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EFFECT OF AIR POWER ON MILITARY OPERATIONS WESTERN EUROPE

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12th ARMY GROUP

GROUND OPERATIONS

PHASE I - CAMPAIGN OF NORMANDY

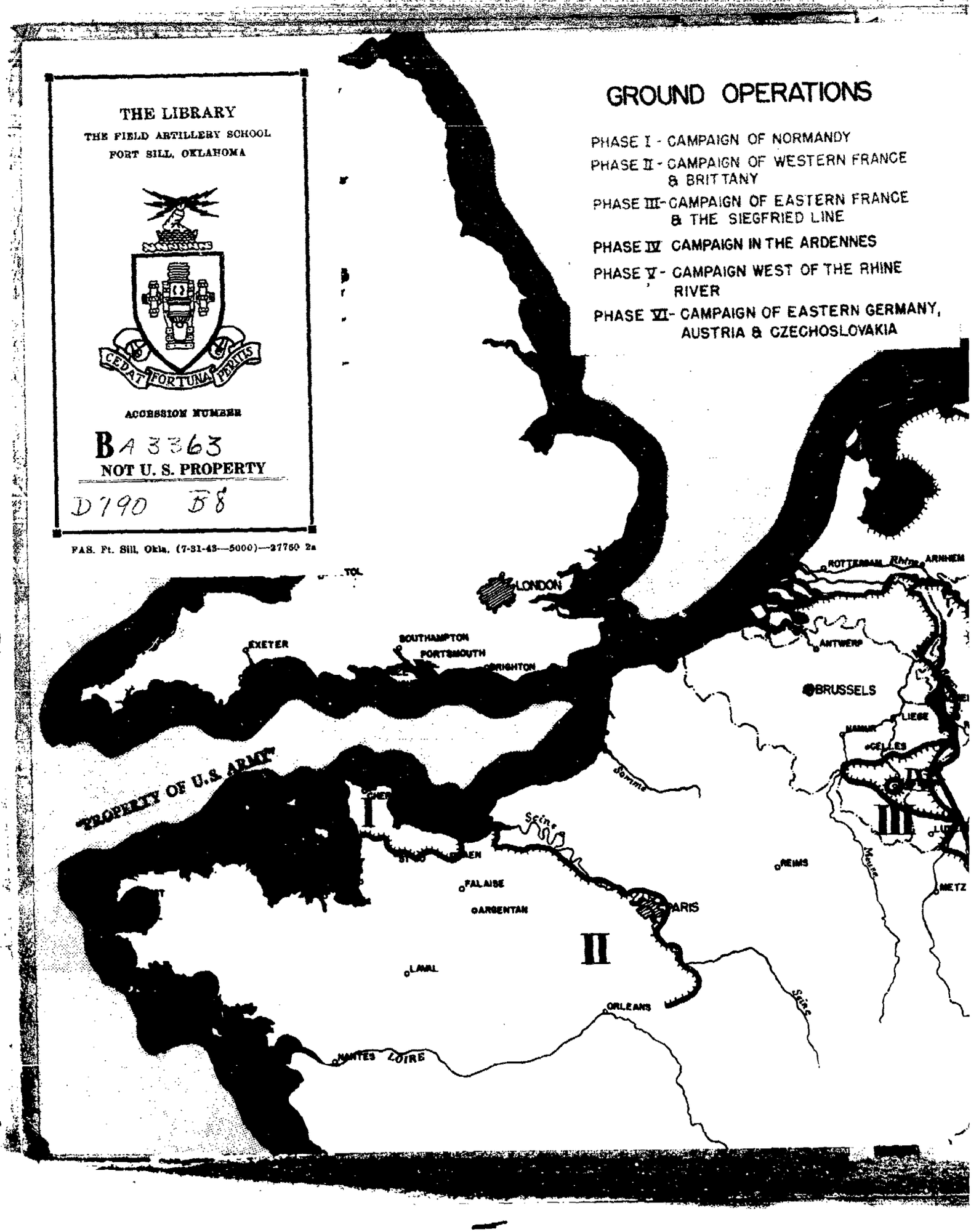
PHASE II - CAMPAIGN OF WESTERN FRANCE & BRITTANY

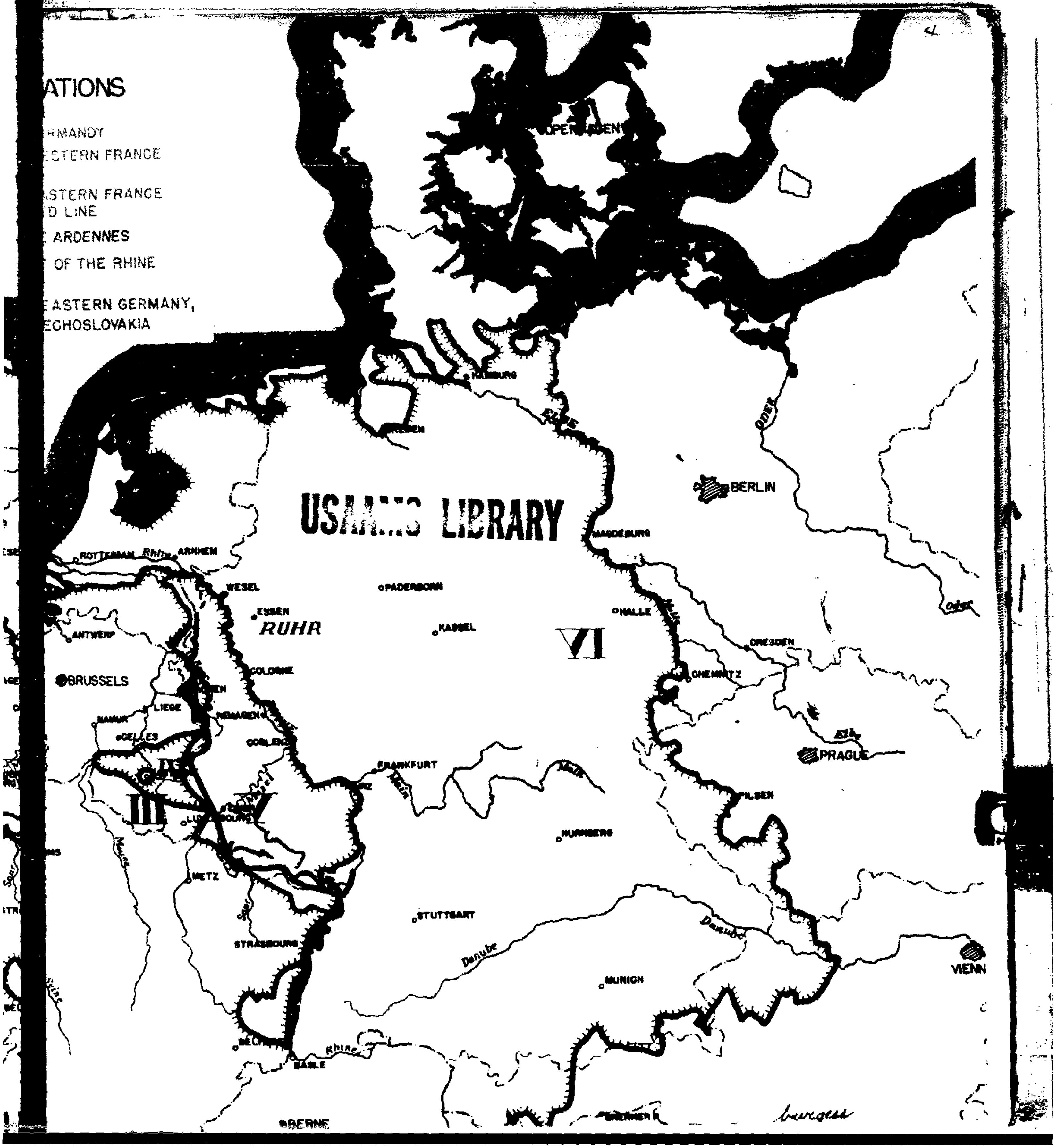
PHASE III - CAMPAIGN OF EASTERN FRANCE & THE SIEGFRIED LINE

PHASE IV CAMPAIGN IN THE ARDENNES

PHASE V - CAMPAIGN WEST OF THE RHINE RIVER

PHASE VI - CAMPAIGN OF EASTERN GERMANY, AUSTRIA & CZECHOSLOVAKIA

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This bombing survey study analyzes air, ground, and naval operations effecting Western Europe under the categories of operations, assaults, and interrogations. The result is a significant study of WWII lessons learned.

