D785
.U551

DO NOT DESTROY.

UNCLASSIFIED

REFERENCE HISTORY

by authority of [redacted] AAF, Hist Div
AG 314.7 OpS 3
Date: 5/5/55 - Kathleen Hosc

REG NO. 5

TO THE ARCHIVES

Copy 5

81-10

By Authority [redacted]
The Commanding General
Army Air Forces
15 Oct. 46 (MR)
Date Initials

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

(Short Title: ~~AAFRH-18~~ USAF Hist. Study 118)

LIBRARY
ARMED FORCES STAFF COLLEGE

CLASSIFICATION REMOVED
authority of ltr, Director, Advanced Studies Institute, University dtd 15 June 59
6-22-59 NG, Lib AFSC

[redacted]

'57

18561

AAF HISTORICAL OFFICE
HEADQUARTERS, ARMY AIR FORCES

UNCLASSIFIED
[redacted]

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
1946	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
The Early Operations Of The Eighth Air Force And The Origins of the Combined Bomber Offensive	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **AAF Historical Office Headquarters, US Army Air Force**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
JFSC - WW II Declassified Records.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**362**	

The Commanding General
Army Air Forces
15 OCT. 46
Date
Initials

REFERENCE HISTORY

CONFIDENTIAL

UNCLASSIFIED

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

17 August 1942 to 10 June 1943

(Short Title: ~~AAFHH-18~~)
USAF Hist Study 118

AG 18561

Prepared by
AAF Historical Office
Headquarters, Army Air Forces
October 1946

UNCLASSIFIED
CONFIDENTIAL



LIBRARY
ARMED FORCES STAFF COLLEGE

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.

[redacted]

CONTENTS

I THE PROBLEM 1

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

The First 14 Missions 18
Factors Limiting Operations 43
Directives of 20 and 29 October 1942 56

III OPERATIONS AND OPERATIONAL PROBLEMS, 21 OCTOBER 1942 TO 13 JANUARY 1943

The German Submarine Bases 62
Other Objectives: Enemy Aircraft and Transportation . . 87
Operational, Logistical, and Tactical Problems 99

IV THE DEVELOPMENT OF POLICY FROM AUGUST 1942 TO JANUARY 1943

Basic Strategy: AAF and British Views 123
Problems of Basic Strategy 132
Aircraft Production: the Problem of Priorities 151
Problems of Control 163
The Case for Bombardment 174
The Casablanca Conference 182

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

The Strategic Contribution 196
The Tactical Problem 213
Conclusion 252

VI PLANNING FROM CASABLANCA TO TRIDENT

Logistical Considerations 255
The Problem of Target Selection 268
The Operational Plan: Organization of the CBO 301

GLOSSARY 311

NOTES 313

BIBLIOGRAPHICAL NOTE 349

INDEX 350

[redacted]

MAP

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

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

UNCLASSIFIED

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.

UNCLASSIFIED

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 bedrock 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 5 heavy

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 1941, 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 these 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 (AWPD-42) which came down

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 prosecuted on too limited a scale to do more than hint at the possibilities inherent in the employment of really large bombardment forces. And scale, 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 abstract, 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.

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 AAF was necessary to such an offensive, and since the AAF had become committed for the immediately forseeable 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,

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 (SLEDGEHAMMER), 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]

The decision to mount TORCH, 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 seem 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

LIBRARY
ARMED FORCES STAFF COLLEGE
37596

to organize, base, and equip a force of AAF 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 Brampton, the second, under Col. J. P. Hodges, with headquarters at Old Catton, and the third, under Col. C. T. Philips, with headquarters at Elveden 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 3/4 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,

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

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. M. 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

itself.[13] Theirs 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

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.

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;

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 bombsight, 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

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 Baker 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 Directif on Day Bomber Operations involving Fighter Cooperation," dated 23 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

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 forces 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) (Opn.) 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 forces would provide its own fighter cover, all tactical planning was to be

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 RAF 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.

Chapter II

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 Command[1] 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

SECRET

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 happily 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 Buddicum rolling-stock repair shops.[5] Germany's shortage of locomotives and rolling stock had become acute since April 1942.

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 B-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 25,000 feet. Three of the bombers had been loaded with 1,100-pound bombs intended for the locomotive workshop, the rest carried 600-pounders ear-marked for the Buddicum shops.[8]

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

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. Fighter opposition was negligible. Three 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 Eaker 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 blase. 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 Eaker 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 Satteville Yard was, after all, considerably larger than a pickle-barrel), pilotage of such a high order that

a tight yet manoeuverable 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 Abbeville/Drucat 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 Abbeville 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

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 89 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 Maritime de la Seine, at Le Trait; the well-equipped airplane factory of Avions Potez at Meaulte, an installation used extensively by the enemy as a repair depot for the near-by fighter base; and the Courtrai/Wevelghem 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/Wevelghem, had been subject to RAF attacks, in each case on a small scale.[19]

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 Wilton 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

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 Eaker 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 48 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 Wilton 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

mission than any hitherto staged. Thirty-seven B-17's took off, 25 from the now experienced 97th Group and 12 from the 301st, 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

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 Fortresses 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 Avions Potez aircraft factory at Meaulte. In order to keep enemy fighters on the ground and provide a diversion for the main force, 13 B-17's of the 301st Group attacked the German fighter airdrome at St. Omer/Longuenesse. Probably for a similar reason,

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.

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 Eighth 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, 68 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 Meaulte. Six of the heavies attacked the German fighter airdrome at St. Omer/Longuenesse 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 5 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 airdrome facilities, and several direct hits were scored, was swallowed up in the

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

Lille, and seven additional B-17's flew a diversionary sweep to Cayeux. Of the total aircraft detailed, 69 attacked the primary target,[39] 2 bombed the alternative target, the Courtrai-Wevelghem airdrome in Belgium, 6 attacked the last resort target, the St. Omer airdrome, 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 HE 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 80 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

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 Hellemmes 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

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 welcomed, and heartily, in AAF circles, but for a different reason. Again, as in the Potes 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 FW-190's concentrated on the bombers to the practical exclusion of the combined British and U. S. fighter escort, which in this instance numbered 158 aircraft including 56 P-38'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 18 wounded; four B-17'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

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 28, 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 60 enemy aircraft could have intercepted. By 24 October the claims had been scaled down to 25, 38, and 44. 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 AAF 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

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.

Eighth Air Force commanders were therefore in an optimistic mood by 9 October 1942, and, in a measure, justifiably so. Possibly the early expressions 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 30 per cent within the one-mile radius, 40 per cent within 800 yards, 25 per cent within 280 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

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 25,000 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 Generals Spaatz

and Eaker 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 Eaker'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.

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 the AAF day bombers and the policy of day bombardment showed surprising promise. As early as 24 August, General Spaatz reported a significant change of mind on the part of the RAF. In a statement which, among other things, indicates how tentative had been the British official acceptance of the American bombardment doctrine, he stated that the RAF 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,

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 Bednall 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 Masefield, 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 28 August he admitted that "The Fortress

bombers have done particularly well in their taming-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 USAAF 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, unhampered 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

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 Eaker 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

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.

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 Directif" of 20 August 1942, American fighters were gradually to assume a larger share in the joint fighter operation, and as their experience and forces 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 made 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

the RAF. These units were formally taken over by the VIII Fighter Command on 29 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 S-5) 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

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 AAF fighter groups of the VIII Fighter Command were transferred to the XII 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 AAF 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. K. On 8 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

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 elder 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 301st 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 offices 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

abortive 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 Fighter 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. K. 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. K. 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

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 8 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 employing bad weather as a cloak for small blind-bombing operations.[88] Plans were in fact already made for these "moling" missions which, it was hoped, by the use of the most advanced navigational and bombing devices, would make it possible for single B-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]

What bothered the Eighth Air Force commanders most about both the diversion to TORCH 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 GAF had its hands full. The British night

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 B-17 attacks 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 B-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 Danzig. 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

(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 Spaatz 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 FW-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 B-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

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 3,186 officers, 24,124 enlisted men, and 34 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

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 Eaker 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

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 Baker 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 Stratemeyer somewhat earlier in October] have been very easy for us [Generals Spaatz and Baker] 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.

Directives of 20 and 29 October 1942

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, had hitherto dictated target priority. According to the "Joint Directif" 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 RAF policy, adapted to fit the peculiar powers and limitations of the American day bombers.

The new directive of 20 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

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. Malo. In second priority came the aircraft factories and repair depots at Mesulte, Cazelles, Antwerp, and Courcelles, and the airfields referred to as Courtrai/Wevelghem, Abbeville/Drucat, St. Omer/Fort Rouge, Cherbourg/ Maupertus, Beaumont/Le Hoger, 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 13 October General Eisenhower

wrote to General Spaatz 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 Spaatz 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

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

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

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]

Chapter III

OPERATIONS AND OPERATIONAL PROBLEMS, 21 OCTOBER 1942 TO 15 JANUARY 1943

The 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

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, Lubeck, and Emden, 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 Emden 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

"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. Even 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

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, time became 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]

Two 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,

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]

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 30 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

yards and factories.[11] 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. P. 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 pledged 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

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-Keroman. Bad weather forced all but the most experienced group to return, leaving only 18 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 53 night raids, dropping 396.1 tons of bombs, mainly on the town itself.[14]

[redacted]

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 30 high-explosive bombs, each weighing one ton. With the exception of a few which fell some 1,100 yards from the pens, most of the bombs fell in the immediate target area. Of the 30 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 once, 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.

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--18 aircraft--could only have been their own planes. The mission temporarily discredited the Quislings, 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 defenses at Lorient 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 B-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 relish or optimism. It was not only a regrettable, even if necessary,

diversion of effort from the main mission of his 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 pens themselves would be virtually impervious 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 5,000 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 4,000 feet. In which 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-38's or P-47's were on hand) the bombers would

[redacted]

be without fighter support over the objective. And, finally, the crews left after the recent departure of the 97th and 301st Groups were by no means seasoned, especially the gunners.[21]

On 9 November, after an attack of indifferent accuracy and effect against Brest 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 prohibitive losses, those hopes were dampened by this experiment of 9 November.[22] Thanks to a well-planned course and a large diversionary mission flown by the RAF, 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 18,300 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, fared much worse. In the neighborhood of St. Nazaire they ran into very intense flak, extremely accurate both in altitude and deflection. 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

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 344 bombs dropped could be plotted from strike and reconnaissance photographs. Of these, eight burst within 500 feet of either of the two aiming points, which consisted of the shops of Chantiers et Ateliers de Penhoust 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. Two others had been rendered unserviceable by the British in a commando raid during the spring of 1942. No attempt was made to hit the KO-pen 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

depot lay unrestored 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 Eighth 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 17,500 to 22,000 feet which, up until the mission against St. Nazaire on 3 January 1943, 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 Brest 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

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 23 November. In all, 158 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 Penhoust, 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 mauled, and hits were scored on the locomotive depot and the station buildings. The gas, electric, and water services in the port were reported out, leaving work in the submarine pens to be carried on by means of kerosene brought from some distance.[30]

According to one account, obtained from a German naval prisoner of war, work continued after the AAF 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, 18 and 22 November, and 30 December. The shelters under construction had been hit three times with undetermined results. It was estimated that the radial 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.

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 Biscay bases, had suffered crippling effects. But the rapid recovery of that port after 23 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 23 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 542 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

the 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 Penhoust 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

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 5 January 1943, the Eighth Air Force, out of an effective total strength of 870 aircraft, had dispatched 663 against the submarine bases, of which 357 actually attacked the target, dropping 655.2 tons of bombs on or in the vicinity of the objective. Of this total of bombs dropped, photographic estimates indicated some 98 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 28 aircraft lost. Claims originally registered included 81 German fighter planes destroyed, 49 probably destroyed, and 38 damaged. Subsequent review revised this score to 24/64/12.[38]

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 had 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 unwonted 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 Room 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 warmly appreciative of the U. S. attacks, if necessarily vague in specifying their reasons. After the attack of 20 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 complement to the offensive

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 Biscay ports."[42]

> It is too early [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 embarrassed 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

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. But, as General Baker undertook to explain to him in a letter of 11 January 1943, the situation was less serious than it appeared. If the RAF were to admit that the submarine pen 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 RAF continue to bomb German industry in Germany. It would therefore be necessary to put up with criticism, understanding the reason for it.[45]

USAAF Headquarters had other misgivings about the submarine base bombing. While generally elated 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] Then there

was the matter of the relatively high losses sustained during the last two missions (10 aircraft out of a total of 106 attacking).

Probably in an effort to allay doubts in AAF 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 hours of 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 were 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 2 January 1945, "and shall continue to knock down better than 6-1 enemy fighters for our bomber losses. This is, we 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 Brest 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 Attaché report from London compared

the bombing 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 1943, 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 paralyse 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 neutralise these five bases completely, 250 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

on ports, as the RAF had 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 1943 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

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. What slowed turn-around most effectively, he claimed, was the necessity for repairing the damage done to hull structure by aerial-bomb and depth-charge attacks delivered at sea.[54] Undoubtedly the AAF 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 15 operations undertaken by the Eighth Air Force during those months involved attacks on the 5 Biscay ports. But the U. S. bombers had 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.

Of the 401 bombers dispatched against targets other than submarine bases, 231 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 major effort against the air installations at Romilly-sur-Seine into a minor attack on the Rouen-Sotteville 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-Sotteville on 12 December. In the aircraft category, although planes were sent three times to the Abbeville-Drucat airdrome, and one to Cherbourg-Maupertus, only the single raid on Romilly-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'Hellemmes and of Fives-Lille had been severely damaged in the USAAF attack of 9 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. RAF attacks on locomotives had created a serious repair situation. In November, for example, RAF Fighter Command aircraft carried out 56 attacks by night and 30 by day in France and the Low

Countries against trains and marshalling yards. In addition to destroying nine locomotives or trains, they stopped 54, a large percentage of which undoubtedly had as a result to pay a visit to the repair shops. Consequently the Lille shops were being taxed to the limit of their capacity, repairing an estimated 50 to 60 locomotives per month.[57]

In addition, Fives-Lille had 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 ability of the S. N. C. F. to provide locomotives for the skeleton service then operating in the Region du Nord and the Region de l'Ouest depended very largely on the speed with which locomotives could be repaired and overhauled.[58] Thus the USAAF attacks on Lille appear to fit into a coordinated plan according to which RAF fighters attacked rolling stock and the Eighth Air Force periodically reduced the capacity of the principal repair depot.

On 8 November, 50 heavy bombers dropped 295 x 500-pound high-explosive bombs intended primarily for the Hellemmes shops, which had hitherto escaped major damage. The repair shop and the machine shop both were damaged. A "reliable source" claimed that this raid destroyed 18 locomotives and damaged 40 more, in addition to causing confusion by a direct hit on the turntable. These figures

appear high and it is impossible to check their accuracy. Another attack, on 6 December, by 36 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 approximately 125 tons of bombs on or in the neighborhood of the objectives. Two groups were to attack Hellemmes 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. Many bombs also fell on railway sidings and storeyards 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 Hellemmes, where locomotives awaiting 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, much 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

that establishment from Hellemmes after the devastating attack of 13 January 1943. British observers estimated that the combined attacks on Fives and Hellemmes may have cost the Germans 12 locomotives.[61]

By mid-January 1942, USAAF bombing at Lille, at St. Nazaire where the locomotive sheds had been destroyed, and at Rouen-Sotteville, combined with RAF attacks on locomotive objectives, had created a situation in which Germany no longer could regard French railway facilities--before the war developed in excess of the demands made on them by normal traffic--as a source of reinforcements for her own over-taxed lines. On 23 February 1943, the British Ministry of Economic Warfare mentioned as credible a report that the Germans had been forced to return to the S.N.C.F. 18 heavy freight locomotives previously requisitioned for use in the Reich. It was believed that the stage had then been reached at which the Germans would find it necessary to surrender requisitioned rolling stock in order to safeguard the ability of the French railway system to meet actual or potential military demands.[62]

Inevitably, bombing of objectives in populous centers such as Lille involved destruction of civilian lives and property. The above-mentioned U. S. attacks on Lille were no more costly in this regard than those made on other French cities prior to November 1942. Reports fail to agree, but it would appear that, on 6 December especially, a considerable loss of life and residential property took place. According to one Free French report, 69 bombs fell

during that raid on private houses, destroying 31, partially destroying 36, and killing 25 persons.[63] Although this source sharply castigated the Americans for careless, possibly even calculated, bombing of a population 90 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 RAF.[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 householders.[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 Romilly-sur-Seine. This aircraft depot and airdrome, situated near the river Seine some 65 miles southeast 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 much repair and re-equipment was done in its workshops. British intelligence placed the number of new planes at Romilly on the date of this attack at 120--these 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]

Of the 101 bombers (80 B-17's and 21 B-24's) dispatched on this mission, 72 (60 B-17's and 12 B-24's) bombed the target area, releasing 306,000 pounds of high explosives and 25,000 pounds of incendiaries. Results were reasonably good. Damage was inflicted on hangars, barrack huts, and aircraft, and 138 craters were made on the landing ground, ten 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 USAAF planes into German-occupied territory, the bombers made 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 northeastern France at the date of the attack was distributed as follows: 12 were based in the Cherbourg area, 48 east of Cherbourg to the Seine, 60 between the Seine and Pas de Calais, 25 in Belgium, and 30 (including 20 used for training purposes) in the Paris area. Of this total of 175 planes, 150 were in all probability in serviceable order. Eight RAF and three U. S. fighter squadrons, all flying Spitfires, conducted four diversions over areas where the German aircraft were known to be kept. Enemy reaction to these efforts amounted to probably 89 aircraft, but no encounters took place. In addition, 55 Spitfire IX's of the RAF escorted the bombers as far as Rouen, and 107 provided cover for

them on their return trip. These operations also proved uneventful for the friendly fighters.[68]

It was against the bomber force that the Germans concentrated the full weight of their attack. It may have been that they were prepared for just such a mission as this, for on 12 December, the date of the preceding American raid, the bombers had flown toward Romilly, intending to attack that objective, but, on finding it closed in by weather, they had fallen back on a target of lower priority. At any rate, the escort this time had barely turned back (at 1150 hours) when 60 German fighters, mostly FW-190's from the Pas de Calais area, attacked the formation.[69] They came in well above, peeled off upside down, and closed in from the front, either slightly above, dead level, or slightly below. One B-17 of the 91st Group was observed to hit the ground at Vascoeuil, and a few minutes later another B-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 Caen Bougie, 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 Me-109's joined in the attack, some approaching from above at 10 or 11 o'clock, flying through the formation and diving out at 5 o'clock. One B-17 of the 306th Group was hit about ten minutes before the target, but it was not until a few minutes later that it started down.[70]

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

in the earlier stages of the engagement and were now making second sorties. Two B-17's of the 306th Group went down in the vicinity of Paris. Over the Channel another bomber, the sixth to be lost on the mission, went down and was last seen smoking badly and approaching the English coast at very low altitude. In all, six bombers were lost, and two more were so badly shot up 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 flak encountered proved consistently inaccurate and ineffective. The losses were heavy, and they reflected the success of the German fighter pilots in adjusting their method of attack to the peculiarities of the American bombers. It was on 23 November, during the attack on St. Nazaire, that the bomber crews had first reported a change in the direction from which the fighter passes were launched.[72] Hitherto, attacks had come mainly from the rear. As soon as the enemy found out that the B-17's and B-24'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 18 broke up in mid-air and 27 more went down in flames as a result of the concentrated fire from the .50-caliber guns. Total claims originally registered reached 53 destroyed, 13 probably destroyed, and 8 damaged.[74]

[redacted]

At this point the problem of claims again raised its disconcerting head. Ever since the mission against Lille 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 Romilly operation, claims of bomber crews seemed again to be excessive in view of the number of aircraft--not over 120--which could have intercepted. It was a serious matter, this business of securing reliable claims of enemy losses, for it reached 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 in large part on the basis of data reported from the European Theater.[76]

Two days after the Romilly mission, Headquarters, AAF wired General Spaatz for his considered opinion on the subject and for that of the British as well.[77] General Spaatz replied that, although cases of duplication still occurred, the final intelligence summaries gave reasonably accurate figures. He reported personally noting an attitude of conservatism on the part of the crews. As for the British, he continued, some senior officers had at first expressed skepticism but had changed their minds in view of later evidence. Some British fighters which had come too close to the American bomber formations and were mistaken for enemy planes had been hit by the bombers at ranges of over 1,000 yards. British fighter pilots had also repeatedly reported having seen the U. S.

bombers destroy enemy fighters. Furthermore, the British in all echelons now pointed to the success of the U. S. .50-caliber guns, and most skeptics had altered their view when shown the extent of the fire power in the American aircraft. In an effort to satisfy British observers that claims had been accurate, it had even been proposed that experienced RAF and Air Ministry officers accompany the U. S. bombers. This policy had at first been agreed to but was later considered unnecessary.[78]

Be that as it may, an Air Ministry analysis set probable figures for the Romilly action at a level much lower than those originally reported by the VIII Bomber Command. Keeping in mind the heavy fire power of the U. S. force of 101 aircraft, the fact that this force had been under attack by fighters for a period of nearly two hours, and that the visual evidence of planes destroyed, even allowing for duplication in claims, pointed to heavy enemy losses, this report suggested 30 enemy fighters destroyed and 15 to 20 damaged as a not unreasonable estimate.[79] Subsequently, VIII Bomber Command itself lowered even this estimate, and on 5 January announced revised claims to be 21/31/7.[80]

Headquarters, VIII Bomber Command had been at work for some time on a system of establishing claims which would be as nearly accurate as possible and which, in fact, ultimately reduced not only the Romilly claims but those of several other operations as well. Finally, on 5 January 1943, the command issued the following revised rules according to which claims would be evaluated. An enemy plane would

be counted as destroyed when it had been seen descending completely enveloped in flames, but not if some flames had been seen merely licking out from the engine. It would be counted as destroyed when seen to disintegrate in the air or when the complete wing or tail assembly had been seen shot away from the fuselage, but not if a wheel had been shot off, or if some other part of the airplane had been seen shot away. It was considered possible, as had actually happened in the case of many USAAF planes, 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 would also be counted as destroyed if the pilot had been seen to bale out, provided the plane was a single-seater. In the category of those probably destroyed would come those enemy planes believed to have been sufficiently in flames to preclude the possibility of the pilot extinguishing them, 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. When parts of the enemy airplane had been shot away, it could be claimed as damaged. Every effort would in the future be made to cut down on claims and to eliminate the possibility of two or more crew members claiming the same German fighter.[81]

In accordance with these principles, claims registered since the beginning of operations were reviewed. Under previous standards, claims for all missions up to and including that of 3 January 1943 had totaled 223 destroyed, 88 probably destroyed, and 99 damaged.

The new yardstick established them at 89 destroyed (a reduction of 60.1 per cent), 140 probably destroyed (an increase of 62.8 per cent), and 47 damaged (a 52.5 per cent reduction).[82] This new yardstick apparently satisfied critics in AAF Headquarters.[83]

Despite all efforts, however, the problem of claims continued to be a vexing one. As long as more than one gunner was shooting at a single plane, a situation that was bound to occur in large and tight bomber formations, there would remain an impossibly intricate task of evaluation. But if claims in the future were often inaccurate, and sometimes high, it was not because a sense of conservatism was not being instilled into the minds of Eighth Air Force crew members. The story is told of a gunner on the Wilhelmshaven raid of 27 January 1943 who, on observing an enemy plane blow up in the air not a hundred yards from the bomber, nudged another gunner and asked, "Do you want to claim that one?", to which the other gunner replied, "No, I didn't see it crash."[84]

Operational, Logistical, and Tactical Problems

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

fall into two large categories: (1) tactical problems, and (2) those of logistics, maintenance, and operations. Most of them had made their appearance and had received initial consideration in the weeks prior to November 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 seven heavy bombardment groups less one squadron (two of which groups were scheduled for TORCH at some 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 had only recently become operational. By 13 January the situation had not improved materially. Although all heavy groups had become operational, and although two 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 5 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 antisubmarine duty from 26 October to 25 November, and another from the same outfit had been detailed as an experimental unit to work on the blind-bombing project. During

November, December, and January, therefore, General Baker could never count on a fully operational force of seven heavy bombardment groups.[85] The Twelfth Air Force had also left the Eighth so low in air force service elements that General Spaatz 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 to full strength those units that were regularly available. The problem of replacements received a great deal of attention during the fall and winter of 1942 both in Washington and in Headquarters, Eighth Air Force. According to General Spaatz the Eighth Air Force units were under strength to begin with, after the requirements of the Twelfth Air Force had been met, 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 Kingdom 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 thus 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 Eighth Air Force. Further withdrawals, he warned, would seriously affect operations from the

United Kingdom which were of vital importance not only in themselves, 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]

AAF 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 were men and materiel.[89] Moreover, the estimate of Eighth Air Force requirements in Washington seems not to have coincided exactly with that made by General Spaatz and General Baker, for records in AAF Headquarters did not indicate so serious a situation as that reported from the theater.[90] Be that as it may, by the end of January 1943 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 operating 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 disperse the enemy fighter defenses and so tended to increase combat losses. In any event, it was obvious that a lower rate of loss might be expected

when a force could be dispatched which was large enough to saturate any given system of defense.[92]

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 and in a position to devote enough time to this work to keep up with the requirements of the operational units. In the fall and winter of 1942, neither of these 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 discouragingly 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.[93]

The Twelfth Air Force had left the Eighth depleted in service units and those left in the United Kingdom were still required to give high priority to equipment destined for North Africa.[94] For similar reasons, the Eighth continued also to suffer from an inadequate flow of parts and tools.[95] And there appeared little likelihood that the situation would improve for some time to come, for, when shipping became available to carry the required personnel and

equipment, it would probably have to be used for transporting combat units. Although General Spaatz warned that "a marked 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 combat replacements as a matter of first priority, since the latter required more time to become acclimatized and might, if necessary, be supported on an emergency basis until normal service units arrived.[96]

At the same time, the Eighth Air Force was facing 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 total strength in heavy bombers lay in depot. In September, 13.3 per cent of the attacking planes suffered reparable damage; in October 37.7 per cent. By December the percentage in this category had risen to 42.1, with January promising an even higher proportion of damaged planes.[97] Still further to complicate matters, it had been found necessary to modify the heavy bombers to meet unforeseen tactical and operational conditions, and, moreover, to do the work to a large extent in the theater. Until a standard model could be turned out in the Zone of the Interior, fully equipped for combat in the European Theater--and even then special projects would require special modifications--changes had to be made at almost all echelons by the cut-and-fit method, which again increased the load on available maintenance facilities.[98]

Maintenance difficulties were reflected in the relatively high rate of abortive sorties resulting from mechanical failure. Since

October, that rate had increased considerably, amounting in November to 23 per cent of all abortives. Crews were instructed to return without entering enemy territory if turrets became inoperative, or guns jammed, or any other important items of equipment failed.[99] It is possible, of course, that the anxiety of group commanders to get as many of their planes in the air as possible had the effect of starting some that, under less hectic operating conditions, might have been left on the ground for more thorough overhaul. In any case this was a serious matter, for the total abortive rate was itself high. Of the 1,053 bombers dispatched from 21 October 1942 to 13 January 1943, 421 had failed to attack.[100] In January, General Baker admitted that, next to the large number of aircraft out of commission, the large number of abortive sorties had been his chief worry during the preceding weeks.[101]

Even more important than mechanical failure as a cause of abortives was the weather. Too often the bombers had to take off in mud and water or fly in rain which caused their guns to freeze or their windows and sights to become blurred at high altitude. And there was always a very good chance that, regardless of expert predictions, the bombardiers would find their targets partially or totally obscured by clouds. As high as 50 per cent of the abortive sorties could be traced directly or indirectly to the weather. Things were improving slightly by January; crews were, for example, learning how, when runways were covered with water, to prevent icing of guns and turrets by the judicious use of oil; and

in some instances malfunction of bomb-bay doors owing to the same conditions was prevented by removing the doors completely.[102] But, in the final analysis, only fine weather could entirely remove these operational hazards.

