.⁵⁷

The attack on objectives in the German homeland had been the depressing fact to all concerned since the latter part of January. The missions had been relatively successful, but, except for the first one, the cost had been high. On the first four the rate of loss, expressed as a percentage of the planes attacking, had been a little over 10 per cent. And most of the losses had resulted from air combat.⁵⁸ Yet the Eighth Air Force commanders were not unduly discouraged, for, they argued, a force of 300 or more planes (the number originally planned for such operations) would lose few if any more than did the small forces then being employed. Moreover, these

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missions had not been escorted, and a reduction in losses could be confidently expected as soon as long-range fighter support could be provided.⁵⁹

Their optimism received considerable impetus when, after a two-weeks absence, the day bombers again flew to a German target and, on 18 March, bombed the submarine building yards at Vegesack. The route had been carefully planned in order to bring the bombers into contact with the enemy defenses at the latest possible moment; and, giving the Frisian Islands a wide berth, they succeeded in avoiding interception until they had reached Heligoland. Then the German fighters of all available types (FW-190's predominating) engaged the bomber formations in a running battle to the target area, and again on the return trip, some following the American force over water to distances of 60 to 80 miles beyond the coastline. Yet these attacks, persistent though they were, for the most part lacked the skill and daring of experienced units, suggesting that the four missions flown by the Eighth to French objectives during the preceding fortnight had drawn off the few well trained units then stationed in northwest Germany. The gunnery of the bomber crews seems, moreover, to have improved. As a result of these two factors the Germans suffered heavily, although the claims registered of 52 enemy fighters destroyed, 20 probably destroyed, and 23 damaged appear to have reflected less the facts than the confusion accompanying a protracted air battle. Probably no more than 50 or 60 of the enemy intercepted. Yet their losses must still have been substantial. Best news of all to the tactical commanders was the relatively small loss (two planes) sustained by

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the bomber force. Considering that it provided also an example of very accurate and apparently effective bombing, it was a reassuring mission.⁶⁰

Meanwhile the day bombers had been running into equally powerful defenses during missions to the submarine bases on the French coast. Indeed, some reported defenses in the neighborhood of those objectives to have been more experienced in the way of the American heavy bombers than those met in Germany. Flak at St. Nazaire, Lorient, and Brest had on more than one occasion caused the bombers serious trouble, and at St. Nazaire on 3 January it had been thrown up in a gridlocked barrage that destroyed several of the attacking planes.⁶¹ During January, February, and March flak at those points continued to cause much damage to the bombers and in a few instances destroyed them. For the most part the fire control method used was a continuous following, and it was frequently so accurate that the bomber formations could hope to escape serious trouble only by taking violent evasive action.⁶²

Yet it was the fighters here, as in Germany, that gave the Eighth its toughest battles. Since it was not possible for the bombers to have escort much beyond the French channel coast, they had to do their heaviest work (namely at Lorient and St. Nazaire) without fighter support over the target area. More important than the lack of full-scale escort was the experience and ingenuity of the enemy fighter units stationed in those parts. They pressed their attacks fearlessly and were constantly trying out new tactics. At Lorient,

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for example, on 25 January, they tried coordinated attacks in groups of six planes, the elements of which came in simultaneously from both sides and from above. Most frequently, however, the German pilots employed the nose attacks which had worked so well against the inadequately protected bomber formations in December and January. 85

To be sure, the bomber crews were also increasing in experience. By preserving as good a defensive formation as possible, by turning into the attacks, and by varying altitude as much as was consistent with tight formation flying, they managed often to evade otherwise lethal passes. In addition, the 1 in nose gun now installed in many of the bombers were credited with breaking up many attacks. Yet even with these improved defensive tactics, the Eighth lost heavily in combat in the neighborhood of the U-boat bases. At Lorient on 26 January an attacking force of 34 bombers lost four to enemy action and one to flak. Of the eight planes lost by the force of 65 that attacked St. Nazaire on 16 February, two definitely were shot down by enemy fighters, four were probably destroyed by fighters, and another two by a combination of fighters and flak. On only two occasions did the bombers have a relatively easy time in dealing with the German aircraft. On 27 February the RAF provided escort of such high quality that 69 bombers were able to complete their mission to Brest without loss of a single plane. And on 3 March the main force, sent to bomb Lorient, benefited materially by having the bulk of the fighter defenses diverted by a few B-24's

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dispatched to escort for that purpose under heavy Spitfire cover.³⁴

fighter escort also rendered missions flown during March to other targets in occupied France and the Low Countries a relatively simple matter. During March, six such missions were dispatched to points which, with the exception of Louvain, lay within escort range. On two occasions, at Louvain on 12 March and at Liège and other points on the day following, forces of 63 and 75 bombers respectively completed their missions without loss, thanks largely to cover provided respectively by 12 and 11 squadrons of Spitfires, and to carefully planned diversionary sweeps by fighters and bombers.³⁵ By this time the prevailing doctrine of fighter support was based on the assumption that all rearward defense of the bomber formations would be the responsibility of the bombers, and that the fighter support would so place itself as to defend the bomber formation from head-on attack, still the most dreaded enemy tactic. This method at the same time left the bombers a clear field, free from problems of identification, in which to engage all hostile aircraft approaching from astern. It represented also an effort to provide closer escort. The four fighters had been supporting the American bombers from the beginning in considerable strength (400 to 500 planes), but they had normally flown an "umbrella" type of cover, developed primarily to protect Wellington bombers which lacked overhead defense. This procedure made it possible on many occasions for the enemy to avoid the escort, and, coming in beneath it, to engage the bombers with little interference. The Spitfires had, moreover, been urged not to come too

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near to the bombers, whose gunners tended to shoot first and identify afterwards. That problem remained, but the need for closer escort had come to be one of overriding importance.⁶⁶

Despite fighter cover, however, the German defenders occasionally pressed their attacks with cleverness and determination, employing deceptive tactics and experimenting with a variety of approaches. A formation of 16 D-24's ran into an especially well planned and executed fighter attack during their attempt to bomb London on 3 March. It was too small a force for ordinary purposes, but the heavy escort provided should normally have been enough to protect it. But the enemy had apparently weighed that factor, for as the fighter escort approached the target to clear the way for the bombers, it was engaged by a considerable force of SE-109's. While the supporting fighters were thus occupied (and the German force was enough to temporarily to saturate them), another swarm of German aircraft which had evidently been waiting for just that opportunity attacked the bomber formation with the utmost ferocity just as it was executing its bombing run. This defensive attack succeeded very well, for it destroyed two of the bombers, including the lead plane, and quite disrupted the bombing run.⁶⁷

During April, the Eighth Air Force encountered increasingly fierce and versatile opposition from enemy fighters. Judging from intercepted German radio messages, it appears that the enemy had come to recognize the daylight bombing campaign as a desperate matter requiring an all-out counteroffensive, regardless of cost.

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The first three missions--to Paris on the 11th, to Antwerp on the 5th, and on the 10th to Lorient and Brest--had strong air withdrawal support, but no escort over the target area, and it was mainly while the bombers were thus unprotected that the heaviest fighter attacks occurred. The fighters reacted in strength of 50 to 75 planes of all types and came in to the attack from all directions, with frontal attacks, though less exclusively employed than heretofore, still predominating. Their most effective tactic was the coordinated attack executed by four to seven aircraft, approaching from the front in waves at intervals of from 1,000 to 1,500 yards. Uncoordinated attacks had hitherto been the exception, most of our German pilots preferring to strike singly. Now they became frequent enough to be considered the result of a consistent plan. And they made it just that much harder for the bombers to defend themselves. They had the effect of dividing the fire of the bombing formation; and they made it difficult for the pilots to take effective evasive action, for if the bombers turned into one attack they were left in no position to repeat the maneuver before the next batch of fighters was upon them. At Paris, too, the enemy concentrated on the relatively unprotected low squadron in one of the two combat wing formations, and destroyed three of its six planes.²⁸

The most effective defense the bombers could employ was to fly as close a formation as possible, with two to three combat boxes flying in combat wing formation so as to give each other the utmost support. Improved forward fire power also helped a great deal. In the case of the Paris mission just mentioned, the low squadron would

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probably have lost even more heavily had not each aircraft been provided with twin nose guns in anticipation of just such an attack. Good results appear also to have stemmed from the careful planning of routes in these cross-Channel missions. The B-21's of the 2d Bombardment Wing flew effective diversions, and even the main attacking force executed feints on its way toward the enemy coast. These maneuvers no doubt account for the fact that fighter attacks became serious only after the target area had been reached. Defensive action on the part of the bombers seems, indeed, to have balanced the increasing ferocity of the enemy fighter opposition during these first three April missions, for total losses amounted to no more than five per cent of the attacking force, a rate of cost considered by no means prohibitive for daylight operations.⁸⁹

Things did not go so well when on 17 April the Eighth once more drove into the Reich in order to attack the rocket-fuel plant at Bremen. It was the largest mission mounted to that date. One hundred and fifteen B-17's of the 1st Bombardment Wing were dispatched, 107 of which attacked. Yet this force also sustained a record loss: 16 of its planes were shot down and 16 damaged to some extent. Never before had the Eighth encountered such heavy or such well coordinated defenses. While the Germans had undoubtedly recognized the tendency of the American bombers to attack targets in the Bremen-Alkmaar area, the enthusiasm of the pilots that provided the bombers on this occasion appears to have stemmed from advance training provided in part by suspiciously favorable weather in the target area, and probably in even larger part by a German observation plane which discovered

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and reported two to four forced-landing sites over the North Sea far beyond DM range. It is known that this plane radioed the location, direction of flight, speed and altitude of the bombers, and this information, coming more than an hour before their arrival at the target, permitted the enemy to organize and concentrate his forces. This he did with still and dispatch. A full detachment of fighters met the formation at a point beyond the British Islands and accompanied it to the target, where a mass of German fighters, no doubt kept conscientiously informed of the bombers' course, were already assembled ready to attack at the critical moment of the bombing run. It seems to have been their main purpose to vitiate the effectiveness of the bombing by knocking down the leading planes and breaking up the bomber formations, because all attacks were withheld until that moment. Over the target, also, the Germans threw up an unusually intense, though not always accurate, concentration of flak.⁷⁰

Possibly as many as 150 aircraft intercepted. They made their first full-scale attack just as the leading bomber groups entered the flak concentration immediately over the target. Most of them drove in from the front, flying recklessly through their own anti-aircraft fire in a variety of coordinated attacks. Flak added to the confusion, and accounted for one bomber. In addition it probably caused some of the bombers to become stragglers and therefore an easy prey to attack by fighters later on in the battle. But it was of minor importance in comparison with the fighter opposition, and the quantity rather than the quality of the barrage was responsible for whatever success

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it may have had in confusing the bomber crews. Despite the severity of both fighter and fleet attack, however, the first groups managed to maintain formation and to bomb with reasonable accuracy.⁷¹

On withdrawal from the target, the bomber formations sustained constant attacks, executed from all directions and maintained persistently well past the Prision Islands. The enemy fighters concentrated on stragglers and on formations too loosely flown for effective mutual support. This first called attention with special force to the problem of defensive formations. Except on the bombing run, the bombers had flown in two combat wings. It was believed that the more scattered formation maintained by the leading wing accounted in large part for the fact that it had suffered all the losses sustained that day. On the other hand, the elements of the second combat wing flew in close support of one another. To be sure, the leading wing bore the brunt of the attack at the target and some of its losses had occurred at that time. But the virtue of a tight defensive formation appeared nonetheless to have been demonstrated with some cogency.⁷²

Ever since November, when the increasing frontal attacks made by the German fighters had forced the Eighth Air Force to increase the forward fire power of its formations, an effort had been made to consolidate the elements so as to achieve the maximum of mutual support. By February the concept of the combat wing formation, consisting of three combat boxes of 18 to 21 planes each, had clearly emerged. But there remained a regrettable tendency on the part of the individual elements to string out, thus destroying the compactness

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necessary for purposes of defense. During February and March much thought was given to this problem, and by April the 34-plane combat wing was capable of being flown in such a way that any fighter approaching from the front should encounter a solid wall of fire. Of course, there remained serious objections to such relatively large and closely flown formations. The upper and lower squadrons obviously had the least protection, being in fact in a comparatively exposed position, and during late March and April the enemy fighters had concentrated on them. Moreover, the formation was an unwieldy one, difficult to maintain, especially on turns, for it involved at least a 100-foot variation in altitude. But for the time being the demands of defense had to be met before those of maneuverability.⁷³

The German decision, then, demonstrated both the vulnerability of any combat wing formation when badly flown and the defensive strength it possessed when properly maintained and adequately equipped with nose guns. Although the American losses were high, the Germans no doubt lost equally heavily. As usual, it is difficult to tell from the reports made by the bomber crews concerning such extensive air battles exactly how many enemy fighters were shot down. But even allowing a substantial margin of error (possibly as much as 40 per cent) the claims of 62 destroyed, 15 probably destroyed, and 17 damaged indicate that the enemy lost seriously.⁷⁴ It may well have been as a result of this engagement that the German fighters tended thereafter to reduce frontal attacks in favor of attacks from other quarters. Since February there had been a tendency in that direction,

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especially on the part of the less experienced units. After April none other's could be the preferred method except for the specific purpose of breaking up the bombing run.

By May the German fighter force had changed as the primary obstacle to any extension of the daylight precision bombing campaign. In January German fighter disposition on the Western front was about the same as it had been in August 1942. It consisted of a shallow coastal defense from coast to English Channel, with heavy in the Pas de Calais area. Indeed, owing to the urgent demands of the Eastern and Mediterranean fronts, the total single-seater fighter strength on the Western front, according to contemporary Allied estimates, dropped from about 270 in August 1942 to 215 in January 1943, a fact which led many U. S. air observers to underestimate for a time the capacity of the G. 75. But the flight time of optimum visibility in January gradually faded out during the following months. By the middle of the year German fighter defenses on the Western front had increased substantially, and reflected the extended scope of daylight air force operations into northwestern Germany. Although German figures are not available for the Western front alone, it now appears that there were in that area and airway at the beginning of 1943 not less than 550 fighters; by the middle of the year that figure had risen almost to 610. During the first quarter of 1943, one-fourth of the total enemy fighter strength was located in Germany and the Western front. During the second quarter the proportion had risen to approximately one-third, and was rapidly increasing.⁷⁶

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one of the most, to say the least, increase in fighter strength was the need, if still so chaotic, development in enemy tactics. The enemy, more attack-minded, was more aggressive in attack, but in their attack there was a large number of assorted kills, some of which were already providing embarrassing to the American force. Coordinated fighter attacks were plentiful and limited, versatile across of broad. Four-engine fighters were being used in the hope that their heavier fire power might be effective against the bombers. Paratrooper mines had been tried out, and air-to-air bombing, had by way been an inevitable habit, characterizing almost every major engagement. Experiments were being conducted in the use of high-altitude, large-caliber cannon and possibly also in the rocket gun, which were to become a live threat to bomber formations in the months to come. Finally, the enemy was rapidly increasing the effectiveness of their standard fighters by adding, both to their number and their armament. The F-100 remained roughly equivalent in fire power to the F-17, but the F-100 was rapidly becoming a more heavily armed aircraft designed for the specific purpose of destroying bombers. As for the American bomber force, it was by the middle of 1954 showing the effects both of the increase in strength of the Red and the increasing effectiveness. During 1953, 14.3 per cent of the attacking bombers were hit by enemy aircraft. By June of the following year this proportion had risen to 19.2 per cent.⁷⁷

But this rapidly accelerated counterattack, pointed to most imperatively, was the need for long-range escort. That was the answer not only to the increased weight and quality of opposition but

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to such particular tactics as air-to-air bombing. The Eighth Air Force commanders had labored under no illusions on that point: long-range escort had from the beginning been considered highly desirable.⁷⁸ But there had been a tendency during the latter part of 1942 to minimize the value of fighter escort and to argue that the bombers, suitably armed, and provided with a few heavily armed escort bombers of the proposed XB-40 type, could if necessary penetrate enemy defenses without assistance. Early RAF fighter cover, though heavy, was not close and had therefore seldom prevented the German fighters from engaging the bombers if they chose. Moreover, prior to January, the bombers had come off very well in combat with enemy fighters.⁷⁹ But, from that point on, the Germans began to improve their technique and the cost of unescorted missions began to increase. Conversely, fully escorted missions gave comparatively good results--in some cases outstanding results--owing in large part to an improving technique of close escort.⁸⁰ Long-range fighters came, therefore, more than ever to be considered, if not essential to long-range daylight bombing, at least essential to its complete success.⁸¹

But the long-range fighters were slow in arriving, and even slower in achieving operational status. The TORCH project had drained the Eighth of all P-38 fighters. Their place was to be taken by P-47's, equipped with long-range tanks. But unexpected design difficulties delayed delivery of the Thunderbolts, and although they began to arrive in the U. K. in January it was many weeks before bugs could be removed and the planes successfully adapted to operations in that theater. Trouble with the VHF radios was the principal

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cause of delay, although serious difficulty was also encountered with engines. For some time experts worked on the offending equipment and at times enlisted aid from the British; but their effort was to little avail, as was demonstrated when on 10 March a P-17's took part for the first time in a fighter sweep. Otherwise uneventful, that operation proved that plane-to-plane communication was virtually impossible among the P-17's. Since such liaison constituted the key to successful fighter tactics in the ETO, the new fighters could not be put into combat until the difficulty had been surmounted. On 6 April, however, three groups--the 4th Fighter Group (recently converted from Spitfires to P-17's), the 50th, and the 73rd--were placed on operational status and set to flying fighter sweeps over the Dutch and French coasts, largely for the purpose of training.⁶²

A week later, during one of these operations, the P-17's had their first engagement with the enemy. The composite groups, totaling 33 planes and led by experienced pilots of the 4th Fighter Group, flew a fighter sweep at 20,000 feet over the northern French coast and encountered a number of Fw-190's in the process. On the whole the results were encouraging, for the Thunderbolts stood up very well in comparison with the German planes. The pilots reported superiority in diving ability and believed their P-17's showed great promise in turning against the Fw-190's. One pilot was able to outrun two enemy at 17,000 feet. They shot down two Fw-190's and damaged one, at a cost of one of their number. The other P-17's were believed lost as a result of engine failure rather than enemy action.⁶³

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its first brush with the enemy and accompanying mainly because it came off better than the observers had feared. The A-17 had still not provided the solution to the problem of the long-range fighter. Engine failures continued to occur with discouraging, though decreasing, frequency, and the radio equipment was erratic, but clearly from the problems that had earlier beset it. Much solidification had yet to be done on both engines and radios before all available A-17's could be made operational. Worst of all, the new fighters as yet lacked auxiliary tanks, which meant that they could not go much farther than the fighters in accompanying the bomber formations. It was not until after July of 1942 that these difficulties were overcome and the A-17 could be classified as a long-range fighter.³⁴

Meanwhile, with long-range fighters still in the future, hope continued to be pinned on the P-40, that experimental, heavily armed escort bomber by means of which it was believed the tendency of the enemy to attack the lead groups and units in exposed positions in the bomber formations might be frustrated. Their arrival was eagerly awaited, but their entry into combat was delayed until July.³⁵

Meanwhile the A-17's began to escort the bombers to a range of about 175 miles. Their first effort was mainly satisfactory. Six squadrons of Thunderbolts joined six squadrons of A-17 fighters in support of the mission executed by 65 A-17's against the Ford and General Motors factories at Ingersoll on 4 July. The A-17's provided high cover and tactical support and shot down one B-190. In the course of 69 offensive sorties that day they lost one plane, and that one not apparently as a result of enemy action. The RAF

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Spitfires also destroyed one Ju-88, probably destroyed another, and damaged three, at a cost of three of their own aircraft. A force of 55 bombers flew a diversionary flight over the channel, under cover of three or four P-17 squadrons. Thanks in part to this diversion and in part to the excellent fighter cover, the bombers encountered only 20 to 30 enemy fighters, although total enemy resistance to the day's

mission had been large. As a result, the bombing force was able to do its work accurately, with little disturbance from enemy action, and to return to base without losing a single plane.⁶⁶ The P-17's helped to cover much of the bombers on other occasions during the rest of May. When, on the 16th, the VIII Bomber Command attacked aircraft objectives at Brussels and St. Omer, the VIII Fighter Command executed 124 offensive sorties in conjunction with cover provided by 16 P-17 squadrons. Total bomber losses were once again held to less than three per cent of the attacking force. Again on the 14th a force of P-17's attacking 21 land targets of value relatively light losses to the close cover provided by British and American fighters, despite not finding any attacks.⁶⁷

But missions beyond fighter range remained hazardous, and during the rest of May six more flown either to targets in Germany without escort or to those in France with partial fighter cover. That the latter was not much better than no cover at all was demonstrated on the 15th when a force of 57 bombers attacked a railway target at Combs and, although escorted by P-17's almost to the target, lost six of its planes to enemy aircraft outside the range of the escort.