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EFFECT OF AIR POWER
ON
MILITARY OPERATIONS

WESTERN EUROPE

BY

GENERAL OMAR N. BRADLEY
MILITARY ADVISOR
UNITED STATES STRATEGIC BOMBING SURVEY

AND

AIR EFFECTS COMMITTEE
12th ARMY GROUP

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This report was prepared under the staff direction of the Air Branches of G—3 and G—2, 12th Army Group.

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O. N. Bradley

O. N. BRADLEY
General, United States Army

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PREFACE

Just after the surrender of the German High Command on 8 May 1945, I was directed by General Eisenhower to offer my services as military advisor to Mr. Franklin D'Olier, Chairman of the U. S. Strategic Bombing Survey. At the time, this group of highly trained specialists and analysts had been engaged since the Fall of 1944 in the study of strategic bombing. From my conversations with the Supreme Commander and Mr. D'Olier I discovered that my advice was desired concerning the overall effects of both strategical and tactical air power on military operations in the European Theater. In this connection, I was to supplement from a ground commander's point of view the studies being conducted by Major General Orville A. Anderson, AAF, a member of the Strategic Bombing Survey and formerly Deputy Commanding General for operations of the Eighth Air Force.

I felt that the proper fulfillment of my mission required a careful review of both my own experiences and those of my combat commanders in the light of how our operations were affected by our tremendous advantage in air power. Accordingly, I designated a committee of qualified staff officers from my key headquarters to assemble as much factual and experience data as could be made available for study. I likewise regarded it important to analyze and consider the best enemy opinion as obtained from key commanders and the consensus of prisoner of war interrogations. From this study I have prepared the following report.

It is important to realize that the closely interwoven employment of the arms and services in modern warfare precludes a definite statement as to the tactical effect of any one arm or weapon to the exclusion of others. I feel, however, that we can arrive at quite sound opinions concerning positive effects of each arm in its own role as it influenced the whole and consider further the results if the cooperation of that arm had been lacking. It must be understood that this report is prepared objectively on conditions as they affected my part in these operations. It is in no sense an air operations report nor does it attempt to weigh the manner of employment of the air forces in either air tactics or technique. Very naturally it has been necessary to narrate those air operations which I believe directly or indirectly affected our campaigns.

The opinions expressed as a result of these studies are intended for the use of the U. S. Strategic Bombing Survey in arriving at their own overall-analysis of Air Effects in this theater of war. Their ultimate evaluation must of necessity be based upon a very detailed exploration of the subject matter from all other angles. This of course is the province of Mr. D'Olier's group.

The axiomatic requirement that victory can only be achieved by the attainment of supremacy on land, sea and in the air has never been so fully proven as in this total defeat of an enemy who never controlled the sea, who tried to substitute strategic artillery for his defeat in the air, and whose armed forces were crushed and homeland over-run by the combined power of our supremacy in all these three elements.

O. N. Bradley

O. N. BRADLEY
General, United States Army

Wiesbaden, Germany 15 July 1945

PART ONE

TYPES, APPLICATION, AND EFFECTS OF AIR ACTION

CHAPTER I

STRATEGIC ATTACKS

STRATEGIC PLANS AND POLICIES

An attempt is made in the paragraphs below to judge in broad compass the military effect of attacks by air forces against strategic targets during eleven months of the ground campaign itself and for approximately two years before invasion. The full unravelling of direct and indirect effects of strategic attacks on ground operations is being accomplished by a detailed study of the German economy and war machine. This chapter, however, will suggest some principal results which are now apparent.

THEORY OF EMPLOYMENT OF STRATEGIC AIR POWER

The decision of the American air forces to use air power as a prelude to and preparation for ground operations has been completely justified. The last three years have been a period of development in the theory of aerial warfare. It is questionable whether a fully rounded theory of bombardment has been crystallized out of experience to date, but a number of controversies have been resolved. Foremost among them perhaps was the question whether air power alone could conquer a strong enemy. It is considered most significant for the course of the war that American military authorities consistently held the opinion that air attack was not of itself sufficient, and that air forces were only part of a rounded team. While some air commanders may quite honestly have hoped to destroy sufficient German industry to force capitulation without necessity for invasion, there was no American official expression of this view, and more important, the choice of targets for attack by American aircraft was seldom affected thereby. The issue was basic to the employment of air power. If strategic bombardment is preliminary to sea invasion and land fighting, it can most effectively be directed against enemy military capabilities. On the other hand, if air power attempts to win a decision by itself, attack should be carried out not so much against the enemy military establishment (except for air defense), as against the less tangible targets of enemy will to resist, the enemy system of political and administrative controls, or the enemy economy in general. Whatever criticism can be made of details of the air campaign as it unfolded, the underlying premise accepted by the American air forces was sound.