Weather, indeed, continued to act as the greatest of all the factors limiting Eighth Air Force bombing. Only once during November and December was it reported that a mission had actually been canceled because of maintenance and repair difficulties and then the trouble arose only after three successive days of operations. On the other hand, weather conditions held available aircraft on the ground on numerous occasions.[103]

High hopes continued to be placed on blind-bombing techniques, and much study was being devoted to the use made of radar by British "Pathfinder" units. It was hoped specifically that development in that direction, together with the improved weather which might be expected during the coming spring and summer months, would permit an average of six missions per month per operational bomber instead of the three missions averaged during the fall of 1942.[104] But the initial experiments in using single, radar-equipped B-24's for "moling" or "intruder" missions gave little ground for optimism. On 2 January 1943, four B-24's of the special experimental squadron made the first of these blind operations over manufacturing cities north of the Ruhr with the object of alerting air-raid crews and otherwise harassing the enemy. It had been specified that, in view of the valuable equipment carried and the small intrinsic value of any bombing done, the airplanes should return to base if cloud cover

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

[redacted]

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]

The Germans had taken some time to adjust themselves to the American raids. Their flak defenses 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 antiaircraft fire and fighter opposition.

German fighter tactics developed in ways especially annoying to the bomber force. They reflected a feverish determination somehow to stop the day bomber threat. Reports from European 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 shake-up had taken place among commanders in fighter Staffeln (squadrons) on the Western Front, with the result that larger and more determined efforts were made to find the weak spot in the American bomber formations and to render their missions prohibitively costly.[108] Many types of attack were tried, but for some time tail attacks predominated. This had been the accepted angle of attack against bombers, and it was the type against which the USAAF had undertaken to protect its heavy bombers by the addition of especially heavy armament and armor plate.[109] The climax in this phase of the German counterattack came on 21 October, when the FW-190's (bearing the yellow nose paint characteristic of

Goering's elite fighter wing) made a series of desperate attacks from the rear in an apparent effort to find a blind spot safe from both dorsal and ball turrets. They came in, sometimes in formations of three, at flight level, opening fire at 800 yards. Three 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 23 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 .30-caliber, hand-held gun, firing through one of four eyelets 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 armament also left a blind spot which the upper turret could not cover.[112]

After 23 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]

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

for the European Theater; and the standard B-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 B-17's and B-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 Kuter 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

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 Kuter 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. Bombing by 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 maximum 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 again 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 wing in one formation. Anything larger than a formation of two or three combat boxes would have required deployment in such

[redacted]

depth that the differences in wind velocity and aircraft performance at different altitudes would have aggravated the tendency of any formation to telescope and lose effective position. Moreover, two groups were about all that could be readily briefed and controlled by a single combat commander. Accordingly the 1st Bombardment Wing formed two combat wings of two groups 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 bombardment 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 bombing whenever the fighter opposition seemed likely to be strong enough immediately over the target to warrant its use: this despite the fact that it would be a clumsy formation to maneuver around the initial point onto the bombing run, and that the resulting bomb pattern would tend to be too large for the desired accuracy.[123]

Fighter cover, and lots of it, had originally been held a prerequisite to day bombing, and the early missions had been flown under a huge umbrella of friendly fighters. Now, in January, opinion was again turning toward escort as one of the surest means of circumventing

the German fighters. Meanwhile, however, and for the period of this chapter in particular, escort did not play a large part in defending the day bomber formations. Had it been available it would, of course, have been used. But after October most priority targets lay beyond the range of the Spitfires which for the time being were the only fighters available for such operations. They usually accompanied the bombers part way in toward the target area and provided withdrawal support on the way out. And, during such missions, large fighter forces, still for the most part RAF, conducted diversionary sweeps to confuse the enemy RDF. Yet the bombers were generally left to the as yet uncertain protection of their own gunners during the critical time over the objective.[124]

As losses mounted during these partially or entirely unescorted missions, and especially as the time drew near when operations would have to be conducted over the Reich itself with its presumably denser fighter defenses, it began to look as if the long-range fighter would be a necessary part of a successful day bombing offensive. By 15 January the 78th Fighter Group was due to have its quota of P-38's, and General Baker hoped that with these he could reduce bomber losses over the submarine bases by one-half. Unfortunately this group soon followed its predecessors to Africa, and the need for long-range fighters remained.[125]

As an alternative to the long-range fighter, the escort-bomber, known provisionally as the XB-40 or YB-40, was in the process of being developed. A B-17 specially equipped to combat enemy fighters, it carried extra armament, armor, and ammunition in place of the usual

bomb load. Originally planned in the summer of 1942, it was scheduled to appear in the European Theater by March 1943. Although contemplated without enthusiasm by General Baker, it was favored by many commanders who hoped that, by mixing it with the bombers in ratio of one B-40 to two or three bombers, they might free the latter from the limitations of fighter range and send them over Germany as far as their fuel would take them.[126]

The Eighth Air Force had less reason to fear antiaircraft fire than fighter attacks during the period under review. Barely one fourth of the bombers lost in action could be credited to flak alone. And only a few more bombers suffered flak damage than were hit by enemy aircraft. But, whereas the percentage of damaged aircraft that were hit by fighter action showed little tendency to increase, the percentage of damaged bombers that had been hit by flak appeared definitely to be rising. And on two occasions, at St. Nazaire on 9 November and on 3 January, substantial losses had been sustained as a result of antiaircraft fire.[127]

The increase in flak damage reflected a marked improvement in German antiaircraft technique. Flak batteries were now concentrated in such a way as to fit the pattern of USAAF targets, with special attention given to the submarine bases on the Bay of Biscay. Originally the only type of fire encountered was that termed a "continuous following" which required the gunners to make a continuous prediction of the position of the target aircraft. Often this type of fire was thrown

up behind the formation and gradually worked forward. It was essentially a trial-and-error method in which altitude could be estimated more easily than deflection, since the gunner had to predict some 20 seconds in advance the point at which the target aircraft would be and since his 88-mm. shells had a lethal radius of only 30 feet. Although the gunners seem to have improved the accuracy of their fire, this method proved relatively ineffective at high altitudes, provided that positive--though not systematic--evasive action were taken by the bombers.[128]

A much more effective technique, if the target could be determined in advance, was that called a "predicted barrage," in which flak was thrown up throughout a limited area through which it had been calculated the attacking aircraft would have to fly. It was a method uniquely adapted for use over the submarine bases which were well known objectives, not easily confused with neighboring targets. In fact, it was at St. Nazaire, on 3 January 1943, that a predicted barrage was first encountered--with serious results to the attacking bombers. The technique was not, however, one likely to succeed in such areas as the Ruhr where targets of high priority abounded.[129]

The tactics best suited for penetrating heavy flak defenses were simple enough, but they almost all necessitated some degree of compromise with the requirements for accuracy or for defense against enemy fighters. Positive evasive action might be taken for as long as possible, the length of the level bombing run being reduced to the shortest commensurate with careful aiming. The bombers might converge on the target nearly simultaneously on at least two axes; they

might maintain a substantial differential in altitude between units; and they might take maximum evasive action immediately after release of the bombs. But care had to be taken not to disperse them to such an extent that elements would fall prey to fighter attack. Finally, to escape flak most effectively, the bombers had to fly at the highest altitude commensurate with accurate bombing.[130] Here, in a sense, was the most difficult compromise to make. It might fairly be said that, in these early months at any rate, flak handicapped effective bombing operations less by destroying or damaging bombers than by forcing the attacking planes to bomb at altitudes too high for their more or less inexperienced crews to achieve consistent accuracy.

The question of bombing accuracy overshadowed all others pertaining to the offensive aspect of bombardment. Unfortunately it is not possible to say anything very precise about the degree of accuracy achieved in those 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 AAF 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 much, however, is incontestable: results in the fall and winter of 1942 were disappointing to all those who, trained in the "pickle-barrel" school of bombing, knew how accurate the American bombers could be.[132] An average of only about 50 per cent of the bombs dropped could be identified by photographic reconnaissance. Although many "duds" were reported by ground sources, it may be assumed that a large proportion of the unidentified bomb falls represented large or

"gross" errors.[133]

It was this tendency to gross errors that concerned bombing analysts most acutely. Under practice conditions, accuracy might conceivably be improved indefinitely by training the bombardiers to set their sights more precisely and the pilots to hold a steadier course during the run on the target. There were thus in practice exercises few gross errors to contend with and few 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 excitement 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, the Norden bombsight, 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 adopted, 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 hanging up or salvoing 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 frequent failure of pilots, bombardiers, and navigators to identify the target. Although an extreme case, it is instructive to notice that on the operation of

18 November 1942 one formation was able to bomb St. Nazaire under the impression that it was bombing La Pallice, 100 miles away. A more typical case occurred in the Lille raid of 9 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]

Most unsettling of all factors making for inaccuracy was the necessity of conducting a steady bombing 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 flak, evasive action was normally taken for as long as possible on the approach to the target, leaving a maximum of 50 seconds for the level bombing run. During that time delicate adjustments had to be made with extreme dexterity and speed, and often under enemy attack.[138] An additional difficulty arose from the fact that, in order to maintain an effective defense

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,

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

[redacted]

the Eighth Air Force prior to mid-January 1943. 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 forged at that time for the defeat of the European Axis. In the next chapter an effort will be made to trace the development of those strategic and organizational plans which culminated in the proceedings at Casablanca.

Chapter IV

THE DEVELOPMENT OF POLICY FROM AUGUST 1942 TO JANUARY 1943

Basic Strategy: AAF and British Views

A combined bomber offensive against the European Axis seemed 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 TORCH had seriously modified the original concept of BOLERO and ROUND-UP (the preparation for and execution of a large-scale invasion of the Continent from the British Isles), the North African operation was supposed 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 even been accorded to the production of the huge 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 resemble closely those 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. That

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 AWPD-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 AWPD-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 AWPD-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

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 AWPD-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

and the vitals of the German war economy. For 1943 and the early part of 1944, priority should accordingly be given to this air offensive against Germany. When that operation was successfully accomplished, as it could be by mid-1944 if the over-all requirements of 63,068 combat aircraft for 1943 were met, it would then be feasible 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 projected air offensive against Germany was to take the form of a combined strategic bombardment offensive such as both U. S. and British airmen had contemplated since the entry of the U. S. into the war. The USAAF, with an operational bomber force of 2,225 planes deployed in the theater by January 1944, would concentrate on the "systematic destruction of selected vital elements of the German military and industrial machine through precision bombing in daylight." The RAF would concentrate upon "mass air attacks of industrial areas at night, to break down morale," which, in view of the acute shortage of skilled labor in Germany, should have a "pronounced effect upon production."[6]

This, in essence, remained the official AAF doctrine during the remaining months of abortive debate which preceded the Casablanca Conference. Some doubts arose as to the suitability of the United Kingdom as a base for a day bomber offensive in view of the dismal data compiled that fall regarding weather conditions in northwestern Europe. But, insofar as they affected basic strategic planning, these doubts were of minor importance. At most it was seriously

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 winter months when weather conditions would be much more favorable to precision bombing than in the U. K.[7] And, anyway, it was confidently expected that improvement in blind-bombing techniques would successfully circumvent conditions of poor visibility.

The principles underlying AWPD-42 were reaffirmed by General Arnold in a memo for the JCS, dated 16 November 1942. This document, however, alters somewhat the strategic assumptions made by the authors of AWPD-42. The Russian front no longer appeared in imminent danger of disintegrating. In fact, Arnold laid emphasis on Germany's mounting embarrassment rather than on her growing strength. Two indecisive Russian campaigns, together with the Allied invasion of North Africa, bombing from the U. K., 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 AWPD-42, considered as the official AAF war plan, abreast of shifting strategic circumstances by means of constant review.[9] On 1 December 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

defeat Germany was by land invasion, that 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. K. Again the nature of the strategic bombing offensive was described as a combined effort by AAF and RAF, operating by day and night, and using precision and 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 RAF 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 AWPD-42 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 1943.[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

minimum air force so that "an overwhelming number" of planes would be available in major theaters. We have, he told his staff, "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 AAF 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. K.[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 Trenchard 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

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 4,000 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 air 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 AAF thinking.

According to a British Air Staff paper of 9 October 1942, the Anglo-American bomber force would be employed with some flexibility in much the same manner as had been envisaged in August: "Initially the British force will be operated mainly by night, and the American by day; the British, however, may veer towards day, or alternatively the American towards night operations in accordance with the development of the tactical situation."[18] It was, however, on this point that there arose whatever disagreement existed between the two forces.

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 operation. 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-dampeners for night operations and in assigning an appreciable portion of them to antisubmarine patrol. It was, however, an idea apparently shared by the Commander-in-Chief, RAF Somber Command.[19]

Both British and American air strategists remained, then, in substantial agreement in urging a combined bomber offensive against Germany from bases in the U. K. But it was 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 ensure 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 exponents

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 impugned 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 what may now seem 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 enemy 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 BOLERO from being slowed down.[20] But as long as BOLERO-ROUND-UP remained the key to Allied offensive strategy there was no gainsaying it. Although it was not the intention of those who advocated the North African campaign to do more than postpone BOLERO and ROUND-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.

Discussion, in fact, began promptly after the tentative adoption of the TORCH plan on 24 July 1942. In meetings of the U. S. JCS during August and the latter part of July, representatives of the Navy made it clear that, 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. K. had been an integral part of the BOLERO-ROUND-UP plan, that its purpose was to support the invasion of Europe, and that, since ROUND-UP no longer constituted the primary project, aircraft could now be considered as a separate feature, committed to the war against Germany only insofar as they were required by TORCH 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]

There had even been some talk, while conversations were still being held regarding TORCH, 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 the need for maintaining the maximum pressure on Germany. If, however, Russian resistance were to collapse, Navy spokesmen urged that the maximum 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 had become too specialized, and that production of weapons should be so balanced as to meet more than one eventuality.[24] The TORCH decision, by taking into account the possibility of Russia's weakening, put an end to this particular argument. But the controversy continued to flourish, if within somewhat restricted limits; and the Navy continued to speak of a "limited offensive" in the Pacific 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 AAF observers to rest on two fundamental misconceptions 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 erred in considering the projected bomber offensive from the U. K. by USAAF planes to be inseparable from the notion of air support for a European invasion. If support of ground

and sea operations had been the principal mission of the heavy bombers, then it would have been perfectly logical to argue that, once those operations had been indefinitely postponed, so likewise had the need for the heavy bomber activity which was to support them. But to do so was obviously to misinterpret the nature of the strategic bombardment program. Both English and American air representatives among the Combined Planners stoutly maintained that long-range attacks on German industry and communications had been and must continue to be considered as a project preliminary to, but otherwise entirely independent of any European invasion, a separate offensive operation in a theater which the postponement of invasion had made for the immediately foreseeable future entirely an air theater. There were even those who nursed the hope that bombardment alone might so weaken the German will to resist that a hard-fought invasion would be unnecessary; but this idea affected basic plans, if at all, only in keeping alive the possibility that a force might at any time be required to capitalize on any such sudden crack in enemy morale. To all of which the Navy spokesmen replied that the maximum pressure of air bombardment could only be maintained when coordinated with ground and sea operations.[26]

It must be admitted, in justice to the Navy point of view, that the original conception of ROUND-UP had apparently made the full-scale prosecution of a bomber offensive contingent upon an Allied landing in northwestern Europe. On 24 August, General Spaatz referred to this notion in a letter to General Arnold.[27]

> In the initial conception of ROUND-UP and in the absence of definite proof, it was felt that the establishment of air supremacy over Germany depended upon operating beyond the tactical radius of operation of fighters. It was under this conception that we felt the movement of ground forces on to the Continent of Europe under the umbrella of air supremacy provided by fighters was essential to advance the blows of our air forces toward Germany.

But, he added, the first week of operations by the bombers of the Eighth Air Force had convinced him that such missions could be extended, as soon as the necessary size of force had been built up, "into the heart of Germany, without fighter protection over the whole range of operation." The AAF was, then, prepared to carry on with its work on a basis entirely independent of ground action; and it clearly considered the original concept of ROUND-UP as outmoded and embarrassing.[28] Yet the apparent confusion of assumptions on this point goes a long way toward explaining the sharply divergent views of the AAF and the U. S. Navy regarding the relative importance of independent bomber operations from the U. K.

In the second place, according to the AAF way of thinking, there was a tendency among both naval and ground men to misinterpret the role of air power in the TORCH strategy itself. General Arnold and the AAF planners had not found it easy to reconcile TORCH with their original conception of a combined bomber offensive from the U. K. They had accepted the plan only after strenuous debate, and during the remainder of 1942 they continued to consider it a diversion from the main business of bombing the sources of German war power.[29] Having accepted it, however, they were concerned to implement it as decisively as possible, and as the plan unfolded they were ready enough to see certain advantages accruing to the air arm in the way of alternate

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 bombing operations from the U. K., at the expense of which any diversions to TORCH must obviously be made, to be not only of primary importance in the longer perspective but an immediately essential part of the TORCH 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 dangerously 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 power. 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 somewhat 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 confliot became one theater as far as air operations were concerned. And the AAF even hoped to exploit the mutually complementary nature of those operations to the fullest extent possible by uniting them under one air commander, who, incidentally, could guarantee that combat units diverted to Africa would

be returned, when their mission was completed or during periods of minimum activity, for the major bombardment campaign from the U. K. Meanwhile the AAF remained content to strike at Germany from any available bases, and recognized the obvious, if 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.[32]

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. K. enjoyed a much more impregnable position than they did in Navy thinking. As a matter of fact it is doubtful whether this AAF interpretation of the TORCH strategy, arising, as it did, out of strictly air considerations, was at first shared by any other agency--except, perhaps, the British air planners. Certainly General Eisenhower was prepared in September 1942 to bring bombing operations from the U. K. to a complete halt in order that Eighth Air Force resources could be devoted entirely to preparing for TORCH. And in early September he did, in fact, issue orders to that effect.[33]

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

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 these 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 these 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

[redacted]

five fighter groups. By 1 January, or as soon as possible before that date, he urged the deployment in the U. K. of 20 heavy bomber, 10 medium bomber, and 10 fighter groups.[35]

Other messages, 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.[36] These communications arrived in Washington, as AAF Headquarters intended, just in time for the critical debate in the JCS over the diversion of the 15 groups reallocated in July from BOLERO 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 CCS 94 which had authorized the diversion were binding and, with critical operations well under way on Guadalcanal, there was no discussion regarding where the diverted air units should be deployed when ready; 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 BOLERO, except for one heavy bombardment group already ordered to the Pacific, until TORCH, the Middle East, and the U. K., in that order, had been brought up to strength in air units as indicated in CCS 91, 7 July 1942. Thus in the allocation of the 69 groups originally scheduled for those areas, 54 should be sent there as a matter of first priority, leaving the groups for the Pacific to be dispatched as soon as available thereafter. The

Navy was willing to admit the importance of TORCH and the Middle East, but insisted that the South and Southwest Pacific be given precedence over the U. K., 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. K. for the rest of the year.[38] But it would appear that General Arnold's opposition both 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 these 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 undisputed priority for the war against Germany. It is not surprising, therefore, that he fought the early diversion of AAF units to the Pacific with every possible argument and with every ounce of weighty military opinion.

On the one hand he reiterated the standard AAF strategic doctrine: that Germany was the chief enemy, that for many months the only way of striking offensively and decisively at Germany's vitals was by aerial bombardment, and that, in view of the need for coordinated air effort in both Europe and Africa during the forthcoming TORCH campaign, those theaters must be considered mutually complementary.

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 SOLERO-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 missions; and Eisenhower, in his message of 6 September, reported that "we are becoming convinced that high altitude daylight precision bombing is not only feasible but highly successful

and that by increasing the scale of attack effective results can be obtained."[43] Conversely, Arnold pointed out that Army-type long-range bombers should be used entirely for bombardment purposes, and not, as Admiral King had at one point suggested, for sea-search and tracking in the Pacific, even though, as the Admiral had also said, they were better suited than the Navy's PBY's for that work.[44]

By mid-October it was clear that JCS discussions had reached a virtual deadlock. Admiral King was willing to concede priority to North Africa and the Middle East, although he felt that neither exceeded in immediacy the needs of the critical campaign in the South Pacific. But both he and Admiral Leahy were unalterably opposed to giving the bomber offensive from the U. K. precedence over any operations in the Pacific.[45]

Meanwhile, during August and September, the War Department was being flooded with requests from the Pacific for additional aircraft. Nor did these requests necessarily embody only the Navy point of view. For example, Maj. Gen. M. F. Harmon, Commanding General U. S. Army Forces in the South Pacific, like all AAF commanders in active theaters, strove vigorously to reinforce his command; and, in view of the brisk fighting then taking place in those parts, he had a better talking point than most.[46]

During October, too, the military situation in the South Pacific had become rapidly more critical. On the 24th, President Roosevelt expressed his anxiety in an urgent memo to the JCS. It would, he said, be necessary at all cost to hold Guadalcanal:[47]

> We will soon find ourselves engaged on two active fronts and we must have adequate air support in both places even though it means delay in our other commitments, particularly to England. Our long range plans could be set back for months if we fail to throw our full strength in our immediate and impending conflicts.

Shortly thereafter an agreement was reached regarding the deployment of AAF units in the Pacific. It is not clear from the available records whether this agreement embodied the original 15-group diversion from BOLERO. But the President's order clearly gave temporary priority to the Pacific and, as had been anticipated in the event of any additional diversion from the U. K., the bomber force operating in England did not increase during the remainder of 1942 as rapidly as had been planned.

The President's memo had the effect of settling the problem of diversion for the time being on the ground of unavoidable military necessity without seriously prejudicing either the case for the war against Germany or that for the strategic bomber offensive from the U. K. Indeed, by its silence on the subject of basic strategy, it implied a strict adherence to the status quo. And so ended the first and in a sense 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, plans for U. S. participation in the bomber offensive from the U. K. continued to meet competition, but on somewhat altered grounds. The story now turns largely on the increasing importance of the African campaign. As TORCH gathered

the momentum of a major operation, its demands became more imperative, its implications more evident, and the prospect of exploiting its presumed success more tempting. And, in view of the continued success of the Russians, the presumption of victory became correspondingly reasonable. But any increase in air commitments to the Mediterranean would, as had long been recognized, have to be made at the expense of the forces allocated to the U. K.,[48] for the minimum requirements of other theaters were considered irreducible. So it became an increasingly difficult matter to balance the needs of TORCH with those of the U. K. Since the British were irrevocably committed to a large-scale bombing of German cities, it became a question largely of distributing U. S. air power to the best advantage.

The U. S. air commanders concerned had already rationalized TORCH in such a way as to make it and the bomber 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 ready by early December to admit that TORCH was for the time being the major Allied operation, and should be given every support possible, even though the air power so invested would be used primarily for tactical rather than strategic purposes. At the same time he made it perfectly clear that he evaluated the African campaign always in terms of the major strategic bombing offensive. In particular, it would help to give the Allies

that superiority in the air without which he recognized neither the bomber offensive nor the invasion of Germany could be accomplished. The North African invasion, he told his staff on 2 December 1942, "is annoying to Germany, but it will not win the war." However, he added, "it does put us in a position to gain air supremacy over Germany." Again, a few days later, "this North African campaign is our big fight . . . . If we kick the Germans out now it will make operations from England much easier next Spring."[49]

AAF Headquarters had, then, become reconciled by this time to the prospect of a minimum bombing effort from the U. K. for the rest of 1942, or until the success of TORCH would release a force adequate for the task. The weather conditions in northwestern Europe helped make that prospect more convincing (if not exactly brighter), for the record of October had contributed to a feeling of frustration which even a relatively successful month of daylight missions in November failed to dispel entirely.[50] Plans accordingly continued to be laid to operate part, if not all, of the Eighth Air Force temporarily from North African bases during the winter months, although it remained a point of policy to maintain a force in the U. K., if for no other reason, to prevent the enemy from reinforcing his air forces in the south.[51] Elaborate plans also continued to be laid to link air operations in Africa with those in the U. K. under one commander in order to make doubly sure that, when the time came, the air units diverted to TORCH might be returned for the major air offensive.[52]

However, no sooner had AAF strategists adjusted themselves to the TORCH plan than the foundations of Allied strategy shifted once more in

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 resulting position. But to exploit a North African victory at all vigorously would mean committing the Allied forces to further land campaigns in the Mediterranean area. This the British were especially eager to do. Mr. Churchill, in November, argued in favor of attacking the "underbelly" of the European monster; and the British Chiefs of Staff had registered their opposition to any plan for an invasion of Western Europe before such time as Germany showed definite signs of weakening. Toward that end, they believed two factors would contribute: the strategic bombardment of Germany from the U. K. and an amphibious campaign in the Mediterranean to exploit TORCH.[53] Although Churchill and Roosevelt appear to have reached substantial agreement on the issue by 18 November, "Operations Subsequent to TORCH" remained a primary subject for debate prior to and during the Casablanca Conference. It had also the effect of reopening the entire question of basic strategy.

The project for exploiting TORCH 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 TORCH in the offing, it began to look as if the cross-Channel invasion would have to be postponed even beyond 1943 in favor of a campaign which, inasmuch as it did not contribute directly

to the plans for the invasion of Germany, had to be considered an 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 CPS subcommittee, appointed on 19 November to study the problem of further action in the Mediterranean, recommended exploitation of TORCH by means of a campaign against Sicily.[55]

It was Col. R. P. Williams, the USAAF member on that subcommittee, who formally registered an objection. In a minority report he vigorously restated AAF doctrine. Admitting certain advantages 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 at that moment strike effectively at that objective, and that any nonessential diversion which would reduce the effectiveness of the bomber offensive should not be undertaken. Following a TORCH 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. K., and capable of maintaining air units from the U. K. with a minimum transfer of ground personnel. In this way, Mediterranean shipping could be protected and Italian objectives could be bombed by long-range bombers during periods when weather in the north proved unfavorable to precision bombardment. North Africa and the U. K. should accordingly be

preserved as one theater in which an extremely flexible and economic air arm might be maintained on the perimeter of Axis Europe.[56]

On 30 December, the subcommittee of the CPS, to which these papers had been returned for further study, reported to the CCS that it would be impossible to reconcile the divergent views the papers embodied until global strategy had been thoroughly reviewed.[57]

Plans for operations subsequent to TORCH had upset the equilibrium of Allied policy. And, as happened before when the balance had been tampered with, there were those who called to mind the fact that the U. S. had grave responsibilities also in the Pacific. This time it was in the War Department that the question was raised. A planning paper, dated 8 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, maintaining only enough force in the U. K. to guarantee the safety of that always vital position.[58]

But it is probable that the War Department planners intended this argument to be used rather to put pressure on the British than actually to reverse U. S. strategic commitments. The British were known to have a very reasonable interest in pressing the war against Germany to a decisive conclusion before attempting to secure a decision in the Pacific; and on 7 November the British Chiefs of Staff had forwarded a memo to the U. S. JCS in which they argued strenuously in

favor of that policy.[59] In any case, War Department planners were guilty of a certain inconsistency. They stated that, according to existing strategy, the bomber offensive from the U. K. should be prosecuted in order "to reduce German production and to bring on the hoped-for collapse of her will to resist." Yet it was just such an eventuality that the British had in mind as the signal for a major land assault on Western Europe--the eventuality which they, like the War Department, hoped to achieve by means of strategic bombing. Their paper of 7 November had concluded that, since a large-scale invasion of Europe "against unbroken German forces 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 war machine before we attempt to re-enter the Continent."