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returned and the time when lateral support on the Swiftfires was dictated by the coast on the return trip. The enemy had deliberately refrained from attacking until the bombers were left without fighter protection.⁸ Losses had also increased the 10 per cent mark when on 21 May the bombers attacked Wilhelmshaven and Lunden, with forces of 77 and 40 aircraft respectively. As at Bremen in April, the enemy fighters concentrated their efforts on breaking up the bombing run. And as both times they succeeded, for bombing results were satisfactory neither at Wilhelmshaven nor Lunden. At the former a lot of the enemy met the bombers as they approached the German coast, and as the bombers reached the initial point, were ready to turn, toward the target, from 10 to 30 fighters appeared and came up, 20 to 30 on each side of the leading bomber formation. As the invaders drew near to their target the defenders began to peel off and to execute frontal attacks in waves of four, six, and eight planes at a time, each wave flying in loose echelon formation. The fighters made seven or eight separate attacks during the bombing run with disastrous results to American planes and personnel as well as to the bombardiers' aim. Several also tried air-to-air bombing, and some appear to have employed rocket guns and large-caliber cannon.⁹

The rest of these unescorted or partially escorted missions conducted during the latter half of May suffered much less severely from fighter action. The reason is twofold. In the first place, improvement in defensive formation flying undoubtedly cut down losses considerably. (On the last mission in May, flown to St. Nazaire, the

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It-10 out in its initial formation, but, as it has been, fighter reaction to this mission was light and the flying of bombers into battle seemed to demonstrate their effectiveness.) In the second place, the Eighth Air Force was able during the latter part of May to send much larger forces against the enemy than hitherto. Not only were the forces being individual targets increased in size, but simultaneous attacks on two or more objectives with effective forces was now possible. This latter tactic could, it was hoped, split the German defenses, thus rendering them less formidable at any given point.⁹⁰

This expansion of the Bomber Force was one fact of overriding significance in Eighth Air Force operations in May. During the month five new B-17 groups--the 88th, 93rd, 931st, 918th, and 974th--became operational, and the 92d, which had been used for training since November, resumed operations. The new groups, organized into the 4th Bombardment Wing, under Brig. Gen. F. M. Anderson, took part in the first mission on 15 May. In addition to the heavy groups, they also increased the temporary addition of one medium group to the strength of the VIII Bomber Command. The 322d Bombardment Group (M), representing the 4th Bombardment Wing under the command of Brig. Gen. Francis J. Kelly, sent its B-23's on their first combat mission on 14 May.⁹¹

The Eighth Air Force was ordered to put on the date its maximum force in the air to part of a joint combined attack against the German war machine. This attack, in fact, turned out to be the heaviest

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24-hour air attack was yet by the Allies during the war. The RAF sent large forces against Berlin and against targets in the Ruhr and in Czechoslovakia, and the USAAF made an impressive display of its newly acquired strength in simultaneous attacks on four separate targets situated at Kiel, Antwerp, Courtrai, and Ijmuiden. In all it dispatched a record bomber force of 236 aircraft (including 12 medium bombers) of which 209 (including 11 medium) attacked Ijmuiden--also a record to that date. In addition to the bombers, VIII Bomber Command P-47's flew 118 offensive sorties in conjunction with the Spitfire squadrons to protect the bomber forces coming in over and Courtrai. Results on the whole were good, one mission in its day starting with a measure of success. The British press reacted enthusiastically, referring to the day's combined activities as the opening of a great "blitz" against Germany, and featuring the unprecedented effort of the American forces.⁵²

In attacking Kiel, the main force of 120 heavy bombers (109 B-17's and 17 B-24's) struck the most distant target yet attempted, covering a distance of some 430 miles. This time they have thrown the German defenses off balance, for only a few of the anti-aircraft guns known to be located in the vicinity of the objective were operating, and the resulting flak was of little consequence. Nor were the fighter attacks, although numerous, pressed with the quality of determination observed on previous occasions in northern Germany. Claims against enemy aircraft were, however, very high (62 destroyed, 24 probably destroyed, and 27 downed), indicating heavy air battle

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even after the area has been made for duplication in claims. It was the 3-24 group that drew the heaviest enemy attacks, partly because it was in a relatively unprotected position (below the lowest group of the second combat wing formation) and partly because the prior area characteristics of the 3-24's prevented them from getting close enough to the Portresses for protection. It alone lost five of the eight aircraft shot down on that mission, which led tactical observers to conclude that it was unwise to fly 3-17 and 3-24 units together in a single formation unless the latter were large enough to take care of themselves if separated.⁹⁸

Although a minor part of the operations on the 14th, the attack executed by 11 3-24's of the 3rd Combat Wing against the Cuban generating station at Iguadua attracted much official attention because it constituted an experiment which might easily have decided whether or not the Cuban bombers could be used effectively in the strategic bomber offensive. A few quarters had been advocating, for some time, the fullest possible use of the medium in minimum-altitude raids against suitable coastal objectives. In the Pacific they had been employed, often with brilliant effect, in deck-level attacks against naval targets, and it was believed that, if properly integrated with other air action, they might be equally effective against such installations as airfields and power plants in near-by coastal areas of Europe. Fifth Air Force headquarters, while not entertaining such high hopes, declared itself ready to investigate the possibilities inherent in these tactics. It was accordingly planned to send the mediums out against coastal installations in

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operations closely coordinated with heavy bombardment missions. To that end combat crews were especially trained in the techniques of minimum-altitude navigation and attack. Those immediately responsible for launching the missions advocated the extensive use of fighter cover, for it was likely that, after their initial attack, the A-10's would be met by dangerous fighter opposition. But their requests were unfavorably considered on the ground that zero-altitude fighter support would be impracticable and that if escort were required the bombing would have to be done at altitudes of 10,000 to 14,000 feet, depending on the anti-aircraft defenses provided for each target.²⁴

The execution of 11 A-10's led only to tentative conclusions, however. The A-10's performed their task without the loss of a single plane and at the cost of only one crew member who was killed when one plane crash-landed at its home base. And according to the crews, they destroyed the target completely, bombing from 100 to 300 feet. But on that point photo reconnaissance proved disappointing, for it gave no indication that any of the targets had been done. The fighter air forces had been instructed to use 10-minute delay fuzes on the 500-pound bombs used in this raid in order that the catch weapons might have time to explode, and it may have been that some of these bombs were removed before they exploded. As for the enemy defenses, the A-10's encountered no fighter opposition--a fact which is not surprising, since the largest force of fighters in the history of our daylight offensive was abroad that day. And the only thing they learned about fighter force composition was that

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be navigated with extreme accuracy in order to reach the enemy coast at the desired point without exposing the bombing elements unduly to antiaircraft fire while hunting for the target. Navigation had not been too exact, and the target was approached in the direction of the longest axis of its antiaircraft defenses, which resulted in minor flak damage to most of the attacking planes.⁹⁵

Much more conclusive indications were obtained three days later when 11 B-26's were sent in two flights to attack respectively the same target at IJmuiden and the power station at Haarlem. Again the mediums flew at zero altitude and without fighter support. One turned back on account of mechanical difficulty. The rest were lost. Little is known about the fate of these planes except that they ran into fighter opposition in addition to a heavy concentration of flak. Nevertheless, the mission served to clarify the place of medium bombardment in the strategic bombing campaign. It was apparent that worthwhile coastal targets were too heavily defended to be safely attacked at low altitudes. And it began to look as if the mediums could contribute only incidentally to the success of the strategic bombing campaign. General Baker consequently decided to place them in VIII Air Support Command and train them primarily as part of a tactical air force for the purpose of supporting the ground forces in the forthcoming invasion of the Continent. Meanwhile, crews could continue to gain experience in medium-altitude attacks (10,000 to 15,000 feet) against strategic objectives under heavy fighter cover.⁹⁶

Viewed as a whole, the success with which the Eighth Air Force solved the problem of penetrating rapidly stiffening enemy defenses

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may be estimated in terms of the loss and battle damage incurred. For the five months from January to May, inclusive, the better loss rate, expressed as a percentage of credit sorties (i. e., sorties in the course of which the aircraft has entered areas normally defended by the enemy or was in any way open subject to attack) was 5.3 per cent. This figure includes both those bombers lost in action and those listed as falling in Category "D," that is, damaged beyond economical repair while engaged in an operational mission. Expressed as a percentage of aircraft actually attacking the target, the figure rises to approximately 6.1 per cent. Fighter losses are much lower, amounting only to about .7 per cent of credit sorties, but this may of the missions on which the 47th-49th groups were sent had been planned in such a way as not to impose the inexperienced units immediately to enemy action. Of the bombers missing in action (not including Category "D") over half were known to have been lost to enemy aircraft, and several of those listed as lost to unknown causes doubtless met a similar fate. All of, on the better hand, could be credited wholly or in part with the destruction of slightly over 14 per cent.⁸⁷

For battle damage the story is somewhat different. A little over 23 per cent of all credit sorties resulted in reportable damage, not more than one in five of which cases could be considered damaged to any major extent. Of these damaged aircraft, approximately 59 per cent were hit by flak; and flak damage no doubt made it possible on many other occasions for enemy fighters to destroy the bombers

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entirely.⁸⁸ Thus that, while of small importance as an immediate cause of bomber losses, was a major source of damage, and since a damaged plane easily became a straggler, this often proved an important indirect cause of losses. Enemy fighters remained nonetheless the principal obstacle in the path of the daylight bombers.

If the light air force tactical experts had to grapple with the problem of penetrating enemy defenses as a matter of most immediate urgency, they by no means forgot that the primary purpose of bombardment is to strike the enemy, and of precision bombardment to do so with the utmost accuracy. The basic techniques of pin-point bombing had been elaborated during the first five or six months of operations, and their close relationship with the requirements of defense had been initially explored.⁸⁹ During the first half of 1918 it was therefore mainly a question of increasing the skill of the combat units, of developing established techniques, and of adapting them to the needs of a larger operating force.

For reasons of defense it had become standard operating procedure for the bombing force to bomb in some sort of formation, and by February a considerable weight of opinion favored bombing by column or group, each aircraft dropping its bombs on a signal from the lead bombardier. But during the period in question a variety of sighting operations continued to prevail. Group formations frequently dropped on the leader, who sighted for both range and deflection, but often individual bombardiers within the formation performed independent range sighting, and often also individual squadrons dropped

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on the sighting of their own lead bomb carrier. In March the Operational Research Section of the 5th, after a careful study of results, recommended strongly that, when bombing in formation, bombs should be dropped on the leader rather than according to individual sighting for range. It also suggested that the air steadiness of bombing on the leader would be enhanced if the length of the resulting bomb pattern could be reduced, either by flying closer formations, or by dropping bombs promptly on signal, or both. At present, bombing on the leader is not a normal technique, although some units continued to follow other methods. And, of course, particular problems existed for direct solutions. Bombing formations still tended, for example, to be often too large or too long, or too high, to be once effective or economical.¹⁰⁰

In March, also, the 5th began successfully to employ the automatic flight control equipment (AFCE) as an aid to accurate bombing. The purpose of this device, the pilot, which could be controlled by the bombardier on the bomb run, was to synchronize sighting and bombing with mechanical precision and to provide a standard bombing run that could be achieved even by veteran pilots. The AFCE seconds immediately before the bombardier released his bombs were obviously the critical point in the bombing mission, for it was then that the bombardier performed his final sighting operation. So it was essential that the aircraft should be held as nearly as possible to a steady course without slips, slides, or changes in altitude, and

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that the pilotage be as free as possible from the influence of fear and of attacking fighters. Correction of this sort is impossible even with the best of pilots. With those produced by the hasty training program into which the AFDL had been forced it could not even be approximated.¹⁰¹

Promising as it was in theory, the AFDL had proved disappointing in its earlier trials. By March, however, certain modifications had materially increased its usefulness and on at least two missions during that month it was used by a group commander with very good results. At Vagosach on 18 March the most surprising results were achieved. On that mission the 105th Group, dropping, on the signal of its lead bombardier who had used the cassette pilot, succeeded in placing an estimated 70 per cent of its bombs within a radius of 1,000 feet of the aiming point. Although not standing entirely free from use of the new equipment, the results of the Vagosach mission did much to overcome a prejudice against AFDL still prevalent in many quarters. Although it continued to fail occasionally, and although unforeseen circumstances sometimes prevented its employment on the bombing run, the cassette pilot continued to give good results; and as it became available it was installed in the lead planes of most bombing formations.¹⁰²

Partly because of improved technique and partly on account of the increasing experience of the 100 groups operating from the U. S. since November 1942, bombing accuracy in the Eighth Air Force improved appreciably from January to July of 1943. The records are of uneven value, but it is possible to notice that, at least in January

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and thereby a group could consider its bombing above average if 50 per cent of the bombs identifiable by photo reconnaissance fall within 1,000 feet of an preassigned aiming point, in March and April it was not uncommon for groups to record 10 to 20 per cent in that category, and several instances were reported above the 50 per cent mark. The improvement is also noticeable in the concentration of bomb patterns. And some of the better results were obtained under trying conditions, even in the face of stiff enemy resistance, as, for instance, the British on 17 April, when very satisfactory bombing was accomplished (one group placed 40 per cent of its bombs within the 1,000-foot radius) in spite of very heavy flak over the target, fierce enemy fighter attacks, hazy weather, and clever camouflage. Over-all results of outstanding accuracy were obtained at Hammes and Weyssbach in March, at Seris in April, and at several in May. 103

A number of bombings, of course, continued to result in complete failure. One such case in three times a bombing unit would place the center of its bomb pattern over 3,000 feet from the aiming point. Many of these so-called gross errors were not completely the fault of the bombardiers. In several instances poor visibility made accurate bombing impossible. In others fighter opposition was so effective that it broke up the bombing run, as at Seris, on 5 March, when the lead bombardier was shot down just as he was approaching the target, and the rest of the unit recovered from the confusion of the combat only to scatter their bombs as far as ten to 15 miles from

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the target. So that, too, the brightness in the lead plane would not function properly, but caused the leader group, if other planes were dropping on the target, to both inaccurately.¹⁰¹

But on many other occasions the trouble lay with the negligence or inexperience of one or more group leaders. Confusion at the briefing, failure to follow instructions or to test instruments, overconfidence, or simply lack of adequate training occasionally led groups astray. Inexperience became especially noticeable even in the 4th Bombardment Group during operations. Later on, in the 3d Bombardment Division, these groups were to be distinguished service, but in many cases their work was erratic in the extreme. On the 14th, for instance, they performed one of the most accurate missions in the 4th to that date. Then, two days later, everything was wrong, and in the confusion the target escaped unscathed.¹⁰²

Indeed, the latter part of the war witnessed the beginning of a temporary decline in over-all bombing efficiency. But the inexperience of new units was only one of the factors involved. More important was the fact that a larger operational force raised a new problem. For a curious thing about formation bombing, noticed in by high air force tactical analysts, was that the leading group or groups tended to achieve better results than those following them over the target. The trouble was later found to decrease appreciably as experience was gained in the handling of large bombing forces. But the tendency remained. It is difficult entirely to account for it except on the ground that succeeding formations, insofar as they are

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unavoidably influenced by those preceding them, are subject not only to the adverse conditions ordinarily expected on a bombing mission but to conditions created by the mistakes of the leading groups as well. At any rate, regardless of the state of training of the units involved in a mission, the incidence of gross errors was likely to increase in direct proportion to the size of the operating force; and the problem of securing maximum accuracy in the over-all attacking force seemed an entirely separate one from that in the individual bombing unit. In that case the ideal solution would have been never to allow more than two groups to bomb a single target in a single action. But dictates of a more and larger force imperative, and so the solution had to be sought during the succeeding months principally in experiences cumulatively acquired in large-scale operations.¹⁰⁸

Another problem was raised in 1942 by the employment of incendiary bombs on a relatively large scale by large bombing formations. Incendiaries had been employed sporadically in the fall of 1942, but had not been used since then. Now, in 1943, it was coming to be recognized that incendiaries might, by destroying the timber of steel plants and machinery, cause more industrial damage in certain circumstances than high explosive bombs. On three occasions, at Kiel on the 14th, at Lubeck on the 15th, and at Kiel again on the 16th, part of the bomber force carried incendiaries. This practice caused certain difficulties. Since the ballistics of incendiaries are quite different from those of high-explosive bombs, requiring

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a closer approach to the target before release, a longer bombing run was required by units carrying them, which meant that the leader of the wing formation had to take into account the extra distance to be flown by the unit carrying incendiaries, and had to plan his withdrawal accordingly. That unit had also to be placed in the last position in the formation in order to prevent other groups from flying through the cluster of bombs from the falling incendiaries. There were two difficulties with these tactics: the incendiary group was likely to be in the least well protected position in the formation; and the longer bombing run necessary when incendiaries formed part of the bomb load left the formation open to enemy attack for an additional unprotected period. On the last mission of 14 May, for instance, a group of 17 B-29's carried the incendiary load and lost five of its planes over the target area. Once again the problem of bombardment tended to merge with that of defense.¹⁰⁷

Conclusion

Looking back over the operations of the preceding five months, the experience of daylight bombardment could at the end of any point with a modest degree of pride to the accomplishments of the daylight bombing force. If the campaign had not produced absolutely conclusive results, and if it had yet to solve certain formidable problems, it had at least done much to silence its critics. On certain ^{particular} occasions, at Nagasaki, for example, it had achieved brilliant results and had elicited hearty congratulations not only from American sources but from the Prime Minister and the British Air Staff.¹⁰⁸

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By June 1967 the 21st Air Force was ready to take its part in the Combined Bomber Offensive from the United Kingdom, the plan for which had matured during the preceding months. Since January it had struck many a blow at the sources of the German effort, and the results might best be accurately judged by the degree of enemy reaction, both in weight of aircraft and in frequency, provoked by the day-to-day campaign. But the importance of these early operations of 1967 lay in the tactical lessons learned rather than in the strategic results. The American force had been engaged in feeling out the enemy, in testing the capacity of its own techniques and equipment, and in enlarging both the scale and scope of its operations. In the latter endeavor it succeeded substantially, although the rate of increase had not been so rapid as its planners had hoped. During May it flew 1,410 bomber sorties, as against 218 in February, and it had flown as far as 100 miles to attack objectives in the German homeland.

More significant, however, than the enlargement of its effort was the experience it had gained in breaking, in penetrating enemy defenses, and in handling seriously increased forces. In order to profit by that experience its tactical doctrine had to be flexible and sensitive to the slightest change in a changing tactical situation still dominated in large part by a powerful and resourceful enemy. An experience of these months revealed two basic and complementary facts: First, the German Air Force constituted the gravest threat to the daylight strategic bombardment campaign; and, second, the enemy's offensive had as yet encountered no insurmountable obstacle. On the basis of these facts it could be reasonably predicted

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that the RAF had to be destroyed before the Combined Bomber Offensive could accomplish its strategic purpose, and that daylight strategic bombing of Germany was tactically feasible. Both conclusions were of the utmost importance in laying the final plans for the Combined Bomber Offensive.

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PLAN FOR THE COMBINED U.S. TO AIRBORNE

The Caribbean Conference gave to the concept of a combined bomber offensive against Germany an unchallengeable place in Allied plans, but it left much to be done before the concept could become a reality. The American day bomber force had to be built up to the point where it could carry its share of the air war effectively and economically. And a comprehensive plan of attack had to be worked out according to which the combined forces might operate systematically and in the reasonable hope that within a given length of time the planned invasion of Western Europe might be successfully launched. On 15 May 1945, SACCS approved the "Plan for the Combined Bomber Offensive from the United Kingdom," on the basis of which it issued, on 10 June 1945, a Directive officially inaugurating the CCS program. Meanwhile planning was undertaken on a scale more elaborate than had hitherto been attempted. Since the US Bomber Command was already fully deployed in the strategic offensive against Germany, and since most of the outstanding problems consequently centered upon the build-up of the U. S. bomber force and the nature of its part in the combined operation, the burden of planning fell mainly on the COMAF.

Logistical Considerations

was dependent on the build-up of the American bomber force. Allied air strategists understood that, to implement the proposed

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as blind offensiv, it could be a heavy to heavy air force ready to strike enemy installations as soon as the first spring thaw and heavy daylight operations possible. But it was not until that the build-up of the Japanese force began in earnest. Meanwhile the Eighth Air Force continued to fight with the few fighters for economical or effective operation. During the months of January, February, and March, its average combat strength was lower than at any time since October 1942, and in February it could only claim an average daily combat strength of 74 operating combinations (combat crews and aircraft). Things improved somewhat in April, but up to the end of June 1944 six operating groups (Four F-17 and two F-24) remained the total effective bombing strength of the Eighth. Moreover, prior to 3 April, the 4th Fighter Group, re-equipped in March with P-47's, was the only U. S. fighter unit consistently available.¹

But the difficulty was not simply that our units were in inferior condition; slowly they might have been replaced. The more immediate and acute problem was that of fuel shortages. During the winter months the Eighth Air Force had been striven in this respect because of the inevitable demand of the B-29 operation, and of temporary restriction on flying because of the weather down the operating groups to a alarming extent. This was especially noticeable in combat operations. Total effective strength suffered not only from actual combat losses but from inactivity. Prior to the first of February, replacement rates received total only 20, and 37 lost; and it was estimated that by March 73 combat crews would have to be considered as away. Operating strength of the Eighth Air Force down to 50 per cent

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strength, with the initial statistics of attrition undermining the morale of the remaining crews. During 1918 crew availability had not seriously limited the force that could be put into the air at any given time. Beginning with February, however, the situation changed appreciably, and from then until May availability of trained crews generally governed the number of bombers that could be dispatched.²

With this situation in mind, Maj. Gen. Ira C. Eaker, CG of the Eighth Air Force, and Lt. Gen. Thomas L. Anderson, who had succeeded General Eisenhower on 5 February 1918 as CG, AFCEAF, urged the War Department to accelerate the air build-up in the U. S. in any way possible. It was, they argued, essential that the Eighth Air Force be increased at once to permit the simultaneous dispatch of at least 300 heavy bombers, an objective which would require an estimated 300 to be on hand in the theater. These figures are not dictated by the ultimate requirements of the combined offensive but by the nature of the immediate task. It had become apparent by April that German fighter strength in the West had been augmented by increased production and by the transfer of units from Russia and the Mediterranean, and a force of 300 planes was considered the minimum that could operate economically and effectively in the face of this growing ^{fighter} opposition. Moreover, a basic strength of 300 planes was held necessary to ensure continuity of action against vital German targets. Until it could be attained, the day bombers could only "nibble at the fringes of German strength" and inadequately exploit German weaknesses.³

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In British expressed even more profound concern regarding the rate of the build-up of the U. S. day bomber force. Their Chief Casual Mortal, in letters to General Arnold (though intended less for him personally than for the JCS) repeatedly stressed the strategic importance of the day and night bomber offensive. Continued mission successes, together with the hard struggle in the front lines, and apparently given the enemy's fundamental shock and it believed the Allies to do everything in their power to prevent him from recovering. The only weapon available for this purpose, mortal maintained, was the bomber force, of which the American day bombers constituted an essential part. In operations of the Eighth Air Force had been "strikingly successful," considering the limited number of planes which had been able to get in the air. But there lay the problem. "If our fear is that their efforts may be curtailed or even brought to a standstill by lack of numbers."