THE COMBINED BOMBER OFFENSIVE

The period from 17 August 1942, when Flying Fortress operations were begun against the continent, until the spring of 1943 was one of trial and experiment. In January 1943, however, the meeting of the Combined Chiefs of Staff at CASABLANCA produced a directive to Allied Air Forces, calling for a "Combined Bomber Offensive" with attack directed against:

(a) The German Air Force
(b) Enemy submarine production and pens
(c) German armament production
(d) Axis oil production
(e) Axis transportation
(f) The German will to resist

OBJECTIVES OF COMBINED BOMBER OFFENSIVE

Detailed attacks pursuant to this directive were subsumed under the code-word Operation POINTBLANK, and were carried out from the spring of 1943 until shortly before the invasion. After the success of the invasion had been assured, Operation POINTBLANK was resumed, with occasional interruptions for excursions of heavy bombers into tactical operations. The present chapter deals with strategic attack against the German Air Force, armaments, oil and transportation as these effected ground operations. It covers neither bombardment of submarines nor attacks designed to weaken enemy will to resist. So far as submarines are concerned, attacks on pens and yards were but a small part of the combined naval and air force program designed to curb the submarine menace to Atlantic shipping. Attacks on these objectives, which lay along the coastline of Europe, doubtless aided considerably in the development of bombing technique, but their achievements cannot be judged independently of other operations far afield from this report. Results of attacks to reduce German will to resist, if indeed any such effect was ever achieved, reacted on military operations too indirectly to be judged by a field commander.

THE DESTRUCTION OF GERMAN AIR POWER

The achievement of air supremacy was a necessary precondition of successful invasion. Defensively, the German air force had to be prevented from attacking Allied ports, marshalling areas, shipping, depots, beachheads, and

movement; the significance of this prevention is examined in terms of Allied vulnerability in Chapter II. Offensively, dominance of the air was required to bring the full weight of Allied air power against the enemy as he attempted to defend the beachhead and, later, to prevent the uncoiling of Allied land power; the manifold ways in which Allied air power defended ground forces against the enemy and paved the way for ground victory forms the central theme of this report. This victory over the Luftwaffe was achieved. It was compounded of many ingredients, including (a) strategic attacks against fighter aircraft production; (b) tactical attacks against airfields and depots; (c) tactical superiority in air operations and combat; and (d) the destruction by strategic air attack of German aviation gasoline output. It is not yet possible to assign weights to these factors, measuring the responsibility of each for the destruction of enemy air power. It is sufficient now to note that in point of time the campaign against the Luftwaffe was begun by strategic bombardment.

INGREDIENTS OF VICTORY OVER THE LUFTWAFFE

A backward look from the present vantage point in time suggests that the attack on the German air force was skillfully carried out. The period from April 1943 through January 1944 saw the opening of the campaign, with spectacular missions against fighter assembly plants at REGENSBURG and WIENER NEUSTADT in August and at MARIENBURG in October 1943. About June, 1943 after the first few penetrations into Germany, the Reichs Luftfahrtministerium raised the sights on its program of fighter production to combat a primary strategic menace now recognized for the first time. When the strength of Allied bomber forces had been built up, long range fighter escort acquired, and when the weather became propitious after a long period of continous cloud cover, single spectacular raids were superseded by systematic destruction. The last week in February 1944 saw six days of continuous pounding of enemy aircraft factories, followed for two months by carefully chosen repeat attacks. Production of single-engine fighters which had increased to 1200 planes in January 1944 from perhaps half that number the previous June dropped to 400 in early March. On 1 March responsibility for new fighters was transferred from the GAF to the Speer Ministry and a new and greatly enlarged fighter schedule, called the Jaegerstab Program, was initiated. Into this program, the Germans poured money, men, machines in an attempt to rebuild a fighter industry, dispersed and partly underground and with a large proportion of jet aircraft. They succeeded, but too late. Though fighter production by the fall of 1944 reached the imposing monthly total of 2400, production was low during the period of invasion. When large-scale production was

FACTOR OF TIME IN ATTACK AGAINST AIRCRAFT PRODUCTION

achieved, aviation gasoline was lacking, and the G A F could do little but line up complete fighters in serried rows outside assembly hangars to stand in idleness.