By the early part of December it was clear that a redetermination of basic strategy would have to be made. The CPS subcommittee report on operations subsequent to TORCH had merely given formal expression to a need which many had recognized for some time. In the absence of clear strategic policy it was especially hard to plan for an operation such as the bomber offensive from the U. K. which had been projected according to a long-range plan and which had therefore no immediate minimum requirement, yet which could absorb any conceivable increase in air units.[60] The Casablanca Conference was convened as the answer to this need; and it was there that the crooked paths of strategic policy were once more made straight, and the rough places plane.

Aircraft Production: the Problem of Priorities

For the AAF to implement its strategic doctrine, it was not enough to secure the necessary decisions concerning grand strategy. It was also a question of securing the means with which to operate. In a sense, of course, the problem of obtaining the aircraft required for the air offensive against Germany was really a part of the broader strategic problem. AAF requirements for defensive and supporting actions in all minor theaters could be established with little controversy. Requirements for the bomber offensive, on the other hand, stood or fell according to whether the project had or had not an unassailable place in Allied strategy. Regardless of strategic decisions, however, it remained a difficult and controversial problem to assign priorities in such a way as to make possible a large-scale air war in Europe without prejudicing other essential programs.

It had been early recognized that to carry out such an offensive as an effective action preliminary to invasion would require a large force of bombers and fighters. The requirements of the bomber offensive thus became the critical item in the aircraft production program which, when it had taken account of the minimum needs of other theaters and of training projects, had reached a startling figure. The 1942 production goal was set at approximately 60,000 planes, of which 45,000 were to be of combat type. Of these 60,000 aircraft 39,274 fell under Army cognizance, 10,190 under that of the U. S. Navy, and the rest were to be produced for the Allies.[61] By the fall of 1942 it was clear that the objective for 1943 would have to be much larger.[62] Production, which by November had only reached a rate of 4,000 planes

per month, had lagged behind originally stated requirements.[65] 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 ascendency over the enemy." The AAF planners who drew up AWPD-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.[66] 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 AWPD-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

in general how strategic bombing should not be done. And the British, in such actions as their attack on the Renault plant at Paris, had provided examples of the destructive effect of bombs on industrial property. The RAF had also given some indication of the rate of attrition to be expected. (At that point the Eighth Air Force had not lost a single bomber in the course of a mission.) But for the rest it was a largely academic problem, which, however, the authors attacked with insight and realism.

"Experience," they claimed, "has shown that it is perfectly feasible to conduct accurate, high level, daylight bombing under combat conditions, in the face of enemy antiaircraft and fighter opposition." Beginning with this confident premise, which by that time had become an article of faith in the AAF, they proceeded to demonstrate on the basis of the best available information regarding German industry, the plan for American participation in a combined bomber offensive. In order to realize the objective of crippling German economy at its nerve centers, they estimated that it would be necessary to destroy some 177 targets, distributed among seven target systems. Assuming that direct hits with high-explosive bombs would do the job, and that an average circular error of 1,000 feet from an altitude of 20,000 feet might be expected, they estimated the bomb tonnage necessary. From that they calculated the number of sorties necessary. Then, assuming that, under European conditions, five or six operations per month could be performed, and that an average attrition rate of 20 per cent per month might be anticipated, judging from British

experience, they arrived at a total required bomber force of 2,985 planes. This force would, they warned, have to be in the theater by 1 January 1944. In the meantime it would be possible to accomplish one-third of the task of strategic bombing, thus leaving only four months of operations by the complete force to be conducted in 1944 before a combined invasion should be attempted.

Having established the requirements for the bomber offensive against Germany, they added to them the minimum needs of air forces in other theaters. The result was an estimated 281 groups (63,068 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. K. When the aircraft required for training and other noncombat purposes were added to the 63,068 combat planes, the total AAF requirements for 1943 became 83,700 planes.[65]

The Navy had apparently estimated its requirements to be in the neighborhood of 26,300 aircraft. But in this number it had included 1,250 Army-type land-based bombers, of the long-range category. The authors of AWPD-42 substituted in their calculation 8,000 trainers to meet the Navy's training needs in place of the 1,250 land-based bombers. This they did in order to avoid duplication of procurement, bases, training facilities, and supplies; for, they argued, the tactical function of these Army-type bombers would be performed as a matter of course by the AAF. So they listed all land-based long-range bombers under AAF cognizance. In addition to the aircraft to be allocated to the Navy, some 20,440 would be required in order to meet commitments

to the other United Nations. According to AWPD-42, the grand total of aircraft required from U. S. production for 1943 became 137,190.[66]

These figures represent the estimate of the AAF according to information available in early September 1942. Subsequent events altered the basis for calculation only slightly. When, on 1 December 1942, the operational and strategic considerations affecting aircraft requirements were reviewed, the result was a slightly more optimistic picture. It was then possible for AAF analysts to say not merely that precision bombing was "feasible," but that it "is being accomplished." And it was then claimed that the Germans were losing six fighters for one U. S. bomber destroyed, rather than the conservative ratio of two to one tentatively suggested in AWPD-42. These considerations, together with the improved situation on the Eastern Front, no doubt induced the authors of this later plan to advance the date of a possible assault on Europe from the spring or summer of 1944 to the end of 1943. But estimates regarding aircraft requirements remained unaffected.[67]

AWPD-42 met stiff opposition from the outset. It was evident that an aircraft program of such magnitude would compete seriously with the Navy's shipbuilding program, especially in the categories of the heavier vessels. And, in fact, Admiral King in September registered his objection to the plan in its entirety. It was a point of particular concern to the Navy that all land-based heavy bombers had been allocated to the AAF.[68] It was also clear that the aircraft program would compete with the Army ground program, especially in such heavy equipment as tanks, antiaircraft guns, and armored cars.

Nevertheless, the AAF estimates received the immediate approval of the War Department General Staff.[69] By 15 October (it is not apparent exactly at what earlier date) the President also accepted them in substance and included a slightly reduced figure of 131,000 planes as the principal item in a "must" program of war production for 1943.[70]

To this point, estimates had been based largely on strategic considerations. Now it became necessary to review the aircraft production program in the light of available resources. Productive capacity and the logistical factors depending 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. Mr. Donald M. Nelson, Chairman of the War Production Board, had already called to the attention of Secretaries Stimson and Knox the fact that the production objectives for 1943 were then considerably out of line with the productive capacity of the country. This point of view he presented to the JCS on 15 October 1942. Against the capacity of U. S. production of munitions, facilities, and war construction during 1943, set in terms of dollars at roughly 75 billions, he placed the total military requirements for that year which amounted to 92.9 billions. A substantial part of this military program had, however, been set by the President as an essential objective. The President's "must" items, comprising the aircraft program of 131,000 planes (37 billions), the merchant-shipbuilding program (3.6 billions), the program for building minor combat vessels of the antisubmarine type (4 billions), production in fulfillment of the USSR Protocol (2.6 billions), and materials plants (1.5

billions), constituted approximately half of the total planned production. Consequently, while other items would almost certainly be delayed until 1944 for completion under such circumstances, the "must" objectives might also be unattainable unless revised.[71]

The JCS therefore agreed to propose a general reduction in 1943 requirements. The aircraft program, being by far the largest single item, became the crux of the entire discussion. General Marshall on 29 October expressed his concern that a decision regarding aircraft should be obtained immediately from the President. He pointed out that each day of delay would result in an appreciable loss of plane production. Accordingly he proposed that the 1943 aircraft program be reduced from 151,000 to 107,000 planes, of which 82,000 would be of combat type. He also was prepared to make even more significant reductions in such Army ground equipment as tanks, antiaircraft guns, and armored cars. Marshall's proposal was received with relative cordiality by Admiral King who had been advised that it would not interfere with the proposed naval building program in any way.[72]

Acting on the advice of his chiefs of staff, President Roosevelt on 29 October instructed Mr. Nelson that the 107,000-plane objective "will be given highest priority and whatever preference is needed to insure its accomplishment." He indicated that the "Army, the Navy and other governmental agencies are to cooperate to the fullest in the furtherance of this program," adding that it was "really essential that in one way or another this program be carried out in toto."[73]

On the face of it, this directive would seem to have settled both the issue of air requirements and that of priority and preferential

treatment in production. It did settle the question of requirements to all intents and purposes. The revised 1943 military program, as approved by the JCS on 26 November 1942, reduced the total dollar value from 92.9 billions to 80.15 billions--which was believed to be an objective within the productive capacity of the nation. In this revised estimate, provision was made for 108,792 aircraft, representing a reduction of 3.73 billions from the figure originally quoted. Although other items of the President's "must" list did not suffer any appreciable reduction, and the Maritime program was actually increased by 25 per cent, those programs not underlined by the Chief Executive were drastically cut. This was especially true of the Army ground program and that part of the Navy building program not specifically given preference by the President.[74]

But the battle for priority, for preferential treatment in allocation of critical materials, had only begun. AWPD-42 had warned that the aircraft production objective for 1943, upon which the success of the bomber offensive depended, could be met only if it were given priority over all other programs. That recommendation had been made in the light of 1942 experience. Since early in that year, aircraft production had been assigned to Priority AA-1, but it had been forced always to share that category with substantial parts of the other major war programs.[75] Plane production had consequently been disappointing.[76] To avoid a similar result in 1943, when air strength was slated to play a crucial part in Allied strategy, it would be necessary to arrange a priority system which would be more

selective than any then in force. Above all, first priority must not be overloaded to an extent which would make the accomplishment of any top priority item a doubtful, perhaps an impossible task.[77]

General Arnold therefore set out, as a matter of the utmost urgency, to secure a frankly overriding priority for aircraft production.[78] In that effort he received the hearty support of General Somervell who, as Commanding General of the Army Service Forces, was in a unique position to give practical counsel.[79] The Army planners as a body favored a revision of existing priorities which would place the aircraft program alone in the top bracket. They pointed out that a directive along such lines would not necessarily establish a fixed priority, but would simply indicate where the primary emphasis should be placed. They appreciated the fact that certain other programs, listed by the President as "must" items for 1943, would be essential to the success of the air war as well as to that of the war in general. The authors of AWPD-42 had foreseen that vast quantities of shipping would be needed to transport the air forces and to supply them. And, with German submarines undertaking a major strategic offensive operation in the Atlantic, it was evident that as large a force of escort and antisubmarine vessels as possible would have to be employed to ensure the safe passage of personnel, equipment, and supplies. The priority proposed by the Army was, then, intended to build a balanced production program around aircraft as the most powerful weapon, and therefore the most critical single item.[80]

The Navy flatly disagreed.[81] It had contemplated the aircraft program as outlined in AWPD-42 with unconcealed disfavor, and had

accepted the revised estimate apparently as the lesser of the proposed evils. According to Admiral King, he had given his approval only on the assurance that aircraft would not interfere with the Navy and Maritime projects which he believed essential to a balanced program of production.[82] So the Navy submitted a counterproposal which placed in first priority not only aircraft but all aircraft carriers, auxiliary carriers, and cruisers then scheduled for completion in 1943 and the first quarter of 1944, submarines due to be completed prior to 31 December 1943, such landing craft as were required to clear the building facilities for escort vessels, and finally, the maximum number of tankers and escort vessels--in short, a major portion of the Navy and Maritime programs.[83] Navy spokesmen urged that these items, especially aircraft carriers and escort vessels, were not only necessary to supply the overseas air forces (as the AAF was perfectly ready to admit), but were actually of greater importance to the war effort than the grand total of aircraft.[84]

Be that as it may, the Navy's counterproposal had the effect of once more overloading first priority. General Arnold agreed to place critical items in the air, Army, Navy, and Maritime programs in a parallel position under an AA-1 category on the advice of production experts who claimed that there would be no consequent interference with the production of the required aircraft for 1943. It soon developed, however, that such a system would not only interfere with aircraft production, but would make the 1943 air objective, on which the President had insisted, impossible to attain.[85] Rather than

accord the necessary preferential treatment to aircraft, Admiral King advocated asking the President to withdraw his "must" program and be guided entirely by priorities established by the JCS.[86] A compromise of sorts was reached on 26 November 1942 by which the President approved a "No. 1 Group" of critical items, which included the 107,000-aircraft program, Army munitions requirements for the following six months, and substantial portions of the Navy and Maritime shipbuilding program. Although differing only slightly from the priority list against which General Arnold had registered his objection, the "No. 1 Group" received his approval. It is probable that by endorsing this paper Arnold hoped on the one hand to avoid the delay and misunderstanding of protracted debate, and on the other to secure a directive which, if not strictly satisfactory, was nevertheless broad and flexible and which would therefore permit a good deal of informal adjustment in its implementation.[87]

Mr. Nelson was asked at the same time to state whether or not this "No. 1 Group" could be accomplished. In his reply, dated 3 December 1942, he pointed out certain factors which seriously complicated the problem of producing all essential equipment on schedule. On the face of it, he wrote, it would seem quite feasible to produce in 1943 the "No. 1 Group," estimated at 50 billions of dollars, when the total productive capacity of the nation amounted to more than 75 billions. But the limiting factor was not over-all productive capacity but certain critical machine tools and component parts. In addition, high priority had been accorded to such other projects as

synthetic rubber, high octane gasoline, aluminum and alloy steel, all of which were in varying degrees required for the completion of the "No. 1 Group" items. It would, he concluded, be possible to produce the required aircraft by juggling the production of machine tools, but it would not be possible to complete all the "No. 1 Group" in 1943, nor could the aircraft program be completed if placed on a preferential basis equal to that of several other large segments of the 1943 war production.[88]

Thus the prospect for 1943 plane production looked just as uncertain as it had in 1942. All programs--the "No. 1 Group," the rubber, high octane gasoline, aluminum and alloy steel program, the Russian Protocol and other export programs, and finally civilian supply and maintenance--all had a legitimate claim to the highest priority, and all had been given a "must" rating at one time or another by the government. It was, by the end of the year, evident that all could be accomplished concurrently in 1943, but not all completed on schedule. It was further clear that some could be completed on schedule if given preferential treatment over all others. Both General Somervell and Vice Admiral F. J. Horne, who had been engaged in surveying the problem, advised that aircraft could be given preference with less detriment to the rest of the critical programs than if preference were given to any other single item. On the other hand, it appeared that the synthetic rubber and high octane gasoline projects could only be accomplished at crippling expense to the rest.[89]

Lack of overriding priorities, especially in the use of critical materials, continued through the following months to handicap the

aircraft production program. During January and February 1943, that program was reported to be 17 per cent behind schedule. And it was apparent that the 1943 objective would probably not be fully attained.[90] But the situation was not actually so serious as the welter of conflicting programs and priorities would seem on paper to make it. During the latter part of 1942 and early 1943, while the JCS were engaged in the futile and not very logical effort to establish which of a number of essential projects was most essential, and to decide which of the President's "must" programs could in fact be accomplished, production was proceeding with no clear priority directive at all, except that aircraft were being given as far as possible an overriding priority in accordance with the President's directive of 29 October. In view of the favorable attitude taken toward the aircraft program by Mr. Nelson and the WPB, the AAF was willing to accept an informal preference in lieu of anything more satisfactory legally, and to refrain prudently from raising the issue unnecessarily.[91]

Problems of Control

In the summer of 1942, British and American air commanders had agreed in principle that their respective bombing forces would be employed in a combined campaign of strategic bombardment against Germany's economic and social structure, but only a provisional arrangement had been made for the control of the combined effort. It had been stated in the "Joint Directif" of 20 August that the American forces would attack primarily by day in order to supplement the night

bombing being carried on systematically by the RAF, and so "to achieve continuity in the bombing offensive against the Axis." That directive had further provided certain specific procedures for the cooperation of the two forces, but at that point only where cooperation was immediately necessary, namely in the provision of British fighter support for the American bombers. The question of over-all control was left vague, probably intentionally. Objectives for the day bomber offensive would be determined "periodically within existing strategy, between the Commanding Generals, Eighth Air Force and A.C.A.S. (Assistant Chief Air Staff) (Opn.), as occasion demands."[92] This paper was necessarily tentative. The capabilities of the American day bomber force were as yet problematical. "Existing strategy" in the early fall of that year was by no means a firmly established or consistent factor. Nor did the directive make any real provision for combined control of both British and American bomber forces in the proposed coordinated offensive.

Yet the directive of 20 August remained, prior to Casablanca, the only single paper in which the aims of the combined offensive were set forth and some statement made of the methods for its control. In the meantime it was supplemented and amended in various particulars affecting the American force. On 21 October the Eighth Air Force received its first clear directive concerning target priorities, by authority of the Commanding General, ETOUSA. On 19 November some additions were made to that list, apparently by the same authority. On 29 October the Air Ministry established Allied policy concerning the bombing of objectives in occupied territory, a policy which, as

it happened, applied especially to the Eighth Air Force.[93] But these directives, emanating as they did from more than one authority, and issued in response to a rapidly developing strategic situation, merely underscored the inadequacy of the existing system of control without at the same time providing any comprehensive substitute. Indeed, by directing the efforts of the Eighth Air Force principally in support of TORCH, the priority directives received from the Theater Commander in effect diverted the American force from the task of strategic bombardment of Germany as originally conceived. And whatever coordination the Eighth Air Force achieved with the RAF in attacks on submarine bases, air installations, and transportation facilities located in occupied France was incidental to the immediate purpose.

In January 1943 General Arnold described the existing method of combined control in terms rather of coordination than of command. Priority of bombing targets for the U. S. bombing force was determined in Britain by a committee composed of RAF officers, representatives from the Ministry of Economic Warfare, and one USAAF representative. The list of targets was then submitted to Eisenhower for approval, after which it was sent to Baker, who selected from the list objectives which weather and other conditions made it possible for his bombers to reach.[94]

Throughout the last quarter of 1942 those most concerned with the bomber offensive recognized that, before it could become an effective combined strategic operation, it would be necessary to secure,

first, a clear directive regarding the mission of the air forces operating against Germany from bases in the U. K. and, second, a system of control which would ensure coordination between the British and American forces and the best use of the means available.[95] While the critical phase of TORCH was in progress, it was probably impossible to obtain either of these essentials. And indeed, an attempt, apparently on the part of the USAAF, to establish a unified command over both British and American air forces operating from the U. K. was abandoned in late October, presumably as unsuitable under existing strategic conditions.[96]

The fact was that TORCH shook the plan for a combined bomber offensive to its very foundations. It has been mentioned in an earlier section of this chapter that the adoption of the North African strategy involved a radical reorientation of Allied policy in the course of which it at one time looked as if the strategic basis for the bomber offensive, insofar as it depended on American participation, might be in fact dissolved. The matter of most immediate urgency therefore became rather to ensure the existence of an American bomber force in the U. K. than to construct the machinery for combined bombing operations in the more or less distant future.

As soon as it became apparent that large numbers of American air units would inevitably be diverted from the U. K. to North Africa, AAF planners undertook to reconcile the TORCH movement with their original concept of a major air offensive from the British Isles. It was, they felt, an unfortunate diversion, but at the same time it

was a diversion not without certain redeeming features. English weather in October had made the possibility of operating a bomber force from Mediterranean bases a reasonably attractive prospect. And any air action which diverted large numbers of German aircraft from northwestern Europe, or which might make it possible in the future to hit Axis installations in Italy, could not be considered a waste of strategic air power. Things would, therefore, work out very well indeed provided the air forces which had been, and would presumably continue to be, moved to Africa (there was some talk of moving the entire Eighth Air Force to Africa if need be) could be moved back again to the U. K. in time for the major air effort there. The problem, then, was to organize the U. S. air forces in Europe and Africa in such a way as to make the most of the flexibility and mobility inherent in air power. If they were placed under a single air command they could not only be moved when necessary from the U. K. to Africa with a minimum of confusion, but, when the time came, they could be brought back to the U. K. by the same authority with equally little administrative difficulty. So it became an AAF policy to urge that the European and African theaters, and the Middle East as well, be considered as one theater for air purposes, and to advocate the creation of a theater air force involving all U. S. air forces operating "from Iceland to Iraq."[97]

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

General Eisenhower. It also allowed General Spaatz to commit himself and his forces whole-heartedly in support of the TORCH operation in the confident hope that, when the campaign was well under way he would be able to return to the U. K. with Eisenhower to take part in ROUND-UP.[98]

The proposed "Theater Air Force" had another virtue, of peculiar importance during the fall of 1942. It was then that the question of diversions to the Pacific was being debated in Washington, and it looked to the proponents of the war against Germany as though the weight of U. S. strategy were in serious danger of shifting toward the Pacific. As General Spaatz put it late in October:[99]

> . . . one of the principal advantages to establishing a single European Air Theatre is that it will have greater influence in attracting forces to this side of the world rather than to the Pacific.
>
> * * * * *
>
> Such a strong appeal would be lacking if there were two conflicting Theatres on this side of the world, each trying to draw to itself the major share of the forces.

As a matter of fact, it was in connection with the debate in early September concerning diversions from the U. K. to the Pacific that the concept of a single air theater embracing all operations against the European Axis was first given official expression.[100]

On 17 September a plan had been sent from AAF Headquarters to General Spaatz embodying this general principle. Late in October, when the prospect seemed very good of securing operating bases in North Africa as a result of a successful campaign there, conversations between Spaatz and Eisenhower gave rise to a specific proposal for a

theater air command. On 19 November this plan, involving the Eighth and Twelfth Air Forces only, was put into official form. The Commanding General, USAAF in the European Theater would be charged with the duty of advising the Theater Commander on all matters in which the USAAF in ETOUSA was concerned, of commanding all USAAF units in ETOUSA, of coordinating strategic air operations and strategic plans with the RAF, and preparing air plans involving operations of the USAAF in ETOUSA.[101]

General Eisenhower was inclined to postpone action on the plan until the capture of Tunisia, by providing the desired air bases, had removed the problem from the sphere of academic discussion. Word from General Arnold decided him to initiate action at once.[102] On the 15th of November, Arnold had written to both Spaatz and Eisenhower, expressing his concern that "unless we are careful, we will find our air effort in Europe dispersed the same way we are now dispersed all around the world." Air operations in Europe must, he declared, be controlled and planned by one man, especially since "if there ever was a time when we should get the maximum effort and effectiveness from our air, it is right now when Germany's air power is on the wane." As the man for the job, he suggested General Spaatz.[103] On 1 December, Spaatz was transferred to Africa as Eisenhower's air adviser, leaving General Baker in charge of the Eighth Air Force in England.[104]

By moving Spaatz to Africa as his air adviser, Eisenhower hoped to secure in effect the necessary unity of air operations in the African Theater, and at the same time to maintain that close relationship between the Twelfth and Eighth Air Forces which he and Spaatz

and Arnold believed to be essential. And, according to General Baker, the advantages of the scheme soon became apparent in practice. However, to give this informal air organization an official status would take time. The British Chiefs of Staff had, on or about the first of December, proposed a broad plan for the control of all Allied air forces in the Mediterranean area with Air Marshal Tedder as commander-in-chief. Any final reorganization would have to take account of this proposal, which did not at all coincide with the American plan for a theater air force. And in any case it would be necessary to secure the approval of the CCS. But time was of the essence. The Tunisian situation was becoming more and more critical, and the need for effective unity of air policy in the TORCH area had become an overriding consideration. On 5 December Eisenhower emphatically stated that "my problem is immediate and critical and is not to be confused nor its solution postponed by deliberate study of an overall system of air command." He therefore declared it his intention to use Spaatz, temporarily, as his deputy for air in the North African Theater. He emphasized the fact that Spaatz was not in a position of formal command. There had not been time to establish separate communications systems and other administrative machinery for anything of that sort. And it was a question whether he had the authority to do it at all. Meanwhile, Spaatz would continue to coordinate operations of the Eighth and Twelfth Air Forces, also on an informal basis.

This stop-gap arrangement Eisenhower hoped would tide him over until such time as long-term plans could be laid for a reorganized air command.[105]

While Eisenhower was having to pay increasing attention to the immediate requirements of TORCH, Arnold and his staff in Washington had their eyes fixed on plans for the eventual unification of air effort in Europe, Africa, and the Middle East.[106] Indeed, Arnold was no longer content merely to place all U. S. air forces operating against the European Axis under one command. He wished also to include those of the British under a single Allied air commander. On 10 December he put the matter to Sir Charles Portal:[107]

> The recent air operations in North Africa have confirmed my opinion that the United Nations air effort against the European Axis should be unified under the command of one supreme commander. At the present time we are carrying on an air war against Germany and Italy by more or less unrelated air efforts from the United Kingdom, North Africa, and the Middle East. Our efforts are being opposed by a very efficient air force, integrated by a very capable supreme air commander, Goering.

In this, as in the matter of the over-all U. S. air command, Arnold had uppermost in his mind the strategic air offensive. To General Spaatz he wrote:[108]

> By appropriate unification of command the North African bases made available by TORCH . . . may be used to substantial advantage in the prosecution of our basic strategic plan for offensive air action against the European Axis. Without such unification the North African front is apt, I believe, to prove a seriously deterring factor in the effective employment of our air arm as a striking force.