As I understand it, he continued the theory of the daylight offensive is that it shall wear down the initial scale of opposition and then press home the advantage with increased numbers against an ever more shattered defense. I cordially agree with this. But it just will not work without the numbers we have been on hand repeated requests by a Brigade . . . will suffice to capture an objective requiring several divisions to take it. . . . Given a force of a few thousand the present one is sure that the results could be increased far more than proportionately.

Mortal then added a warning, of a special significance to American ears. If, despite the build-up to date and the proven toughness of the American units, the efforts of the Eighth Air Force should come to nothing as a result of lack of numbers, it would greatly strengthen the arguments of those who advocated an increase in night bombing.

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"rather than the combination of several night attacks in which you would be firmly believed."⁵

It was a matter of vital interest to British air planners not only to estimate the actual flow of U. S. bombardment aircraft to the U. S. but to have also a clear picture of the projected flow. The process of selecting, surveying, and building an airfield code, they claimed, took about one year, and it was therefore essential for them to know well in advance the total planned build-up and its approximate rate. Early in February, the US modified its obligation in Washington that provision had been made for 63 bomber airfields in the U. S. to accommodate 10,000 units on the basis of one bombardment group per airfield, and it specifically requested information concerning the U. S. air build-up as a basis for construction planning.⁶ General Arnold submitted a similar request for his own planning purposes.⁷ To him, however, it was not so much a question of the projected accommodations being adequate as it was of the American bomber force fully and early use of them. "The worst," he cabled General Arnold on 1 March 1945, "that the British want is for them to use their facilities or their discouragement will be reflected in providing insufficient airbases and facilities for the eventual air force to be employed from this theater."⁸

But it was not easy for Arnold and his staff to provide the requested information. While heartily in agreement with both Churchill and Portal that the combined bomber offensive depended on a rapid increase in the American bomber strength, and that flow information

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was essential to strategic planning in the U. S., only were not able to do much about it.⁹ Plans, of course, had been laid since the summer of 1912, but after the advent of NIS and the reorientation of strategic policy to the Mediterranean, it had been impossible to make firm commitments to the U. S. In September 1912 the Secretary of War had projected a total of 20 bomber groups and 11 fighter groups for the Eighth Air Force by September 1913, but his estimates had remained largely on the level of pure conjecture. It was not, in fact, until after the outbreak that the strategic policy known as the "1913 plan" made it possible to build on long-range War plans upon it. In answer to the British request for flow information, General Scott's report early in February released a plan to the British delegation in Washington which called for the following build-up of U. S. air forces in the U. S.:¹⁰

Type	20 June 1913	31 December 1913	30 June 1914
heavy bomber	18 groups	37 groups	40 groups
medium bomber	3 "	10 "	11 "
fighter	7 "	15 "	25 "

Except that fighter units were later reduced to an ultimate total of 10, in accordance with an agreement arrived at between Arnold, Andrews, and Portal, these figures remained substantially the planning objective during the spring of 1913. But they were issued with the strictest reservations: it was pointed out that the factors governing flow were variable, based on data to an extent wholly unpredictable.¹¹

Several of these factors operated during the period prior to July 1913 to the distinct disadvantage of the U. S. air build-up in the U. S. It was to be recalled that that project (not, of course,

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referred to as the "cold-war" (CIC A.) was particularly subject to external influences. Admittedly the impact in the military program, it was essential to receive all heavy bombardment not specifically required in order to secure the success.¹² That, of course, meant that any increase in the scheduled requirements elsewhere would inevitably affect the bomber force in the U. S. Consequently diversions to other theaters continued to be a factor which only the fortunes of war could determine. The 2-17 groups, the 39th and the 2d, which had been scheduled as the February quota for the Eighth Air Force were diverted to the 1st Air Force in North Africa. A group of 2-24th, the 30th, originally destined for the Eighth, was sent in turn to the 1st Air Force. And in March it was decided to reinforce the Southwest Pacific by one of the 2-21 groups out of the 2-21 quota to the U. S.¹³ In addition to these diversions, the mounting anti-submarine war in the Atlantic put an increasing strain on 2-21 resources, thus further delaying the flow of that type to the Eighth Air Force.¹⁴

Each proposed diversion met stiff resistance on the part of Andrews and later in the theater as of Arnold's staff in Washington.¹⁵ The argument was that the diversion of forces in the U. S. in the face of the increasing demands of the war in the Pacific was a serious matter. But overriding strategic considerations, coupled with considerable pressure exerted in favor of the Southwest Pacific and the Pacific areas, in most instances forced the issue.¹⁶

Diversions undoubtedly reduced the number of units which could be sent to the U. S. as it

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does not appear that availability acted as the immediate determining factor in the growth of the day bomber force during the spring of 1943. As of 30 April 1943, it was reported by the Third Air Force that 540 B-17's and 10 B-24's were either in the air or on route.¹⁷ At the same time it was noted that the Eighth Air Force during April still operated with but six heavy groups, which provided a fully operational average daily strength for the month of only 123 planes.¹⁸ So the delay in creating even a relatively effective striking force in the U. S. between January and May 1943 was to be explained with reference to certain contingent factors, chief of which was the lack of available shipping for the transport of ground personnel.

Despite the resolution on the part of the CCB to develop the bomber offensive from the U. S. as rapidly as possible, priority in shipping was necessarily related with the immediately critical operations in the Mediterranean. To finish TORO and prepare for the Y-Plan meant that almost all available transports would be required during February, March, and April to carry troops to North Africa.¹⁹ Thus, even though the CCB had on 17 February given priority to the air forces in troop shipments to the U. S.,²⁰ arrival of the troops in that theater fell off sharply during those months. In December 1942 and January 1943, 121 troops had been moved to the U. S. at a rate of approximately 5,000 per month, placing in the theater as of 25 January a total of 12,430. During February only 303 troops moved, and during March only 333. The situation improved somewhat during April; and during May 22,413 121 troops were carried to the U. S., making

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*Combined Bomber Offensive began
directing 9 10 Jun 1943 p. 196 of AAFRH-18.*

Learning tactics, p 213

fighter escort problem p 236 + preceding pages.

YB-40 escort bomber, p 236

*Conclusions (battle damage, A-1, losses, etc.) for Jan to May
check pp 252-254 p. 244
p. 255 etc.*



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check "Joint/American British directive on
Day Bomber..." cited on p.15 (bottom para) of

AAFRH-18.

Exp for sub-pens on p.57 + p.62

Buildup of 12 AF + depletion of 8 AF c/p 03 of AAFRH-18

p.106a - discussion of ability of 8 AF to hit targets + defend itself.

BoF formation developed pp 112-113

Bombing problems pp 117-119 etc

* Development of Policy p 123

Independent Bomb ops p.135 - p.137 ^{and following pp} important

Aircraft production pp 154 -

check "Joint Directive" of 20 Aug 42 - cited on p.163 and other

command problems pp 165-166

problems = the selecting a Deputy for air 171 ff

c. The case for bombardment" p.174

Arguments for day bombing, p.186

priority objectives listed on p.191

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a total of 60,400 lbs of the 27th of that month.²¹

Although the shipping needs for personnel during these months had been greatly reduced, cargo shipping proved no bottleneck. In fact, more cargo space remained allocated to the LOGISTICS-SIGINT project than could immediately be required, and it was in order to make use of it that the policy was adopted by the US of shipping equipment and supplies to the theater long in advance of the actual arrival of the troops. By June 1951 the bulk of the scheduled troop movement to North Africa had been completed and troops were now moved toward the U. S. The bottleneck in troop shipping accordingly became progressively less serious during the latter half of 1950, although shipping in general remained a seriously limiting factor on all Allied operations.²²

When it became apparent in February that virtually no shipping would be available for moving troops to the U. S. prior to July 1951,²³ Generals Andrews and Blair urged that, if ground echelons and service troops could not be shipped, all the personnel on any bomber groups should be flown to the theater as rapidly as they could be available, leaving the ground troops to be sent at the first opportunity. Obviously they would not be able to exert such a high level of efficiency, and their strategy might be disrupted; but every effort would be made to service them on some of the ground troops already in the theater. In this way, it was hoped, final training and acclimatization could be completed and the units prepared for operation by the time their ground echelons

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arrived.²⁴ This plan, in fact, adopted, and on 12 March Stear-
nager was able to report that a total of 412 heavy bombers, including
the flight echelons of six groups, were scheduled for arrival during
March and April. All units, incidentally, had 70 percent of re-
placement aircraft ready to arrive within eight to ten days.²⁵

This movement of flight echelons and replacement aircraft with-
out adequate ground air service troops was, of course, only a tem-
porary expedient, and an expedient of last resort at best. For it
obviously required the services of ground crew members in the
theater. Even still, it placed a added strain on the VIII Air
Force Service Command, which was still spending a good proportion
of its air servicing units for itself (the dispatch of aircraft
from the U. S. to Europe did not end until June 1945) and which
was itself in balance of reinforcements as a result of the paucity
of transatlantic shipping.²⁶ The same facts in fact, as in the full
realization that flight echelons could operate only so long in a
theater without resupply, forced Arnold to write on 1 March
expressing his concern over the difficulty in the 100th Air Division to obtain
the requested Arnold to consider the suggestion he had made at
a conference to the effect that, in the worst case to the worst, he
would try sending personnel to the U. S. or to this port.²⁷ In
reply it is pointed out that, although air transportation was being
utilized as far as possible for shipping, nevertheless, it would not be
practicable to rely on that alone enough personnel to provide sub-
stantial relief.²⁸ Lack of adequate ground crew personnel and

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By the end of May the program for the distributed offensive had greatly improved. The overriding requirements of the Mediterranean operations had decreased appreciably and the air and a tactical had begun once more to flow toward the U. S. In effect, the bare minimum strength of the Eighth Air Force had doubled during the month, going from six to twelve heavy groups.⁶¹ But the logistical experience of the preceding months had exerted a sobering influence on all Allied planning. It was recognized by the U. S. CHIEF of Staff Conference, convened in May that discussions of problems had taken too little account of limitations both in resources and in shipping.⁶²

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the JMDM demands reflected a deep concern over the problem of shipping, and it was then the case that if an effective force was to be developed, the JMDM would have to be given top priority in shipping.⁶⁶

As early as April, logistics considerations had prompted the War Department to survey in detail the entire problem of transport and deployment with a view to conservation wherever possible.⁶⁷ In implementation of the War Department transport planning program, General Arnold's chief of staff issued on 11 April 1943 setting forth the insurmountable facts limiting the build-up of the American combat force in the U. S.:

Utilizing full rail tonnage should be ready to start all-out operations from England at the earliest possible date and that these operations require ground as well as air personnel, it is becoming more and more apparent that the limiting factor in determining the size of the Army Air Forces in the United Kingdom will not be the availability of airplanes but the availability of shipping space for our personnel.

It indicated that, according to the current program, there should eventually be in the U. S. 3,210 combat planes of all types plus 4,170 reserves, all sustained by a total of 111,100 air officers and men. But, it declared, "utilizing our best estimates as to shipping available and existing priorities for ground and air troops our best estimate is that not to exceed 500,000 air force personnel can be sent to you by March 1944."⁶⁸

On 1 May, Arnold directed Maj. Gen. Collett Bradley, Air Inspector of the AF, to proceed to the U. S. in order to study the air force organization there. Again drawing attention to the fact

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that the current program, calling for a line-off of the 1 strength to 275 groups, required an air force group to be moved overseas that could be sustained or could reasonably be expected to be the support of air force operations. Consequently, the Air Force would have either to reduce the size of its projected overseas air force strength or to reorganize it. That a force and units in such a way as to support this ultimate strength in air force with fewer men. Now, the U. S., would suggest, offer more opportunities for using personnel than any other theater: "first, because it is highly industrialized; second, because the ground situation is stable; and, third, because this theater will ultimately have half of our overseas strength." General Bradley was therefore instructed to study, among other things, the possibilities of operating, maintaining, and supplying an ultimate force of 150 groups from the U. S. with a minimum of 300,000 air force troops. If this proved impracticable he was to determine what air force strength could be operated with that strength in personnel.

An resulting Bradley plan, submitted to the War Department on 20 May 1943, represented a comprehensive attempt to adapt strategic considerations to logistical limitations. As originally formulated it recommended the following allocation of tactical groups to the U. S.:

Type	June 1943	Sep. 1943	Dec. 1943	March 1944	June 1944
Heavy Bomber	10-1/2	20	30	40	40
Light Bomber	4	7	9	9	9
Medium Bomber	-	1	3	10	13
Fighter	5	9	16	24	24
Fighter (night)	-	-	1/2	3/2	3/2
Photo	-	1/2	1/2	1	1
Troop Carrier	1/2	1-1/2	1-1/2	9	9
Observation	1	1	1	2	3

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It also recommended the allocation of a minimum of 15,000 troops to the United States Air Force, and gave priority to units set up for the strategic bombardment program.³⁷ Moreover, it served as a conceptual point of departure, the policy plan constituted the principal basis for logistical planning during 1942, especially in the allocation of personnel.

While working on the report, the staff, the Joint and Combined Chiefs of Staff, in connection with Table A, were making their own estimates of strategic requirements in relation to available shipping. In the light of the staff plan for the Combined Bomber Offensive which was then under consideration and approval of the staff, the Combined Chiefs of Staff decided that the U. S. Army to be variant in the U. S. to be able to reach a minimum of 61 groups by 1 January 1944.³⁸ This represented a considerable increase from the hitherto generally accepted final figure of 45 or 46 heavy groups, which, however, had not been planned for possible deployment prior to March 1944. It appears, nevertheless, that the goal of 61 groups, advanced in date to March 1944, was in June 1942 the current planning objective.³⁹

The Problem of Target Selection

The selection of targets in light of the staff plan for the CBO. As Giulio Douhet, early proponent of air power, had foreseen, it is here that future air commanders could show their ability.⁴⁰

... the selection of objectives, the coupling of goals and determining of order in which they are to be achieved is the most difficult and delicate task in air warfare, concluding that the staff and the CBO must be strictly guided in their choice.

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... it is a part of a general doctrine--military, political, social, and economic, depending upon the conditions of the moment.

It is not hard, then, to see to doubt the value of systematic industrial analysis as a basis for the selection of targets for strategic bombardment. Inasmuch, then, as it is to be used not as a means to reduce the enemy's ability to wage war, it becomes desirable to analyze the economic structure of his war effort. And, inasmuch as the United States, by way of its doctrine of precision bombing, committed principally to the destruction of industrial targets, it is concerned the problem of industrial analysis with peculiar gravity.

Indeed, during the months following the attack, the United States initiative in planning for the strategic bombing of Germany, and the leading spirit in that effort was a concern for the scientific selection of targets. In 1940 the United States substantially on the basis of reports submitted to the War Relocation Authority by a committee of industrial and labor union leaders, and in the headquarters since December of 1942.¹¹ This report attempted to set forth the industrial objectives in Germany the destruction of which would reduce the enemy's ability to wage war in the shortest possible time; and it resulted from the application of a methodology developed for this purpose. If the results of the former offensive do not in every instance confirm the recommendations contained in the report, the attempt to apply a scientific method to the problem of target selection is nonetheless of considerable historical interest.

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The Committee of Operations Analysts (COA), as the group came to be called, brought to their work a clearly articulated philosophy. It was prompted by what was felt to be the crying need for a more selective system in the analysis of objectives, and for one which would remove as far as humanly possible the guesswork from strategic bombardment. It was founded solidly upon faith in the scientific method, and on the specific belief that that method could be applied successfully to aerial warfare. Moreover, it was colored throughout by the preconceptions inherent in the American concept of precision bombing: industrial analysis should make it possible to destroy the key system in the area of target production without expending effort aimlessly or indiscriminately on objectives of less than vital importance.

The first and most obvious step in the analysis of enemy industry was to bring the enemy economy into its proper focus for strategic bombing operations, to locate it, and to determine the relationship of each part to the enemy war effort.¹² Once it had been necessary to eliminate enemy industries as possible from destruction, suitable targets, using careful intelligence and good maps, were found for eliminating an industry as far as possible from the individual industrial plant to plant, with a view to the availability of destruction in each instance. After the above steps had been completed, enemy industry could be listed in order of priority for bombing, and each target within each industry.

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In the course of this investigation, the following questions were obtained to the following questions: 1. What are the minimum requirements of the enemy? In other words, at what point would a shortage impair the front-line military effort of the enemy? 2. What are the production capabilities of the enemy? If every available industrial country, including occupied Russia, is mobilized to the utmost, what would be the total? 3. Is Germany self-sufficient in the enemy? If not, what relationship exists between capacity and minimum requirements, taking into consideration stockpiles and available substitutes? 4. Where are the enemy plants located and what percentage of total capacity is represented by each plant? 5. What are the physical characteristics of the installations, the railway? To what extent are the buildings and equipment structurally resistant to high-explosive and incendiary attack? 6. What extent of damage is recoverable? 7. What is the time lag between the destruction of each plant and the effect on front-line strength? 8. What is the force required to effect the necessary destruction? Also, in short, will it be worth it?

Two of the above questions, one concerning the minimum requirement of the enemy in relation to its productive capacity and that regarding the time lag between plant destruction and effect on front-line strength, are of particular importance. It is not enough, for example, to establish the fact that Germany was producing a certain quantity of steel and that it would be possible to destroy a certain percentage of its steel-producing plants. An critical

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problem was rather to determine whether and to what extent it would be possible for the Germans to make use of alternate capacity in the form of standby plants, to restrict non-essential consumption, and to draw upon stores of already processed material. Knowledge of the time factor was equally vital. If the full effect of a bombing program would not be felt for 12 months, it would be folly to attempt in six months a ground invasion which depended on prior success of the air attack. Moreover, if the effects of a bombing program were too long delayed, there was every chance that the enemy could adjust his economy in such a way as to reduce or even erase the effect of the bombing on his front-line strength. So it was useless to attack an industry lying too deep in the economic process; and it was equally futile to strike indecisively, with a force and at a rate unequal to the task.

These, in brief, were the principles of target selection with which the COA undertook the task of analyzing German economy. The principles were not the product of the moment, however. In fact they were fairly well developed when, in December 1942, that committee began to function. Back of its work lies a long history of target selection. Owing in part to their close proximity to the German-dominated Continent of Europe and to their extreme vulnerability in event of war, the British had, since 1929, been at work analyzing the industries of potential enemies with a view to possible strategic bombardment. Their approach was substantially the same as that of the COA with one exception, namely their emphasis on the bombing of areas rather than of individual installations. Just as the American analysts had their method shaped by their operational doctrine, so the British were influenced by theirs. British analysts were not, however, unaware of the virtues of attacks on key or on so-called

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"bottle-neck" industries. A paper prepared by the Air Ministry in July 1939 called attention to the value of these restricted objectives.⁴³ There were, it said, "vital spots in industry as well as in the human body," but it warned that those would probably be well guarded by natural circumstances or by artifice. In addition "there are . . . many alternative manufacturing processes, and the manufacture of an essential commodity is frequently already undertaken or can readily be started in many different factories, particularly in countries which have made a deep study of their industrial economy and have organized their industry to meet modern war conditions." Area attack, on the other hand,

is not intended to imply an indiscriminate scattering of projectiles over the whole or any part [of a specific industrial area] . . . On the contrary, there will be definite objectives in the area itself normally consisting of industrial targets [which] . . . constitute the chief vital spots of the industrial body.

Despite a continued willingness to consider the destruction of specific industries vital to German front-line strength, the British, in emphasizing area attack, laid a basis for target selection which could not easily accommodate a force devoted to the attack of precision objectives. Just as the RAF plan of attack differed from that of the American, the industrial intelligence compiled by British analysts was likely to differ qualitatively from that demanded by the USAAF. During the period when the AAF was planning its day bombing campaign against Germany, and during the earlier months of that campaign, the American force depended for its target planning largely on British intelligence sources. But it was inevitable that sooner or later it would have to make its own analysis of German industry conducted specifically for its own purposes.

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The pioneer agency in this endeavor was the Secret Information Section, AG/AS A-1.⁴⁴ By the summer of 1942 it was being called on to an increasing extent for advice regarding the projected bombing program. It found in its files a mass of factual data concerning various industries, but without any rational basis of selection. It therefore set out to compile a series of studies of specific industrial systems which would get to the heart of the problem of target selection. Roughly speaking, these were developed, as they were called, by establishing the importance of the industry in question as an enemy war machine and so forth. This followed detailed data on the enemy's industrial plants in that field, and of the available supply. The industry was then analyzed with regard to its vulnerability to air attack, and the extent to which of all the necessary factors for production from bombing could be considered effective in reducing fighting strength.⁴⁵

One of the most difficult points of establishment was the relationship between industrial requirements and supply. In response to inquiry on the part of many industrialists concerned as to the impact of supply alone, assuming that supply was generally determined by requirements and that it could therefore reflect requirements with some degree of accuracy. W. O. Rail, for instance, then vice president of the reduction in railway production for the country could stand and still keep its war effort effectively deployed, replied that U. S. railway capacity was already strained and that any reduction could have a serious effect. For separate requirements and civilian requirements were often the different things; and on further study it was

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estimated that a reduction of almost one-third of U. S. railway could be absorbed without impairing the war effort at all. Analysis of German rail transportation convinced the air analysts that no effect on German fighting ability could be expected until 31% of rail facilities had been destroyed. Similarly it was estimated that other German industries, no matter how vital to the war effort, were less tight than had generally been thought.⁴⁶

The Air Estimates, by December 1942, had become the subject of considerable discussion. To some observers they seemed to smack of defeatism; to others they indicated a need for still more concentrated effort along the same lines. In either case they contributed to a mounting concern in the Air Staff regarding the problem of target selection in Europe. Also contributing was the controversy over AWPD-42. That document, essentially a statement of U. S. air requirements, had, it will be recalled, been built around the concept of a systematic bombardment of German war industry. It had come nearer than any document hitherto produced in AAF Headquarters to being a comprehensive bombardment plan: and insofar as it attempted to name each feasible target in the major industrial systems and to estimate according to a rational, if somewhat theoretical, method the size of force required to destroy the objectives, it represented a step forward in the direction of systematic target selection. But it had been completed in September, before the other efforts of A-2 had gone far enough to provide the systematic body of industrial intelligence considered necessary for that sort of study, and it suffered from the inchoate state of target information prevailing at that time. AWPD-42 was under discussion at the highest level during most of the fall of 1942, and as the discussions progressed its limitations in the direction of target analysis became the more apparent.⁴⁷

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On 10 October 1942, General Arnold signed a directive requiring Col. Byron A. Dill, W/AS, to study at General,

to have the group of operational analysts, under your jurisdiction or for and submit to me a report analyzing the race of progressive deterioration that should be anticipated in the German war effort as a result of her increasing air operations and her prepared to employ against its sustaining sources. This study should result in the discovery of facilities as can be arrived at as to the date when this deterioration will have progressed to a point to permit a successful invasion of Western Europe.

At the time no such group existed except in civilian organization, but Colonel Dill was authorized to create one and to organize air-ward and civilian personnel for the purpose.⁴⁹

Available in certain quarters, notably at the Institute for Advanced Study at Princeton, N. J., civilian interest had been aroused in the problem of target selection. And there was too talk to the effect that staff officers in the quarters, did not have the time to devote to long-range strategic air planning; nor was that type of activity for which a regular army career was considered to provide the best preparation.⁵⁰ The resulting committee accordingly called together in part of civilians. In addition to Alvin Karp, Jr., Francis A. Harbo, ⁵¹ and Stuart L. Harbo, who served as chairman and member, for the Institute to call him to represent the Board of Economic Warfare, and Harold G. Harbo to represent the Office of Strategic Services. The rest of the group consisted of Col. Byron A. Dill, W/AS, AC/AS G-2; Lt. Col. A. C. Dill, W/AS, Chief of Target Information Section, G-2; Lt. Col. Thomas G. Langhorne, representing G-2; and Col. Guido R. Carera and Lt. Col. A. Gordon Lach, both from Headquarters General. Colonel Dill was designated as chairman.

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Originally called the Advisory Committee on the Bomb, this group came to be known as the Committee of Operations Analysts.⁵²

Administratively speaking, the creation of the COA was an important step, because for the first time in the U.S. it had the coordination of industrial intelligence from all of many sources and the analysis of that information for the purposes of air target selection clearly the responsibility of a single agency. It also did a useful service by removing the task of target selection from ordinary military channels and placing it where it could be performed free from the restrictions inherent in relatively obscure staff work.

Subcommittees were delegated to study each pertinent German industrial system. Much of the initial work consisted of bringing up to date, checking, and supplementing wherever possible the work already done in A-2 and in the various government agencies.⁵³ The sources of information tapped by the COA subcommittees were many and varied and included records provided by the War Department, OSS, G-2, G-3, G-4, G-5, G-6, G-7, G-8, G-9, G-10, G-11, G-12, G-13, G-14, G-15, G-16, G-17, G-18, G-19, G-20, G-21, G-22, G-23, G-24, G-25, G-26, G-27, G-28, G-29, G-30, G-31, G-32, G-33, G-34, G-35, G-36, G-37, G-38, G-39, G-40, G-41, G-42, G-43, G-44, G-45, G-46, G-47, G-48, G-49, G-50, G-51, G-52, G-53, G-54, G-55, G-56, G-57, G-58, G-59, G-60, G-61, G-62, G-63, G-64, G-65, G-66, G-67, G-68, G-69, G-70, G-71, G-72, G-73, G-74, G-75, G-76, G-77, G-78, G-79, G-80, G-81, G-82, G-83, G-84, G-85, G-86, G-87, G-88, G-89, G-90, G-91, G-92, G-93, G-94, G-95, G-96, G-97, G-98, G-99, G-100, G-101, G-102, G-103, G-104, G-105, G-106, G-107, G-108, G-109, G-110, G-111, G-112, G-113, G-114, G-115, G-116, G-117, G-118, G-119, G-120, G-121, G-122, G-123, G-124, G-125, G-126, G-127, G-128, G-129, G-130, G-131, G-132, G-133, G-134, G-135, G-136, G-137, G-138, G-139, G-140, G-141, G-142, G-143, G-144, G-145, G-146, G-147, G-148, G-149, G-150, G-151, G-152, G-153, G-154, G-155, G-156, G-157, G-158, G-159, G-160, G-161, G-162, G-163, G-164, G-165, G-166, G-167, G-168, G-169, G-170, G-171, G-172, G-173, G-174, G-175, G-176, G-177, G-178, G-179, G-180, G-181, G-182, G-183, G-184, G-185, G-186, G-187, G-188, G-189, G-190, G-191, G-192, G-193, G-194, G-195, G-196, G-197, G-198, G-199, G-200, G-201, G-202, G-203, G-204, G-205, G-206, G-207, G-208, G-209, G-210, G-211, G-212, G-213, G-214, G-215, G-216, G-217, G-218, G-219, G-220, G-221, G-222, G-223, G-224, G-225, G-226, G-227, G-228, G-229, G-230, G-231, G-232, G-233, G-234, G-235, G-236, G-237, G-238, G-239, G-240, G-241, G-242, G-243, G-244, G-245, G-246, G-247, G-248, G-249, G-250, G-251, G-252, G-253, G-254, G-255, G-256, G-257, G-258, G-259, G-260, G-261, G-262, G-263, G-264, G-265, G-266, G-267, G-268, G-269, G-270, G-271, G-272, G-273, G-274, G-275, G-276, G-277, G-278, G-279, G-280, G-281, G-282, G-283, G-284, G-285, G-286, G-287, G-288, G-289, G-290, G-291, G-292, G-293, G-294, G-295, G-296, G-297, G-298, G-299, G-300, G-301, G-302, G-303, G-304, G-305, G-306, G-307, G-308, G-309, G-310, G-311, G-312, G-313, G-314, G-315, G-316, G-317, G-318, G-319, G-320, G-321, G-322, G-323, G-324, G-325, G-326, G-327, G-328, G-329, G-330, G-331, G-332, G-333, G-334, G-335, G-336, G-337, G-338, G-339, G-340, G-341, G-342, G-343, G-344, G-345, G-346, G-347, G-348, G-349, G-350, G-351, G-352, G-353, G-354, G-355, G-356, G-357, G-358, G-359, G-360, G-361, G-362, G-363, G-364, G-365, G-366, G-367, G-368, G-369, G-370, G-371, G-372, G-373, G-374, G-375, G-376, G-377, G-378, G-379, G-380, G-381, G-382, G-383, G-384, G-385, G-386, G-387, G-388, G-389, G-390, G-391, G-392, G-393, G-394, G-395, G-396, G-397, G-398, G-399, G-400, G-401, G-402, G-403, G-404, G-405, G-406, G-407, G-408, G-409, G-410, G-411, G-412, G-413, G-414, G-415, G-416, G-417, G-418, G-419, G-420, G-421, G-422, G-423, G-424, G-425, G-426, G-427, G-428, G-429, G-430, G-431, G-432, G-433, G-434, G-435, G-436, G-437, G-438, G-439, G-440, G-441, G-442, G-443, G-444, G-445, G-446, G-447, G-448, G-449, G-450, G-451, G-452, G-453, G-454, G-455, G-456, G-457, G-458, G-459, G-460, G-461, G-462, G-463, G-464, G-465, G-466, G-467, G-468, G-469, G-470, G-471, G-472, G-473, G-474, G-475, G-476, G-477, G-478, G-479, G-480, G-481, G-482, G-483, G-484, G-485, G-486, G-487, G-488, G-489, G-490, G-491, G-492, G-493, G-494, G-495, G-496, G-497, G-498, G-499, G-500, G-501, G-502, G-503, G-504, G-505, G-506, G-507, G-508, G-509, G-510, G-511, G-512, G-513, G-514, G-515, G-516, G-517, G-518, G-519, G-520, G-521, G-522, G-523, G-524, G-525, G-526, G-527, G-528, G-529, G-530, G-531, G-532, G-533, G-534, G-535, G-536, G-537, G-538, G-539, G-540, G-541, G-542, G-543, G-544, G-545, G-546, G-547, G-548, G-549, G-550, G-551, G-552, G-553, G-554, G-555, G-556, G-557, G-558, G-559, G-560, G-561, G-562, G-563, G-564, G-565, G-566, G-567, G-568, G-569, G-570, G-571, G-572, G-573, G-574, G-575, G-576, G-577, G-578, G-579, G-580, G-581, G-582, G-583, G-584, G-585, G-586, G-587, G-588, G-589, G-590, G-591, G-592, G-593, G-594, G-595, G-596, G-597, G-598, G-599, G-600, G-601, G-602, G-603, G-604, G-605, G-606, G-607, G-608, G-609, G-610, G-611, G-612, G-613, G-614, G-615, G-616, G-617, G-618, G-619, G-620, G-621, G-622, G-623, G-624, G-625, G-626, G-627, G-628, G-629, G-630, G-631, G-632, G-633, G-634, G-635, G-636, G-637, G-638, G-639, G-640, G-641, G-64

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country, the OCA paid close attention to the organization and physical characteristics of appropriate U. S. industries. Much of this information came from qualified experts in private industry.⁵⁶ By 1946 no civil facilities had been completed, or were nearing completion, on the German or Japanese.

On the 15th of 1946 the OCA reported its findings to General Arnold. In Directive of 1 December 1946 under which the committee was organized had specified that it was to make a study of the data upon which the sustaining success of Western Axis military strength might be reduced through aerial action and as to certain an invasion of the Continent. With the committee's stated intent unable to do for the reasons: first, it could not forecast with any degree of certainty the air force which would be available, and, second, that the operational experience of the Eighth Air Force to date formed an inadequate basis for conclusions as to accuracy, attrition, and certain other operational factors affecting such a proposition. It did, however, present certain important conclusions. Concerning target selection it declared:⁵⁷

It is better to cause a high degree of destruction in a few really essential industries or services than to cause a small degree of destruction in many industries. A single or cumulative and simplified approach should be selected to achieve maximum destruction.

When raising the projected counter offensive, it made the following observations:

- (1) The destruction and complete neutralization of the point target would greatly impair the ability to sustain the counter offensive effort. There are several combinations of targets and industries which could be selected for the counter offensive.

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- (2) In view of the ability of adequate and properly utilized air power to impair the industrial sources of the enemy's military strength, only the most vital considerations should be permitted to delay or divert the application of an adequate air striking force to this task.

It was noted the need for continuing effort in the analysis of target information, and for continuing close cooperation between British and American agencies in that regard. It further recommended that, since operational factors such as weather and the disposition of the enemy, known only to commanders in the theater, played often a decisive part in choosing particular targets, and since the Eighth Air Force was aware of and in agreement with the principles of target selection set forth by the CCA, the current selection of specific objectives be left to the responsible authorities in England, subject only to such directions as might be called for by broad strategic considerations.

For reasons of security the committee refrained from drawing up a formal priority list of target systems. But it is clear from the arguments presented that the system was listed in descending order of preference, and there is reason to believe that the committee did so as a result of a policy informally agreed upon between the principal parties concerned.⁵³

First on the list came the German aircraft industry. It was fully appreciated that an early attack on that system would be essential to the success of later bombardment operations. The force of this argument had been generally admitted ever since the RAF had begun to react effectively to the daylight operations of the Eighth.

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It was estimated with some degree of accuracy⁵⁹ that, although fighter production had been given preference by the Germans, maintenance and production in that industry are delicately balanced. But a diversity of opinion existed, both in the U. S. and in England, as to whether the attack should be directed primarily against fighter assembly plants or against fighter engine plants. The proponents of the attack on the former argued that, since the current ratio of German single-engine fighter strength to monthly production was three to one, the German fighter force was having to recreate itself from fighter assembly lines every three months. Destruction of seven assembly plants, even if the enemy could repair the damage at the end of one month, would have to be repeated but twice to eliminate substantially German strength in single-engine fighters. If five separate component erecting shops were included in this attack, production could be curtailed for approximately six months owing to the destruction of intricate jigs and other hard-to-replace machinery. Proponents of attack on fighter engine plants pointed, however, to the recuperability of final assembly plants unless extensive damage were done to both assembly sheds and component erecting shops. On the other hand, engine assembly plants were believed to require six months or more for full recuperation; and an attack on them would strike at replacements needed for operational aircraft. But it was conceded that, on the basis of American experience, the time-lag between the completion of an engine and final assembly of a finished aircraft varied from one month to six weeks, during which time something over 200 enemy fighters could be produced. This question of time, in

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in addition to the fact that engine plants constituted no what less vulnerable targets than final assembly plants, appears to have been given great if not decisive weight. For, although the OOI recommended bombing all of 22 targets consisting of final assembly plants, component erecting plants, and initial assembly plants as part of a single target system, the first two categories were clearly given precedence over the last. All but one of these 22 targets lay within 400 to 600 miles from London, and together they were estimated to account for over 90 per cent of single-engine production.

"It is difficult to determine whether an attack on aircraft lines would have been preferable to that delivered against airframes," the report of the Strategic Bombing Survey declared in 1945. Considerable German opinion, however, held that it would have, and recent investigation of German aircraft industry facilities that, although the capacity of the industry as a whole during the first years of the war was more than adequate, less excess capacity existed in engines than in airframes.³⁰

Next to fighter aircraft, and closely related to their manufacture, came ball bearings. On the basis of American experience as well as according to British opinion, it was argued that ball bearings represented a potential bottleneck in German industry, especially in the manufacture of war material. It was the belief of both British and American economic authorities that stocking of ball bearings was not practicable and had not in fact taken place. It was believed that only the larger plants were capable of making a full line of ball bearings and that smaller plants concentrated on specialized types. Furthermore, the German aircraft plants alone were correctly

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reputed to manufacture in the neighborhood of one-half of the total Axis production, thus offering a peculiarly concentrated target within practicable flying range. While the effect on enemy front-line strength would not be immediate, the indirect effects would, it was felt, be great and pervasive, touching eventually all high-speed equipment. This effect could not be timed accurately, but it was believed that it would begin to be felt within one month. Subsequent intelligence had later shown that the committee somewhat overestimated the vulnerability of ball-bearing plants and underestimated the feasibility of offsetting economies in the use of bearings, possibly also of stocking them.⁵¹

Petroleum was given third place. Germany's oil position was rightly considered to be extremely tight, though not quite so tight as it later turned out to have been.⁵² It was pointed out that crude oil represented two-thirds of available Axis oil supplies, of which crude supplies 90 per cent were produced in the Ploesti area of Rumania and the rest widely dispersed in small amounts in other Axis countries. The remaining third of the Axis oil came from synthetic products, of which 90 per cent was believed to come from 13 Bergius hydrogenation plants, and the rest from numerous Fischer-Tropsch plants. The committee estimated that destruction of the 13 hydrogenation plants would deprive Germany of about one-fourth of her available petroleum sources, including two-thirds of her existing production of aviation gasoline. Aircraft stocks, substitutes, and working inventories could probably not delay the full effect of their destruction for more than four months. Although strongly constructed, they were believed

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vulnerable to air attack and difficult to reconstruct. If, in addition to the hydrogenation plants, some 26 refineries were also destroyed, supplies of petroleum products would be cut 10 per cent, with obviously disastrous consequences to the German war effort.

Oil was thus considered an important target. But it was not given the high place that the lesson derived from later events indicates that it should have. The COM appears to have felt that Germany controlled enough stand-by refining capacity to cushion the immediate shock of bombing and to delay the effect on front-line strength beyond the point where the aerial effort would be immediately profitable.³³ The committee was apparently handicapped here, more than in most instances, by lack of adequate intelligence data. It underestimated the importance of synthetic production; and it gave little attention to the close technical integration of both hydrogenation and Fischer-Tropsch synthetic oil plants with the chemical industry, especially that part of it producing explosives and synthetic rubber.³⁴

The COM report gave fourth place to grinding wheels and crude abrasives. In doing so it reflected, as in the analysis of the non-friction bearing industry, the committee's preoccupation with bottlenecks in enemy industry. The report demonstrated the essential part played by grinding wheels in the manufacture of innumerable metallic parts for war equipment. It pointed out that wheels were rapidly consumed, there was no substitute for them, they were difficult to stock, and they were produced in vulnerable installations. Crude abrasives could be obtained in order to heighten the effect of attack on the

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grinding wheel industry, but the relative invulnerability and recoverability of that industry made it a less attractive target than the grinding wheel factories.

Next came nonferrous metals: copper, aluminum, and zinc. Although neither aluminum nor low-grade zinc production was considered a high priority target, it was believed that something could be said for attacking copper mines and refiners and alumina-producing plants in view of their importance in war production. It was admitted that the use of these metals lay too deep in the economic process to warrant priority attention. As for zinc, the industry was believed, probably somewhat optimistically, to be very tight and the destruction of key factories feasible.³⁵

It is very possible, as the U. S. Strategic Bombing Survey concluded, that the synthetic rubber industry might profitably have been given attention earlier in the war. That the OGI gave it only sixth place is in part a by-product of its failure to appreciate fully the close interdependence of synthetic rubber and synthetic oil plants. Had it been recognized, for example, that the former depended largely on the latter for hydrogen, both might have been elevated jointly to a higher priority.³⁶ The committee also overestimated the probable amount of blockade-running the Germans would be able to conduct in order to import rubber supplies. Imports during the war appear to have been negligible, and Germany was consequently thrown back almost completely on the large and costly oil synthetic plants for air requirements.³⁷ In value of this target system, as contributed by

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the COI, while high in terms of concentration and vulnerability and in view of the indispensability of mobile stocks, depended entirely upon the success of blockade-running, which was estimated to contribute, together with the production of scrap, approximately one-third of Germany's rubber supplies. It was believed that destruction of benzene plants, which were susceptible to incendiary attack, would more immediately damage the enemy position than the destruction of the two major synthetic plants.

When it came to submarines, which it placed seventh, the COI expressed profound disliking concerning the results to be expected from either the sinking of operating bases or construction yards. Construction yards had for some time been considered both by the Allies and British authorities to be targets of great value.⁵⁵ Admitting that complete and simultaneous destruction of all the yards in Germany and three less important ones in Italy would probably delay by at least 18 months the launching of any new U-boats, and that most important components were made in those yards, the committee argued that one quick recuperative capacity and large facilities available would minimize the effects of anything other than a devastation attack on the industry as a whole, and that even such complete destruction would not reduce the operating U-boat fleet for approximately one year. The five operating bases along the French coast offered not much more encouragement. They had been attacked at an increasing rate since October 1942 in the hope that repair and refitting would thus be slowed up and the number of operating U-boats consequently be reduced. But evidence on that point was not conclusive. It was noted that the

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was considered to be of an essentially inconclusive nature. It appears, therefore, that the committee was well on the way toward the healthy skepticism regarding the bombing of petroleum installations which by the end of the year had become very marked and which has since been amply confirmed by German records.⁶⁹

In ninth and tenth place came respectively military motor transport vehicles and the transportation system in general. On the face of it, motor transport vehicles seemed to offer a fairly profitable target, for supply was estimated to fall considerably short of military requirements, and 85 to 90 per cent of the lower production was believed concentrated in seven plants. It now appears that, if a concentrated attack had been planned on oil and rubber, motor transport vehicles might well have been ignored as a separate objective.⁷⁰

As for rail and water transport, the committee labored under no illusions whatsoever. Without for a moment minimizing the vital importance of transport facilities to the entire enemy war economy, it maintained that limited and scattered attacks upon transport targets would be of little consequence because the recuperative powers and flexibility of that system permitted rapid and successful readjustment. Therefore, it stated, no key or isolated transport targets the destruction of which would be decisive. An attack would have to be widespread and sustained; and at that time the committee was unwilling to think in terms of mass attack or of attack on any but the most concentrated industries. Although the bombing of transportation has since been recognized as of decisive importance in the defeat of the Axis,⁷¹ it is very probable that its effectiveness could not have been

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realized until a sufficient force had been built up to make the necessarily heavy and ubiquitous attack feasible, and until it was possible to take full advantage of a generally unorganized transport system by decisive ground action.