For Eisenhower, however, the immediately urgent problem remained that of the air command in the Mediterranean, especially in the TORCH area. He had on 30 December been authorized by the War Department to submit the plan for an ETOUSA Air Force Headquarters to the CCS.[109] But on 31 December he informed the Combined Chiefs that he planned, subject to their approval, to set up, directly under him as Commander-

in-Chief of TORCH, an Allied Commander-in-Chief for Air. The British had tentatively suggested Tedder as his air commander, with the understanding that he would also have operational control over other bomber forces in the Mediterranean area. But Eisenhower still considered it essential that his air commander retain control over the U. S. air forces in the U. K. He therefore decided to avoid the issue of a unified Mediterranean air command under Tedder by proposing Spaatz as air commander for the TORCH force alone, in the hope that, as he put it, "later developments would soon demonstrate to all concerned the necessity for regarding the whole U. K.-TORCH-Mideast area as a single theater, at least so far as U. S. long-range bombers are concerned." The necessity for retaining a large portion of the British air forces in the U. K. would, he added, probably always prevent them from applying the same principle to their bombing forces.[110]

On 5 January, Eisenhower issued a directive to Spaatz placing him in command of the newly created Allied Air Force in North Africa. In addition to his duties in that connection Spaatz was to be responsible for coordinating air operations between the Eighth Air Force and the Allied Air Force, and for allocating, when necessary, replacement aircraft and crews between the Eighth Air Force, the Twelfth Air Force, and the Eastern Air Command.[111] The arrangement was weighted heavily in favor of the North African campaign. But it retained the principle of the complementary character of air operations in the two theaters, European and African. It did not, of course, attempt to provide for that over-all control of Allied air power for

which General Arnold hoped, although, as he himself said, by unifying Allied effort in one area at least it was a step in the right direction.[112]

By the end of December events no longer pointed so imperatively toward a unified command of all air forces operating against the European Axis as they had done during the earlier phases of TORCH. Operations in the Mediterranean area had become increasingly important. It no longer appeared likely that, upon the successful completion of the North African campaign, Eisenhower and Spaatz would be free to return to the U. K. for the ROUND-UP invasion in 1943, although the possibility had by no means been abandoned in all quarters.[113] "Operations subsequent to TORCH" had already raised its disconcerting head and, under British pressure, it seemed probable that something of the sort would be undertaken in preference to an early campaign in Northern Europe.[114] Furthermore, at the moment the drive for Tunisia had slowed down discouragingly, and the anticipated base areas for future strategic bombing of Axis objectives in Italy had not materialized. As for Arnold's plan for a unified Allied air force, too many obstacles lay in its road. It required the prior existence of a supreme commander for all Allied forces operating against the European Axis, and a roughly parallel organization and deployment of British and U. S. air forces, neither of which circumstances prevailed. The plan was apparently never presented to the CCS.[115]

Although the idea of the essential unity of air activity in the U. K., North Africa, and the Middle East still flourished, especially

in AAF Headquarters, it was no longer likely to provide the answer to the problem of how best to control the strategic air offensive against Germany. It had been a useful concept in those perilous times in the fall and winter of 1942. It had no doubt helped to keep the projected bomber offensive from being indefinitely postponed as a result of permanent diversions to the Pacific and to Africa. But now, as the European strategy matured, it became a question once again of clarifying the mission of the strategic bombing forces in the U. K., and of constructing some kind of machinery by means of which the American and British air forces in that theater could achieve coordination of effort in a combined bomber offensive against the heart of Germany itself. That work was accomplished for practical purposes at the Casablanca Conference.

The Case for Bombardment

In an earlier part of this study it has been mentioned that the burden of proof in any discussion involving air strategy or aircraft production rested on the exponents of air power. The period prior to Casablanca was one during which many of the basic military decisions were being made, and it was consequently one during which the exponents of air power, both American and British, were called upon constantly to demonstrate the force of their arguments. This was particularly true of the American air strategists who possessed an as yet largely untried tactical doctrine, and who faced, in the U. S. JCS, a divided opinion regarding basic strategy and therefore regarding the best use to be made of U. S. air power. In the final analysis

SECRET

there was one way, and one way only, to present convincingly the case for air, and that was by direct reference to experience. But, at least to begin with, operations could not be expected to speak entirely for themselves. They had to be advertised; and, in the case of U. S. daylight precision bombing, which during the period in question was being undertaken on a relatively restricted scale, they had to be presented to the best possible advantage not only to the U. S. war agencies, but to the British as well.

Headquarters, AAF fully appreciated the critical character of the experiment being carried on by the Eighth Air Force in the U. K. And that self-consciousness was shared by the commanders in the field. General Eaker referred feelingly to the missionary work being done by what he later called his "piddling little force of Fortresses." It might, he said, "affect the whole future of day bombardment in this war."[116] Accordingly, every mission that could be interpreted without falsification of fact as an air victory, or as a demonstration of the AAF doctrine of strategic bombardment, was at once relayed to Washington and there seized upon eagerly.

The initial operations of the VIII Bomber Command in August came at an extremely opportune moment. American ideas of bombing, and the American bombers themselves, were being subjected to an increasing amount of skeptical attention. General Arnold was about to begin his fight in the JCS to prevent the diversion of air units to the Pacific, and AAF planners were in the process of estimating the air requirements for 1943 preparatory to issuing AWPD-42.[117]

On each account the VIII Bomber Command provided evidence of the utmost significance. The Lille attack of 9 October proved similarly useful. No sooner had the news reached Washington than a memo was prepared in AAF Headquarters for Mr. Hopkins in which it was argued that the Lille mission "provides further proof of the soundness of the basic concept of AWPD-42, i. e. the effectiveness of properly exercised air power in destroying the ability of our enemy to wage war, and emphasizes the importance of maintaining to the full extent possible the vital air offensive against Germany."[118] It will be recalled in this connection that later in October President Roosevelt ordered an overriding priority in the production of aircraft according to a program built solidly around the heavy bomber and in the spirit of AWPD-42.

But it was not enough simply to welcome the dispatches which as a matter of routine brought useful news to Headquarters. It was necessary to solicit expressions of opinion favorable to bombardment, and to see that information flowed copiously and in the most useful form from the theater to Washington. During the crises of September and October 1942--when it was a question of preventing diversions from the ETO and of supporting AWPD-42--General Spaatz was specifically requested to "bombard" the War Department with messages indicating the success of bombing operations, the feasibility of future strategic bombardment, and the approval of the theater commander.[119]

In connection with AWPD-42, General Kuter wrote to Spaatz on 16 September as follows:[120]

> I should like to remind you that the Eisenhower to Marshall messages coming from the battlefield (Aerial) are given weight here in Washington exactly equivalent to the words of Jehovah. Furthermore, the Spaatz to Arnold messages are viewed with real awe by the local Olympians. If it appears reasonable to you and to Ike that a few more heavy groups in 43-44 are to be preferred over an additional armored division, or over a shiny new battleship in 46-47, a suggestion to that effect would provide us with some very effective ammunition. Enclosed herein is a superlative message. We will pin a big gold medal on everyone involved in such a message, from the code clerk upward. The closer the resemblance of the actual message to the enclosed sample, the larger and shinier will be the medal. If the last sentence is included, the medal will be studded with rubies and emeralds.

In November, General Arnold sent to General Baker an officer especially qualified for the task of "writing up and presenting to the American people the true potentialities of air power which are factually supported by operations in your theater." He must, Arnold wrote, "fully inform this country of the success that we have had with them [the heavy bombers] to date and point out forcibly that through their use from Europe in ever increasing numbers we can crush Germany's capacity to wage war at its source."[121]

It soon became apparent that some agency in AAF Headquarters should be made specifically responsible for digesting data regarding bombardment and preparing it suitably for presentation to the President, the JCS and CCS, the Chief of Naval Operations, and interested members of Congress. On 25 November, the Director of Bombardment was ordered to establish the required agency, and certain specifications were laid down for its operation:[122]

> Data must be factual. Any resemblance to propaganda will defeat our purpose. The presentation must be such as will stir the imagination of the listener. It is necessary,

therefore, that the data be prepared by persons with imagination, who have been trained in selling new ideas.

In presenting the case for bombardment, which of course meant at this juncture the strategic bombing of Germany, the AAF received powerful support from the British whose opinion, by virtue of their long experience both in receiving and delivering bombs, carried much weight. Lord Trenchard's paper, stoutly arguing that air power must be applied independently in strategic bombing, not entangled with land campaigns undertaken in accordance with outmoded military doctrines, was widely circulated in the War Department, and apparently had a good deal of influence on American strategic thinking.[123] On 13 October, Air Commodore S. C. Strafford wrote to Brig. Gen. O. A. Anderson, AC/AS Plans, regarding the problem of preserving for the heavy bomber "its proper and vital place in the new air program," and enclosed certain documents embodying British doctrine on the subject which he hoped would be of some use in that direction.[124] Somewhat later, in November, Air Vice Marshal Arthur Slessor brought a memo prepared by the British Chiefs of Staff to the U. S. for discussion with the JCS. This document, reflecting much of Lord Trenchard's ideas on air power and urging the creation of a great Anglo-American force of 4,000 to 6,000 bombers by April 1944 as a matter of the highest priority compatible with other essential projects, made a most favorable impression on Mr. Lovett, Assistant Secretary of War for Air. It was forwarded to Secretary Stimson on 15 November after having been withdrawn from the JCS agenda only after Admiral King had protested that, since it had not been approved by

the British Imperial War Council, it could not be considered official.[125]

The AAF also drew independently on British experience. On 1 November 1941, General Arnold had sent a board of AAF experts to England to study the effectiveness of German bombing, and it was their impression, supported by British opinion, that, had the enemy practiced systematic strategic bombardment as the British and American air strategists understood it and had they concentrated at an earlier date on vital objectives and followed up their attacks to a decisive conclusion, the results would have been fatal to the British war effort. Attention was further called in the fall of 1942 to the devastating effect of RAF area bombing. The 1,000-plane raid on Cologne was believed, for example, to have destroyed approximately 12 per cent of the city's main industrial and residential areas.[126]

At this point, however, certain difficulties arose. The AAF was ready enough to cite the effectiveness of British area bombing when it was a question of demonstrating the place of a combined bomber offensive in the total strategic picture. The British effort had from the beginning been taken for granted as an essential part of a 24-hour-a-day bombing program calculated to bring continuous pressure to bear on the enemy. But there was the initial problem of demonstrating that the American bombing force was capable of supplying the daylight raids which constituted the other half of the combined offensive. It was, in other words, often easier to present the case for strategic bombardment in general than that of daylight precision bombing to which the AAF was committed more as a matter of

faith than of knowledge empirically arrived at. The British had been carrying on a manifestly effective campaign of area bombardment according to more or less thoroughly proved principles, and there was always a presumption in the minds of disinterested observers in favor of the American bombing force contributing to this established campaign rather than pioneering in unproved methods. More than that, precision bombing had been specifically and sharply questioned in the late summer of 1942 by the British semiofficial press and by the U. S. Navy. Consequently a good deal of special pleading was done in behalf of precision techniques, and comparisons were sometimes drawn to the disadvantage of the British doctrine.

For instance, when the news of the first bombing mission of the Eighth Air Force arrived in Washington, the Chief of Air Staff ordered a memo prepared for General Arnold's signature to General Marshall, for the attention of Admirals King and Leahy. The attack on Rouen, 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 [underscoring in the original] required the ability to hit small targets from high altitudes.

It was, furthermore, not a doctrine adopted capriciously. The war experience of all nations had been carefully studied, the difficulties in accomplishing precision bombing determined, and U. S. training, materiel, and tactics modified accordingly.[127]

This and similar statements were meant strictly for home consumption. Likewise for staff use only were a series of special studies, dated 19 October, prepared under the Director of Intelligence, Service,

Headquarters, AAF, which undertook to analyse the British area bombing at Rostock, Cologne, and Osnabrück. The general conclusion reached was that bombing of this sort, while effective enough in producing general damage, was an unreliable and costly way of paralysing the enemy's war machine, and that, in comparison, precision bombing of a specific phase of the enemy's war economy according to a definite but flexible strategic plan afforded the most economical means of effecting a decisive concentration of bombardment effort.[128]

Apparently through no fault of the Air Staff, these studies finally reached the RAF with results described by General Baker on 6 December as "most unfortunate." Baker, in fact, considered them an unfair statement of the British effort, being based on inadequate information.[129] Although interested constantly in presenting a favorable case for precision methods, AAF Headquarters and American air commanders in the ETO were alike concerned over the tendency, inherent in many American observers, both civilian and military, to depreciate the British effort including RAF bombing. They clearly understood that good Anglo-American relations were essential to the bombardment program, as well as to any other combined enterprise.[130]

Nevertheless, one of the most difficult tasks they faced was to sell daylight, precision bombing to the British. British opinion had originally been deeply skeptical of the American doctrine, and, although British official sanction was given tentatively to the day bombardment program and the operational record of the Eighth Air Force had been a revelation to most observers in England, opinion in the U. K. remained

throughout the rest of 1942 in some doubt regarding the relative effectiveness of the American bombing. Indeed, when during the fall the daylight operations of the Eighth Air Force became seriously handicapped by the weather and when improved German fighter tactics and antiaircraft fire took increasing toll of the U. S. bombers, the question was asked with increasing insistence whether the VIII Bomber Command should not resort to the night, area bombing and give up the vexing attempt to bomb pin-point targets. At Casablanca that question was put specifically to General Arnold, and much of the character of the Combined Bomber Offensive depended on the answer given to it at that time.[151]

The Casablanca Conference

When the Casablanca Conference met in the middle of January 1943, it had before it three important tasks affecting the bomber offensive against Germany. It had to define the place of that offensive in basic strategic plans, it had to clarify the mission of the bombing forces, especially that of the Eighth Air Force, and it had to establish a formal system of control for the combined bombing operation.

The strategic decisions made at Casablanca reaffirmed the plans on the basis of which a combined bomber offensive had originally been conceived. First priority was given unequivocally to the war against the European Axis. To defeat Germany it would be necessary to invade the Continent of Europe in force. But Europe had still to be considered as a fortress which must be subjected to vigorous bombardment over a

long period of time before the final assault would be practicable. Hence the combined bomber offensive remained a prerequisite to any major land operation against Germany.[132]

Meanwhile, however, further amphibious and land operations would be undertaken in the Mediterranean area. It was decided to take Sicily (Operation HUSKY) as a means of securing the Mediterranean lines of communication, of diverting German pressure from the Russian front (Commissar Molotov had suggested that Britain and the U. S. send ground forces to the Continent sufficient to divert 40 divisions from the Eastern Front), and of intensifying pressure on Italy.[133] The agreement to mount HUSKY was made only after much debate. The U. S. JCS had been consistently opposed to Mediterranean "Operations subsequent to TORCH" because they believed them merely another step in an indecisive and costly encircling action, and because they favored concentrating Allied forces, both air and surface, for the decisive push against the heart of Germany which could only be launched effectively in northwestern Europe. The British Chiefs of Staff, on the contrary, while insisting on the maximum application of Allied strategic air power against Germany proper, preferred to postpone cross-Channel operations in favor of an offensive in the Mediterranean in the hope of seriously dispersing German strength.

Certain logistical factors favored the British policy. Most important of all was the fact that the Allies already had large forces in North Africa ready for further operations in the Mediterranean once TORCH had been completed, and it would greatly ease the

critical shipping problem if those forces could be utilized without having to be transported to the U. K. The American delegation appreciated this economy of tonnage and admitted the additional advantages offered by a successful HUSKY in the way of extending air coverage for Allied shipping, of increasing pressure on Italy, and possibly even of eliminating that minor Axis partner. The British pointed out that, if HUSKY were mounted, it would actually be possible to concentrate a larger force of heavy bombers in the U. K. than if an early invasion of the Continent were contemplated, for in that latter event a much larger proportion of lighter bombers and ground support planes would have to be maintained which would be to some extent at the expense of the heavy bombardment.[134]

It was immediately clear that HUSKY would prevent a ROUND-UP type of invasion during 1943. But British and American opinion was in agreement that this fact should not detract at all from the importance in the interim of a maximum bombing effort against Germany's war economy.[135] In a sense the HUSKY plan, by allowing more time for the systematic application of strategic air power, enhanced the position of the bomber offensive as a major, independent, offensive operation. Moreover, a full-scale air war of this nature provided the American and British governments with a valuable talking point in dealing with Russia. Keeping Russia as an effective ally was still regarded as an essential part of Allied strategy, yet it was not possible to open the kind of second front suggested by Molotov. It was accordingly considered that a major air offensive from the south and west would accomplish a diversion of German air strength

from the Eastern Front which should go a long way toward satisfying Premier Stalin.[136]

It remained now to decide how this "heaviest possible bomber offensive against the German war effort" should be conducted--from what bases, against what type of targets, and under what system of command. A great deal depended on the capabilities of the American bombing force, regarding which there still existed some doubt. Apparently under the leadership of the Prime Minister, pressure was brought to bear to have the heavy bombers of the Eighth Air Force join the RAF in the night bombing campaign. General Arnold had therefore to present the case for daylight bombardment in some detail. General Baker was summoned, as the man most likely to speak authoritatively on the subject, and was given the opportunity of defending the U. S. doctrine.[137]

Only one convincing argument, Baker maintained, had ever been advanced for night bombing over day bombing, and that was that it was safer. In point of fact, however, the Eighth Air Force rate of loss in day raids had been lower than that of the RAF on its night operations. That fact could be explained in part by the great improvement in German night fighter tactics and in part by the heavy fire power possessed by the American bombers. If the day bombers were made to operate by night their losses, as a result of both enemy action and operational hazards, would increase materially, for they were neither equipped nor trained for that sort of work. And to equip and train them would cause untold delay. But there was another side to the coin. Day bombing, regardless of the question of safety, could do

things that night bombing could not. The day bombers could hit small, important targets such as individual factories which could not be found, seen, or hit at night. Their accuracy in such attacks Baker estimated at about five times that of the best night bombing, thanks to the excellent bombsight they carried. Hence day bombing tended to be more economical than night bombing, for a force only one-fifth as large would be required to destroy a given installation. Baker of course admitted that the objective of night bombardment was not primarily the destruction of individual targets but the devastation of vital areas, and as such it could not properly be compared to precision bombing on the ground of accuracy. But that introduced another point of the greatest significance: day bombing and night bombing were ideally calculated to supplement each other. By employing both it would be possible to bring continuous, 24-hour pressure to bear on the enemy, thus preventing his defenses from relaxing. It would also be possible, in many cases, for the AAF to locate difficult targets and mark them by the fires resulting from their preliminary bombing, and so make it feasible for the RAF to complete the job at night. Furthermore, the day bombing program reduced airdrome, air space, and communications congestion in the U. K. where space was at a premium. Finally, day bombing would permit the destruction of German day fighters. It was, Baker felt, the most economical method of reducing German air strength, because the enemy would have to send up his fighter planes to protect vital objectives even when he would not commit them to battle with Allied fighter forces.

Other questions were asked General Baker. Why had there been so

many abortive sorties? Why had there been so few missions? Why should the U. S. bombers and those of the RAF not be given the same directive and the same targets? Why have U. S. bombers not bombed Germany? In answer, Baker described the factors that hitherto had limited the activity of his bombers: the relative inexperience of the crews; the requirements of TORCH which had seriously bled the Eighth Air Force and which had 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

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

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 Baker 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

now 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 forces 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]

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

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 Biscay bases in a special category.[145] Nevertheless, the CCS 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 Mediterranean theater, and for action against unforeseen but important objectives. When the Allied armies re-entered the Continent, the combined bomber force would afford them all possible support in the manner most 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 to contain German fighter strength away from the Russian and Mediterranean theatres of war." In another provision affecting primarily the American force, it specified that in attacking objectives in occupied countries the

attacking force would conform to "such instructions as may be issued from time to time for political reasons by His Majesty's Government through the British Chiefs of Staff." This provision was meant to answer a peculiar problem. Political considerations, it had been argued, often superseded military expediency in the case of objectives in occupied countries. The British government or representatives from one of the exiled governments sometimes placed a political embargo on some otherwise excellent military target. In such cases decisions had often to be taken very quickly, and it would not be practicable to deal with the matter through the CCS in Washington.[146]

Oddly enough, the Casablanca Directive made no mention of the system of command under which the combined offensive was to be conducted. Except that it was issued by the CCS "to the appropriate British and United States Air Force Commanders, to govern the operation of the British and United States Bomber Commands in the United Kingdom," it leaves the reader quite in the dark regarding the machinery of control. Very probably the omission was intentional, for CCS 166/1/D is primarily a strategic directive. But the lack of any specific paper on the subject of command seems to have caused some confusion. On 2 February 1943, the British Joint Staff Mission proposed to the U. S. JCS that the British Chief of the Air Staff should assume "forthwith" the responsibility for carrying out the combined bomber offensive as decided upon at Casablanca, and that his first act should be to issue to the Commanding General of the Eighth Air Force "the agreed directive (CCS 166/1/D)."[147]

a suggestion which is somewhat surprising inasmuch as the paper in question was already addressed to "the appropriate British and United States Air Force Commanders."

The Secretary of the JCS replied by referring to the agreement reached in CCS 65th Meeting, 21 January 1943, at Casablanca. On General Marshall's motion it had then been agreed that control of bomber operations conducted by the U. S. Air Forces in the U. K. would be in the hands of the British as a "matter of command rather than agreement with the U. S. Commanders." It would, however, "be the responsibility of the U. S. Commanders to decide the technique and method to be employed." A message including this information was dispatched on 4 February to the Commanding General, U. S. Forces in the U. K. Other than that, no directive appears to have been issued.[148] Meanwhile, of course, the responsibility for the combined bombardment operation fell naturally upon the British Chief of the Air Staff, Sir Charles Portal, and it was he, as agent of the CCS, who directed it for the rest of 1943.

The Casablanca Conference did much to clear the strategic atmosphere. It was thereafter possible for Allied strategists to plan with new assurance and to think with new clarity. But the work of the Conference was done on the level of general policy: although it laid down guiding principles, it did not entertain specific plans. Even the directive for the bomber offensive, despite its apparent immediacy, provided only a general indication of policy and its target priority list gave only tentative direction. It became the task of

the succeeding months, culminating in the TRIDENT Conference of May 1943, to translate the Casablanca decisions into terms of specific commitments and detailed objectives.

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 those 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 Eaker 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

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.

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 RAF 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

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

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 interpreters 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 16 submarines in varying stages of construction. Photo reconnaissance after the raid revealed a most

[redacted]

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 having actually capsized. 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

severe damage to buildings and equipment (the company claimed compensation to the extent of RM 4,365,470), 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 materiel 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 crushing 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 5,800 tons--approximately 1,845 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 Brest,

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 15 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

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.

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 16 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 1944--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.

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 Erla Aircraft and Aero Engine Works at Antwerp, the Focke-Wulf factory at Bremen, and the airframe factory of S. N. C. A. du Nord (formerly Avions Potez) at Meaulte--were of significant weight. All three of these heavier attacks, ranging from approximately 431,500 pounds to 526,000 pounds, resulted in concentrated and severe damage. 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 FW-190 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

[redacted]

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

On 12 and 28 March the day bombers returned to the scene of their first operation and struck a relatively heavy blow (313,000 and 418,000 pounds of high explosives respectively) against the Sotteville yard at Rouen, causing severe damage to the tracks and to the Buddicum repair shops. In addition, the latter attack almost completely destroyed the Quatre Mares locomotive repair shops. Most spectacular were the results at Rennes, when on 8 March 67 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 Brest 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 6 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,

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.[30] 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 RAF 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.[31]

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 (86 bombers dropped 502,100 pounds of high explosives over the target area) since the RAF had bombed the same plant on the night of 3/4 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 Wehrmacht

at least 3,000 trucks; and it appeared unlikely that the factory could resume prewar 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 1943, 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 would 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, Lorient and St. Nazaire virtually ceased

[redacted]

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 Organization Todt. The people of Brittany knew only too well the strategic importance of the Brest 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 AAF 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 would suffer seriously, even though accidentally. At Rennes, for example, the AAF mission of 8 March left nearly 300 civilian casualties. The French population not unnaturally felt that this was a terrible price to pay for "un si court delai et ralentissement du traffic." 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

'Mr. Laval'" elicited when it was projected on the screen.[36] Resentment 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 precision 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 5 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 4 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

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]

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. K. had also to combat criticisms of daylight precision bombardment which continued to crop up despite the official acceptance of the program by the CCS at Casablanca.[41] Allan A. Michie of the Reader'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 AAF, which stubbornly" refused to abandon its dogmatic insistence on daylight bombing, a concept tactically unsound under European conditions and

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 AAF spokesmen were unable to answer these criticisms effectively because as yet day bombing operations in the U. K. 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. Michie, on the other hand, and to those for whom he spoke, six months of actual operations in the U. K. 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

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 14 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 "moling" operations proved unsatisfactory and were abandoned after March. It was not until the end of November 1943 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 crews saw 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.

[redacted]

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, 64 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. Two 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 much 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 what 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.

The only losses that occurred during the day's mission resulted from enemy air action. Both the B-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. Yet even the German fighters proved less dangerous than had been feared, for they seemed much less experienced 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 1943 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 Emden, the bombers stirred up a veritable hornet's nest of fighters. For the first time they were opposed by

twin-engine fighters (Me-110's and Ju-88's) in addition to the usual Me-109's and FW-190'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. Flak 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 enlisted also from units as far south as Flushing. 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 RDF 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

[redacted]

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 held 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 an Me-109 to drop bombs on the B-17's from special

external bomb racks. On 16 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.[58]

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 half way 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

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 50 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 more of the B-17's were not lost; and in the course of the air battle the bombers may have destroyed upwards of 15 of the enemy planes.[57]

The attack on objectives in the German homeland had been the engrossing 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

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

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, crews reported defenses in the neighborhood of these objectives to have been more experienced in the ways 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 predicted barrage that destroyed several of the attacking planes.[61] During January, February, and March flak at these 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 these parts. They pressed their attacks fearlessly and were constantly trying out new tactics. At Lorient,

for example, on 23 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.[6]

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 twin nose guns 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 23 January an attacking force of 54 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 60 bombers were able to complete their mission to Brest without loss of a single plane. And on 6 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

dispatched to Brest for that purpose under heavy Spitfire cover.[64]

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 Rennes, lay within escort range. On two occasions, at Rouen on 12 March and at Amiens 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.[65] 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 RAF 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 warned not to come too

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 B-24's ran into an especially well planned and executed fighter attack during their attempt to bomb Rouen on 8 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 FW-190's. While the supporting fighters were thus occupied (and the German force was enough 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.

SECRET

The first three missions--to Paris on the 4th, to Antwerp on the 5th, and on the 16th to Lorient and Brest--had strong RAF 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. Coordinated attacks had hitherto been the exception, most of the 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.[68]

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

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-24'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.[69]

Things did not go so well when on 17 April the Eighth once more drove into the Reich in order to attack the Focke-Wulf 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. But this force also sustained a record loss: 18 of its planes were shot down and 46 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-Wilhelmshaven area, the enthusiasm of the welcome they provided the bombers on this occasion appears to have stemmed from advance warning provided in part by suspiciously favorable weather in the target area, and probably in even larger part by a German observation plane which discovered

and reported the bomber force while the latter was over the North Sea far beyond RDF 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 skill and dispatch. A small detachment of fighters met the formation at a point beyond the Frisian Islands and accompanied it to the target, where a mass of German fighters, no doubt kept constantly 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 antiaircraft 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

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

On withdrawal from the target, the bomber formations sustained constant attacks, executed from all directions and maintained persistently well past the Frisian Islands. The enemy fighters concentrated on stragglers and on formations too loosely flown for effective mutual support. This fact 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

necessary for purposes of defense. During February and March much thought was given to this problem, and by April the 54-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 best a wide variation in altitude. But for the time being the demands of defense had to be met before those of maneuverability.[73]

The Bremen mission, then, demonstrated both the vulnerability of the 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,

especially on the part of the less experienced units. After April nose attacks ceased to be the preferred method except for the specific purpose of breaking up the bombing run.