Coming to the large number of coke batteries in Axis Europe, coking plants were not considered a suitable target system, despite their vulnerability and an undoubtedly basic importance of coke production in a number of critical industries. Iron and steel received still less favorable consideration. Briefly enough, in the light of later investigation,⁷² the CGA considered that the Axis position with respect to steel was generally strong and that the destruction of even one-half of the steel-producing plants would have little effect on the military effort over a period of one year. Such plants were, moreover, relatively invulnerable to attack on account of the ruggedness of their construction and equipment. Even the production of high-grade alloy steels, which was at once more critical and more vulnerable than that of ordinary steel, was believed to involve enough potential alternate facilities to insure a substantial time-lag between destruction and effect on front-line strength.

Machine tools were considered generally to lie too deep in the industrial process to constitute high-priority targets as long as the industries they supported were in operation. Tools required for new or changed types of final product might, however, be more critical items. The destruction of 13 selected plants, it was stated, could reduce machine-tool replacement capacity by 10 per cent, with effects

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that would eventually be felt throughout this country. Although the machine-tool industry was only placed twelfth on the list, the fact that it was given consideration at all betrays a faulty understating of that industry as carried on in Germany. At this point the assumption of essential similarity between industrial processes in Germany and the U. S. proved misleading. German manufacturers had an entirely different conception of the use of machine tools than did their counterparts in America. Here rapid turnover of plant inventory and a tendency toward early obsolescence in machine-tool types generally discouraged the accumulation of large replacement stocks. In Germany, where machine tools were treated as long-term investments, the industry had managed to build up a comfortable reserve, leaving excess producing capacity in the form of plants at one time devoted to manufacturing for export. One might have been tempted to conclude that machine tools were attacked systematically is hard to say, but the fact remains that at no time did German industry as a whole come anywhere near being short on machine tools.⁷³

A curious omission in the list of high-priority targets was the electric power system. It was recognized, of course, that industry in modern Germany was largely dependent on electrical energy for continued operations. Yet it was believed that in almost no instance was any single industry dependent on one electric generating plant. Rather they depended upon a network which pooled the greater part of the electrical energy within an area. It was considered that by destroying 32 targets in the Ruhr area, for example, heavy industry in that area could be in large part eliminated. But an attack on the

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power industry as a whole was felt to be of questionable validity. Equally questionable was the vulnerability of electrical power plants to aerial bombing, judging from criticism experienced during the "Elitz."

It is easy for the observer after the fact, without hindsight, that the knowledge of subsequent events alone can confer, to criticize conclusions arrived at without any such assistance. But the failure of the Allies to attack German electric power and the failure of the COA to recommend it both stem from a lack not of foresight but of adequate information regarding the situation as it currently prevailed--a distinction of the utmost importance in an historical study of this sort. It now appears that the Germans themselves were constantly concerned about the limitations of their so-called grid system, the difficulty of adding capacity, the relationship of curtailment and shortage of electric energy to production losses in industry as a whole, and, above all, the danger that the Allied command could discover the extreme vulnerability of their electric power industry. The U. S. Strategic Bombing Survey summed up the situation by saying that, in the state of critical shortage in which industry found itself, any loss of production in electric power would have directly affected essential war production, a fact which the Germans themselves readily admitted.⁷⁴

Electrical equipment, optical precision instruments, food production, and anti-aircraft and anti-tank armaments were treated by the COA, for good and sufficient reasons, as of little significance in the bombing program. But the chemical industry, and in particular the nitrogen

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industry, received equally scant recognition. Separate studies had been prepared on several aspects of that complex, namely on coke, synthetic oil, synthetic rubber, and nitrogen. Analyses of the production of explosives and other chemical products were not separately undertaken, either because of the known availability of substitute products, the number and dispersion of plants, the existence of large amounts of excess capacity, or the fact that the product had only an indirect relationship toward military activity. The COA's views on coke, rubber, and oil have already been canvassed. Admittedly nitrogen was important to Axis military effort in the fields of explosives, synthetic oil, and fertilizer. But only eight per cent of nitrogen production was believed used in the manufacture of explosives. And, although it was estimated that 42 per cent was devoted to synthetic oil production, and that if 21 principal nitrogen plants were destroyed the effect would be felt in the oil industry within three months, no attempt appears to have been made to correlate the two for the purposes of strategic destruction.

The COA, as in this instance again handicapped by a faulty understanding of the German chemical industry. Synthetic rubber, synthetic oil, nitrogen, methanol, and other important chemicals formed interdependent parts of a single industrial complex. The production of nitrogen and methanol, both of extreme significance in the manufacture of explosives, was heavily concentrated in synthetic oil plants. As it happened, the attack on synthetic oil, when it finally came, in fact succeeded in producing, as a fortuitous by-product, a marked

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drop in the production of nitrogen, which in turn contributed to the shortage of explosives experienced by the Germans in the closing campaigns of the war. The nitrogen industry, according to the strategic bombing survey, possessed "all the qualifications to have been a primary bombing target." Not only was nitrogen essential, but there were no possible substitutes for it, and most of its production was "unusually concentrated" in a few plants. Moreover, an attack on it would also have been an attack on the synthetic oil industry. It therefore appears that, had the interdependence of the synthetic oil, the synthetic rubber, and the principal chemical industries been fully appreciated, they might all have been subject to early and concentrated attack with much profit to the Allied cause.⁷⁵

On 23 March 1945 the CCA report, after being favorably considered by General Arnold's Advisory Council, was sent to the U. S. for coordination with the British authorities and the Eighth Air Force.⁷⁶

On 6 April the Ministry of Economic Warfare reported its conclusions:

We are in substantial or close agreement with the Committee in the opinions which they express in their covering letter, insofar as these are within our province; and with their conclusions on the following classes of target: Aircraft, rail facilities, petroleum, non-ferrous metals, synthetic rubber and fibers, transportation, submarines.

On the other hand the spokesman, Mr. G. G. Vickers, expressed some reservations. Several, he said, "appear to have been based on what we regard as a somewhat superficial examination of the enemy's position and show a certain divergence of opinion between us on questions of fact, which we are already in process of trying to reconcile by discussion here and in Washington." But, he added, these divergencies

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attained little beyond they related to industries which neither agency considered as likely candidates for adoption as primary targets. On three points only was there significant disagreement. The RAF took a less optimistic view than the OCU of the damage an attack on propeller wheel factories could inflict on Axis industry, and based its argument mainly on the large number of plants and the probable existence of considerable stocks. In the second place it advocated closer study of the possibilities of attacking major transport and aircraft facilities by way of selected internal-combustion engine components and accessories. Finally the RAF believed the possibilities of affecting aircraft production through attack on propeller factories worthy of further investigation. It is interesting to note in passing that on the subject of nitrogen, the RAF was even less enthusiastic than the OCU, claiming that some 20 per cent of enemy producing capacity was at the time lying idle.⁷⁷

Like the RAF, the Eighth Air Force declared itself in substantial agreement with the OCU report.⁷⁸ But it is not clear from available documents how that paper was received by other British agencies. Suffice it therefore to say that on the basis of the OCU report--and on the advice of the RAF, the British Air Staff, and the Eighth Air Force--a final list of primary objectives was drawn up consisting of 73 targets in six systems arranged as follows in order of priority:⁷⁹

- Submarine construction yards and bases
- German aircraft industry
- Ball bearings
- Oil
- Synthetic rubber and tires
- Military transport vehicles

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It will be noticed that grinding wheels and abrasives and the non-ferrous metal industry, given respectively fourth and fifth place in the COA report, were deleted from the final list of primary objectives, no doubt on the advice of the British. On these specific ground, submarines retained the priority given them at Casablanca is not apparent from the documents at hand; but it is safe to assume that the problem of shipping in the Atlantic convo lanes, which had reached a climax in April, had forced the issue. Otherwise there appears to have been general unanimity of opinion. Concerning German fighter aircraft, especially, the British War Staff agreed heartily, urging, indeed, not only an attack on the single-engine fighter industry but on all fighters. In a paper dated 2 April it argued that all British and American bombardment forces should, in the first stages of the proposed offensive at least, be concentrated against the IAF, especially the fighter force, to the exclusion of all other objectives. For, it maintained,⁵⁰

the most formidable weapon being used by the enemy today against our bomber offensive is his fighter force--his single engine fighters by day and his twin engine fighters by night--and the elimination or serious depletion of this force would be the greatest contribution to the furtherance of the joint heavy bomber offensive of the USAF and RAF.

After the principal target systems had been determined, there remained to be elaborated an operating plan to accomplish the destruction of the 70 specific objectives of which those systems consisted. For this purpose General Blair appointed a committee composed of General Russell, General Anderson, and plans personnel of the USAF, RAF, and British Air Force. General Anderson's staff, who he preside, in the

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light of operating experience, what force of planes would be required to do the job and what chronological order of attack against the six target systems would make best use of the increasing forces being made available. This operational plan, together with the list of targets, became known as the "Plan for the Combined Bomber Offensive from the United Kingdom," or, more briefly, the CBO Plan. It received "un-qualified endorsement" by the Commanding General, ETOUSA, the Chief of Air Staff, RAF, and the Air Officer Commanding-in-Chief, RAF Bomber Command.⁸¹ Late in April General Eaker brought the plan to Washington.⁸²

It was a comprehensive and impressive report which Eaker presented to the JCS on 29 April 1943.⁸³ In order to accomplish the mission of the bomber offensive as set forth at Casablanca the plan provided for the neutralization of a given percentage of each industrial system agreed upon. Destruction of the submarine building yards selected would reduce current submarine construction by 89 per cent. Destruction of 43 per cent of German fighter capacity and 65 per cent of German bomber production was provided for. Of the ball-bearing production, 76 per cent could be eliminated by destroying the targets selected. The attack on oil was made clearly contingent upon certain already planned attacks against Floesti from the Mediterranean. Should that effort succeed, it would then, but only then, be necessary to attack the oil installations in the Ruhr in order to exploit the advantage gained in Rumania. Together these attacks would account for 48 per cent of Germany's oil production. Provision was next made for destroying 50 per cent of the synthetic rubber capacity and nearly all

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of the tire production of Axis Europe. Finally, the elimination of seven selected plants producing military transport and armored vehicles should have a considerable, though not readily measurable, effect on enemy strength. "The cumulative effect of the destruction of the targets comprising the systems just listed will fatally weaken the capacity of the German people for armed resistance." QED.

But there was one overriding consideration which the planners declared would, temporarily at least, alter this order of priority. The CBO Plan warned that the Germans, recognizing the vulnerability of their vital industries, were rapidly increasing the strength of their fighter defenses, especially on the Western Front. The German fighters were taking constant toll of Allied bombing forces both by day and by night, "not only in terms of combat losses but more especially in terms of reduced tactical efficiency." If their number were materially increased, "it is quite conceivable that they could make our daylight bombing unprofitable and perhaps our night bombing too." For this reason, the plan concluded, with more force than clarity, "German fighter strength must be considered as an Intermediate objective second to none in priority."⁸⁴

As finally determined, target priority in the CBO Plan stood as follows:

- (1) Intermediate objectives:
German fighter strength.
- (2) Primary objectives:
German submarine yards and bases.
The remainder of the German aircraft industry.
Ball bearings.
Oil (Contingent upon attacks against Floesti from the Mediterranean).

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- (3) Secondary objectives in order of priority:
Synthetic rubber and tires.
Military motor transport vehicles.

It is not the province of this study to evaluate the CEO in terms of positive results. But later events and subsequently acquired information cast on the planning phase a degree of light the implications of which cannot at this point be entirely ignored. This is especially true with regard to target selection. Generally speaking the bomber offensive succeeded. It is, therefore, not a question of explaining any failure in attaining ultimate objectives. But it now appears that over-all target selection might in a few instances have been improved and the bombing force have been utilized more effectively. Electric power might well have been given a high priority. Nonfriction bearings might well have been accorded a lower priority. Probably more important than either the inclusion of bearings or the exclusion of electric power was the failure to concentrate at an earlier date on oil and to appreciate the vital interdependence of synthetic oil, synthetic rubber, nitrogen, and other elements in the vast chemical complex. Submarine installations received no doubt an undue weight of bombs. But in that case the choice was dictated not by industrial analysis but by what was felt to be strategic necessity. The attack on transportation, when it came, was decisive, but it is probable that it could not have been undertaken directly at an earlier date without overwhelming force and complete concentration of effort. It must be remembered, of course, that contingent factors of a purely operational nature which could not have been foreseen affected the results of the offensive. The day bomber force, for example, was not

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built up so rapidly as had been planned, a fact which made it impossible to strike the ball-bearing industry as rapidly and decisively as had been anticipated. The CBO Plan had made it very clear that a successful initial attack on that industry would demand the immediate concentration of effort on the remaining elements of that system in order to exploit the initial success. The fact remains, however, that the final choice of targets in April of 1943 did not correspond in every respect to the points of most extreme vulnerability in the German war economy.

Was, then, the method of industrial analysis, in this instance identified especially with the COA, an effective instrument for the appraisal of strategic objectives? Did it result in a more penetrating choice of target systems than had hitherto been achieved? It may be instructive before answering these questions to examine some of the priority lists which had been drawn up by U. S. agencies (British examples are not available) prior to the work of the COA.

ANPD-1, prepared in AAF Headquarters and dated 12 August 1941, had envisaged a strategic bombardment attack on German industry by an American bomber force and arranged the industrial systems in the following order of priority:⁸⁵

- Electric power
- Transportation
- Oil and petroleum supplies
- The morale of the German population

As a possible "intermediate" objective, the accomplishment of which might be essential to the destruction of the above target systems, the German Air Force would have to be neutralized by attacks on air bases, aircraft factories (both engine and airframe), and aluminum and magnesium factories. In addition, other lines of action, such as the

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bombing of submarine bases, might possibly be forced by the necessity of maintaining the security of bases.

A "Plan for the Initiation of Air Force Bombardment in the British Isles," also emanating from Headquarters, IAF and dated 20 March 1942,⁶⁵ had selected some 111 targets within four categories in the following priority:

- Armaments industry
- Electric and water power
- Petroleum and fuel
- Mail and water transportation

WAFB-42, issued 9 September 1942, constituted the most thorough effort made up to that date by U. S. agencies. It had arrived at the following list:

- Eng. MF: Fighter factories, bomber factories, and engine plants
- Submarine building yards
- Transportation system: building shops, repair works, travelling yards, and canals
- Electric power
- Oil
- Aluminum
- Rubber

It was becoming a commonplace in strategic thinking, that destruction of the A-1 had to be a prerequisite to any systematic reduction of Germany's war potential. And as the submarine menace mounted it was becoming clear that something drastic, involving temporary diversion of strategic bombing forces, would have to be done. These considerations in fact dictated the priorities for eighth air force operations during the fall and winter of 1942. Both the directive under which the American bombers began their base raid on 20 October which supplemented it, listed submarines, aircraft, and transportation in that order.⁶⁶ Similarly, the Casablanca directive of 21 January 1943

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has listed priority targets in the following order:¹⁸

submarine construction yards
The aircraft industry
Transportation
Oil

It is obvious that the CGO priorities given to target systems came no nearer to the answer as given tentatively by events than did the earlier lists, and in some instances they failed to come as close. In other words, the systematic approach to the problem made by the CGO obtained, in an over-all sense, an end result no more satisfactory than that achieved by the efforts of the earlier analysts. This fact, however, does not mean that the attempt to apply a more or less scientific method to the problem of target selection was badly conceived. It merely means that conditions were not entirely favorable to a project carried out at that level. Insofar as it was possible to solve the problem on the basis of facts, rather than of lipponderables, there could be no limit to the valid application of a scientific method. And potentially it was a question of ruthlessly factual investigation. But actually there existed in almost every instance a serious shortage of reliable information, and the resulting lacunae had to be bridged by intelligent guesswork and an clever use of analogies. In dealing with this mass of inadequacies and approximations the social scientist as such finds himself in a position of no special advantage over the military strategist or any other intelligent layman; and an elaborate methodology may even, by virtue of a considerable but unavoidably misdirected acrobatics, lead one investigator far afield. The moral of this story is obvious.

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and has frequently been drawn. Strategic bombing, probably more than any other strategic undertaking, requires the most complete body of intelligence data possible. Without it, strategic bombing can only succeed--the one in question succeeded notably--but only at the expense of such ineffective effort.

III. Operational Plans: Organization of the GSO

As presented by General Eaker, the plan of operations was divided into four phases, each marked by an increase in the size and capabilities of the American bombing force. In estimating the force required, the authors of the GSO plan drew heavily on the experience of the Eighth Air Force which, by April of 1943, possessed a very useful body of information. They were not, therefore, forced, as the authors of AAF-42 had been, to resort to highly theoretical calculations. From the experience of the Eighth in 12 missions against assorted targets it was concluded that 100 bombers dispatched on each successful mission could effect satisfactory destruction on that part of the target area within 1,000 feet of the aiming point when bombing from altitudes of 20,000 to 30,000 feet. Each target was accordingly evaluated in terms of the number of circles of 1,000-foot radius in which destructive effect had to be produced, and the total number of sorties required for total destruction was calculated on that basis. As for rate of operations, the Eighth Air Force had averaged six per month over the preceding half year. Experience also indicated that at least 200 aircraft must be in the theater to make possible the dispatch of 100 on operations, and that GSO plans constituted the

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dominance sought for deep penetrations in the face of existing fighter opposition.

By 30 June 1943, the GfV Flak reestablished, there should be in the bomber Bf 110 and Bf 109 fighter bombers. It would not, however, be possible to train such before this date. Therefore for the force of 600 planes required for deep penetrations. Consequently, missions during the first phase of operations (April to July) would be limited to the range of fighter escort or to attacks on objectives not demanding flights deep into enemy territory. Targets in this phase would consist mainly of submarine yards and not too distant aircraft installations. Only two systems called for long missions: an attack on oil installations to exploit prior attacks on Rostock, and a very-long-range attack against the German aircraft ball-bearing industry. During the next phase, from July to October, the campaign in heavy bombers should reach 1,100 and objectives might be selected within a radius of 400 miles from the base area in England. Effort would be concentrated against German fighter bases, heavy and fighter aircraft factories as well as airbases and repair facilities. Probably 75 percent of the striking force would be used for this purpose, the remaining 25 percent being left to continue the attack on submarine construction yards. During the third phase, from October to January, the German fighter force would continue to be attrited and the other sources of German power would be undermined. During this phase, the bombing force would have to be adequate to perform all its major tasks: by 1 January 1944 it should number 1,740 heavy bombers. The final phase, during the early months of 1944, should

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see the entire bombing force used to sustain the effect already produced and to prepare the way for a combined operation on the Continent. To accomplish these tasks 2,702 heavy bombers would be needed by 31 March 1944.

The plan made no specific provision for the use of U. S. medium bombardment. But it clearly indicated that medium bombers would be required for supplementary attacks against all strategic targets within their range. They would be especially useful for attacking German fighter airbases in order to aid the passage of the heavy bombers until the bombing of the enemy aircraft industry had made itself felt. For these purposes, and for the final phase in support of cross-channel operations, an eventual force of 600 medium bombers should be in the theater by 31 March 1944. In addition, of course, there would at all times be a need for an extensive American fighter force to protect the bombers and to assist in the reduction of German fighter strength.