By May the German fighter force had emerged 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 Brest to Heligoland Bight, weighted heavily in the Pas de Calais area. Indeed, owing to the urgent demands of the Eastern and Mediterranean fronts, the total single-engine 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 GAF.[75] But the slight tinge of optimism visible 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 Eighth 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 Germany at the beginning of 1943 not many more than 360 fighters; by the middle of the year that figure had risen almost to 600. 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]

More significant, however, than the increase in fighter strength was the rapid, if still somewhat chaotic, development in enemy tactics. The deadly nose attacks had been effectively thwarted, but in their place there had emerged a Pandora's boxful of assorted ills, some of which were already proving embarrassing to the American force. Coordinated fighter attacks were a fruitful and infinitely versatile source of trouble. Twin-engine fighters were being used in the hope that their heavier fire power might be effective against the bombers. Parachute mines had been tried out, and air-to-air bombing had by May become an inveterate habit, characterizing almost every major engagement. Experiments were being conducted in the use of high-angle, large-caliber cannon and possibly also in the rocket guns which were to become a dire threat to bomber formations in the months to come. Finally, the Germans were rapidly increasing the effectiveness of their standard fighters by adding both to their armament and their armor. The Me-109 remained roughly equivalent in fire power to the P-47, but the FW-190 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 1943 feeling the effects both of the increase in strength of the GAF and its mounting effectiveness. During 1942, 13.6 per cent of the attacking bombers were hit by enemy aircraft. By June of the following year the proportion had risen to 18.2 per cent.[77]

What 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

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 YB-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

cause of delay, although serious difficulty was also experienced with engines. For weeks radio 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 few P-47'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-47'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 8 April, however, three groups--the 4th Fighter Group (recently converted from Spitfires to P-47's), the 56th, and the 78th--were placed on operational status and set to flying fighter sweeps over the Dutch and French coasts, largely for the purpose of training.[82]

A week later, during one of these operations, the P-47's had their first engagement with the enemy. Two composite groups, totaling 65 planes and led by experienced pilots of the 4th Fighter Group, flew a fighter sweep at 30,000 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-47's showed great promise in turning against the FW-190's. One said he was able to outrun the enemy at 17,000 feet. They shot down two FW-190's and damaged one, at a cost of one of their number. Two other P-47's were believed lost as a result of engine failure rather than enemy action.[83]

This first brush with the enemy seemed encouraging mainly because it came off better than many observers had feared. The P-47 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 emerging but slowly from the problems that had earlier beset it. Much modification had yet to be done on both engines and radios before all available P-47'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 Spitfires in accompanying the bomber formations. It was not until after May of 1943 that these difficulties were overcome and the P-47 could be classified as a long-range fighter.[84] Meanwhile, with long-range fighters still in the future, hope continued to be pinned on the YB-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 May.[85]

Meanwhile the P-47's began to escort the bombers up to a range of about 175 miles. Their first effort was eminently satisfactory. Six squadrons of Thunderbolts joined six squadrons of RAF fighters in support of the mission executed by 65 B-17's against the Ford and General Motors factories at Antwerp on 4 May. The P-47's provided high cover and withdrawal support and shot down one FW-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

[redacted]

Spitfires also destroyed one FW-190, probably destroyed another, and damaged three, at a cost of three of their own aircraft. A force of 33 bombers flew a diversionary feint over the Channel, under cover of three more P-47 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 reaction 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.[86] The P-47's helped to ease the task of the bombers on other occasions during the rest of May. When, on the 15th, the VIII Bomber Command attacked aircraft objectives at Meaulte and St. Omer, the VIII Fighter Command executed 124 offensive sorties in conjunction with cover provided by 13 RAF squadrons. Total bomber losses were consequently held to less than three per cent of the attacking force. Again on the 14th a force of B-17's attacking Belgian targets owed its relatively light losses to the close cover provided by USAAF and RAF fighters, despite determined enemy attacks.[87]

But missions beyond fighter range remained hazardous, and during the rest of May six were 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 29th when a force of 57 bombers attacked a railway target at Rennes and, although escorted by P-47's almost to the target, lost six of its planes to enemy aircraft between the time the escort

returned and the time when withdrawal support of RAF Spitfires was picked up at the coast on the return trip. The enemy had deliberately refrained from attacking until the bombers were left without fighter protection.[88] Losses had also reached the 10 per cent mark when on 21 May the bombers attacked Wilhelmshaven and Emden, with forces of 77 and 46 aircraft respectively. As at Bremen in April, the enemy fighters concentrated their efforts on breaking up the bombing run. And at both targets they succeeded, for bombing results were satisfactory neither at Wilhelmshaven nor Emden. At the former a few of the enemy met the bombers as they approached the German coast, and as the bombers reached the initial point, preparatory to turning toward the target, from 40 to 60 fighters appeared and queued 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.[89]

The rest of these unescorted or partially escorted missions conducted during the latter half of May suffered much less severely from fighter attack. 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

[redacted]

YB-40 put in its initial appearance, but, as it happened, fighter reaction to this mission was light and the flying dreadnoughts had little chance 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 bombing individual targets increased in size, but simultaneous attacks on two or more objectives with effective forces was now possible. This latter tactic would, it was hoped, split the German defenses, thus rendering them less formidable at any given point.[90]

This expansion of the bomber force was the fact of overriding significance in Eighth Air Force operations in May. During the month five new B-17 groups--the 95th, 96th, 351st, 94th, and 379th--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. L. Anderson, took part in the first mission on 13 May. In addition to the heavy groups, May also witnessed the temporary addition of one medium group to the strength of the VIII Bomber Command. The 322d Bombardment Group (M), representing the 3d Bombardment Wing under the command of Brig. Gen. Francis M. Brady, sent its B-26's on their first combat mission on 14 May.[91]

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

24-hour air attack made 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 Eighth 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 mediums) attacked--also a record to that date. In addition to the bombers, VIII Fighter Command P-47's flew 118 offensive sorties in conjunction with RAF Spitfire squadrons to protect the smaller forces bombing Antwerp and Courtrai. Results on the whole were good, each mission in its way meeting 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 force.[92]

In attacking Kiel, the main force of 126 heavy bombers (109 B-17's and 17 B-24's) struck the most distant target yet attempted, covering a distance of some 460 miles. This fact may have thrown the German defenses off balance, for only a few of the antiaircraft 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 northwestern Germany. Claims against enemy aircraft were, however, very high (62 destroyed, 24 probably destroyed, and 27 damaged), indicating a heavy air battle

even after allowance has been made for duplication in claims. It was the B-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 performance characteristics of the B-24's prevented them from staying close enough to the Fortresses 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 B-17 and B-24 units together in a single formation unless the latter were large enough to take care of themselves if separated.[93]

Although a minor part of the operations on the 14th, the attack executed by 11 B-26's of the 3d Bombardment Wing against the Velsen generating station at Ijmuiden attracted much official attention because it constituted an experiment which might easily have decided whether or not the medium bombers could be used effectively in the strategic bomber offensive. AAF Headquarters had been advocating for some time the fullest possible use of the mediums 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. Eighth 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

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 mediums advocated the extensive use of fighter cover, for it was likely that, after their initial attack, the B-26'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 antiaircraft defenses provided for each target.[94]

The experiment of 14 May led only to tentative conclusions, however. The B-26'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 500 feet. But on that point photo reconnaissance proved disappointing, for it gave no indication that any damage at all had been done. The Eighth Air Force had been instructed to use 30-minute delay fuses on the 500-pound bombs used in this raid in order that the Dutch workmen might have time to escape, and it may have been that some of these bombs were removed before they exploded. As for the enemy defenses, the B-26's encountered no fighter opposition--a fact which was not surprising since the largest force of heavies in the history of the daylight offensive was abroad that day. And the only thing they learned about flak was that zero-altitude missions must

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

may be estimated in terms of the losses and battle damage incurred. For the five months from January to May, inclusive, the bomber 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 has in any way been subject to attack) was 5.6 per cent. This figure includes both those bombers lost in action and those listed as falling in Category "E," 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 6.4 per cent. Fighter losses ran much lower, amounting only to about .7 per cent of credit sorties, but then many of the missions on which the new P-47 groups were sent had been planned in such a way as not to expose the inexperienced units needlessly to enemy action. Of the bombers missing in action (not including Category "E") 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. Flak, on the other hand, could be credited wholly or in part with the destruction of slightly over 14 per cent.[97]

For battle damage the story is somewhat different. A trifle over 29 per cent of all credit sorties resulted in reparable 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

entirely.[98] Thus flak, 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, flak often proved an important indirect cause of losses. Enemy fighters remained nonetheless the principal obstacle in the path of the daylight bombers.

If the Eighth 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.[99] During the first half of 1943 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 combat box 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

on the sighting of their own lead bombardier. In March the Operational Research Section of the Eighth, 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 effectiveness 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 more promptly on signal, or both. Thereafter, bombing on the leader became the normal technique, although some units continued to favor other methods. And, of course, particular problems called for different solutions. When attacking small targets, for example, the units often bombed in flights of six or even fewer because a group bomb pattern would necessarily be too large to be at once effective and economical.[100]

In March, also, the Eighth began successfully to employ the automatic flight control equipment (AFCE) as an aid to accurate bombing. The purpose of this automatic pilot, which could be controlled by the bombardier on the bomb run, was to synchronize sighting and pilotage with mechanical precision and to provide a steadier bombing run than could be achieved even by veteran pilots. The few seconds immediately before the bombardier released his bombs were obviously the critical moment in the entire 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, skids, or changes in altitude, and

that the pilotage be as free as possible from the influence of flak and of attacking fighters. Perfection of this sort was impossible even with the best of pilots. With those produced by the hasty training program into which the AAF had been forced it could not even be approximated.[101]

Promising as it was in theory, the AFCE 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 bombardier with very good results. At Vegesack on 18 March the most surprising results were achieved. On that mission the 305th Group, dropping on the signal of its lead bombardier who had used the automatic pilot, succeeded in placing an estimated 76 per cent of its bombs within a radius of 1,000 feet of the aiming point. Although not stemming entirely from the use of the new equipment, the results of the Vegesack action did much to overcome a prejudice against AFCE still prevailing in many quarters. Although it continued to fail occasionally, and although unforeseen circumstances sometimes prevented its employment on the bombing run, the automatic 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 techniques and partly on account of the increasing experience of the few groups operating from the U. K. since November 1942, bombing accuracy in the Eighth Air Force improved appreciably from January to May of 1943. The records are of uneven value, but it is possible to notice that, whereas in January

and February a group could consider its bombing above average if 20 per cent of the bombs identifiable by photo reconnaissance fell within 1,000 feet of the preassigned aiming point, in March and April it was not uncommon for groups to record 30 to 40 per cent in that category, and several instances were reported above the 50 per cent mark. Some improvement is also noticeable in the concentration of the bomb patterns. And some of the better results were obtained under trying conditions, even in the face of stiff enemy resistance, as, for instance, at Bremen on 17 April, when very satisfactory bombing was accomplished (one group placed 60 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 Rennes and Vegesack in March, at Paris in April, and at Meaulte in May.[103]

A number of bombings, of course, continued to result in complete failure. More than once 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 Rouen, on 8 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 moment only to scatter their bombs as far as ten to 15 miles from

the target. Sometimes, too, the bombsight in the lead plane would not function properly, thus causing the entire group, if other planes were dropping on the leader, to bomb inaccurately.[104]

But on many other occasions the trouble lay with the negligence or inexperience of the crews themselves. Confusion at the bombing run, failure to follow instructions or to test instruments, overconfidence, or simply lack of adequate training occasionally led groups astray. Inexperience became especially noticeable when in May the 4th Bombardment Wing began operations. Later on, as the 3d Bombardment Division, these groups were to do distinguished service, but in May their work was erratic in the extreme. On the 19th, for instance, they performed one of the most accurate missions made in the ETO to that date. Then, two days later, everything went wrong, and in the confusion the target escaped unscathed.[105]

Indeed, the latter part of May witnessed the beginnings 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 operating force raised new problems. For a curious thing about formation bombing, noticed in May by Eighth 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

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 became an entirely separate one from that in the individual bombing unit. That being the 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 defense made larger forces imperative, and so the solution had to be sought during the succeeding months principally in experience cumulatively acquired in large-scale operations.[106]

Another problem was raised in May 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 May, it was coming to be recognised that incendiaries might, by destroying the temper of steel plates and machinery, cause more industrial damage in certain circumstances than high explosive bombs. On three occasions, at Kiel on the 14th, at Emden on the 15th, and at Kiel again on the 19th, 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

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 adapters 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 Kiel mission of 14 May, for instance, a group of 17 B-24's carried the incendiary load and lost five of its planes over the target area. Here again the problem of bombardment tended to merge with that of defenses.[107]

Conclusion

Looking back over the operations of the preceding five months, the exponents of daylight bombardment could at the end of May 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 Vegesack, 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]

By June 1943 the Eighth 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 war effort, and the results may be most accurately gauged by the degree of enemy reaction, both in weight of armament and in ferocity, provoked by the day bomber campaign. But the importance of these early operations of 1943 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 1,340 bomber sorties, as against 298 in February, and it had flown as far as 460 miles to attack objectives in the German homeland.

More significant, however, than the enlargement of its effort was the experience it had gained in bombing, in penetrating enemy defenses, and in handling materially increased forces. In order to profit by that experience its tactical doctrine had to be flexible and sensitive to the slightest change in a shifting tactical situation still dominated in large part by a powerful and resourceful enemy. The 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 day bomber offensive had as yet encountered no insurmountable obstacle. On the basis of these facts it could be reasonably argued

that the GAF had to be destroyed before the 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.

SECRET

Chapter VI

PLANNING FROM CASABLANCA TO TRIDENT

The Casablanca 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 force 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 18 May 1943, the CCS approved the "Plan for the Combined Bomber Offensive from the United Kingdom," on the basis of which it issued, on 10 June 1943, a directive officially inaugurating the CBO proper. Meanwhile planning was undertaken on a scale more elaborate than had hitherto been attempted. Since the RAF 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 USAAF.

Logistical Considerations

Much depended on the build-up of the American day bomber force. Allied air strategists understood that, to implement the proposed

SECRET

combined offensive, it would be necessary to have an effective force ready to strike enemy installations as soon as the fine spring weather made heavy daylight operations feasible. But it was not until May that the build-up of the American force began in earnest. Meanwhile the Eighth Air Force continued to fight with too few bombers for economical or effective operation. During the months of January, February, and March, its average combat strength sank 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 that month six operating groups (four B-17 and two B-24) remained the total effective bombing strength of the Eighth. Moreover, prior to 8 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 new units were becoming operational more slowly than might have been expected. The more immediate and acute problem was that of replacements. During the winter months the Eighth Air Force had been starved in this respect because of the insatiable demands of the TORCH operation, and by February attrition was beginning to wear down the operating groups to an alarming extent. This was especially noticeable in combat crews where total effective strength suffered not only from actual combat losses but from war weariness. Prior to the first of February, replacement crews received totaled only 20, as against 67 lost; and it was estimated that by March 73 combat crews would have to be considered war weary. Spring found some of the groups down to 50 per cent

strength, with the fatal statistics of attrition undermining the morale of the remaining crews. During 1942 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. Frank M. Andrews, who had succeeded General Eisenhower on 5 February 1943 as CG, ETOUSA, urged the War Department to accelerate the air build-up in the U. K. 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 500 heavy bombers, an objective which would require an estimated 600 to be on hand in the theater. These figures were 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 600 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]

[redacted]

The British expressed even more profound concern regarding the rate of the build-up of the U.S. day bomber force. Air Chief Marshal Portal, in letters to General Arnold (though intended less for him personally than for the JCS)[4] repeatedly emphasized the strategic importance of the day and night bomber offensive. Continued Russian successes, together with the hard struggle in the Mediterranean, had apparently given the enemy a fundamental shock and it behooved the Allies to do everything in their power to prevent him from recovering. The only weapon available for the purpose, Portal maintained, was the bomber force, of which the American day bombers constituted an essential part. The operations of the Eighth Air Force had been "strikingly successful," considering the limited number of planes General Baker had been able to put in the air. But therein lay the problem. "My one 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 main 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 weakening fighter defense. I cordially agree with this. But it just will not work without the numbers any more than on land repeated attacks by a Brigade . . . will suffice to capture an objective requiring several Divisions to take it. . . . Given a force of two or three times the present one I am sure that the results would be increased far more than proportionately.

Portal then added a warning, of special significance to American ears. If, despite the build-up to date and the proven keenness 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

"rather than the combination of day and night attack in which you and I so firmly believe."[5]

It was a matter of vital interest to British air planners not only to stimulate the actual flow of U. S. bombardment aircraft to the U. K. but to have also a clear picture of the projected flow. The process of selecting, surveying, and building an airfield would, they claimed, take 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 RAF notified its delegation in Washington that provision had been made for 65 bomber airfields in the U. K. to accommodate USAAF 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 Baker 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 force making full and early use of them. "We must," he cabled General Arnold on 1 March 1943, "show them [the British] that we mean to use their facilities or their discouragement will be reflected in providing insufficient airdromes 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 Baker and Portal that the combined bomber offensive depended on a rapid increase in the American bomber strength, and that flow information

was essential to airdrome planning in the U. K., they were not able to do much about it.[9] Plans aplenty had been laid since the summer of 1942, but after the advent of TORCH and the reorientation of strategic policy toward the Mediterranean, it had been impossible to make firm commitments to the U. K. In September 1942 the Peabody Flow Plan had projected a total of 24 bomber groups and 11 fighter groups for the Eighth Air Force by September 1943, but its estimates had remained largely on the level of pure conjecture. It was not, in fact, until after Casablanca that the strategic policy became in itself firm enough to permit building of long-range flow plans upon it. In answer to the British request for flow information, General Stratemeyer early in February released a plan to the RAF delegation in Washington which called for the following build-up of U. S. air forces in the U. K.,[10]

Type	30 June 1943	31 December 1943	30 June 1944
Heavy Bomber	18 groups	37 groups	45 groups
Medium Bomber	6 "	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 1943. Yet they were issued with the strictest reservations: it was pointed out that the factors governing flow were variable, some of them to an extent wholly unpredictable.[11]

Several of these factors operated during the period prior to May 1943 to the distinct disadvantage of the U. S. air build-up in the U. K. It must be remembered that that project (now commonly

referred to by the code-name SICKLE) was peculiarly subject to external influences. Admittedly the largest in the entire AAF program, it was scheduled to receive all heavy bombardment not specifically required in other theaters.[12] That, of course, meant that any increase in the essential requirements elsewhere would immediately affect the bomber force in the U. K. Consequently diversions to other theaters continued to be a factor which only the fortunes of war could determine. Two B-17 groups, the 99th and the 2d, which had been scheduled as the February quota for the Eighth Air Force were diverted to the Twelfth in North Africa. A group of B-24's, the 308th, originally destined for the Eighth was sent in March to the CBI Theater. And in March it was decided to reinforce the Southwest Pacific by one of the B-24 groups out of the May quota to the U. K.[13] In addition to these diversions, the mounting antisubmarine war in the Atlantic put an increasing strain on B-24 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 Baker in the theater and of Arnold's staff in Washington.[15] The argument for a speedy augmentation of forces in the U. K. in time for the lengthening days of spring and summer was a cogent one. But overriding strategic considerations, coupled with considerable pressure exerted in favor of the Southwest Pacific and Asiatic areas, in most instances forced the issue.[16]

Diversions undoubtedly reduced over an extended period of time the availability of bomber units for commitment to the U. K. But it

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 AAF Headquarters that 540 B-17's and 90 B-24's were either in the theater or en route.[17] Yet the fact remained 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 153 planes.[18] So the delay in creating even a moderately effective striking force in the U. K. between January and May 1943 must 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 CCS to develop the bomber offensive from the U. K. as rapidly as possible, priority in shipping necessarily rested with the immediately critical operations in the Mediterranean. To finish TORCH and prepare for HUSKY 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 CCS had on 17 February given priority to the air forces in troop shipments to the U. K.,[20] arrival of AAF troops in that theater fell off sharply during those months. In December 1942 and January 1943, AAF troops had been moved to the U. K. at a rate of approximately 5,800 per month, placing in the theater as of 28 January a total of 42,420. During February only 303 were moved, and during March only 368. The situation improved somewhat during April; and during May 22,413 AAF troops were carried to the U. K., making

a total of 66,490 as of the 27th of that month.[21]

Although the shipping space for personnel during these months had been greatly reduced, cargo shipping proved no bottleneck. In fact, more cargo space remained allocated to the BOLERO-SICKLE project than would immediately be required, and it was in order to make use of it that the policy was adopted by the ASF of shipping equipment and supplies to the theater long in advance of the actual arrival of the troops. By June 1943 the bulk of the scheduled troop movement to North Africa had been completed and troops once more moved toward the U. K. The bottleneck in troop shipping accordingly became progressively less serious during the latter half of 1943, 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. K. prior to May 1943,[23] Generals Andrews and Baker urged that, if ground echelons and service troops could not be shipped, flight echelons of heavy bomber groups should be flown to the theater as rapidly as they came available, leaving the ground troops to be sent at the first opportunity. Admittedly they would not be able to operate at a high level of efficiency, and their entry into combat might be delayed; but every effort would be made to service them by means 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

arrived.[24] This plan was, in fact, adopted, and on 12 March Stratemeyer was able to report that a total of 482 heavy bombers, including the flight echelons of six groups, were scheduled for movement during March and April. All units, incidentally, and 75 per cent of replacement aircraft were to arrive with complete combat crews.[25]

This movement of flight echelons and replacement aircraft without adequate ground and service troops was, of course, only a temporary expedient, and an expedient of last resort at that. For it obviously strained the services of ground crews already in the theater. Worse still, it placed an added burden on the VIII Air Force Service Command, which was still spending a good proportion of its time servicing units for TORCH (the dispatch of aircraft from the U. K. to Africa did not end until June 1943) and which was itself in bad need of reinforcement as a result of the paucity of personnel shipping.[26] With these facts in mind, and in the full realization that flight echelons could operate only to the limit of available service facilities, Portal wrote to Arnold on 1 March expressing his concern over the delay in the BOLERO-SICKLE movement and requesting Arnold to consider the suggestion he had made at Casablanca to the effect that, if the worst came to the worst, he would try sending personnel to the U. K. by air transport.[27] In reply it was pointed out that, although air transportation was being studied as a remedy for the shipping bottleneck, it would not be practicable to move by that means enough personnel to provide substantial relief.[28] Lack of adequate ground crew personnel and

service units therefore continued to be a serious handicap to the day bomber offensive and accounts in large part for the slow growth of the U. S. striking force in the U. K.

The flow of aircraft was also subject to delay, though to a much less serious extent. In January, for example, it was reported that a lag in the modification centers had slowed up the flow of replacements to the point where it became a question whether replacements should be taken from newly formed units, which would delay the dispatch of complete groups, or whether groups should be sent to the theater intact, at the expense of replacements.[29] Again in April, Baker was informed that trouble with piston rings in the B-17 engines had delayed temporarily the movement of five groups to the ETO.[30] Nonetheless, the fact remained that, without adequate ground personnel, aircraft would be accumulated in the U. K. to very limited advantage, no matter how rapidly they were moved.

By the end of May the prospects for the day bomber offensive had greatly improved. The overriding requirements of the Mediterranean operations had decreased appreciably and both men and materiel had begun once more to flow toward the U. K. The effective bombardment strength of the Eighth Air Force had doubled during the month, going from six to twelve heavy groups.[31] But the logistical experience of the preceding months had exercised a sobering influence on all Allied planning. It was recognized by the time the TRIDENT Conference convened in May that discussions at Casablanca had taken too little account of limitations both in resources and in shipping.[32]

SECRET

The TRIDENT debates reflected a deep concern over the problem of shipping, and it was then made clear that if the bomber offensive were to be accomplished, the USAAF would have to be given top priority in shipping.[33]

As early as April, logistical considerations had prompted the War Department to survey in detail the entire problem of manpower deployment with a view to conservation wherever possible.[34] In implementation of the War Department manpower planning program, General Arnold cabled General Baker on 14 April 1943 setting forth the inescapable facts limiting the build-up of the American bomber force in the U. K.:

> Realizing full well that we 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 US Army Air Forces in the United Kingdom will not be the availability of airplanes but the availability of shipping space for our personnel.

He indicated that, according to the current AAF program, there should eventually be in the U. K. 8,340 combat planes of all types plus 4,170 reserves, all sustained by a total of 844,000 AAF officers and men. But, he 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."[35]

On 1 May, Arnold directed Maj. Gen. Follett Bradley, Air Inspector of the AAF, to proceed to the U. K. in order to study the air force organization there. He again drew attention to the fact

that the current AAF program, calling for a leveling off of total strength at 273 groups, required more Air Force troops to be moved overseas than could be sustained or could reasonably be expected to meet the approval of the War Department. Consequently, the AAF would have either to reduce the size of its projected overseas aircraft strength or to reorganize its theater forces and units in such a way as to support this ultimate strength in aircraft with fewer men. Now the U. K., Arnold suggested, offered more opportunities for saving 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 120 groups from the U. K. with a maximum of 500,000 Air Force troops. If this proved impracticable he was to determine what aircraft strength could be operated with that strength in personnel.[36]

The resulting Bradley Plan, submitted to the War Department on 20 May 1943, represented a comprehensive attempt to adapt strategic desiderata to logistical limitations. As originally formulated it recommended the following flow of tactical groups to the U. K.:

Type	June 1943	Sep. 1943	Dec. 1943	March 1944	June 1944
Heavy Bomber	18-3/4	25	38	46	46
Medium Bomber	4	7	9	9	9
Light and Dive Bomber	-	1	3	10	16
Fighter	5	9	16	24	24
Fighter (night)	-	-	1/4	3/4	3/4
Photo	-	1/2	1/2	1	1
Troop Carrier	1/2	4-1/2	7-1/2	9	9
Observation	1	1	3	4	8

It also recommended the allocation of a maximum of 485,843 AAF troops to the Eighth Air Force, and gave priority to units set up for the strategic bombardment program.[37] Insofar as it served as a convenient point of departure, the Bradley Plan constituted the principal basis for logistical planning during 1943, especially in the allocation of personnel.

While Bradley was engaged in drawing up his report, however, the Joint and Combined Chiefs of Staff, in connection with TRIDENT, were making their own estimates of strategic requirements in relation to available shipping. In the light of the detailed plan for the Combined Bomber Offensive which was then under consideration and approved on 18 May, the Combined Staff Planners estimated that U. S. heavy bombardment in the U. K. would have to reach a maximum of 51 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, moreover, had not been planned for complete deployment prior to March 1944. It appears, nevertheless, that the goal of 51 groups, advanced in date to March 1944, became in June 1943 the current planning objective.[39]

The Problem of Target Selection

Target selection was of the essence in laying detailed plans for the CBO. As Giulio Douhet, early prophet of air power, had foreseen, it was here that future air commanders would show their ability.[40]

> . . . the selection of objectives, the grouping of zones and determining the order in which they are to be destroyed is the most difficult and delicate task in aerial warfare, constituting what may be defined as aerial strategy . . . . This choice may

> . . . be guided by a great many considerations--military, political, social, and psychological, depending upon the conditions of the moment.

What may not have been quite so clear to Douhet was the paramount value of systematic industrial analysis as a basis for the selection of targets for strategic bombardment. Inasmuch as the aim of strategic bombardment was to reduce the enemy's ability to wage war, it became essential to analyze the economic sources of his war potential. And, inasmuch as the USAAF was, by way of its doctrine of precision bombing, committed primarily to the destruction of industrial targets, it approached the problem of industrial analysis with peculiar gravity.

Indeed, during the months following Casablanca, the USAAF took the initiative in planning for the strategic bombing of Germany, and the moving spirit in that effort was a concern for the scientific selection of targets. The CBO Plan was drawn up substantially on the basis of a report submitted to General Arnold on 8 March 1943 by a committee of analysts which had been working toward that end in AAF Headquarters since December of 1942.[41] This report attempted to set forth the industrial objectives in Germany the destruction of which would weaken the enemy most decisively in the shortest possible time; and it resulted from the application of a methodology elaborated for the purpose. If the results of the bomber 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.

The Committee of Operations Analysts (COA), as the group came to be called, brought to their task a clearly articulated methodology. 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 guess work 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 keystone in the arch of German production without expending effort needlessly 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 anatomize it, and to define the relationship of each part to the enemy war effort.[42] Next it was necessary to eliminate as many industries as possible from selection as suitable targets, being careful the while that as good reasons were found for eliminating an industry as for recommending one. Then the individual industries were taken apart plant by plant, with a view to the feasibility of destruction in each instance. After the above steps had been completed, each industry could be listed in order of priority for bombing, and each target within each industry.

In the course of this investigation answers had to be 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 facility in every European country, including occupied Russia, were utilized to the utmost, what would be the total? 3. How nearly self-sufficient is the enemy? That is, 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 themselves? To what extent are the buildings and machinery structurally resistant to high-explosive and incendiary attack? To what extent are they replaceable? 6. What is the time-lag between the destruction of each plant and the effect on front-line strength? 7. What is the force required to effect the necessary destruction? What, in short, will be the cost?

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

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 stand-by 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

"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 these 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.

The pioneer agency in this endeavor was the Target Information Section, AC/AS A-2.[44] By the summer of 1942 it was being called on to an increasing extent for advice regarding the projected bombing program. It found itself with a great mass of factual data concerning German industry, but without any rational system 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 Air Estimates, as they were called, began by establishing the importance of the industry in question to the enemy war machine as a whole. Then followed detailed statements of the enemy's minimum requirements in that field, and of the available supply. The industry was then analyzed with regard to its vulnerability to air attack, and an estimate was made of the time necessary before destruction from bombing would become effective in reducing fighting strength.[45]

One of the most difficult points to establish was the relationship between minimum requirements and supply. There was a tendency on the part of many industrialists consulted to think in terms of supply alone, assuming that supply was generally determined by requirements and that it would therefore reflect requirements with some degree of accuracy. U. S. railway experts, for instance, when asked how much reduction in railway facilities the country could stand and still keep its armies effectively deployed, replied that U. S. railway capacity was already strained and that any reduction would have a serious effect. But apparent requirements and minimum requirements were often two different things; and on further study it was

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]

On 9 December 1942, General Arnold signed a directive requiring Col. Byron E. Gates, AC/AS Management Control,[48]

> to have the group of operational analysts under your jurisdiction prepare and submit to me a report analyzing the rate of progressive deterioration that should be anticipated in the German war effort as a result of the increasing air operations we are prepared to employ against its sustaining sources. This study should result in as accurate an estimate 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 skeleton organization, but Colonel Gates was authorized to create one and to deputize service and civilian personnel for the purpose.[49]

Meanwhile 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 some talk to the effect that staff officers in Headquarters, AAF did not have the time to devote to long-range strategic air planning; nor was that a type of activity for which a regular army career was considered to provide the best preparation.[50] The resulting committee accordingly came to be formed in part of civilians. In addition to Elihu Root, Jr., Thomas W. Lamont,[51] and Edward M. Earle, who served as independent members, Fowler Hamilton was called in to represent the Board of Economic Warfare, and Edward S. Mason to represent the Office of Strategic Services. The rest of the group consisted of Col. Edgar P. Sorensen, AC/AS A-2; Lt. Col. Malcolm W. Moss, Chief of Target Information Section, A-2; Lt. Col. Thomas G. Lanphier, representing G-2; and Col. Guido R. Perera and Lt. Col. W. Barton Leach, both from Management Control. Colonel Gates acted as chairman.

Originally called the Advisory Committee on Bombardment, 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 made the assimilation 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, BEW, WPB, ONI, OSRD, the Bureau of Foreign and Domestic Commerce, the Department of Justice, and the State and Treasury Departments. The British Ministry of Economic Warfare, the Air Ministry, and the RAF continued to provide valuable data.[54] Late in January 1943 four members of the COA flew to England where they compared notes with the British agencies and also with A-5 of the Eighth Air Force and the Economic Warfare Division of the American Embassy, both of which had been working on target information in the theater.[55] Assuming that the industrial system in one highly industrialized country would be essentially similar to that of any other highly industrialized

country, the COA paid close attention to the organization and physical characteristics of appropriate U. S. industries. And much of their information came from qualified experts in private industry.[56] By March 1943 special studies had been completed, or were nearing completion, on 19 German war industries.

On the 8th of that month the COA reported its findings to General Arnold. The directive of 9 December 1942 under which the committee had operated had specified that it determine as nearly as possible the date upon which the sustaining sources of Western Axis military strength might be so reduced through aerial bombardment as to permit an invasion of the Continent. This the committee declared itself unable to do for two reasons: first, it could not forecast with any degree of certainty the air forces 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. Results are cumulative and the plan once adopted should be adhered to with relentless determination.

Concerning the projected bomber offensive, it made two pronouncements:

(1) The destruction and continued neutralization of some sixty targets would gravely impair and might paralyze the Western Axis war effort. There are several combinations of targets from among the industries studied which might achieve this result.

(2) In view of the ability of adequate and properly utilised 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 stressed 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 COA, 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 systems were 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.[58]

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 GAF had begun to react effectively to the daylight operations of the Eighth.

It was estimated with some degree of accuracy[59] that, although fighter production had been given preference by the Germans, wastage and production in that industry were 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 500 enemy fighters could be produced. This question of time, in

addition to the fact that engine plants constituted somewhat less vulnerable targets than final assembly plants, appears to have been given great if not decisive weight. For, although the COA recommended bombing all of 22 targets consisting of final assembly plants, component erecting plants, and engine 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 engines 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 indicates 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.[60]

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 materiel. 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 Schweinfurt plants alone were correctly

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 effect 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 indicates that the committee somewhat overestimated the vulnerability of ball-bearing plants and underestimated the feasibility of effecting economies in the use of bearings, possibly also of stocking them.[61]

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.[62] It was pointed out that crude oil represented two-thirds of available Axis oil supplies, of which crude supplies 60 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 80 per cent was believed to emanate 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. Resort to 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

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 90 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 wisdom derived from later events indicates that it should have. The COA 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.[63] 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.[64]

The COA 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 attacked in order to heighten the effect of attack on the

grinding wheel industry, but the relative invulnerability and recuperability 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 smelters 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. Nonetheless, the industry was believed, probably somewhat optimistically, to be very tight and the destruction of key factories feasible.[65]

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 COA gave it only sixth place is in fact 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.[66] 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 three large and one small synthetic plants for her requirements.[67] The value of this target system, as contemplated by

the COA, while high in terms of concentration and vulnerability and in view of the inadequacy of mobile stocks, depended entirely upon the success of blockade-running, which was estimated to contribute, together with the reclamation of scrap, approximately one-third of Germany's rubber supplies. It was believed that destruction of ten tire 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 COA expressed profound misgivings concerning the results to be expected from bombardment either of operating bases or construction yards. Construction yards had for some time been considered both by American and British authorities to be targets of doubtful value.[68] Admitting that complete and simultaneous destruction of all 19 yards in Germany and three less important ones in Italy would probably delay by at least 15 months the launching of any new U-boats, and that most important components were made in those yards, the committee argued that the 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 work might be slowed up and the number of operating U-boats consequently be reduced. But evidence on this point, though admitted to be by no means complete,

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 submarine 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 truck 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. There were, 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

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

Owing to the large number of coke batteries in Axis Europe, coking plants were not considered a suitable target system, despite their vulnerability and the undoubtedly basic importance of coke production in a number of critical industries. Iron and steel received still less favorable consideration. Wisely enough, in the light of later investigation,[72] the COA considered that the Western 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, become critical items. The destruction of 12 selected plants, it was stated, would reduce machine-tool replacement capacity by 40 per cent, with effects

that would eventually be felt throughout Axis war industry. Although the machine-tool industry was only placed twelfth on the list, the fact that it was given consideration at all betrays a faulty understanding 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, where 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. What might have been the case had machine tools been 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 of 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. But 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 Rhine-Ruhr area, for example, heavy industry in that area could be in large part eliminated. But an attack on the

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 British experience during the "blitz."

It is easy for the observer after the fact, equipped with wisdom 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 prescience 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 would 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 antiaircraft and antitank machinery 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

industry, received equally scant recommendation. 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 was 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

drop in the production of nitrogen, which in turn contributed to the shortage of explosives experienced by the Wehrmacht 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 1943 the COA report, after being favorably considered by General Arnold's Advisory Council, was sent to the U. K. for coordination with the British authorities and the Eighth Air Force.[76] On 3 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 targets:- Aircraft, Ball Bearings, Petroleum, Non-Ferrous Metals, Synthetic Rubber and Tyres, Transportation, Submarines.

On the others the MEW spokesman, Mr. C. 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

mattered little because 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 MEW took a less optimistic view than the COA of the damage an attack on grinding 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 MEW 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 MEW was even less enthusiastic than the COA, claiming that some 20 per cent of enemy producing capacity was at the time lying idle.[77]

Like the MEW, the Eighth Air Force declared itself in substantial agreement with the COA 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 COA report--and on the advice of the MEW, the British Air Staff, and the Eighth Air Force--a final list of primary objectives was drawn up consisting of 76 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

It will be noticed that grinding wheels and abrasives and the nonferrous 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 what specific grounds 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 convoy 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 Air Staff agreed heartily, urging, indeed, not only an attack on the single-engine fighter industry but on all fighters. In a paper dated 9 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 GAF, especially the fighter force, to the exclusion of all other objectives. For, it maintained,[80]

> The most formidable weapon being used by the enemy today against our bomber offensive is his Fighter Force--his single engined fighters by day and his twin engined 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 RAF and AAF.

After the principal target systems had been determined, there remained to be elaborated an operating plan to accomplish the destruction of the 76 specific objectives of which those systems consisted. For this purpose General Baker appointed a committee composed of General Hansell, General Anderson, and plans personnel of the USAAF, RAF, and Eighth Air Force. The committee's task was to decide, in the

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 "unqualified endorsement" by the Commanding General, ETOUSA, the Chief of Air Staff, RAF, and the Air Officer Commanding-in-Chief, RAF Bomber Command.[61] Late in April General Eaker brought the plan to Washington.[62]

It was a comprehensive and impressive report which Eaker presented to the JCS on 29 April 1943.[63] 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 Ploesti 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

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 Ploesti from the Mediterranean).

(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 CBO 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

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.

AWPD-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

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, AAF and dated 20 March 1942,[86] had selected some 144 targets within four categories in the following priority:

Munitions industry
Electric and water power
Petroleum and fuel
Rail and water transportation

AWPD-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:

The GAF: fighter factories, bomber factories, and engine plants
Submarine building yards
Transportation system: building shops, repair works, marshalling yards, and canals
Electric power
Oil
Aluminum
Rubber

It was becoming a commonplace in strategic thinking that destruction of the GAF would 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 task and that of 20 October which supplemented it, listed submarines, aircraft, and transportation in that order.[87] Similarly, the Casablanca Directive of 21 January 1943

SECRET

had listed priority targets in the following order:[88]

Submarine construction yards
The aircraft industry
Transportation
Oil

It is obvious that the CBO 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 COA attained, 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 imponderables, 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 the clever use of analogies. In dealing with this mass of inexactitudes 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 momentum, lead the investigator far afield. The moral of this story is obvious

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

The Operational Plan: Organization of the CBO

As presented by General Baker, 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 CBO Plan had recourse to the experience of the Eighth Air Force which, by April of 1943, represented a very useful body of information. They were not therefore forced, as the authors of AWPD-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 would 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 800 aircraft must be in the theater to make possible the dispatch of 300 on operations, and that 300 planes constituted the

minimum necessary for deep penetrations in the face of existing fighter opposition.

By 30 June 1943, the CBO Plan recommended, there should be in the theater 344 heavy and 200 medium bombers. It would not, however, be possible to train much before that date the crews for the force of 800 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 Ploesti, and a very-long-range attack against the Schweinfurt ball-bearing industry. During the next phase, from July to October, the strength in heavy bombers should reach 1,192 and objectives might be selected within a radius of 400 miles from the base area in England. Effort would be concentrated against German fighter assembly and fighter aircraft factories as well as airdromes and repair facilities. Probably 75 per cent of the striking force would be used for this purpose, the remaining 25 per cent 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 attacked 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 January 1944 it should number 1,746 heavy bombers. The final phase, during the early months of 1944, should

[redacted]

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 airdromes 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 800 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 RAF and USAAF operations in the combined offensive the CBO 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

specific industrial objectives by day, and the RAF would ordinarily attack by night the cities associated with these objectives, the timing to depend on the tactical situation.

> This plan does not attempt to prescribe the major effort of the R.A.F. Bomber Command. It simply recognizes the fact that when precision targets are bombed by the Eighth Air Force in daylight, the effort should be complemented and completed by R.A.F bombing attacks against the surrounding industrial area at night. Fortunately the industrial areas to be attacked are in most cases identical with the industrial areas which the British Bomber Command has selected for mass destruction anyway. They include HAMBURG, BREMEN, HANOVER, BERLIN, LEIPZIG, WILHELMSHAVEN, BREMERSHIRE /BREMERHAVEN?/, COLOGNE, STUTTGART, and many other principal cities. They also, of course, include smaller towns whose principal significance is coupled with the precision targets prescribed for the Eighth Air Force.

In the course of its passage through the JCS the plan encountered little opposition. Whatever discussion took place centered on the proposed commitment of forces. General Arnold advocated that allocation of U. S. bombardment to the combined offensive should be made substantially as set forth by General Eaker.[89] The Navy members, however, raised some objection to making too firm a commitment in view of the acute shipping problem; and they recalled a decision of the CCS concerning priority of future operations in which SICILY, together with TORCH and HUSKY, had been bracketed with operations in the Southwest Pacific. Nevertheless, on 4 May the JCS approved the COO Plan as presented by Eaker and recommended implementing it to the maximum extent practicable, consistent with aircraft production objectives, available shipping, and current strategic commitments.[90] On 14 May the JCS presented the plan to the Combined Chiefs, who were meeting in Washington in connection with the TRIDENT

Conference. In a memo dated on the preceding day, the JCS had recommended, first, that the CBO be given top priority in build-up and its execution facilitated, and second, that its progress be watched continuously with an eye to determining a date for cross-Channel operations.[91]

Before the CCS could accept the plan, including the commitment of forces it required, certain strategic decisions had to be made involving the entire course of the European War. It was no longer a question of approving the concept of a combined bomber offensive. That had been settled at Casablanca, where that campaign was inseparably linked with the ROUND-UP operation; and, since all parties still agreed at TRIDENT that a cross-Channel invasion was a prerequisite to defeat of the European Axis, the combined bomber offensive remained unquestionably part of Allied strategy. Rather it was a question of determining what priority the bomber offensive should be given among other major undertakings in the allocation of forces. British and U. S. strategists had come to the conference with divergent views regarding the best disposition of Allied forces after the accomplishment of HUSKY. The American representatives argued, as at Casablanca, in favor of gathering forces in the U. K. as rapidly as possible in preparation for an invasion of Western Europe at the earliest practicable date. The British, with equal consistency, advocated further large-scale campaigns in the Mediterranean on the ground that such operations would, by eliminating Italy and seriously dispersing German forces, make ROUND-UP more

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 SICILY, 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

SECRET

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 COS, the direction of the bomber offensive rested, issued on 10 June 1943 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 disorganisation 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]

This matter of coordination was of crucial importance. No matter how well the over-all plan had been conceived, the CBO, to be truly combined effort, required constant and often detailed cooperation between the two forces. At Casablanca it had been generally assumed that the Chief of Air Staff, RAF would supervise the combined offensive as agent for the CCS, but no specific machinery had been set up by which the two forces could coordinate their plans. In this respect the CBO Plan added nothing to the Casablanca discussions. On receiving the CBO Plan, General Arnold wrote to Sir Charles Portal urging the creation of "somewhat more formalized machinery for closest possible co-ordination, or rather, integration, of the two bomber efforts." For, he added, "the increasing complexity of their operations would appear to me as soon to be beyond the capabilities of the commanders, in person, to coordinate." He accordingly suggested that a permanent committee be established for this purpose, to operate within the limits of the Casablanca decisions.[97]

Under separate directive of 10 June 1943, a combined operational planning committee was set up. That body was to consist of representatives 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 Bomber Operations would be available "to be co-opted as necessary for purposes of liaison with the Air Staff." It was made clear that the committee was to be concerned with coordination and with the tactical plans

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 was in no way responsible for the conduct of operations, which remained the responsibility of the Commanders concerned.[98]

Despite such arrangements as these, a weakness remained in the organization of the CBO. The CBO Plan and the directive of 10 June 1943 both purposely avoided committing the RAF to a rigid adherence to the particular objectives they set forth. The action of the Eighth Air Force, for which these target systems appear to have been primarily devised, would "as far as practicable" be complemented by that of the RAF Bomber Command. It was "fortunate" that the objectives of the two forces would 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 bombing the enemy according to widely divergent operational theories; and, insofar as the RAF hoped to bring about the general disorganization of German economy by attacking civilian morale as a primary objective, its strategic doctrine differed radically from that upon which the CBO 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, when the weight of the American attack had made the distinction between pin-point and area

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.

SECRET

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
BEW	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. A.

SECRET

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
M&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
USAWW	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

NOTES

Chapter I

1. See AAF Reference Histories: No. 2, Origins of the Eighth Air Force (cited hereafter as Origins) for a fuller discussion of policy prior to August 1942.

2. CCS 94, 24 July 1942.

3. Ibid., approved substantially in CCS 33d Meeting, 25 July 1942. See also Minutes, CCS 32d and 34th Meetings.

4. Origins, p. 37.

5. See below, pp. 49-50.

6. Origins, p. 71.

7. A/P Status Reports, BOLERO Papers, in AFSHO files.

8. Air Ministry Weekly Summary #133, pp. 13 ff.

9. Origins, pp. 95 ff. That U.S. air strategists had been thinking in 1918 along lines similar to those being explored by the British is demonstrated by a paper by Capt. L. S. Kuter entitled "American Air Power--School Theories vs World War Facts," prepared for the Air Corps Tactical School Course of War Lectures, 1937-38.

10. H. A. Jones, The War in the Air, Being the Story of the Part Played in the Great War by the RAF, Oxford, 1937, App. IV, p. 19.

11. Ibid., App. II.

12. Ibid., Apps. V, VI, and X.

13. Ibid., App. X, p. 33.

14. Ibid., App. X, p. 34.

15. Ibid., App. VI.

16. Ibid., App. X, p. 33.

17. Note by Lord Trenchard, "Our War Policy (August 1942)," 29 August 1942, filed with R&R, AFDMR to AFRGS, 14 Sep. 1942, in AAG 381-F. See also memoranda by Lord Trenchard dated 19 Mar. 1941 and 30 Sep. 1941 which advocate attacking Germany through the air especially for morale purposes. WP-1 General, 27 Oct. 1941, in files AC/AS Plans, Office Services Division. An attached buck slip for Maj. Gen. Carl A. Spaatz from Lt. Gen. H. H. Arnold reads as follows,

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

18. See Origins, pp. 81-90, for fuller treatment of both British and U. S. doctrines.

19. AWPD-1, 12 Aug. 1941, in AFAEP files, Office of Security Officer.

20. In the New York Times, 8 August 1942, John MacCormac cited "British-U. S. Rift on Planes Holding Up Air Offensive," a report denied by Spaatz, 11 August 1942. An article by Peter Masefield in The Sunday Times, 16 August 1942, inspired a cable from David Anderson to the New York Times, 18 August, "British deem our heavy bombers unsuited for raids on continent. Masefield suggests we use B-17's for patrolling Atlantic and concentrate on Lancasters." On 18 August, General Dwight D. Eisenhower reported that there was no AAF-RAF friction over methods and objectives of the bomber offensive. New York Times, 16 August 1942.

21. Origins, pp. 104-107.

22. Reproduced in History, VIII Fighter Command by Lt. Col. W. H. Heinrichs, pp. 72-75, in AFSHO files.

Chapter II

1. Although this mission was the first in the European Theater by American heavy bombers, the first mission by American bombers operating out of the U. K. was flown on 4 July 1942 by six crews of the 15th Bomb Sq. (Light) flying RAF Bostons. Targets for this patriotically-timed light mission consisted of four airdromes in Holland. 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 bombed the objective, but with unobserved results. History, First Bomb Wing, Activation to 17 August 1942, pp. 14 ff.

2. Sunday Times, 16 Aug. 1942.

3. CM-OUT-5137 (8-17-42), Arnold to USFOR, AF #5424, 17 Aug. 1942.

4. CM-IN-6736 (8-18-42), London to AGWAR, AF #1274, 18 Aug. 1942.

5. The First 1100 Bombers 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., K-5785.

7. First 1100, p. 15.

8. Hist., 1st Bomb Div., 17 Aug. to 30 Nov. 1942, pp. 2-3.

9. See mission report and bomb plot, and ORS Day Raid Rpt. #1, 30 Dec. 1942, Mission #1, First 1100.

10. Ibid.

11. Ltr., Baker to CG 8th AF, 19 Aug. 1942, in AAG 385-B.

12. Hist., 1st Bomb Div., p.4.

13. Ltr., Baker to CG 8th AF, 19 Aug. 1942.

14. Ibid.

15. See n. 4 above.

16. Hist., 1st Bomb Div., p. 4.

17. Ltr., A/M Trafford Leigh-Mallory to Baker, 22 Aug. 1942, in AAG 385-F.

18. First 1100, Mission #2.

19. Ibid., see appropriate mission reports.

20. Ibid., Mission #4.

21. Ibid.

22. Ltr., Baker to CG, 8th AF, 27 Aug. 1942, in A-2 Lib., K-8406.

23. First 1100, see appropriate mission reports, including ORS Day Raid Rpts.

24. Ibid., Mission #9. See especially ORS Day Raid Rpt. #9, 30 Dec. 1942.

25. Bombs dropped were: 123x500 HE, 32x1,100 HE, 43x1,000 HE, and 16x250 Incendiary. Ibid.

26. Interpretation Reports #F 501, 11 Sep. 1942 and #F 503/K.S.60, 4 Oct. 1942, ibid.

27. OSS Report, 15 Nov. 1942, in A-2 Lib., K-10567.

28. OSS Rpt., 19 Oct. 1942, in A-2 Lib., K-3741.

29. Ltr., Spaatz to Stratemeyer, 14 Sep. 1942, in AAG 370.2.

30. This light bomb squadron was temporarily assigned to the 1st Bomb Wing, VIII Bomber Command and later consigned to Africa.

31. First 1100, Mission #10.

32. Compare reconnaissance photos included in ibid. for this mission and for #1.

33. Ibid., Mission #11.

34. Ibid., Mission #12. On 30 Sep. 1942 Spaatz complained of the preceding three weeks of weather which, he said, was considered unusually bad in England. (Ltr. to Stratemeyer, quoted in R&R, AFCAS to Director of Air Defense, 5 Oct. 1942, in Plans WP-III-A-2 #2.) On 8 September General Spaatz ordered all tactical operations to give way to activity in support of TORCH. Operation TORCH, Pt. I, p. 1, in AFSHO files.

35. First 1100, Mission #13.

36. CM-IN-2355 (10-6-42), London to AGWAR, #3155, 5 Oct. 42. Cf. First 1100, Mission #13. The figures in the latter source show some variations.

37. Ibid. For estimate of damage see Industrial Damage Report #69, 18 Nov. 1942, Ministry of Economic Warfare, in A-2 Lib., K-8587.

SECRET

38. New York Times, 10 Oct. 1942, p. 13; First 1100, Mission #14.

39. Ibid.; Cf. CM-IN-04049 (10-10-42), USAWW to ACWAR, #244E, 10 Oct. 42, which gives 6%.

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., Baker to CG 8th AF, 1 Nov. 1942, in papers sent to AFHRO files by Col. J. M. Parten.

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 AWPD-42. Cf. First 1100, Mission #14.

48. These figures taken from CM-IN-04049 (10-10-42); CM-IN-10602 (10-25-42), USAWW to ACWAR, #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); R&R, AFAEP to AFDAS, 27 Aug. 1942, filed with R&R, AFDAS to AFABI, 11 Oct. 1942, in Plans AWPD-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., Baker to CO, 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.

55. Ltr., Baker to CG 8th AF, 27 Aug. 1942, in A-2 Lib., K-8406.

56. Ibid., 1st ind., Hq 8th AF to CG ETOUSA, 27 Aug. 1942; ltr., Spaatz to Arnold, 24 Aug. 1942, in AAG 385-F.

57. R&R, AFDAS to AFASI, AFAEP, AFAAP, AFACT, AFADS in turn, 31 Aug. 1942, in AAG 385-F. Cf. ltr., Spaatz to Stratemeyer, 14 Sep. 1942, in AAG 370.2.

58. Ibid.

59. Paper signed by Maj. F. S. Wildman, Current Intelligence Section, A-2, European Theater, 26 Oct. 1942, in A-2 Lib., K-7851.

60. Ltr., Spaatz to Arnold, 24 Aug. 1942, in AAG 385-F.

61. Ltr., Baker to CG AAF, 27 Aug. 1942, in A-2 Lib., K-8406.

62. Operations by Fortress Aircraft of the Eighth Air Force from 17 August to 6 September 1942. Report by Air Ministry, attached to report, Capt. E. V. Rickenbacker to S/W, 12 Oct. 1942, in A-2 Lib., K-4754. Rickenbacker recommended that this letter be read by all USAAF personnel.

63. Quoted in CM-IN-0594 (9-2-42), USAWW to AGWAR, #8APO, 1 Sep. 42.

64. Sunday Times, 23 Aug. 1942.

65. Ibid., 6 Sep. 1942.

66. Ibid., 18 Oct. 1942.

67. Ltr., Spaatz to Stratemeyer, 14 Sep. 1942, in AAG 370.2

68. Interview, Col. F. Armstrong, 24 Nov. 1942, in A-2 Lib., K-6182; Hist., 1st Bomb Div.; CM-IN-1410 (10-4-42), USAWW to AGWAR, #61E, 3 Oct. 42; CM-OUT-1844 (10-8-42), CG AAF, AFDMR to USAWW, #A-395, 5 Oct. 42.

69. See Chap. I, this study.

70. Report of Lt. Gen. Ira C. Baker on U. S. Army Air Forces Activities in United Kingdom Covering Period from February 20, 1942, to December 31, 1943, Tab. C, p. 2, in AFSHO files; Hist., VIII Fighter Command by Col. Heimrichs, pp. 104-105.