For the integration of AF and USAAF operations in the combined offensive the GBO plan made only a surprisingly informal provision. "Fortunately," it said, the capabilities of the two forces were "entirely complementary." It argued that the most effective results from strategic bombing would be obtained by directing the combined day and night efforts of the U. S. and British bomber forces to all-out attacks against targets which were mutually complementary, in a campaign to undermine decisively a limited number of selected target systems. The American bombers would thus, in general, bomb

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certain of success. With the American view, the CBO Plan, calling as it did for a cross-Channel invasion as soon as the bomber offensive had completed its final phase in April 1944, was in perfect accord. The British, on the other hand, were reluctant to make too firm a commitment in that direction for fear it might "tie our hands" regarding plans in other directions.⁹²

At the same time the British representatives agreed that the intensity of the bombing campaign would have a material effect on any land operation, whether in northwestern Europe or in the Mediterranean area, and that it should not be reduced except after "critical examination." Sir Charles Portal, without maintaining that the utmost priority should continue to be accorded to SICKLE, expressed deep concern for the rate of that undertaking. The important thing about the CBO Plan, he emphasized, was to be found not so much in the "tremendous effect" it promised on German production and morale, as in the proposed elimination of the German fighter force, which, he believed, was growing so rapidly that every week's delay made the task of defeating Germany more difficult, no matter where the principal effort was to be applied.⁹³

On 18 May, after considerable discussion, the CCS approved the CBO Plan as presented.⁹⁴ And the conference finally decided that the CBO would, as planned, culminate in a cross-Channel invasion for which 1 May 1944 was selected as the target date. Operations in the Mediterranean were to consist only of action calculated to eliminate Italy. In addition, it was decided to launch bombing attacks as soon as possible from Mediterranean bases against the Ploesti oil fields. The question of priority among these specific undertakings for 1943 and 1944 was happily avoided, for, after balancing available resources with

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requirements more thoroughly than at any previous meeting, the conference concluded that all were possible, and that, broadly speaking, "there are sufficient air forces to meet all requirements in all Theaters."⁹⁵

In compliance with the decisions made at TRIDENT, the C/AS, RAF, in whose hands, as agent of the CCS, the direction of the bomber offensive rested, issued on 10 June 1945 to the Air Officer Commanding-in-Chief, Bomber Command and Fighter Command and to the Commanding General, Eighth Air Force a directive to govern the CBO. This paper confirmed the primary object of the bombing campaign as set forth at Casablanca, and incorporated the essential elements of the CBO Plan as adopted at TRIDENT. Of the necessary coordination between the two forces involved, it was stated: "While the forces of the British Bomber Command will be employed in accordance with their main aim in the general disorganization of German industry their action will be designed as far as practicable to be complementary to the operations of the Eighth Air Force." The British Fighter Command would, "consistent with the needs of the air defence of the United Kingdom" (which, by the way, had been left entirely up to the RAF), be employed to further the bomber offensive. The American fighter forces would also be employed in the furtherance of the bomber offensive in accordance with the instructions of the Commanding General, Eighth Air Force and in cooperation with forces of Fighter Command. The allocation of targets and "the effective co-ordination of the forces involved" was to be insured by "frequent consultation between the Commanders concerned."⁹⁶

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Joint Board of coordination and of crucial importance. The inter-
 national to overall plan and then coordinate, the C-2, to be ^a really
 combined effort, required constant and extended detailed cooperation
 between the two forces. As a result, it had been generally assumed
 that the Chief of Air Staff, who could supervise the combined
 offensive as agent for the C-2, but no specific machinery had been
 set up by which the two forces could coordinate their plans. In
 this respect the C-2 had failed nothing to the disorganized discus-
 sions. On receiving the C-2 plan, General Arnold wrote to Sir
 Charles Portal on 10 June 1940, the creation of "an effective formalized
 machinery for closest possible co-ordination, or rather, integration,
 of the two battle efforts." For, he added, "the increasing coordina-
 tion of their operations would appear to be as soon as beyond the
 capabilities of our commanders, in person, to coordinate." It
 accordingly suggested that a permanent committee be established for
 this purpose, to operate within the limits of the disorganized dis-
 cussions.⁵⁷

Under General Directive of 10 June 1940, a combined operational
 planning committee was set up. That body was to consist of repre-
 sentatives from the RAF Bomber and Fighter Commands, Eighth Air
 Force, VIII Bomber Command, and VIII Fighter Command. An Air
 Ministry representative from the Directorate of War Operations
 would be included "to be co-opted as a secretary for purposes of
 liaison with the Air Staff." It was also clear that the committee
 was to be concerned with coordination and with the tactical plans.

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for specific combined operations, which should be prepared well in advance of requirements, and with critical examination of the tactical execution of these plans. It is no one's responsibility for the conduct of operations, which retained the responsibility of the Commanders concerned.⁸³

Despite such arrangements as these, a weakness remained in the organization of the CIO. The CIO Plan and the directive of 10 June 1948 both purposely avoided committing the CIO to a rigid adherence to the particular objectives they set forth. The notion of the CIO as a force, for which these target systems appear to have been primarily devised, would "as far as practicable" be complemented by that of the JCS Under Command. It was "fortunate" that the objectives of the two forces could for the most part coincide, but it was also fortuitous: such coincidence of effort was not explicitly made a necessary part of the plan, however much the authors may have considered it essential for practical purposes. The British and American forces were still engaged in testing the enemy according to widely divergent operational theories; and, insofar as they hoped to bring about the general disorganization of German society by attacking civilian morale as a primary objective, the strategic doctrine differed radically from that upon which the CIO Plan had been erected. It was probably inevitable, therefore, that the two forces would continue to operate along lines not so nearly parallel as had originally been intended. The combined bombing effort did not in fact achieve close integration until late in the campaign, and on the night of the American attack on the distinction between gas-point and area

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bombing a shadowy one, and when the importance of enemy oil and transportation had become so apparent as to leave little doubt regarding the primary objectives. Meanwhile the participants labored at times under a sense of frustration originating in the largely unresolved dichotomy that continued to characterize the bomber offensive.

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GLOSSARY

✓ AAFAC	Army Air Forces Antisubmarine Command
✓ AAFRH	Army Air Forces Reference Histories
✓ AAG	Air Adjutant General
✓ A. C. A. S.	(British) Assistant Chief of Air Staff
✓ AC/AS	Assistant Chief of Air Staff
✓ A/C/M	Air Chief Marshal
✓ AC/S	Assistant Chief of Staff
✓ AFAAP	Assistant Chief of Air Staff, Personnel
✓ AFABI	Assistant Chief of Air Staff, Intelligence
✓ AFACT	Assistant Chief of Air Staff, Training
✓ AFADS	Assistant Chief of Air Staff, A-4
✓ AFAEP	Assistant Chief of Air Staff, Plans
✓ AFCAS	Chief of Air Staff
✓ AFCE	Automatic flight control equipment
✓ AFDAS	Deputy Chief of Air Staff
✓ AFDMC	Management Control
✓ AFDMR	Director of Military Requirements
✓ AFDPU	AAF Program Planning
✓ AFDTs	Director of Technical Services
✓ AFRDB	Directorate of Bombardment
✓ AFRGS	Director of Ground-Air Support
✓ AFSC	Air Force Service Command
✓ AFSHO	AAF Historical Office
✓ AGWAR	Adjutant General, War Department
✓ A/M	Air Marshal
✓ ASF	Army Service Forces
✓ BEN	Board of Economic Warfare
✓ C/AS	Chief of Air Staff
✓ CBI	China-Burma-India
✓ CBO	Combined Bomber Offensive
✓ CCS	Combined Chiefs of Staff
✓ CG	Commanding General
✓ C-in-C	(British) Commanding in Chief
✓ COA	Committee of Operations Analysts
✓ CPS	Combined Planners Staff
✓ COS	(British) Chiefs of Staff
✓ C/S	Chief of Staff
✓ ETO	European Theater of Operations
✓ ETOUSA	European Theater of Operations, U. S. Army

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✓FW	Focke-Wulf
✓GAF	German Air Force
✓HB	Heavy bomber
✓HE	High-explosive bomb
✓JCS	Joint Chiefs of Staff
✓JPS	Joint Staff Planners
✓JTG	Joint Target Group
✓Ju	Junkers
✓Me	Messerschmitt
✓MEW	(British) Ministry of Economic Warfare
✓MIS	Military Intelligence Service
✓MM&D	[Assistant Chief of Air Staff] Materiel, Maintenance, and Distribution
✓OIG	Office of the Inspector General
✓ONI	Office of Naval Intelligence
✓OPD	Operations Division, War Department
✓ORS	Operational Research Section
✓OSRD	Office of Scientific Research and Development
✓OSS	Office of Strategic Services
✓PRU	Photo Reconnaissance Unit
✓RAF	Royal Air Force
✓R&R	Routing and Record Sheet
✓RDF	Radio Direction Finder
✓SAS	Secretary of Air Staff
✓S/W	Secretary of War
✓SWPA	Southwest Pacific Area
✓T/M	Tactical mission
✓U.K.	United Kingdom
✓USANW	U. S. Army Air Forces Headquarters at Widewing, England
✓USFOR	U. S. Forces [in Europe]
✓USSBS	U. S. Strategic Bombing Survey
✓USSOS	U. S. Services of Supply
✓VHF	Very high frequency
✓WDGS	War Department General Staff
WPB	War Production Board

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"Have we come read to in connection with our future air planning. Perhaps there are ideas which we should keep in our minds. It looks that way to us."

18. See Origins, pp. 41-50, for fuller treatment of both criticism and U. S. doctrine.
19. 1940-1, 12 Aug. 1941, in AFM Files, Office of Security Officer.
20. In the New York Times, 8 August 1942, John McGraw cited "British U. S. Air Force holding up air offensive," a report dated by Spatz, 11 August 1942. The article by Robert Macfie in the Sunday Times, 13 August 1942, inspired a cable from David M. Johnson to the New York Times, 13 August, "British desire our heavy bombers unsuited for raids on continental. We should suggest to use B-17's for controlling Atlantic and concentrate on Lancasters." On 13 August, General Dwight D. Eisenhower reported that there was no "mild" objection over methods and objectives of the bomber offensive. New York Times, 16 August 1942.
21. Origins, pp. 104-107.
22. I produced history, VIII - 1, later corrected by Lt. Col. W. C. Harrison, pp. 72-75, in AFM Files.

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Chapter II

1. Although this mission was the first in the European theater by American heavy bombers, the first mission by American bombers operation out of the U. S. was flown on 4 July 1942 by six crews of the 15th Bomb Sq. (Light) against the Eastern. Purpose for this patriotically timed light mission consisted of four aircrews in all. It was not a very successful effort, three of the planes having failed to drop their bombs on the target, two having been destroyed, and only one having reached the objective, but with unobserved results. History, First Bomb Unit, Activation to 17 August 1942, p. 17 IV.
2. Sunday Times, 16 Aug. 1942.
3. C-102-1147 (-17-42), Arnold to CG 3d AF, 17 Aug. 1942.
4. C-101-1736 (-17-42), Arnold to AAF, 17 Aug. 1942.
5. The First 1100 Bomb Group Dispatched by the VIII Bomber Command [First 1100], Vol. I, p. 15, in A-2 Lib.
6. Air Ministry, Weekly Intelligence Survey, 161, 2 Oct. 1942, in A-2 Lib., A-8735.
7. First 1100, p. 15.
8. Hist., 1st Bomb Div., 17 Aug. 1942, ev. 142, pp. 1-3.
9. Mission report and to CG 3d AF, and the Day and Rpt. 1, 30 Dec. 1942, Mission 1, First 1100.
10. Ibid.
11. Ltr., Ltr. to CG 3d AF, 19 Aug. 1942, in A-8 665-1.
12. Hist., 1st Bomb Div., p. 4.
13. Ltr., Ltr. to CG 3d AF, 19 Aug. 1942.
14. Ibid.
15. See A. 4 above.
16. Hist., 1st Bomb Div., p. 1.
17. Ltr., Ltr. to CG 3d AF, Ltr. to CG 3d AF, 22 Aug. 1942, in A-8 665-1.
18. First 1100, Mission 2.

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38. New York Times, 10 Oct. 1942, p. 13; First 1100, Mission #14.
39. Ibid.; Cf. CM-IN-04049 (10-10-42), USAMW to AGWAR, #244E, 10 Oct. 42, which gives 65.
40. Ibid. The figures in Intelligence Narrative #14 do not agree with those given in Interpretation Report #S.A. 151. Neither source agrees with CM-IN-04049. Figures taken from ORS Day Raid Rpt. #13, 30 Dec. 1942.
41. See bomb plot in First 1100, Mission #14. Cf. ORS Day Raid Rpt. #13.
42. Ltr., Eaker to CG 8th AF, 1 Nov. 1942, in papers sent to AFSHO files by Col. J. M. Parton.
43. OSS Rpt., 25 Nov. 1942, in A-2 Lib., K-11481.
44. Interp. Rpts. #K-1413 and #KS.63, First 1100, Mission #14.
45. OSS Rpt., 25 Nov. 1942, K-11481.
46. Ind. Dmg. Rpt., #59, 18 Nov. 1942.
47. Draft memo for Mr. Harry Hopkins, filed with R&R, AFDAS to AFABI, 11 Oct. 1942, in Plans AAFD-42. Cf. First 1100, Mission #14.
48. These figures taken from CM-IN-04049 (10-10-42); CM-IN-10602 (10-25-42), USAMW to AGWAR, #705E, 24 Oct. 42. Cf. First 1100, Mission #14.
49. Hist., 1st Bomb Div., p. 14.
50. CM-IN-04049 (10-10-42); CM-IN-10602 (10-25-42); P&R, AFAEP to AFDAS, 27 Aug. 1942, filed with R&R, AFDAS to AFABI, 11 Oct. 1942, in Plans AAFD-42; inclosure to report received by CG AAF from 8th AF, 3 Mar. 1943, in A-2 Lib., K-13923.
51. Draft memo for Mr. Hopkins.
52. Ltr., Eaker to CG, 8th AF, 25 Aug. 1942, in AAG 385-F.
53. Spaatz quoted Group Captain Broadhurst, RAF, who claimed he had never, in 57 daylight sweeps escorting bombers, seen accuracy of bombing such as had been attained in the first three missions of the Eighth Air Force, and on those occasions the attacks had been made from only 10,000 feet. Ltr., Spaatz to Arnold, 24 Aug. 1942, in AAG 385-F.
54. First 1100, Vol. II, p. 401.

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35. Apr., 1942, 100-10, 100-10, 100-10, 100-10.
36. 100-10, 100-10, 100-10, 100-10, 100-10, 100-10.
37. 100-10, 100-10, 100-10, 100-10, 100-10, 100-10.
38. 100-10.
39. 100-10, 100-10, 100-10, 100-10, 100-10, 100-10.
40. Apr., 1942, 100-10, 100-10, 100-10, 100-10.
41. Apr., 1942, 100-10, 100-10, 100-10, 100-10.
42. 100-10, 100-10, 100-10, 100-10, 100-10, 100-10.
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50. 100-10, 100-10, 100-10, 100-10, 100-10, 100-10.
51. 100-10, 100-10, 100-10, 100-10, 100-10, 100-10.
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73. Ltr., Spantz to Arnold, 16 Sep. 1912, in 113-370.2.
74. Ltr., Lt. Col. G. C. Smith, 1 Apr. 1911, in 113-370.2, 1-1370.2.
Cf. Ltr., Spantz to Arnold, 13 Sep. 1912.
75. Ltr., 31 Dec. 1912, "The Post Office," in 113-370.2, 1-1370.2.
pilots' order no. for 31 Dec. 1912, by Robert L. Johnson, Jr., of
the 1st Force Field Division. Cf. CM-1-1-12 (1-1-12).
76. Ltr., Spantz to Strateneger, 17 Dec. 1912, in 113-370.2.
77. Ltr., Spantz to Arnold, 16 Sep. 1912, in 113-370.2. Ltr., 1912
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(1-1-12), London to Strat, 1715, 1 Sep. 12.
78. Ltr., Wilt for Coud., p. 103.
79. Opt. EC121, Pt. 1, No. 1, in 113-370.2.
80. Ltr., Pt. 1, No. 10; Ltr. for Arnold from 113-370.2 13 Sep. 1912, in 113-370.2.
81. Opt. EC121, Pt. 1, No. 12-13.
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83. Ltr., 11 Oct. 1912, OIG to Coud. 17, 20 Nov. 1912, in 113-370.2, 113-370.2.
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84. Opt. EC121, Pt. 1, No. 3-17, in 113-370.2, p. 17.
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to Ltr. of Ltr. 113-370.2, 11 Oct. 1912, in 113-370.2, 113-370.2.
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87. Ltr., 11 Oct. 1912.
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90. Ltr., 11 Oct. 1912, in 113-370.2, 113-370.2.
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94. Ibid.
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96. C-IT-01557 (10-11-42), London to AAF, 10 Oct. 1942.
97. Ltr., Baker to CG 8th AF, 1 Nov. 1942, in Fortson papers.
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99. Ltr., Baker to CG 8th AF, 1 Nov. 1942.
100. Cpn. FCR32, Pt. II, p. 2.
101. Ltr., Baker to CG 8th AF, 1 Nov. 1942.
102. A/P Status Reps., 101130 papers, in AAF 3 files.
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105. Ltr., Baker to Spantz, 8 Oct. 1942, in AAF 312.1-A.
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108. Daily Diary of General Spantz, 21 Oct. 1942, excerpt in Fortson papers.
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111. Correlation of memo received from Col. Goodrich, 20 Oct. 1942, in AAF 312.1-A. Cf. CBS Rpt., 26 Dec. 1942, in A-2 Lib., 1-3397.
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4. Air Estimate; The Submarine Situation in Europe [Air Estimate, Subs], pt. 1, Opns. Sec., AS, A-2, USAF, Wash., D. C., 12 Feb. 1943, p.1, in AFSP-18 files. Cf. ltr., Strat.ayer to Spatz, 20 Nov. 1942, in SAS 235; AFSP-7, Choc. III.
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9. Evaluation, Tab I.
10. Ibid., Tab G, App. C.
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16. OCS Rpt., 20 Dec. 1942, in A-2 Lib., 1-1097; OCS Rpt. 31/57-0, 27 Jan. 1943, A-2 Lib., 1-13245; First 1100, Mission 15; Interp. Rpt. 3-1. 194; OCS Rpt. 31/57-0, 31 Dec. 1942.

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19. Ltr., Spaatz to Arnold, 31 Oct. 1942, in A-2 Lib., K-8822.
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21. Ltr., Spaatz to Arnold, 31 Oct. 1942.
22. First 1100, Mission #18.
23. Ibid., Vol. II, pp. 401 ff.
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25. ORS Day Raid Rpt. #17, 30 Dec. 1942; First 1100, Mission #18. See especially Interp. Rpt. #K.1433, and Statistical Analysis of Operations included in same source.
26. See Tac. Mission Folders, passim.
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30. Ind. Dmg. Rpt. #62, 9-22 Nov. 1942, 23 Dec. 1942, in A-2 Lib., K-11758; OSS Rpt., 11 Jan. 1943, in A-2 Lib., K-9650; Attacks on U-boat Bases by U.S. Aircraft, N.I.D. U.C. Rpt. #E964C, 3 Dec. 1942, in A-2 Lib., K-8198. See also Interp. Rpts. in respective mission reports.
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35. ORS Day Raid Rpt #28, in Tac. Mission Folder #28; Ind. Dmg. Rpt. #66, 23 Feb. 1943, in A-2 Lib., K-18289.

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40. First 1100, Vol. II, p. 367; N.I.D. U.C. Rpt. #272, 21 Nov. 1942, in A-2 Lib., K-7236.
41. Ibid.
42. Evaluation, Tab G, App. B, ltr., Sir Dudley Pound to Eaker, 23 Nov. 1942.
43. Ibid.; ltr., Naval Staff Officer, Hq Bomb Comd. to Eaker, 25 Nov. 1942, in First 1100, Vol. II, p. 380; N.I.D. U.C. Rpt. #E964C, 3 Dec. 1942, in A-2 Lib., K-8198.
44. Analysis of Results, in A-2 Lib., K-9226.
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57. Ind. Dmg. Rpt. #63, 5 Jan. 1943, in A-2 Lib., K-11497.
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61. Ind. Dmg. Rpts. #66, 23 Feb. 1943, and #74, 11 Nov. 1943, the latter in A-2 Lib., K-41388; OSS Rpts. #P.1/4735, 22 Mar. 1943, A-2 Lib., K-21404, and #P.7/6938, 28 Mar. 1943, K-20869; Interp. Rpt. #F.S.85, 3 Feb. 1943, in Tac. Mission Folder #29 (Lille, 13 Jan. 1943).
62. Ind. Dmg. Rpt. #66.
63. Eye witness report forwarded by American Embassy, London, to Chief, MIS, 1 Apr. 1943, in A-2 Lib., K-19872.
64. OSS Rpt., 15 Mar. 1943, in A-2 Lib., K-21402; OSS Rpt. #P.1/4274, 24 Feb. 1943, K-20638.
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86. Ltr., Spaatz to CG ETOUSA, 9 Nov. 1942, in Plans, WF-III-A-2 #2.
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89. Ltr., Arnold to Eaker, 2 Dec. 1942, in AAG 312.1-A; CM-OUT-4254 (11-13-42), AFDAS to CG 8th AF, #A-753, 13 Nov. 42.
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 109. Evaluation of Defensive Measures, p. 36.
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 113. Ltr., Eaker to Stratemyer, 2 Jan. 1943; 8th AF Weekly Intelligence Digest, 2 Jan. 1943, in A-2 Lib., K-10507.
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- 119. Evaluation of Defensive Measures, pp. 83 and 89; int., Col. L. C. Craigie, 12 Jan. 1943, in A-2 Lib., K-10885.
- 120. Int., Hansell, 9 Aug. 1943; Hist., 2d Bomb Wing, p. 41; int., Col. F. Armstrong, 24 Nov. 1942, in A-2 Lib., K-6182.
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- 137. Prelim. Rpt. on Bomb Accuracy.

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- 142. Prelim. Rpt. on Bomb Accuracy.
- 143. Report on Advantage of Dropping on the Leader over Sighting Individually when Bombing in Formation, ORS, 20 Mar. 1943, in Opns. Anal. Div. Rpts., Vol. I, #2.
- 144. Prelim. Rpt. on Bomb Accuracy.
- 145. Tac. Doctrine, 1st Bomb Wing, 1 Feb. 1943.