71. CM-IN-0428 (10-1-42), London to AGWAR, #2951, 30 Sep. 42; Hist., VIII Ftr. Comd., p. 103. Apparently former Eagle pilots also were assigned to the 38th Ftr. Sq. CM-IN-2802 (10-7-42), London to AGWAR, #3181, 6 Oct. 42; Rpt. of VIII Ftr. Comd., 8 Aug. 1943, in A-2 Lib., K-55475.

72. CM-IN-0442 (9-1-42), London to AGWAR, #1715, 1 Sep. 45.

73. Ltr., Spaatz to Arnold, 18 Sep. 1942, in AAG 370.2.

74. Int., Lt. Col. C. S. Hough, 1 Apr. 1943, in A-2 Lib., K-18770. Cf. ltr., Spaatz to Arnold, 18 Sep. 1942.

75. Time, 31 Aug. 1942, "The Best Planes," based on rpts. of U. S. pilots' preference for Spitfires, by Geoffrey Parsons, Jr., of the New York Herald Tribune. Cf. CM-IN-0442 (9-1-42).

76. Ltr., Spaatz to Stratemeyer, 14 Sep. 1942, in AAG 370.2.

77. Ltr., Spaatz to Arnold, 18 Sep. 1942, in AAG 370.2. They made their first operational flight 1 September 1942. CM-IN-0389 (9-1-42), USAHW to AGWAR, #148, 1 Sep. 42.

78. Hist., VIII Ftr Comd., p. 106.

79. Opn. TORCH, Pt. I, p. 1, in AFSHO files.

80. Ibid., Pt. I, p. 20; memo for Arnold from A/C/M Sir Charles Portal, 20 Aug. 1942, in AAG 311.2.

81. Opn. TORCH, Pt. II, pp. 12-13.

82. Hist., VIII AFSC, Chap. I, p. 25, in AFSHO files.

83. Ltr., Hq 8th AF, CIC to CG 8th AF, 23 Nov. 1942, in Hist., VIII AFSC, App. 128-60; Hist., 1st Bomb Div., p. 15.

84. Opn. TORCH, Pt. I, pp. 3 ff., and Pt. II, p. 17.

85. Ltr., Spaatz to Stratemeyer, 30 Sep. 1942, quoted in R&R, AFCAS to Dir. of Air Def., 8 Oct. 1942, in Plans WP-III-A-2 #2.

86. See n. 34 above.

87. See below, Chap. IV.

88. Ltr., Baker to Stratemeyer, 8 Oct. 1942, in AAG 312.1-A.

89. Hist., 2d Bomb Div. (and 2d Bomb Wing), Activation to 31 Dec. 1943, p. 34, in AFSHO files; ltr., Baker to CG 8th AF, 1 Nov. 1942, in Barton papers, AFSHO files.

90. Ltr., AC/S, A-2, 8th AF to Col. G. C. MacDonald, 24 Oct. 1942, in A-2 Lib., K-8822.

91. Int., Maj. K. Douglas, Liaison Officer, 8th AF and British Air Ministry, in A-2 Lib., K-3805; cf. VIII Bomber Command, Weekly Digest of Enemy Activity, 8 Oct. 1942, in A-2 Lib., K-3828.

SECRET

92. Ltr., AC/S, A-2, 8th AF, to Col. J. K. Gerhart, 28 Sep. 1942, in AAG 381-F.

93. Ltr., AC/S, A-2, 8th AF to Col. G. C. MacDonald, 24 Oct. 1942. This source estimated a slight over-all loss in strength for September 1942. Cf. ltr., Arnold to Maj. Gen. G. C. Kenney, CG AAF SWPA, 8 Oct. 1942, in AAG 312.1-A.

94. Ibid.

95. Ltr., Spaatz to Arnold, 16 Sep. 1942, in AAG 370.2.

96. CM-IN-04567 (10-11-42), London to ADWAR, #6422, 10 Oct. 1942.

97. Ltr., Baker to CG 8th AF, 1 Nov. 1942, in Parton papers.

98. First 1100, Mission #15.

99. Ltr., Baker to CG 8th AF, 1 Nov. 1942.

100. Opn. TORCH, Pt. II, p. 2.

101. Ltr., Baker to CG 8th AF, 1 Nov. 1942.

102. A/P Status Rpts., BOLERO Papers, in AFSHO files.

103. Ltr., Baker to CG 8th AF, 1 Nov. 1942.

104. Ibid. Cf. Report, Capt. E. V. Rickenbacker to S/W, 12 Oct. 1942, in A-2 Lib., K-4754.

105. Ltr., Baker to Stratemeyer, 8 Oct. 1942, in AAG 312.1-A.

106. Ltr., Hq 8th AF to CG VIII Bomber Comd. and VIII Ftr. Comd., 20 Oct. 1942, in Baker Report.

107. Memo for Spaatz from Eisenhower, 13 Oct. 1942, in Parton papers, AFSHO files.

108. Daily Diary of General Spaatz, 21 Oct. 1942, excerpt in Parton papers.

109. See above, notes 27 and 28. See also OSS Rpt., 26 Dec. 1942, in A-2 Lib., K-8697.

110. OSS Rpts. dtd. 15 Nov. 1942, 19 Oct. 1942, 26 Dec. 1942, 25 Nov. 1942, in A-2 Lib., K-10687, K-3741, K-8697, K-11481, respectively.

111. Translation of memo received from Col. Coustet, 30 Oct. 1942, in AAG 412.1-A. Cf. OSS Rpt., 26 Dec. 1942, in A-2 Lib., K-8697.

112. Ltr., Air Ministry, 29 Oct. 1942, in Baker Report, Tab E, Exhibit 1.

Chapter III

1. An Appreciation of the Air Effort Against Submarines, prepared by A-5, 8th AF, 16 Jan. 1943, included as Tab G in An Evaluation of the Air Effort against Submarines /Evaluation/, Intelligence Service, Hq AAF, 8 March 1945, in AFSHO files. See also ibid., App. C, extract from correspondence from Air Ministry, Bomb Opns., 1 Aug. 1942.

2. Bombing attacks on the German U-boat Industry, MEW, 21 July 1942, in Evaluation, Tab N.

3. Evaluation, Tab G, App. C.

4. Air Estimate; The Submarine Situation in Europe /Air Estimate, Subs/, Pt. I, Opns. Sec., AS, A-2, USAAF, Wash., D. C., 12 Feb. 1943, p.1, in AFSHO files. Cf. ltr., Stratemeyer to Spaatz, 26 Nov. 1942, in SAS 385; AAFRH-7, Chap. III.

5. Ibid., pp. 94-5. See also memo for CG AAF from Brig. Gen. C. W. Russell, 3 Nov. 1942, in AFSHO files.

6. Air Estimate, Subs, Pt. I, pp. 4-7.

7. 2d ind (no basic ltr.), CG 8th AF to CG AAF, 15 Sep. 1942, in Plans IV-7 #1; ltr., Spaatz to Arnold, 31 Oct. 1942, in A-2 Lib., K-8822.

8. Air Estimate, Subs, Pt. I, pp. 4-7.

9. Evaluation, Tab N.

10. Ibid., Tab G, App. C.

11. Ibid.

12. Memo for CG AAF from Russell, 3 Nov. 1942; cf. Plans Division Digest, 7 Nov. 1942 and 21 Dec. 1942.

13. See Chap. II above; First 1100, Vol. II, p. 385; Extract, Daily Diary, CG 8th AF, 2 Nov. 1942, in Partom papers; ltr., Arnold to Baker, 2 Dec. 1942. The B-24's referred to were to be replaced from allocations to the AAFAC.

14. First 1100, Mission #15.

15. Ibid.

16. OSS Rpt., 26 Dec. 1942, in A-2 Lib., K-8697; OSS Rpt. #R1/3780, 27 Jan. 1943, A-2 Lib., K-15265; First 1100, Mission #15; Interp. Rpt. #S.A. 154; OSS Day Raid Rpt. #14, 30 Dec. 1942.

SECRET

17. OSS Rpts. cited in n. 16 above. See also translation of memo from Col. Constet, 30 Oct. 1942, in AAG 312.1-A.

18. First 1100, Mission #15.

19. Ltr., Spaatz to Arnold, 31 Oct. 1942, in A-2 Lib., K-8822.

20. 2d ind. (no basic ltr.), CG 8th AF to CG AAF, 15 Sep. 1942, in Plans IV-T #1.

21. Ltr., Spaatz to Arnold, 31 Oct. 1942.

22. First 1100, Mission #18.

23. Ibid., Vol. II, pp. 401 ff.

24. Ibid., Mission #18.

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.

27. First 1100, Mission #21; reports on missions #19 to #27, in Tac. Mission Folders.

28. See below, p. 80.

29. First 1100, Vol. II, p. 369.

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, M.I.D. U.C. Rpt. #E964C, 3 Dec. 1942, in A-2 Lib., K-8198. See also Interp. Rpts. in respective mission reports.

31. Report from British source on information received from German Naval prisoner of war taken in December 1942, in A-2 Lib., K-18178.

32. M.I.D. U.C. Rpt. #E964C, 3 Dec. 1942; Analysis of Results of US AAF Bombing Attacks on Submarine Bases in France during November 1942 [Analysis of Results], (rpt. by Intel. Staff, Air Ministry), in A-2 Lib., K-9226; OSS Rpt., 11 Jan. 1943.

33. Ibid.

34. Analysis of Results, A-2 Lib., K-9226; VIII Bomber Command Narrative of Operations, in Tac. Mission Folder, Mission #28, A-2 Lib.

35. ORS Day Raid Rpt #28, in Tac. Mission Folder #28; Ind. Dmg. Rpt. #66, 23 Feb. 1943, in A-2 Lib., K-18289.

SECRET

36. OSS Rpt. #P.1/4330, 2 Mar. 1943, in A-2 Lib., K-19393.

37. AAF Informational Intelligence Report #43-4, 26 Mar. 1943, in AFSHO files; ORS Day Raid Rpt. #28.

38. Evaluation, Tab G, App. A. Figures on USAAF losses represent losses from all causes, including crashes. Cf. incl. to rpt., CG 8th AF to CG AAF, 3 Mar. 1943, in A-2 Lib., K-13423.

39. AAFRH-7, Chap. III; Naval Attaché Rpt., 12 Feb. 1943, in A-2 Lib., K-17645; ltr., Baker to Arnold, 11 Jan. 1942, in A-2 Lib., K-14347.

40. First 1100, Vol. II, p. 367; M.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 Baker, 23 Nov. 1942.

43. Ibid.; ltr., Naval Staff Officer, Hq Bomb Comd. to Baker, 25 Nov. 1942, in First 1100, Vol. II, p. 380; M.I.D. U.C. Rpt. #B964C, 3 Dec. 1942, in A-2 Lib., K-8198.

44. Analysis of Results, in A-2 Lib., K-9226.

45. Ltr., Baker to Arnold, 11 Jan. 1943, in A-2 Lib., K-14347.

46. Ltr., Stratemeyer to Spaatz, 26 Nov. 1942, in SAS 385; ltr., Arnold to Baker, 2 Dec. 1942, in AAG 312.1-A.

47. Ltr., Stratemeyer to Spaatz, 26 Nov. 1942.

48. Ltr., Baker to Stratemeyer, 2 Jan. 1943, in AAG 370.2; ltr., Baker to Arnold, 11 Jan. 1943.

49. Ltr., Baker to Arnold, 26 Nov. 1942, in SAS 385; ltr., Baker to Arnold, 11 Jan. 1943.

50. Naval Attaché Rpt., 12 Feb. 1943.

51. Evaluation, Tab G, App. F; Perforability of German Submarine Pens, ORS Special Rpt. #1, 8 Dec. 1942.

52. Ibid., p. 3; cf. Evaluation, Tab G, p. 3.

53. Analysis of Results, in A-2 Lib., K-9226. Admiralty was reported to be in agreement with the conclusions arrived at in this paper.

54. U.S. Strategic Bombing Survey [USSBS], AFO 413, Interview #59, Grand Admiral Doenitz, 28 June 1945, in AFSHO files; cf. Strategic Aerial Bombardment of Germany, 10 Dec. 1943, in AFSHO files.

55. See ORS Day Raid Rpts., in Tac. Mission Folders, A-2 Lib.

56. Interp. Rpt. #k.1449, 16 Dec. 1942, in Tac. Mission Folder #24 (Lille, 6 Dec. 1942).

57. Ind. Dmg. Rpt. #63, 5 Jan. 1943, in A-2 Lib., K-11497.

58. Ibid.; Ind. Dmg. Rpt. #66, 23 Feb. 1943, in A-2 Lib., K-18289.

59. Tac. Mission Folders #17 (Lille, 8 Nov. 1942) and #24 (Lille, 6 Dec. 1942).

60. ORS Day Raid Rpt. #29, 19 Feb. 1943, in Tac. Mission Folder #29 (Lille, 13 Jan. 1943).

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.

65. OSS Rpt. #P.7/6938, 28 Mar. 1943.

66. Tac. Mission Folder #26 (Romilly, 20 Dec. 1942).

67. Intel. Narrative #26, and ORS Day Raid Rpt. #26, 2 Feb. 1943, in ibid.

68. Air Min. Rpt., USAAF Attack on Romilly, 20 Dec. 1942, n.d., in ibid.

69. Ibid.

70. Ibid. See also Intel. Narrative #26 in same folder.

71. Ibid.

72. CM-IN-10858 (11-25-42), USAWW to AGWAR, #239, 25 Nov. 42.

73. See appropriate mission reports in Tac. Mission Folders.

74. Ibid., Intel. Narrative #26.

75. See above, Chap. II.

76. CM-OUT-7903 (12-23-42), CG AAF, AFABI to CG 8th AF, #A-1153, 22 Dec. 42.

77. Ibid.

78. CM-IN-11208 (12-26-42), Algiers to USFOR-AGWAR, #3083, 25 Dec. 42.

79. Air Min. Rpt., USAAF Attack on Romilly, 20 Dec. 1942, n.d.

80. Incl. to rpt., CG 8th AF to CG AAF, 3 Mar. 1943, in A-2 Lib., K-13923.

81. Ibid.

82. Ibid.

83. CM-OUT-3659 (1-11-43), CG AAF, AFAAP to CG 8th AF, #A-1313, 9 Jan. 1943.

84. Ltr., Baker to Stratemeyer, 30 Jan. 1943, in AAG 312.1-B.

85. A/P Status Rpts., BOLERO Papers; Hist., 2d Bomb Wing, Activation to 31 Dec. 1943, pp. 37-9.

86. Ltr., Spaatz to CG ETOUSA, 9 Nov. 1942, in Plans, WP-III-A-2 #2.

87. CM-IN-4417 (11-11-42), London to AGWAR, #8, AFW 307A, 10 Nov. 42; CM-OUT-2851 (7-11-42), WD OPD to USFOR, 10 Jul. 42. Cf. ltr., Spaatz to CG ETOUSA, 9 Nov. 1942; ltr., Spaatz to Stratemeyer, 7 Nov. 1942, in AAG 312.1-A.

88. CM-IN-825 (12-2-42), London to AGWAR, #1026, 2 Dec. 42.

89. Ltr., Arnold to Baker, 2 Dec. 1942, in AAG 312.1-A; CM-OUT-4254 (11-13-42), AFDAS to CG 8th AF, #A-753, 13 Nov. 42.

90. CM-OUT-4254 (11-13-42); ltr., Arnold to Baker, 2 Dec. 1942.

91. A/P Status Rpts., BOLERO Papers; ltr., Baker to Stratemeyer, 30 Jan. 1943, in AAG 312.1-B.

92. See ltr., Baker to Stratemeyer, 2 Jan. 1943, in AAG 370.2.

93. ORS Day Raid Rpts.; CM-OUT-4874 (1-14-43), AFDMC to CG 8th AF, #A-1335, 14 Jan. 43.

94. Hist., VIII AFSC, Chap. V, p. 117.

95. First 1100, Vol. II, p. 458; CM-IN-1368 (11-4-42), London to AGWAR, #498, 3 Dec. 42.

96. Ltr., Spaatz to CG ETOUSA, 9 Nov. 1942, in Plans WP-III-A-2 #2.

97. Hist., VIII AFSC, Chap. V, pp. 91 ff.

98. Ibid., pp. 151 ff., especially p. 152.

99. Eaker Rpt., Tab E, Exhibit 3.

100. ORS Day Raid Rpts., passim. See also Hist., VIII AFSC, Chap. V, p. 108.

101. Ltr., Eaker to Stratemeyer, 2 Jan. 1943.

102. Ibid.; ORS Day Raid Rpts., passim; Eaker Rpt., Tab E, Exhibit 3.

103. See cables, 8th AF, CM-IN-4417 (11-11-42), London to AGWAR, #8, AFN 307A, 10 Nov. 42; Eaker Rpt., Tab E, Exhibit 3.

104. Ltr., Eaker to Stratemeyer, 2 Jan. 1943; CM-IN-10920 (1-24-43), USAWW to AGWAR, #516, 23 Jan. 43; ORS Memo #13, 11 Jan. 1943, in Opns. Anal. Div. Rpts., Radio and Radar, Vol. 1; Eaker Rpt., Tab E., Exhibit 3.

105. ORS Day Raid Rpt. #27A; Hist., 2d Bomb Wing, pp. 35-36.

106. An Evaluation of Defensive Measures Taken to Protect Heavy Bombers from Loss and Damage, Opns. Anal. Sec., Hq 8th AF, Nov. 1944, p. 3, in Opns. Anal. Div. files.

107. See Hist., 1st Bomb Wing.

108. First 1100, p. 395.

109. Evaluation of Defensive Measures, p. 36.

110. ORS Day Raid Rpt. #15; ltr., Eaker to CG 8th AF, 23 Oct. 1942, in Tac. Mission Folder #15; VIII Bomber Command Weekly Digest of Enemy Activity, 28 Oct. 1942, in A-2 Lib., K-5288.

111. CM-IN-10858 (11-25-42), USAWW to AGWAR, #239, 25 Nov. 42; int., Brig. Gen. H. S. Hansell, 9 Aug. 1943, in A-2 Lib., K-30922.

112. Evaluation of Defensive Measures, p. 36.

113. Ltr., Eaker to Stratemeyer, 2 Jan. 1943; 8th AF Weekly Intelligence Digest, 2 Jan. 1943, in A-2 Lib., K-10507.

114. Evaluation of Defensive Measures, p. 94. These figures include bombers having received class E damage, which involved virtual destruction.

115. Int., Lt. Col. E. H. Snavely, 27 Jul. 1943, in A-2 Lib., K-29946.

116. CM-IN-9057 (12-21-42), London to AGWAR, #183, 20 Dec. 42.

117. CM-OUT-1338 (1-5-43), AFRDB to CG 8th AF, #A-1260, 4 Jan. 43.

SECRET

118. Int., Hansell, 9 Aug. 1943; Hist., VIII AFSC, Chap. V., pp. 118-19.

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.

121. Ibid. See also Evaluation of Defensive Measures, pp. 43-46; Tactical Doctrine, 1st Bomb Wing, 1 Feb. 1943, in A-2 Lib., K-37105.

122. Ibid.

123. Evaluation of Defensive Measures, p. 46.

124. Ltr., Baker to Arnold, 11 Jan. 1943; int., Armstrong, 24 Nov. 1942; int., Capt. H. L. Stouse, 10 Jan. 1943, in A-2 Lib., K-26776.

125. Ltr., Baker to Arnold, 11 Jan. 1943; int., Craigie, 12 Jan. 1943.

126. Paper, sgd. Brig. Gen. A. J. Lyon, 8 Aug. 1942, in A-2 Lib., K-705; int., Craigie, 12 Jan. 1943; int., Col. P. W. Tibbets, 20 Feb. 1943, in A-2 Lib., K-13172.

127. ORS Day Raid Rpts., passim; Evaluation of Defensive Measures, p. 94; see above, pp. 73, 79-80.

128. Tac. Doctrine, 1st Bomb Wing, 1 Feb. 1943; int., Armstrong, 24 Nov. 1942.

129. Ibid.

130. Ibid.

131. Int., Lt. Col. Leslie H. Arps, Dir., Opns. Anal. Div., 25 July 1945. Cf. CM-IN-6635 (12-16-42), London to ACMAR, #984, 15 Dec. 42.

132. Int., Lt. Col. Carl Norcross, 5 Jan. 1943, in A-2 Lib., K-9482; int., Craigie, 12 Jan. 1943.

133. ORS Day Raid Rpts., passim; Preliminary Report on Bombing Accuracy, ORS, VIII Bomb Comd., 4 Jan. 1943, in A-2 Lib., K-15469.

134. Ibid.

135. Ibid.

136. Report on Perspective Maps, 31 May 1943, in A-2 Lib., K-82291.

137. Prelim. Rpt. on Bomb Accuracy.

138. Int., Craigie, 12 Jan. 1943.

139. Baker Rpt., p. 4.

140. First 1100, pp. 395-6.

141. Int., Craigie, 12 Jan. 1943; ltr., Stratemeyer to Spaatz, 24 Dec. 1942, in AAG 312.1-A.

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.

Chapter IV

1. CCS 94, 24 July 1942, approved in substance in CCS 33d Meeting, 25 July 1942. See also CCS 97/3, 14 Aug. 1942.

2. CCS 97/3.

3. JCS 30, 5 April 1943.

4. Ltr., Spaatz to Arnold, 23 Nov. 1942. See also discussion below, p. 136.

5. Memo, President to Marshall, 24 Aug. 1942.

6. AWPD-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 Stratemeyer, 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.

12. Cf. JCS 152; memo for S/W from Mr. Lovett, 15 Nov. 1942, in SAS 381; memo for all Staff Directorates from C/AS, 2 Dec. 1942, in SAS 385.

13. See Chap. I, above.

14. CCS 32d Meeting, 25 July 1942.

15. CPS 40th Meeting, 3 Dec. 1942, 41st Meeting, 4 Dec. 1942.

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., AFSHO. 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-11271.

19. See below, p. 185. See also ltr., Spaatz to Arnold, 10 Nov. 1942; Rickenbacker Rpt.; Butcher MS.

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. CCS 97/2); JPS, 24th Meeting, 22 July 1942 (Ref. CPS 35/1).

22. JCS 28th Meeting, 11 Aug. 1942.

23. JCS 26th Meeting, 28 July 1942, JCS 28th Meeting, 11 Aug. 1942, CPS 26th Meeting, 24 July 1942 (Ref. CPS 35/1).

24. JPS 24th Meeting, 22 July 1942.

25. Ibid.

26. CPS 26th Meeting, 24 July 1942; ltr., Spaatz to Arnold, 24 Aug. 1942; notes on JPS 33d Meeting, 2 Sep. 1942 (Ref. JPS 48), Tab A, memo, Arnold to C/S, 29 July 1942; CCS 94, 24 July 1942.

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.

29. AAFRH-2; ltr., Spaatz to Arnold, 23 Nov. 1942; ltr., Baker to Arnold, 11 Jan. 1943, A-2 Lib., K-14347; JCS 152, 16 Nov. 1942, memo by CG AAF.

30. Ltr., Spaatz to Arnold, 3 Oct. 1942, A-2 Lib., K-8822.

31. JCS 97/1, 11 Sep. 1942, memo by CG AAF; cf. JCS 152, 16 Nov. 1942.

32. Ltr., Spaatz to Arnold, 31 Oct. 1942. See below, pp. 145-46.

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 AFSHO 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).

39. Memo, Arnold to C/S, 29 July 1942.

40. Notes on JPS 33d Meeting, 2 Sep. 1942.

41. JCS 33d Meeting, 15 Sep. 1942 (Ref. JCS 97/1).

42. JPS 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, incls. A, C, and D; notes on JPS 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 Opn. 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 AGWAR, #5062, 18 Nov. 42; CM-OUT-7197 (11-22-42), AFDTS to CG ETO, #R-3451, 22 Nov. 42; CM-IN-825 (12-2-42), London to AGWAR, #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.

SECRET

57. CCS 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 Opn. 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 CCS 97 series; cf. JPS 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, pp. 124-26.

65. AWPD-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 AAG 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.

SECRET

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 AC/AS Plans from AC/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 H&R, AFDAS 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).

[redacted]

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 AAG 381-A.

96. Digest of conversation between Eisenhower and Spaatz at Widewings, 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 Widewings, 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. Baker Rpt., Tab C, p. 3.

105. Msg., Eisenhower to Smith and Ismay, 3 Dec. 1942, in Baker Secret File, AFSHO files; ltr., Baker to Stratemeyer, 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 Stratemeyer, 17 Dec. 1942, in AAG 312.1-A.

107. Ltr., Arnold to Portal, 10 Dec. 1942. Cf. ltr., Stratemeyer 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 Stratemeyer, 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 Stratemeyer, 17 Dec. 1942, comment 3, AFAEP to AFCAS, n.d.

110. Msg., Eisenhower to CCS and British COS, 31 Dec. 1942; msg., Eisenhower, to Marshall, 31 Dec. 1942; both in Baker 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., Baker 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., Baker to Arnold, 11 Jan. 1943, in A-2 Lib., K-14347; ltr., Baker to Stratemeyer, 8 Oct. 1942, in AAG 312.1-A.

117. See above, present chapter.

118. Draft attached to R&R, AFDAS to AFABI, 11 Oct. 1942, in Plans, AWPD-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 Baker, 18 Nov. 1942, in AAG 312.1-A.

122. R&R, AFCAS to Dir. of Bomb, 25 Nov. 1942, in SAS 385; R&R, AFCAS to Col. C. Cabell, 19 Nov. 1942.

123. See above, Chap. I. R&R, AFDMR to AFRGS, 14 Sep. 1942, in AAG 381-F; ltr., Stratemeyer 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 S/W 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 AFDAS, 27 Sep. 1942, in SAS 385.

127. Memo for Marshall from Arnold, 22 Aug. 1942, in SAS 385; cf. R&R, AFCAS to Dir. of Mil. Requirements, 19 Aug. 1942, in SAS 385. For Spaatz message of 18 August reporting the results of the Rowan mission, see above, Chap. II.

126. Special Studies of Bombing Results #1-3, Hq AAF, Dir. of Intel. Service, 19 Oct. 1942, in A-2 Lib., K-90712.

129. Ltr., Baker to Arnold, 6 Dec. 1942; B&R, AFCAS to AC/AS A-2, 21 Dec. 1942; Arnold to Baker, 2 Jan. 1943, in AAG 312.1-A.

130. Ltr., Spaatz to Stratemeyer, 14 Sep. 1942, in AAG 370.2; ltr., Stratemeyer 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. Baker Rpt., p. 7; ltr., Baker to Stratemeyer, 30 Jan. 1943, in AAG 312.1-B.

138. Baker 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.

SECRET

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), USAWW to WAR, #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 Valkan, Wegesack, 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. OSS Rpt., 15 Mar. 1943, in A-2 Lib., K-15943; T/M Rpt. #61, see especially Interp. Rpt. #KS.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.

21. Summary of Eighth AF Heavy Bomber Operations as Called for in the CBO 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., AAF Eval. Bd., ETO, 28 Oct. 1944, in A-2 Lib., K-93145.

24. USSBS, Sub. Ind. Rpt.; Ibid., interview #50, 28 June 1945, in AFSHO 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. #881/43, 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., #9013, 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; OSS 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 C/AS to all AC/AS, 30 Apr. 1943, in SAS 385.