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Chapter IV

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2. CCS 97/3.
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4. Ltr., Spaatz to Arnold, 23 Nov. 1942. See also discussion below, p. 136.
5. Memo, President to Marshall, 24 Aug. 1942.
6. AAFPD-42, 9 Sep. 1942, copy in Office of Director, Joint Target Group (JTG).
7. See discussion of subject in Chapter I and Chapter II above. Ltr., Spaatz to Arnold, 31 Oct. 1942, A-2 Lib., K-8822; ltr., Spaatz to Stratemyer, 30 Sep. 1942, quoted in R&R, AFCAS to Director of Air Defense, 5 Oct. 1942, in Plans, WP-III-A-2 #2.
8. JCS 152, 16 Nov. 1942.
9. Ltr., Kuter to Spaatz, 16 Sep. 1942, in AAG 381-F.
10. Plan for the Defeat of the Axis Powers, 1 Dec. 1942, copy in Office of Dir., JTG.
11. Minutes, Air Staff Meetings, 5 and 26 Aug. 1942; memo, CG AAF to C/S, 29 July 1942.
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14. CCS 32d Meeting, 25 July 1942.
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16. Lord Trenchard, Our War Policy, 29 Aug. 1942. See Chap. I above. Cf. ltr., Spaatz to Arnold, 16 Sep. 1942, in AAG 370.2.
17. American-British Strategy, 7 Nov. 1942, in files, Opn. Hist. Br., AFHQ. Cf. memo for S/W from Mr. Lovett, 15 Nov. 1942.
18. An Appreciation by the Air Staff on the Employment of an Anglo-American Force of 5,000 Heavy Bombers, 9 Oct. 1942, in A-2 Lib., K-14271.

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20. Memo, Roosevelt to Marshall, 6 May 1942, cited in AAFRH-1, Chap. I, n. 64.
21. JCS 26th Meeting, 28 July 1942 (Ref. CCS 97); JCS 28th Meeting, 11 Aug. 1942 (Ref. JCS 97/2); JPS, 24th Meeting, 22 July 1942 (Ref. CPS 35/1).
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27. Ltr., Spaatz to Arnold, 24 Aug. 1942, in AAG 385F.
28. Cf. ltr., Spaatz to CG ETOUSA, 9 Nov. 1942, in Plans, WP-III-A-2 #2, in which Spaatz complains of the necessity of continuing to operate under the original ROUND-UP plan without any up-to-date directive.
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30. Ltr., Spaatz to Arnold, 3 Oct. 1942, A-2 Lib., K-8822.
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33. JCS 97/1, 11 Sep. 1942. Cf. memo, Portal to Arnold, 20 Aug. 1942, in AAG 311.2.
34. Ltr., Stratemeyer to Spaatz, 25 Aug. 1942, in AF3HO files.
35. JCS 97/1, Incl. A, msg., Eisenhower to Marshall, 5 Sep. 1942.
36. Ibid., Incls. B, C, and D.
37. JPS 48, 28 Aug. 1942, subsequently circulated as JCS 97, 11 Sep. 1942.
38. Notes on JPS 33d Meeting, 2 Sep. 1942 (Ref. JPS 48).

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39. Memo, Arnold to C/S, 29 July 1942.
40. Notes on JFS 33d Meeting, 2 Sep. 1942.
41. JCS 33d Meeting, 15 Sep. 1942 (Ref. JCS 97/1).
42. JFS 48/1/D, 7 Oct. 1942, which consisted of the minutes of JCS 36th Meeting, 6 Oct. 1942.
43. JCS 97/1, 11 Sep. 1942, incl. A, C, and D; notes on JFS 33d Meeting, 2 Sep. 1942.
44. Ltr., Marshall to King, 4 Sep. 1942, and attached correspondence, in AAG 385-F; cf. JCS 37th Meeting, 13 Oct. 1942.
45. JCS 33d Meeting, 15 Sep. 1942 (Ref. JCS 97/1); JCS 36th Meeting, 6 Oct. 1942; JCS 37th Meeting, 13 Oct. 1942.
46. AAFRH-1, pp. 112-13.
47. Memo, Roosevelt for Leahy, King, Marshall, and Arnold only, 24 Oct. 1942, in AFSHO files, 13th AF.
48. Memo, Spaatz to CG ETOUSA, 9 Nov. 1942, cited in Cpn. TORCH, p. 20.
49. Memo for all Staff Directorates from C/AS, General Arnold's Opinion on How to Win the War, 2 Dec. 1942, in SAS 385; Minutes, A/S Meeting, 8 Dec. 1942, in SAS files.
50. See above, Chaps. II and III.
51. Ltr., Spaatz to Arnold, 31 Oct. 1942; CM-IN-8691 (11-20-42), London to AGMAR, #5062, 18 Nov. 42; CM-OUT-7197 (11-22-42), AFDIS to CG ETO, #R-3451, 22 Nov. 42; CM-IN-825 (12-2-42), London to AGMAR, #1026, 2 Dec. 42.
52. See below, pp. 166 ff.
53. CCS 124, 18 Nov. 1942; Notes on JCS 42d Meeting, 17 Nov. 1942 (Ref. JCS 152); *ibid.*, Tab A, memo for C/S from Maj. Gen. T. T. Handy, 8 Nov. 1942; CPS 40th Meeting, 3 Dec. 1942, and 41st Meeting, 4 Dec. 1942. Cf. CCS 55th Meeting, 14 Jan. 1943 (Casablanca).
54. Memo, Churchill to Roosevelt, 18 Nov. 1942, incl. to JCS #153, 18 Nov. 1942; memo for JCS from Joint Strategic Survey Committee, 27 Nov. 1942, in AAG 008-A. Cf. CCS 57th Meeting, 15 Jan. 1943 (Casablanca); Casablanca Conf., 2d Meeting, 18 Jan. 1943.
55. CPS 49/1, 27 Nov. 1942.
56. Incl. B, CPS 49/1, 27 Nov. 1942, Minority Rpt. by member of USAAF. Cf. CPS 49/2, 5 Dec. 1942, memo, CG AAF to JCS.

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57. CGC 124/1, 30 Dec. 1942. Cf. CPS 49/3, 8 Dec. 1942.
58. Memo for C/S from Handy, 8 Nov. 1942. Cf. Notes on JCS 42d Meeting, 17 Nov. 1942, in which a similar line of thought is expressed.
59. American-British Strategy, 7 Nov. 1942, copy in files of Cpn. Hist. Br., AFSHO. This paper was prepared by the British COS and brought to the U.S. by Air Vice Marshal Slessor for discussion and coordination with the JCS. It was presented to that body and then withdrawn on the protest of Admiral King that it was not official since it had not been approved by the British Imperial War Council. Memo for S/W from Lovett, 15 Nov. 1942, in SAS 381. Cf. above, n. 17.
60. Ltr., Spaatz to CG ETOUSA, 9 Nov. 1942, in Plans, WP-III-A-2 #2. Cf. Plans Div. Digest, 5 Dec. 1942.
61. JCS 30, 1 May 1942; cf. ltr., Roosevelt to Mr. Donald M. Nelson, 1 May 1942, filed with JCS 30.
62. See CGC 97 series; cf. JF3 45, 15 Aug. 1942, memo from AC/AS Plans for JPS; JPS 29th Meeting, 19 Aug. 1942; notes on JPS 33d Meeting, 2 Sep. 1942 (Ref. JPS 51/D).
63. JCS 43d Meeting, 24 Nov. 1942 (Ref. JCS 134/2).
64. See above, p. 124-26.
65. AMPD-42.
66. Ibid.
67. Plan for Defeat of Axis Powers, 1 Dec. 1942; see above, p. 126.
68. Ltr., Kuter to Spaatz, 16 Sep. 1942, in MAG 381-F; Minutes, A/S Meeting, 29 Sep. 1942, in SAS; JCS 43d Meeting, 24 Nov. 1942 (Ref. JCS 134/2).
69. Ltr., Kuter to Spaatz, 16 Sep. 1942; JCS 38th Meeting, 20 Nov. 1942 (Ref. JCS 134); JCS 41st Meeting, 10 Nov. 1942 (Ref. JCS 146).
70. JCS 134, 19 Oct. 1942, and Incl. "C", dated 15 Oct. 1942.
71. Ibid.
72. JCS 38th Meeting.
73. Ltr., President to Nelson, 29 Oct. 1942, filed with JCS 146/10.
74. JCS 134/3, 26 Nov. 1942.
75. JCS 30, 5 Apr. 1942; JCS 41st Meeting.

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76. Memo for Col. E. C. Langmead, 25 Nov. 1942, filed with JCS 146/5, 30 Nov. 1942; JCS 43d Meeting, 24 Nov. 1942.
77. JCS 41st Meeting, 10 Nov. 1942. See also JCS 146 series passim; memo for AG/AS Plans from AG/AS A-4, 20 Nov. 1942, filed with JCS 146/2, 24 Nov. 1942.
78. JCS 146 series, passim. See especially, JCS 41st Meeting, 10 Nov. 1942, JCS 146/2, 24 Nov. 1942, JCS 146/7, 7 Dec. 1942.
79. Memo for Col. Langmead, 25 Nov. 1942; JCS 45th Meeting, 8 Dec. 1942 (Ref. JCS 146/7); JCS 186, 4 Jan. 1943.
80. JPS 51/1, 20 Oct. 1942; JPS 43d Meeting, 28 Oct. 1942 (Ref. JPS 51/1); JPS 44th Meeting, 4 Nov. 1942; JCS 41st Meeting, 10 Nov. 1942, and attached notes.
81. Ibid. See especially JPS 43d Meeting, 28 Oct. 1942, JCS 41st Meeting, 10 Nov. 1942. See also memo for Col. Langmead, 25 Nov. 1942.
82. JCS 43d Meeting, 24 Nov. 1942.
83. JCS 146, 5 Nov. 1942.
84. JCS 41st Meeting, 10 Nov. 1942.
85. JCS 146/1, 17 Nov. 1942, Tab A; JCS 146/2, 24 Nov. 1942 (memo by CG, AAF), and attached papers.
86. JCS 43d Meeting, 24 Nov. 1942.
87. JCS 146/5, 30 Nov. 1942, containing ltr., Leahy to Nelson, 26 Nov. 1942. See also attached papers, especially R&R, AFDA3 to A-4, 5 Dec. 1942.
88. JCS 146/6, 5 Dec. 1942.
89. JCS 186, 4 Jan. 1943.
90. JPS 62d Meeting, 3 Mar. 1943 (Ref. JPS 51/5); JCS 186/1, 6 Jan. 1942; JCS 54th Meeting, 18 Jan. 1943 (Casablanca); memo for CG AAF from Brig. Gen. B. E. Meyers, 25 Mar. 1943, in AAG 452.01-B; ltr., Lovett to Harry Hopkins, 25 Mar. 1943, in AAG 352.01; JCS 146/16, 6 May 1943; JCS 416/2, 10 June 1943.
91. JCS 45th Meeting, 8 Dec. 1942, and attached notes.
92. See above, Chap. I.
93. See above, Chap. II.
94. JCS 52d Meeting, 16 Jan. 1943 (Casablanca).

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95. Ltr., Spaatz to Arnold, 10 Nov. 1942, in Plans, WP-III-A-2 #2; ltr., Spaatz to Arnold, 31 Oct. 1942, in A-2 Lib., K-8822; ltr., Arnold to Eisenhower, 15 Nov. 1942, in Parton papers, AFSHO files; ltr., Arnold to Portal, 10 Dec. 1942, in AAC 381-A.
96. Digest of conversation between Eisenhower and Spaatz at Midewings, 29 Oct. 1942, in Parton papers.
97. See above, present chap., and n. 96 above.
98. Spaatz Daily Diary, 21 Oct. 1942, in Parton papers; digest of conversation, Eisenhower and Spaatz, 29 Oct. 1942.
99. Ibid.; ltr., Spaatz to Arnold, 31 Oct. 1942. See also above, present Chap.
100. See above, present chapter.
101. Ltr., Spaatz to Arnold, 31 Oct. 1942; digest of conversation, Eisenhower and Spaatz, 29 Oct. 1942; memo, Spaatz to CG ETOUSA, 19 Nov. 1942 (cf. memo, Spaatz to CG ETOUSA, 14 Nov. 1942); Meeting at Midewings, 23 Nov. 1942, in AAG 312.1-A.
102. Ltr., Spaatz to Arnold, 23 Nov. 1942.
103. Ltr., Arnold to Spaatz, 15 Nov. 1942; ltr., Arnold to Eisenhower, 15 Nov. 1942, both in Parton papers.
104. Eaker Rpt., Tab C, p. 3.
105. Msg., Eisenhower to Smith and Ismay, 3 Dec. 1942, in Eaker Secret File, AFSHO files; ltr., Eaker to Stratemyer, 6 Dec. 1942, in AAG 370.2.
106. Memo, AC/AS Plans to CG AAF, 2 Dec. 1942, in AAG 320.2-A; memo, AC/AS Plans to OPD, 3 Dec. 1942, in Plans, WP-III-A-2 #2; R&R, AFCAS to AFAEP, 20 Dec. 1942, comment 2, AFAEP to AFCAS, 28 Dec. 1942, in SAS 370.2; ltr., Arnold to Spaatz, 30 Dec. 1942, in Plans, WP-III-A-2 #2. At one point AAF Headquarters appears to have found Eisenhower's stopgap measures confusing. R&R, Arnold to Stratemyer, 17 Dec. 1942, in AAG 312.1-A.
107. Ltr., Arnold to Portal, 10 Dec. 1942. Cf. ltr., Stratemyer to Spaatz, 11 Dec. 1942, in SAS 381; ltr., Arnold to Hopkins, 16 Dec. 1942, in WP-III-B-1 #4; R&R, Arnold to Stratemyer, 17 Dec. 1942, comment 3, AFAEP to AFCAS, n.d., in WP-III-A-2 #2.
108. Ltr., Arnold to Spaatz, 30 Dec. 1942, in Plans, WP-III-A-2 #2.
109. Eisenhower was authorized to submit the plan for ETOUSA AF Hq to CCS in message OPD #606, 30 Dec. 1942. R&R, Arnold to Stratemyer, 17 Dec. 1942, comment 3, AFAEP to AFCAS, n.d.

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- 110. Msg., Eisenhower to CCS and British COS, 31 Dec. 1942; msg., Eisenhower to Marshall, 31 Dec. 1942, both in Eaker Secret File.
- 111. Directive, Eisenhower to Spaatz, 5 Jan. 1943, in Parton papers. Cf. msg., Eisenhower to CCS and British COS, 4 Jan. 1943, in same collection; CCS 139, 5 Jan. 1943.
- 112. Ltr., Arnold to Spaatz, 30 Dec. 1942.
- 113. Ltr., Eaker to Arnold, 11 Jan. 1943, in A-2 Lib., K-14347.
- 114. See above, present chapter.
- 115. Ltr., Arnold to Spaatz, 28 Dec. 1942, in AAG 381-A.
- 116. Ltr., Eaker to Arnold, 11 Jan. 1943, in A-2 Lib., K-14347; ltr., Eaker to Stratemyer, 8 Oct. 1942, in AAG 312.1-A.
- 117. See above, present chapter.
- 118. Draft attached to R&R, AFDCAS to AFABI, 11 Oct. 1942, in Plans, AMPD-42.
- 119. See above, present chapter.
- 120. Ltr., Kuter to Spaatz, 16 Sep. 1942, in AAG 381-F. Cf. ltr., Spaatz to Kuter, 5 Oct. 1942, in AAG 370.2.
- 121. Ltr., Arnold to Eaker, 18 Nov. 1942, in AAG 312.1-A.
- 122. R&R, AFDCAS to Dir. of Bomb, 25 Nov. 1942, in SAS 385; R&R, AFDCAS to Col. C. Cabell, 19 Nov. 1942.
- 123. See above, Chap. I. R&R, AFDCR to AFRCG, 14 Sep. 1942, in AAG 381-F; ltr., Stratemyer to Spaatz, 30 Sep. 1942, in SAS 370.2; Rickenbacker Rpt.
- 124. Ltr., A/C S. C. Strafford to AC/AS Plans, 13 Oct. 1942, in Plans, WP-III-A-2 #2.
- 125. Memo for B/N from Lovett, 15 Nov. 1942, in SAS 381. The subject paper is no longer attached to the memo, but is summarized therein.
- 126. Plans for Defeat of Axis Powers, 1 Dec. 1942. Cf. R&R, AFABI to AFDCAS, 27 Sep. 1942, in SAS 385.
- 127. Memo for Marshall from Arnold, 22 Aug. 1942, in SAS 385; cf. R&R, AFDCAS to Dir. of Mil. Requirements, 19 Aug. 1942, in SAS 385. For Spaatz message of 18 August reporting the results of the Rouen mission, see above, Chap. II.

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128. Special Studies of Bombing Results #1-3, Hq AAF, Dir. of Intel. Service, 19 Oct. 1942, in A-2 Lib., K-90712.
129. Ltr., Eaker to Arnold, 6 Dec. 1942; R&R, AFOS to AC/AS A-2, 21 Dec. 1942; ^{to} Arnold to Eaker, 2 Jan. 1943, in AAG 312.1-a.
130. Ltr., Spaatz to Stratemyer, 14 Sep. 1942, in AAC 370.2; ltr., Stratemyer to Spaatz, 30 Sep. 1942, in SAS 370.2. See above, Chap. II.
131. See above, Chap. II, p. 41, present Chap., p. 131; see also below, Chap. V, pp. 213-14.
132. CCS 155.1, 19 Jan. 1943. Cf. CCS 169, 22 Jan. 1943; CCS 58th Meeting, 16 Jan. 1943.
133. CCS 155.1; CCS 57th Meeting, 15 Jan. 1943.
134. CCS 55th Meeting, 14 Jan. 1943; CCS 57th Meeting, 15 Jan. 1943; Casablanca Conf., 2d Meeting, 18 Jan. 1943; CCS 169; JCS, Conf. with the President, 16 Jan. 1943.
135. Ibid.
136. CCS 57th Meeting; CCS 165/2, 22 Jan. 1943.
137. Eaker Rpt., p. 7; ltr., Eaker to Stratemyer, 30 Jan. 1943, in AAG 312.1-B.
138. Eaker Rpt., Tab. E, Exhibit 3.
139. Ibid.
140. Butcher MS, under d. 17 Jan. 1943.
141. JCS, Conf. with President, 15 Jan. 1943; Casablanca Conf., 2d Meeting; JCS 56th Meeting, 20 Jan. 1943; CCS 65th Meeting, 21 Jan. 1943. Cf. JCS 51st Meeting, 14 Jan. 1943.
142. CCS 55th Meeting; CCS 65th Meeting; CCS 155/1.
143. Ibid.
144. CCS 55th Meeting; CCS 58th Meeting, 16 Jan. 1943; JCS, Conf. with President, 16 Jan. 1943.
145. CCS 65th Meeting.
146. Ibid.
147. Memo for Maj. Gen. B. M. Giles, 8 Sep. 1943, in Plans, J&CCS Div., PD 384.3 (4-29-43), Sec. II.
148. Ibid.

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Chapter V

1. Figures have been taken from Statistical Summary of Eighth Air Force Operations, ETO, and from Tactical Mission Reports [T/M Rpts.]. See below, Chap. VI, for discussion of the logistical situation.
2. See above, Chap. III, for discussion of the antisubmarine problem.
3. Target Priorities of the Eighth Air Force, 15 May 1945, in A-2 Lib., KO-24068.
4. See above, Chap. IV.
5. An Evaluation of the Air Effort against Submarines, Intel. Serv., Hq AAF, 8 Mar. 1943, in AFSHO files.
6. Beginning with February, cables during this period which report Eighth Air Force missions to submarine or other objectives in occupied territory usually state that, weather conditions having made missions to Germany impossible, targets in occupied countries had been selected. E.g., CM-IN-14209 (2-28-43), USAINW to WAF, #10, 27 Feb. 43.
7. Evaluation of Air Effort against Subs; RAF Bomber Command Quarterly Review, Jan.-Mar. 1943, in A-2 Lib.
8. Ibid.; USSBS, German Submarine Ind. Rpt., 3 Nov. 1945, in AFSHO files.
9. Ibid.
10. T/M Rpts., #31, 37, 46, 56, 59.
11. Ibid., #45; Ind. Dmg. Rpt. #69, 30 Apr. 1943, in A-2 Lib., K-24250.
12. USSBS, Bremer Vulkan, Vegesack, 30 Oct. 1945.
13. USSBS, Sub. Ind. Rpt.
14. Ibid.
15. T/M Rpts., #30, 36, 38, 40, 51, 53, 55, 58, 61.
16. RAF Bomb Comd. Quart. Rev., Jan.-Mar. 1943.
17. OCS Rpt., 15 Mar. 1943, in A-2 Lib., K-15943; T/M Rpt. #61, see especially Interp. Rpt. #K3.87A, 22 June 1943.
18. Quoted in USSBS, Sub. Ind. Rpt., p. 19.
19. Ibid.
20. Naval Attaché Rpt., 17 Feb. 1943, in A-2 Lib., K-17642.