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 Stratemeyer from Sorensen, 13 Apr. 1943, in SAS 385.

44. See below, Chap. VI; ltr., Eaker to Stratemeyer, 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.

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 WAR, #867, 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., Baker 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.

81. Memo for Dir. of Bomb from Andersen, 31 Jan. 1943; ltr., Stratemeyer to Baker, 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 AFSHO files; 8th AF Tac. Devel., Chap. II; Baker 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., Stratemeyer to Baker, 7 Jan. 1943; radiogram, Allied AF to AGWAR, #408, 25 Jan. 1943; ltr., Baker 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.; Baker Rpt., Tab C; ltr., Baker 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., Baker 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., Baker to Giles, 28 May 1943, in AAG 312.1-B; CM-IN-18992 (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.

98. Ibid.

99. See above, Chap. III.

100. Advantage of Dropping on the Leader over Sighting Individually for Range When Bombing in Formation, ORS Rpts., Vol. I, #2, 20 Mar. 1943. Memo as to Desirability of Shortening Group Bombfall Patterns . . . , 7 May 1943, ORS Rpts., Vol. I, #3. See also ORS 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 Baker, 31 Mar. 1943, in AAG 312.1-B; int., Lt. Col. J. B. Montgomery, 13 Apr. 1943, in A-2 Lib., K-32358; CM-IN-14043 (4-23-43), USAWW 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 ORS Rpt., VIII Bomb Comd. Bombing Accuracy, 1 Jan. to 15 Oct. 1943.

103. ORS 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. ORS 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), USAWW to WAR, #D-1174, 28 May 43.

108. CM-IN-10753 (3-20-43), USAWW to WAR, #707, 19 Mar 43; ltr., Baker to Arnold, 19 Mar. 1943, in AAG 312.1-B; CM-OUT-8161 (3-22-43), CG AAF to CG ETO, #R-6840, 22 Mar. 43.

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 AFSHO files.

2. Ibid., p. 14; CM-IN-1215 (2-3-43), London to AGWAR, #977, 2 Feb. 43; ltr., Baker to Stratemeyer, 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 AC/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), USAWW to WAR, #55, 1 Mar. 43; CM-IN-2926 (4-5-43), London to WAR, #8463, 5 Apr. 43. Cf. ltr., Anderson to Stratemeyer, 2 Mar. 1943, in AAG 312.1-C.

4. In a letter to Arnold, 1 Mar. 1943, Air Marshal W. G. S. Welsh 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), USAWW to WAR, #55, 1 Mar. 1943.

9. Ltr., Arnold to Baker, 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) AC/AS AFDPU 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, ETOUSA, 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 Special Operations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
7	2	2	1	1	2	2	2	1

Revised Troop Basis ETOUSA, copy in files of Combat Ops. Br., AFSHO.

[SECRET]

14. JCS 238/3, 21 Mar. 1943; CM-IN-13932 (3-26-43), London to AGWAR, #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, AFAEP to CG ETO, #R-7303, 5 Apr. 43; ltr., Stratemeyer to Baker, 8 Mar. 1943, in AAG 312.1-B.

15. Ltr., Stratemeyer to Baker, 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., Baker to Stratemeyer, 26 Feb. 1943, in AAG 312.1-B.

16. Ltr., Stratemeyer to Baker, 7 Feb. 1943; memo for Arnold from AC/AS Plans, 25 Apr. 1943, in Plans, WP-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 MSS prepared by Control Div., ASF.

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., MM&D, 20 Apr. 1943, both in custody of Admin. Hist. Br., AFSHO.

23. Plans Div. Digest, 17 Mar. 1943; ltr., Anderson to Stratemeyer, 2 Mar. 1943.

24. Ltr., Baker to Stratemeyer, 26 Feb. 1943; CM-IN-302 (3-1-43), USAWW to WAR, #55, 1 Mar. 43; ltr., Baker to Stratemeyer, 2 Mar. 1943, in SAS 370.2.

25. Ltr., Stratemeyer to Baker, 6 Mar. 1943, in AAG 312.1-B; cf. Plans Div. Digest, 17 Mar. 1943.

26. Hist., VIII AFSC, Chap. IV; Operation TORCH, in AFSHO files.

27. Msg., Portal to Arnold, 1 Mar. 1943.

28. Ltr., Stratemeyer to Evill, 12 Mar. 1943.

SECRET

29. CM-OUT-10312 (1-30-43), CG AAF to CG ETO, #R-5494, 29 Jan. 43; CM-IN-424 (2-1-43), London to ACWAR, #930, 1 Feb. 43.

30. Ltr., Arnold to Baker, 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., ACWAR to USAWW, #R-7578, 14 Apr. 1943, in ibid., docs.

36. Ltr., Arnold to Maj. Gen. Follett 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, MEW, 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, AFSHO files. Cf. AWPD-42.

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. USSBS, 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. USSBS, Over-all Rpt.; cf. Special Oil Rpt., in AFSHO files.

65. Ibid.

66. Ibid.

67. Ibid. Cf. Rpt. to COA by Subcommittee on Western Axis Rubber.

68. See above, Chap. III.

69. USSBS, 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.

72. Ibid.

73. Ibid.

74. Ibid.

75. Ibid.

76. Notes from Hist. of COA.

77. Ltr., C. G. Vickers, MEW, to Portal, 3 Apr. 1943, in USSBS files, #322; see also attached detailed comments on COA Rpt.

78. Baker 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. Baker 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 SAS 370.2.

82. Notes from Hist. of COA.

83. JCS Special Meeting, 29 Apr. 1943, ref. JCS 277. This paper presented by Baker, 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 CBO Plan herein following.

84. Ibid.

85. AWPD-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.

87. See above, Chaps. I, II, and III.

88. See above, Chap. IV.

89. JCS 277, 29 Apr. 1943. The schedule here proposed differed from that presented by Baker only in the first phase when 864 rather than 944 heavy bombers were projected.

90. JCS 77th Meeting, 4 May 1943.

91. CCS 217, 14 May 1943; CCS 215, 13 May 1943.

92. CCS 85th Meeting, 15 May 1943; CCS 87th Meeting, 18 May 1943; CCS 219, 14 May 1943; CCS 232/1, 18 May 1943.

93. CCS 85th Meeting; CCS 87th Meeting; ltr., Portal to Arnold, 15 Apr. 1943.

94. CCS 87th Meeting.

95. CCS 242/6, 25 Mar. 1943 (final report on TRIDENT decisions to the President and the Prime Minister).

96. Baker Rpt., Tab E, Exhibit 8; CCS 138, 2 Jan. 1943.

97. Ltr., Arnold to Baker, 22 Apr. 1943, in SAS 370.2.

98. Baker Rpt., Tab E, Exhibit 10.

BIBLIOGRAPHICAL NOTE

Because of the nature of this history, the sources of the information were found chiefly in highly classified documents of AAF, British, and Allied staff offices. As cited in the Notes, much reliance was placed on CCS and JCS papers; on British Air Ministry reports, correspondence, and analyses; and on the files of the Assistant Chief of Air Staff-5. Other sources frequently used include the files of AC/AS-2; interpretation reports, evaluations, and interviews in the A-2 Library; letters in the Air Adjutant General and Secretary of Air Staff files; reports of the Office of Strategic Services, Operational Research Section and Operations Analysis Section of Eighth Air Force, the AAF Evaluation Board, the Committee of Operations Analysts; the U. S. Strategic Bombing Survey; the Baker Report; Statistical Summaries; and unit histories, cables, Tactical Mission Folders, and special studies in the Archives of the AAF Historical Office. The reference to "Butcher MS" concerns the manuscript copy by Capt. Harry C. Butcher, USNR, for his book My Three Years With Eisenhower, later published by Simon and Shuster: New York, 1946.

SECRET

INDEX

A

A-2, AC/AS, 274-76
A-5, 8th AF, 277
Abbeville/Drucat airdrome, 23, 29, 57, 88
Advisory Committee on Bombardment, 277
Advisory Council, AAF, 291
African theater, 65, 101, 144
Air Estimates, 274-75
Air Inspector, AAF, 266
Air Offensive Against Germany, 213
Air Staff, AAF, 181, 275
  Chief, 204
Algiers, 101
Allied Air Force in North Africa, 172
Amiens, 24, 26, 225
Andersen, David, 314 (n 20)
Anderson, Brig. Gen. D. A., 178
Anderson, Brig. Gen. F. L., 239, 293
Andrews, Lt. Gen. F. M., 257, 260-61, 263
Antisubmarine Comd., 68
Antwerp, 57, 206, 208, 211, 240
Arnold, Gen. H. H., 19, 52, 83, 127, 135, 139, 142-43, 159, 169-71, 173, 177, 182, 258-60, 266, 276, 304
Ateliers et Chantiers Maritime de la Seine, 24
Ateliers d'Hellemmes, 31, 88
Augsburg, 63
Automatic flight control equipment (AFCE), 120, 247
Avions Potez aircraft factory, 24, 28, 206
AWPD-1, 124, 298
AWPD-42, 3, 124-25, 127, 152, 154-55, 158-59, 175-76, 275, 301

B

B-17, 1, 14, 18-20, 22-25, 27-28, 32, 34, 36, 40-41, 51-53, 69, 71, 73, 93-95, 109-11, 114, 216-17, 219, 221, 228, 236, 240-41, 256, 261-62, 265, 314 (n 20), 344 (n 16)
B-24, 14, 18, 31-32, 34, 36, 50, 53, 68-69, 73, 93, 95, 106-06a, 109, 111, 216, 220, 224, 226, 228, 240-41, 252, 256, 261-62, 321 (n 13), 344 (n 16)
B-26, 241-43
B-40, 115
Baltic Sea, 64
Beaumont/Le Roger airfield, 57
Bednall, Colin, 41
Belgian Ambassador to U. S., 211
Belgian casualties, 59
Belgium, 32, 83
Benghazi, 86
Bergius hydrogenation plant, 282
Berlin, 192, 240, 304
Billancourt, 8, 208
Biscay, Bay of, 65, 68, 78, 81-82, 85, 87, 115, 190-91, 206
Board of Economic Warfare, 276-77
BOLERO, 2, 5-6, 8, 123, 132-33, 140, 142, 144, 263
Bombardment, Director of, 177
Bordeaux, 57, 66
Boston a/c, 315 (n 1)
Bradley, Maj. Gen. Follett, 266-67
Bradley Plan, 267-68
Brady, Brig. Gen. F. M., 239
Brampton, 8
Bremen, 63, 197, 200, 218, 220, 228, 238, 249, 304
Bremerhaven, 63, 199, 304
Bremershire, 304
Bremer Vulkan, 200-01
Brest, 57, 66, 69, 74, 202, 223, 225, 227

Brest Peninsula, 69, 75, 84, 207, 210
British Admiralty, 85, 204, 323 (n 53)
Tracking Room, 81
British Air Ministry, 40, 60, 67, 78, 82, 85, 97, 164, 273, 277, 308
British Air Staff, 108, 292-93
British Bomber Comd. See RAF.
British Chief of Air Staff, 188, 193-94, 244, 307-08
Asst. Chief of Air Staff, Opns., 16, 56, 164
British Chiefs of Staff, 130, 147, 149, 183, 193, 332 (n 59)
British Directorate of Bomber Opns., 308
British Empire, 10
British Fighter Comd. See RAF.
British Imperial War Council, 179, 332
British Joint Staff Mission, 193
British Ministry of Economic Warfare, 63, 91, 165, 291-92
British War Cabinet, 9, 209, 212
Brittany, 207, 210
Broadhurst, Group Capt., 317 (n 53)
Buddicom rolling-stock repair shop, 19-20, 207
Burma, 124

C

Caen Bougie, 94
Casablanca Conference, 122, 124, 126, 131, 150, 164, 174, 182-95, 206, 213, 216, 255-65, 294, 305
Casablanca Directive. See CCS 166/1/D.
Cayeux, 32
CCS 91, 140
CCS 94, 140
CCS 166/1/D (Casablanca Directive), 191, 193, 209, 299
CCS 217, 347 (n 83)
Central Planning Office, 203
Channel Is., 61
Chantiers et Ateliers de Penhouet, 74, 76
Cherbourg, 57, 88, 93
China-Burma-India Theater, 261
Churchill, Winston, 9, 12, 131, 147, 185, 252
Clark, Gen. Mark, 140
Cologne, 63, 179, 181, 304
Combat Crew Replacement Center, 48
Combined Bomber Offensive (CBO), 1-2, 11-12, 196, 253-54, 268, 297, 300-01, 308-09
Combined Bomber Offensive Directive, 1
Combined Bomber Offensive Plan, 1, 15, 205, 269, 294-95, 298, 302-03, 306-09
Combined Chiefs of Staff (CCS), 2, 56, 123, 171, 177, 187-88, 192-94, 196, 212-13, 255, 268, 305-08, 334 (n 109)
Combined Staff Planners (CPS), 135, 148-50, 268
Committee of Operations Analysts (COA), 270, 272, 277-78, 283, 285, 289-91, 293, 298
Compagnie de Fives-Lille, 31
Cooke, Admiral, 133
Cosselies, 57
Courcelles, 57
Courtrai, 240
Courtrai/Wevelghem airdrome, 24, 32, 57
Czechoslovakia, 240

D

Daily Mail, 41
Danzig, 51
DB-7, 29-30
De Gaulle Committee, 211
Deutsche Werke (Kiel), 200
Dieppe, 23
Diesel factory, 63
Doenitz, Grand Admiral, 87, 203, 205
Douhet, Giulio, 268-69
Drucat. See Abbeville.
Dutch casualties, 59

E

VIII Air Force Service Comd., 48, 214, 264
VIII Air Support Comd., 243
VIII Bomber Comd., 1, 18, 20, 24, 28, 38, 48-49, 53, 69, 73, 75, 78, 96-97, 103, 109, 175-76, 182, 237, 239, 308, 316 (n 30)
  CG, 16, 81
  Hq., 97
VIII Fighter Comd., 34, 46-47, 240, 308
  CG, 16
Eagle squadrons, 45
Eaker, Maj. Gen. I. C., 8, 15, 22-23, 26, 37, 39-40, 50, 54-55, 82-84, 101-02, 105, 114-15, 165, 175, 177, 181, 185-87, 189, 196, 243, 257, 259, 261, 263, 265-66, 294, 301, 304, 347 (n 83)
Earle, E. M., 276
Eastern Air Comd., 172
Eastern Front, 6, 155, 185
Economic Warfare Div., American Embassy in England, 277
Eisenhower, Gen. D. D., 57, 139, 142, 165, 168-73, 177-89, 257, 314 (n 20), 334 (n 106, 109)
Elveden Hall, 8
Emden, 63, 199, 216-17, 238, 251
Erla Aircraft & Aero Engine Works, 206
ETOUSA, 164, 169, 171, 257, 343 (n 13)
  AF Hq., 334 (n 109)
  CG, 294
Evill, Air Marshal D. C. S., 343 (n 4)
Evreux, 94

F

1st Bomb Wg., 107, 111, 113, 121, 217, 228, 316 (n 30)
4th Bomb Wg., 239, 250
4th Fighter Gp., 46-47, 235, 256
15th Bomb Sq., 29, 315 (n 1)
56th Fighter Gp., 235
Fischer-Tropsch plant, 282-83
Fives-Lille, 31-33, 88-90
Flensburg, 199
Flushing, 218
Focke-Wulf Flugzeugbau (Bremen), 206, 228
Ford plant (Antwerp), 208, 238
Foreign and Domestic Commerce, Bureau of, 277
Fort Rouge, 57
Fortress, 18, 25-26, 31-41, 216, 220-21, 241. See also B-17.
France, 54, 59, 65-66, 68, 88, 102, 225
French bases, 72
French coast, 75, 209
French, Fighting, 33
French people, 59-60, 70
Frisian I., 216, 218, 222, 229-30
FW-190, 24-25, 27, 29, 34, 46, 71, 94, 108, 206, 222, 226, 233
FW-200, 52

G

G-2, WDGS, 276
Gare d' Orleans, 74
Gates, Col. Byron E., 276
General Motors plant (Antwerp), 208, 236
German Air Force, 40, 92, 128, 189-90, 206, 298
German High Comd., 31
Germania Werft (Kiel), 200
Goering, Hermann, 109, 171
Guadalcanal, 140, 143

H

Haarlem, 243
Hamburg, 63, 199, 304
Hamilton, Fowler, 276
Hamm, 207, 220
Hanover, 304
Hansell, Brig. Gen. H. S., 107, 142, 293
Harmon, Gen. M. F., 143

Harris, Air Marshal, 189
Headquarters, AAF, 19, 38, 83-84, 96, 99, 102, 117, 127, 146, 174, 176, 181, 241, 275-76, 299, 334 (n 106)
Heligoland, 222
Heligoland Bight, 232
Hellemmes, 32, 89, 91
Hodges, Col. J. P., 8
Holland, 24, 61, 315 (n 1)
Horne, Vice Adm. F. J., 162
House Appropriations Committee, 214
HUSKY, 183-84, 304-05

I

Ijmuiden, 240-43
Institute for Advanced Study (Princeton, N. J.), 276
Intelligence, AC/AS, 39. See also A-2.
Intelligence Service, Director of, 180-81
Inter-Allied Bombing Air Force, 10
Italy, 306

J

JCS 277/1, 347 (n 83)
"Joint/American/British Directif on Day Bomber Operations involving Fighter Cooperation," 15, 45, 56, 163-64
Joint Chiefs of Staff (JCS), 6, 133, 140, 142-43, 147-48, 156-58, 163, 174, 177, 189, 193-94, 258, 268, 294, 304-05, 332
Joint Staff Planners, 140
Joint Strategic Survey Committee, 148
Ju-88, 218
Justice Dept., 277

K

Keroman, 69
Kiel, 51, 63, 197, 199-200, 240, 251-52
King, Admiral, 143, 157, 160-61, 178, 180
Knox, Sec. of Navy Frank, 156
Kuter, Brig. Gen. L. S., 107, 111-12, 176, 313 (n 9)

L

Lamont, T. W., 276
Lancaster a/c, 14, 41
Lanphier, Lt. Col. T. G., 276
La Pallice, 57, 66, 75, 119
Laval, Mr., 211
Leach, Lt. Col. W. S., 276
Leahy, Admiral, 133, 143, 180
Le Havre, 30, 57
Leigh-Mallory, Air Marshal Sir Trafford, 23
Leipzig, 304
Le Roger. See Beaumont.
Le Trait, 24, 26
Liberator. See B-24.
Lightning a/c. See P-38.
Lille, 31-32, 35, 42, 52, 59, 88-91, 96, 119, 176
London, 84
Longfellow, Brig. Gen. N. K., 8, 107
Longueau marshalling yard, 24, 26
Longuenesse, 28, 30, 57
Lorient, 53, 57, 59, 66, 69, 71, 74, 77-78, 202-03, 209, 211, 223-24, 227
Lovett, Asst. Sec. of War for Air, 178
Low Countries, 54, 59, 88, 92, 199
Lübeck, 63, 199

M

Malta, 86
Management Control, AC/AS, 276
Marinewerft (Wilhelmshaven), 200
Maritime program, 158
Marshall, Gen. G. C., 133, 139, 149, 157, 177, 189
Masefield, Peter, 18, 41, 314 (n 20)
Mason, E. S., 276
Maupertus, 57, 88
Meaulte, 24, 28-29, 57, 206, 237, 249

Mediterranean Theater, 192, 295
Me-109, 22, 25, 34, 94, 219, 233
Me-110, 218
Michie, A. A., 213-14
Middle East, 124, 133, 137, 140-42, 167, 172-73
Mission 9, 29
Mitchell, Gen. Wm., 9
Molotov, Commissar, 183-84
Moss, Lt. Col. M. W., 276, 345 (n 44)

N

91st Bomb Gp., 94
92d Bomb Gp., 28, 239
93d Bomb Gp., 31, 100
94th Bomb Gp., 239
95th Bomb Gp., 239
96th Bomb Gp., 239
97th Bomb Gp., 20, 27-28, 44, 48, 69, 73
99th Bomb Gp., 261
Naval Operations, Chief of, 177
Nelson, D. M., 156-57, 161, 163
Netherlands. See Holland; Low Countries.
New York Times, 314 (n 20)
Norden bombsight, 118
North Africa, 100, 124, 145, 148, 171, 173
North African campaign, 146, 173
North Sea, 220, 229

O

Office of Naval Intelligence (ONI), 277
Office of Scientific Research & Development (OSRD), 277
Office of Strategic Services (OSS), 276-77
Old Catton, 8
Operational Research Sec., 8th AF, 247
Osnabruck, 181

P

P-38, 34, 45-46, 52, 72, 114, 234
P-47, 72, 197, 233-37, 240, 244, 256
Paris, 92, 94-95, 153, 227, 249
Pas de Calais, 93-94, 232
Patton, General, 140
PBY, 143
Peabody Flow Plan, 260
Penhouet works, 79
Perera, Col. G. R., 276
Philips, Col. C. T., 8
"Plan for the Combined Bomber Offensive from the United Kingdom." See CBO Plan.
Plans, AC/AS, 68
Ploesti, 282, 294-95, 302, 306
Portal, Air Chief Marshal Sir Charles, 171, 194, 258, 260, 264, 306, 343 (n 4)
Potez, 26, 30, 34
Pound, Sir Dudley, 82
President. See Roosevelt.
Prime Minister. See Churchill.
Princeton, N. J., 276

Q

Quatre Mares locomotive repair shop, 207
Quislings, 71

R

Reader's Digest, 213
Red Cross conventions, 61
Region de l'Ouest, 89
Region du Nord, 89
Reich, 102, 197, 216, 220, 228
Renault works, 8, 153, 208
Rennes, 207, 210, 225, 237, 249
Resistance Movement, 211
Rhine area, 288
Rickenbacker, Capt. E. V., 318 (n 62)
Romilly-sur-Seine, 88, 92, 94, 96-97

Roosevelt, President, 132, 143-44, 147, 152, 158, 176
Root, Elihu, Jr., 276
Rostock, 63, 181
Rotterdam, 24, 29, 220
Roubaix, 32
Rouen, 225-26, 249
Rouen-Sotteville Marshalling Yard, 1, 19-20, 22, 26, 88, 91, 180, 207
ROUND-UP, 6, 123, 132-36, 142, 168, 173, 184, 305, 330 (n 28)
Royal Air Force (RAF), 8, 12-13, 16, 20, 24-25, 27, 40, 43, 46-47, 56, 62-63, 68-69, 73, 75, 83, 86, 88-89, 91, 93, 106a, 152, 164-65, 179, 181, 185-88, 198-200, 202, 204, 209, 211, 224, 227, 236-40, 259-60, 273, 277, 293, 303, 309, 315 (n 1)
  Bomber Comd., 15-16, 37, 50, 63, 82, 189, 193, 203, 255, 304, 307-08
    Air Officer Commanding-in-Chief, 131, 294, 307
  Coastal Comd., 65, 68, 82
  Fighter Comd., 88, 307-08
    Air Officer Commanding-in-Chief, 16, 307
  See also British.
Ruhr, 13, 106, 220, 240, 288, 294
Rumania, 282, 294
Russell, Brig. Gen. C. W., 68
Russia, 51, 271
Russian Army, 5, 145, 258
Russian front, 123, 125
Russian Protocol export program, 162

S

2d Bomb Gp., 261
2d Bomb Wing, 217, 228
78th Fighter Gp., 114, 235
St. Malo, 57
St. Nazaire, 57, 66, 69, 73-75, 77-79, 91, 95, 109, 115-16, 119-20, 203, 209, 211, 220, 223-24, 238
  Bassin de, 74
St. Omer airdrome, 28, 30, 32, 57, 237
Schweinfurt ball-bearing plants, 281, 302
Seine R., 92-93
Sicily, 148, 183
SICKLE, 261, 304, 306
SLEDGEHAMMER, 6
Slessor, Air Vice Marshal Arthur, 178, 332 (n 59)
S.N.C.A. du Nord, 206
S.N.C.F., 89
Somervell, General, 159, 162
Sorensen, Col. E. P., 276
Sotteville (M/Y). See Rouen.
South Pacific, 125, 143, 304
Southwest Pacific, 125, 133, 261, 304
Spaatz, Lt. Gen. Carl A., 8, 19, 23, 37-38, 40, 46, 52, 58, 68, 71-72, 96, 101-02, 104, 106a, 135, 139-40, 142, 168-69, 172-73, 176-77, 316 (n 34), 317 (n 53), 330 (n 28)
Spitfire, 45, 114, 197, 225, 235-38, 240
  V, 20
  5-B, 46
  IX, 20, 93
  unit, U. S., 46
Stalin, Premier, 185
Stimson, Secretary of War, 156, 178
Strafford, Air Commodore S. C., 178
Stratemeyer, Maj. Gen. G. E., 55, 260, 264
Stuttgart, 304
Sunday Times, 18, 314 (n 20)

T

3d Bomb Div., 250
3d Bomb Wg., 239, 241
12th Air Force, 48, 53, 100-01, 103, 169-70, 172, 261
XII Bomber Comd., 48
XII Fighter Comd., 47
35th Ftr. Gp., 318 (n 71)
301st Bomb Gp. (H), 27-28, 48, 73
305th Bomb Gp., 248
306th Bomb Gp., 94
308th Bomb Gp., 261

UNCLASSIFIED

322d Bomb Gp. (M), 239
351st Bomb Gp., 239
379th Bomb Gp., 239
Target Information Sec., AC/AS A-2, 274-76
Tedder, Air Marshal, 170
"Theater Air Force," 168
Thunderbolt. See P-47.
Todt organization, 203, 210
TORCH, 7, 45, 47, 49-50, 53-57, 100-01, 123-24, 129, 132-34, 136-42, 144-50, 152, 165-66, 170-73, 183, 187-89, 214, 234, 256, 260, 264, 304, 316 (n 34)
Trenchard, Maj. Gen. H. M. (Lord), 10, 12, 129, 178
TRIDENT Conference, 195, 255, 265-66, 268, 304-05, 307
Tunisia, 169

U

U-boat, 57, 62, 64-65, 67, 69, 74, 76-77, 80-81, 86, 198-201, 204-05, 224, 285
United Kingdom, 2-3, 124, 139, 172. See also British.
U. S. Army Forces in South Pacific, 143
U. S. Forces in the U. K., CG, 194
U. S. Navy, 68, 151. See also Naval Operations; ONI.
U. S. Strategic Bombing Survey, 205, 281, 284, 289, 291

V

Vascoeuil, 94
Vegesack, 197, 200, 222, 248-49, 252
Velsen generating station, 241
VHF radio, 234
Vickers, C. G., 291

W

War Dept., 101, 139, 143, 149-50, 178, 257
War Dept. General Staff, 156
War Production Board, 156, 163, 277
Wehrmacht, 208
Wellington bomber, 225
Weser R., 200
Western Front, 232
Wilhelmshaven, 63, 99, 199-200, 215-16, 218-20, 228, 238, 304
Williams, Col. R. P., 148
Wilton Shipyard, 24, 26, 29
World War I, 9-10

X, Y

XB-40, 114
YB-40, 114, 234, 239

UNCLASSIFIED