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21. Summary of Eighth AF Heavy Bomber Operations as Called for in the CBC Plan, First Phase, 1 Jul. 1943, in COA papers, file "Bomb Damage." Cf. Navy Intel. Rpt., London, 6 May 1943, in A-2 Lib., K-24265 which embodied the report of a Polish official who was supposed to have had information from an eye witness.
22. The Strategic Bombardment of Europe, 10 Dec. 1943, prepared by AC/AS Intel.
23. Rpt., IAF Eval. Bd., ETO, 28 Oct. 1944, in A-2 Lib., K-93145.
24. USSBS, Sub. Ind. Rpt.; ibid., interview #50, 28 June 1945, in AF3HO files.
25. USSBS, Sub. Ind. Rpt.
26. T/M Rpts. #43, 50, 52, 55, 56, 58.
27. USSBS, Plant Rpt. #5, Focke-Wulf Aircraft Plant, Bremen.
28. T/M Rpts. #39, 41, 42, 43, 47.
29. Ibid. #41, 42, 47; Rpt., Air Intelligence, British Joint Staff Mission; Ind. Dmg. Rpt. #69, 30 Apr. 1943, in A-2 Lib., K-24250; Rpt., Railway Research Service, 20 Mar. 1943, in A-2 Lib., K-23890; OSS Rpt. #281/43, 7 Apr. 1943, in A-2 Lib., K-23181.
30. Ind. Dmg. Rpt. #74, 11 Nov. 1943, in A-2 Lib., K-41388.
31. RAF Bomb Comd. Quart. Rev., Jan.-Mar. 1943.
32. T/M Rpts. #49, 54, 56; Ind. Dmg. Rpts., #70, 29 May 1943, in A-2 Lib., K-25882, and #72, 12 Aug. 1943, in A-2 Lib., K-31975.
33. See above, Chap. IV.
34. See CCS 166/2, 15 May 1943 and enclosed msg., #0013, Andrews to Marshall, 23 Apr. 1943.
35. Navy Intel. Rpt., 9 Dec. 1943, in A-2 Lib., K-40214; OSS Rpt. #P.1/4061, 9 Feb. 1943, in A-2 Lib., K-16108; CSS Rpt., #P.1/4651, 25 Mar. 1943, in A-2 Lib., K-21401.
36. US Liaison Rpt. from France, 23 Apr. 1943, in A-2 Lib., K-31335.
37. Ibid.; Navy Intel. Rpt., 9 Dec. 1943.
38. JCS 341, 27 May 1943.
39. Navy Intel. Rpt., 9 Dec. 1943.
40. CCS 166/2; CCS 166/3 (embodying proposals presented originally as JCS 341); CCS 97th Meeting, 4 June 1943; memo, by G/AS to all AC/AS, 30 Apr. 1943, in SAS 385.

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41. See above, Chap. IV.
42. Allan A. Michie, The Air Offensive Against Germany, New York, 1943.
43. New York Herald Tribune, 19 Feb. 1943, editorial; cf. memo for Arnold from Lovett, 19 Feb. 1943 and attached ltr., Foster to Arnold, 22 Feb. 1943, in SAS 385; CM-IN-95731 (1-21-43), USFOR to AGWAR, #6595, 21 Jan. 43; see also memo for Stratemyer from Sorensen, 13 Apr. 1943, in SAS 385.
44. See below, Chap. VI; ltr., Eaker to Stratemyer, 19 Feb. 1943, in AAG 312.1-B; CM-IN-4057 (3-8-43), USSOS to WAR, #300, 8 Mar. 43.
45. T/M Rpts.
46. Eaker Rpt.
47. See above, Chap. IV, and below, Chap. VI; int., Brig. Gen. H. S. Hansell, 9 Aug. 1943, in A-2 Lib., K-30922; int., crew of 324th Sq., 91st Gp., 19 Mar. 1943, in A-2 Lib., K-16497.
48. T/M Rpt. #31.
49. Ibid.; 8th AF Weekly Air Intel. Sum., 13 Feb. 1943, in A-2 Lib., K-16232.
50. See above, Chap. III.
51. T/M Rpt. #32.
52. Ibid. #37.
53. Ibid.
54. Ibid.
55. See above, Chap. III.
56. T/M Rpts. #36, 37, 46.
57. Ibid. #39; CM-IN-2432 (3-5-43), USAWW to WAR, #221, 5 Mar. 43.
58. T/M Rpts., passim.
59. CM-IN-14665 (2-28-43), USAWW to WAR, #41, 28 Feb. 43.
60. T/M Rpt., #45; CM-IN-11505 (3-22-43), USFOR to WAR, #771, 21 Mar. 43; CM-IN-10753 (3-20-43), USAWW to WAR, #707, 19 Mar. 43; ltr., Eaker to Arnold, 19 Mar. 1943, in AAG 312.1-B; ltr., Eaker to Longfellow, 24 Mar. 1943, in VIII Bomb Comd. Diary, under d, 25 Mar. 1943.

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61. See above, Chap. III.
62. T/M Rpts. #30, 36, 38, 40.
63. Ibid.
64. Ibid.
65. Ibid., #39, 41, 42, 43, 47, 48.
66. Ibid., #43; Eighth Air Force Tactical Development, August 1942 to May 1945, prepared by 8th AF and AAF Eval. Bd., ETO, 9 Jul. 1945, Chap. II.
67. T/M Rpt., #41.
68. Ibid., #49, 50, 51.
69. Ibid.
70. Ibid., #52; CM-IN-12237 (4-20-43), USFOR to WAF, #267, 20 Apr. 1943.
71. Ibid., #52.
72. Ibid.
73. See above, Chap. III; 8th AF Tac. Devel., Chap. I.
74. T/M Rpt., #52.
75. 8th AF Tac. Devel., Chap. V; cf. ltr., Eaker to Arnold, 11 Jan. 1943, in AAG 312.1-B; memo for CG AAF from AC/AS Intel., European Theater Officer, 6 Apr. 1943, in A-2 Lib., K-44054.
76. USSBS, The Defeat of the German Air Force; 8th AF Tac. Devel., Chap. V.
77. USSBS, Defeat of GAF; An Evaluation of Defensive Measures Taken to Protect Heavy Bombers from Loss and Damage, Opns. Anal. Sec., Hq 8th AF, Nov. 1944, p. 94, gives 18.9 per cent for the month of June 1943. See also T/M Rpts., passim.
78. See above, Chap. III.
79. Memo for Dir. of Bomb from Brig. Gen. F. L. Anderson, 31 Jan. 1943, in SAS 370.2; int., Capt. H. L. Stouse, 10 June 1943, in A-2 Lib., K-26776.
80. See T/M Rpts., especially #38, 42, 43.

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81. Memo for Dir. of Bomb from Anderson, 31 Jan. 1943; ltr., Stratemyer to Eaker, 7 Jan. 1943, in AAG 370.2; Intel. Memo, Hq VIII Bomb Comd. 3 May 1943, Effect of Fighter Escort on B-17 Losses, in A-2 Lib., K-24072.
82. Hist., VIII Ftr. Comd., in AFCHO files; 8th AF Tac. Devel., Chap. II; Eaker Rpt., Tab C; CM-IN-4168 (3-9-43), USAWW to WAR, #331, 8 Mar. 43; CM-IN-450 (2-2-43), London to WAR, #933, 1 Feb. 43; ltr., Stratemyer to Eaker, 7 Jan. 1943; radiogram, Allied AF to AGWAR, #408, 25 Jan. 1943; ltr., Eaker to Giles, 13 May 1943, in AAG 312.1-B; CM-IN-5642 (5-9-43), USAWW to WAR, #815, 8 Mar. 43; CM-IN-5880 (3-12-43), USAWW to WAR, #427, 11 Mar. 43; CM-IN-7903 (3-15-43), USAWW to WAR, #570, 15 Mar. 43.
83. CM-IN-10127 (4-17-43), USAWW to USFOR, #744, 17 Apr. 43; Hist., VIII Ftr. Comd.
84. 8th AF Tac. Devel.; Eaker Rpt., Tab C; ltr., Eaker to Giles, 13 May 1943, in AAG 312.1-B; CM-IN-5642 (5-9-43).
85. CM-IN-7811 (4-14-43), USFOR to WAR, #375, 8 Apr. 43; ltr., Eaker to Giles, 17 Apr. 43, in AAG 312.1-B.
86. T/M Rpt., #54; Hist., VIII Ftr. Comd.
87. T/M Rpts., #55, 56.
88. Ibid., #61. Cf. Intel. Memo, Hq VIII Bomb Comd., 3 May 1943.
89. T/M Rpt., #60.
90. Ibid., #56, 57, 58, 59.
91. Stat. Sum., 8th AF.
92. T/M Rpt., #56 (see A-2 Lib. folder in particular).
93. Ibid.
94. Ibid.; CM-OUT-4825, CG AAF to CG ETO, #R-6631, 12 Mar. 43; CM-IN-8565 (3-17-43), USAWW to WAR, #607, 16 Mar. 43.
95. T/M Rpt., #56.
96. Ibid., #58; ltr., Eaker to Giles, 28 May 1943, in AAG 312.1-B; CM-IN-16992 (5-29-43), USAWW to WAR, #D-1184, 29 May 43.
97. These figures are taken where possible from Stat. Sum., 8th AF. However, some breakdowns in Evaluation of Defensive Measures, compiled by ORS, 8th AF, are handier and have consequently been used. The two sources seldom agree in detail, but they are usually not far enough apart to affect any general conclusions based on them.

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98. Ibid.
99. See above, Chap. III.
100. Advantage of Dropping on the Leader over Sighting Individually for Range When Bombing in Formation, CRS Rpts., Vol. I, #2, 20 Mar. 1943. Memo as to Desirability of Shortening Group Bombfall Patterns . . . , 7 May 1943, CRS Rpts., Vol. I, #3. See also CRS Rpt., Analysis of VIII Bomber Command Operations from the Point of View of Bombing Accuracy, 1 Jan. 1943 to 15 Oct. 1943.
101. Ltr., Eubank to Eaker, 31 Mar. 1943, in MAG 312.1-B; int., Lt. Col. J. B. Montgomery, 13 Apr. 1943, in A-2 Lib., K-32358; CM-IN-14043 (4-23-43), USAAF to WAR, #5656, 23 Apr. 43; CM-OUT-9045 (3-24-43), CG AAF to CG 8th AF, #A-1873, 23 Mar. 43.
102. Ibid. See also CRS Rpt., VIII Bomb Comd. Bombing Accuracy, 1 Jan. to 15 Oct. 1943.
103. CRS Rpt., VIII Bomb Comd. Bombing Accuracy, 1 Jan. to 15 Oct. 1943.
104. Ibid.; see also T/M Rpts., passim.
105. Ibid., esp. T/M Rpts., #59, 60.
106. Ibid.; cf. CRS Rpt., 12 May 1943, Comparison of Bombing Results in Relation to the Order in Which Participating Groups Reached the Targets.
107. T/M Rpts., #56, 57, 59; CM-IN-18701 (5-29-43), USAAF to WAR, #D-1174, 28 May 43.
108. CM-IN-10753 (3-20-43), USAAF to WAR, #707, 19 Mar 43; ltr., Eaker - to Arnold, 19 Mar. 1943, in MAG 312.1-B; CM-OUT-8161 (3-22-43), CG AAF to CG ETO, #R-6840, 22 Mar. 43.

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Chapter VI

1. Statistical Summary of Eighth Air Force Operations, European Theater, 17 Aug. 1942 to 8 May 1945 [Stat. Sum., 8th AF], compiled by Office of Statistical Control, Hq AAF, 10 June 1945, copy in AF3HO files.
2. Ibid., p. 14; CM-IN-1215 (2-3-43), London to AGMAR, #977, 2 Feb. 43; ltr., Eaker to Stratemyer, 19 Feb. 1943, in AAG 312.1-B; rpt., Brig. Gen. F. L. Anderson (n.d.), quoted in excerpt in R&R, Dir. of Bomb to AG/AS A-3, 12 Feb. 1943, in Plans, WP-III-A-2 #2. For the problem of crew morale see int., Brig. Gen. H. S. Hansell, 9 Aug. 1943, in A-2 Lib., K-30922.
3. CM-IN-302 (3-1-43), USAF to WAR, #55, 1 Mar. 43; CM-IN-2926 (4-5-43), London to WAR, #2463, 5 Apr. 43. Cf. ltr., Anderson to Stratemyer, 2 Mar. 1943, in AAG 312.1-C.
4. In a letter to Arnold, 1 Mar. 1943, Air Marshal D. C. S. Evill said that Portal directed him to emphasize that "his sole object in sending this message is that it may be available to you as support for action toward the build-up of the U.S. Bomber Force in U.K."
5. Msg., Portal to Arnold (d. 19 Feb. 1943, according to external evidence), in Plans, WP-III-A-2 #2; msg., Portal to Arnold, 1 Mar. 1943, in same file.
6. Quoted in Hist., VIII AFSC, Chap. IV, p. 25.
7. Ibid., pp. 27-9.
8. CM-IN-302 (3-1-43), USAF to WAR, #55, 1 Mar. 1943.
9. Ltr., Arnold to Eaker, 24 Mar. 1943, in Hist., VIII AFSC, Chap. IV, docs.
10. Hist., VIII AFSC, pp. 4-6; cf. msg., RAF Delegation, Washington to Air Ministry, 5 Feb. 1943, in ibid., docs.
11. Ltr., Arnold to Foster, 3 Mar. 1943, in Plans, WP-III-A-2 #2.
12. CM-OUT-3936 (3-11-43) AG/AS AFDP to CG ETO, #R-6562, 11 Mar. 43.
13. The following extract from the summary of tentative assignment of tactical units, made in accordance with revised troop basis, ETCUSA, and dated 16 January 1943, shows the monthly quotas planned at that time for the Eighth Air Force in heavy bombers:

Units remaining in U.K.
after withdrawal for

<u>Special Operations</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>
7	2	2	1	1	2	2	2	1

Revised Troop Basis ETCUSA, copy in files of Ops Br., AF3HO.

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14. JCS 238/3, 21 Mar. 1943; CM-IN-13932 (2-16-43), London to AGRAR, #8194, 26 Mar. 43; CM-IN-7241 (2-14-43), London to WAR, #7248, 14 Feb. 43; CM-OUT-5113 (2-15-43), Hq AAF, A-3 to London, #R-5889, 15 Feb. 43; CM-OUT-2033 (4-5-43), Hq AAF, AFAP to CG ETO, #R-7303, 5 Apr. 43; ltr., Stratemyer to Eaker, 8 Mar. 1943, in AAG 312.1-B.
 15. Ltr., Stratemyer to Eaker, 7 Feb. 1943, in AAG 312.1-A; CM-IN-2562 (2-5-43), London to WAR, #6989, 5 Feb. 43; CM-IN-2178 (4-4-43), London to WAR, #8433, 3 Apr. 43; ltr., Eaker to Stratemyer, 26 Feb. 1943, in AAG 312.1-B.
 16. Ltr., Stratemyer to Eaker, 7 Feb. 1943; memo for Arnold from AG/AS Plans, 25 Apr. 1943, in Plans, WF-III-A-2 #2; CM-OUT-2033 (4-5-43), Hq AAF to CG ETO, #R-7307, 5 Apr. 43. The direct effect of diversions, as far as heavy bombers were concerned, was felt mainly in the B-24's, which were considered more suitable than the B-17's for service in the Pacific and Asiatic areas and for antisubmarine patrol. Form SC-X-62's for Feb, May, and June 1943 (HB Allocations), in Off. of Stat. Control. See also AAFRH-7.
 17. Ibid.
 18. Stat. Sum., 8th AF, p. 14.
 19. Preshipment to the ETO, historical LSC prepared by Control Div., AAF.
 20. CM-IN-9389 (2-1-43), London to WAR, #7354, 18 Feb. 43.
 21. SOS Monthly Progress Reports, see in each number Sec. 3, Transportation.
 22. Preshipment to ETO. Cf. Diary, Dir. of Mil. Req., Air Service Div., EW&D, 20 Apr. 1943, both in custody of Admin. Hist. Br., AFSHC.
 23. Plans Div. Digest, 17 Mar. 1943; ltr., Anderson to Stratemyer, 2 Mar. 1943.
 24. Ltr., Eaker to Stratemyer, 26 Feb. 1943; CM-IN-302 (3-1-43), USAF to WAR, #55, 1 Mar. 43; ltr., Eaker to Stratemyer, 2 Mar. 1943, in SAS 370.2.
 25. Ltr., Stratemyer to Eaker, 6 Mar. 1943, in AAG 312.1-B; cf. Plans Div. Digest, 17 Mar. 1943.
 26. Hist., VIII AFSC, Chap. IV; Operation TORCH, in AFSHC files.
 27. Msg., Portal to Arnold, 1 Mar. 1943.
 28. Ltr., Stratemyer to Evill, 12 Mar. 1943.

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29. CM-OUT-10312 (1-30-43), CG IAF to CG EIC, #R-5494, 29 Jan. 43;
CM-IN-424 (2-1-43), London to AGWAR, #930, 1 Feb. 43.
 30. Ltr., Arnold to Eaker, 19 Apr. 1943, in AAG 312.1-B.
 31. Stat. Sum, 8th AF, p. 9.
 32. JCS 313, 12 May 1943.
 33. CCS 83d Meeting, 13 May 1943; CCS 235, 18 May 1943.
 34. Hist., VIII AFSC, pp. 9-10.
 35. Msg., AGWAR to USAWW, #R-7578, 14 Apr. 1943, in ibid., docs.
 36. Ltr., Arnold to Maj. Gen. Pollett Bradley, 1 May 1943, quoted in
extenso in ibid., pp. 10-11.
 37. Ibid., pp. 6, 10-13.
 38. CCS 244/1, 25 May 1943, Annex IV, App. A. See below, present Chap.,
for discussion of CBO Plan.
 39. Hist., VIII AFSC, Chap. IV, p. 6.
 40. General Giulio Douhet, The Command of the Air, New York, 1942, pp. 50,
59-60, quoted in Air Force Objectives, an address delivered before
the Army Navy Staff College, 13 Aug. 1943, by Brig. Gen. Edgar P.
Sorensen, AC/AS Intel., in AFSHO files (COA Papers).
 41. See below, present chapter.
 42. The following analysis is adapted from the more or less official
account contained in Air Force Objectives.
 43. Vulnerability to Air Attack and Lists of Most Important Targets,
Air Targets Intelligence, Air Ministry, A.I.1(b), 24 July 1939.
Cf. Priorities for Bombing Attack among Economic Targets in German
Europe, MEM, 8 Jan. 1942; Lecture Notes on Air Targets Intelligence,
Organization and Duties of A.I.9 (Air Ministry). All the above
papers in A-2 Lib.
 44. Considerable light has been thrown on this phase of the subject by
Lt. Col. Malcolm W. Moss, then chief of the Target Information
Section, A-2, and by Prof. Edward M. Earle of the Institute for
Advanced Studies, Princeton.
 45. See copies of Air Estimates in A-2 Lib.
 46. Ibid.
 47. Notes from History of the Organization and Operation of the COA by
Col. Guido R. Perera, in Parton papers, AFHQ files. Cf. AWPD-42.
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48. Directive, Arnold to AC/AS Management Control, 9 Dec. 1942, in Report of Committee of Operations Analysts, 8 Mar. 1943 [COA Rpt.], copy in custody of Combat Opns. Br., AAF Hist. Off.
49. Ibid.
50. Notes from Hist. of COA.
51. Thomas W. Lamont joined the Committee on 7 Jan. 1943. Ibid.
52. See COA Papers, in custody of Comb. Opns. Br., AAF Hist. Off.
53. Ibid., file entitled COA General.
54. Ibid.; cf. reports to COA by subcommittees on the various industries examined. Complete file in A-2 Lib.
55. Notes from Hist. of COA.
56. See Subcommittee Rpts.
57. COA Rpt., 8 Mar. 1943.
58. Int., Edward M. Earle, 7 Nov. 1945.
59. Cf. USCEB, Over-all Report (European War), 30 Sep. 1945.
60. Ibid.
61. Ibid.
62. Ibid. Cf. Rpt. to COA by Subcommittee on Axis Oil Industry.
63. See COA Papers, file entitled "Oil."
64. USCEB, Over-all Rpt.; cf. Special Oil Rpt., in AFCHO files.
65. Ibid.
66. Ibid.
67. Ibid. Cf. Rpt. to COA by Subcommittee on Western Axis Rubber.
68. See above, Chap. III.
69. USCEB, Over-all Rpt. Cf. The Strategic Bombardment of Europe, 10 Dec. 1943, prepared by AC/AS Intel., which comes to a similar conclusion.
70. Ibid.
71. Ibid.

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72. Ibid.
73. Ibid.
74. Ibid.
75. Ibid.
76. Notes from Hist. of COA.
77. Ltr., C. G. Vickers, LEM, to Portal, 3 Apr. 1943, in USSBS files, #322; see also attached detailed comments on COA Rpt.
78. Eaker Rpt., Tab E, p. 3.
79. Ibid. Cf. Notes from Hist. of COA.
80. The Attack on the GAF, 9 Apr. 1943, prepared by Air Staff, Air Ministry, copy in custody of Comb. Opns. Br., AAF Hist. Off.
81. Eaker Rpt. Tab E; ltr., Portal to Arnold, 15 Apr. 1943, Incl. A to CCS 217, 14 May 1943; ltr., Arnold to Portal, 22 Apr. 1943, in SAC 370.2.
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83. JCS Special Meeting, 29 Apr. 1943, ref. JCS 277. This paper presented by Eaker, which became JCS 277/1, is substantially the one finally adopted as CCS 217, which has been used as the basis for the analysis of the CEO Plan herein following.
84. Ibid.
85. AAFD-1, 12 Aug. 1941, in AFAEP files, Office of Security Officer.
86. Plan for the Initiation of Air Force Bombardment in the British Isles, 20 Mar. 1942, in AFAEP files, Office Services Div.
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90. JCS 77th Meeting, 4 May 1943.
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- 92. CCS 85th Meeting, 15 May 1943; CCS 87th Meeting, 18 May 1943;
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- 93. CCS 85th Meeting; CCS 87th Meeting; ltr., Portal to Arnold,
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- 94. CCS 87th Meeting.
- 95. CCS 242/6, 25 Mar. 1943 (final report on TRIDENT decisions to the
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- 96. Eaker Rpt., Tab E, Exhibit 8; CCS 138, 2 Jan. 1943.
- 97. Ltr., Arnold to Eaker, 22 Apr. 1943, in SAS 370.2.
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