The peak of the campaign of strategic attack on aircraft production was well timed. Culminating in the all-out attacks of the last week of February 1944, it preceded invasion of the continent by slightly more than three months. In immediate response the Luftwaffe conserved its strength to meet the invasion, risked fewer defensive sorties against bomber penetrations, and refused the invitation to combat offered by fighter sweeps. Strength was thus maintained in the west at roughly 1000 fighter aircraft. Only a small portion of this was held forward in France, however, though five or six prize squadrons were held in readiness in the rear. Invasion achieved tactical surprise in the air as on the ground. The Luftwaffe waited on the ground until the extra squadrons could be brought up. Ten days of battle with Allied fighters ground down the total force in the West to 400, for the most part stationed in Germany. And from D plus 15 forward, the German Air Force failed to count as a serious threat to Allied military operations.

A few attempts at comeback were made — the night operations against the AVRANCHES bridge, the 1945 New Year's Day attack on Allied airfields in Belgium and France, the vicious dives at the bridge at REMAGEN, and the jet-aircraft thrusts on armored spearheads and frontline positions. None of these was serious, however, in deterring Allied ground forces from the accomplishment of their mission.

THE ATTACK ON GERMAN MATERIEL

ATTACKS ON ENEMY ARMAMENT

While Allied strategic and tactical air forces achieved clean-cut victory over the German Air Force, the results of their efforts against enemy arms production cannot be judged unequivocally. In the first place, heavy losses in Russia in 1941 and the shadow of American participation in the war in Europe had led to a series of increases in German armament output, which lasted through 1944. The scale of these increases may be judged from a 1945 Speer Ministry publication, believed to be broadly accurate (though in certain respects misleading).

	Index Numbers of Armament Production				
TYPE	1940	1941	1942	1943	1944
Automatic infantry weapons	100	190	185	255	461
Mortars	100	97	223	524	705
Guns (from 75 mm upwards, incl. guns built in the tanks)	100	136	240	600	938
Light AFVs (weight) . .	100	277	370	810	1119
Medium AFVs (weight) . .	100	212	364	645	994
Extra heavy AFVs (weight)	—	—	100	2638	5486
Total AFVs (weight)	100	225	375	990	1730
AMMUNITION					
for automatic infantry weapons	100	45	45	108	182
Mortar bombs	100	20	83	210	480
Mines	100	72	510	1438	3400
Bazooka projectiles	—	—	—	100	1610
for guns from 75 mm upwards	100	100	210	344	400

Secondly, attack on armaments was conducted at a variety of points in the production process — against ball-bearings in 1943 and early 1944, tank engines and gears in 1944, and rubber tires in 1943 and 1944, tank and truck assembly in 1944 and 1945, and again, when the ground situation made it appear as though the war would shortly be over, against depots of finished ordnance equipment first in September 1944 and again in March and April 1945.

INCREASE IN ARMAMENT OUTPUT DESPITE AIR ATTACK

The increases in armament output shown in the Speer Ministry table are impressive. They were made from a fairly low level, to be sure. In addition they could be put in the shade by similar percentage figures of increases in armament production from 1942 to 1944 in the United States or the United Kingdom. It is clear, however, that Allied bombardment of such basic industries as steel, and of output of finished armaments and their components did not produce a decline in production. Effects achieved were in preventing still further increases, which may have been desired by the Germans. For however large the increases in output were, armament production in Germany proved to be inadequate to the task of containing the Allied ground forces attacking from east, west and south. Detailed analysis, when completed, will show comparisons between planned and actual output, and will more clearly indicate the role of strategic bombing in keeping the latter below the former.

It is difficult to form an overall estimate of the effects of strategic bombardment on tank output, and the resultant significance of these attacks on Allied ground operations. Perhaps the most noteworthy aspect of the attacks is that they were concentrated neither in time nor against a single process of manufacture. The result appears to have been that the setbacks administered the enemy by the individual attacks, or by groups of attacks, were overcome in time. Production on an annual basis continued to increase. The enemy was forced in September 1944 to withdraw from the Western Front seven of his fourteen panzer and panzer grenadier divisions for refitting, and to incorporate, in four others, the panzer brigades developed in August 1944 as a stop-gap device. The enemy was still able to refit these seven divisions as far as tanks were concerned in the relatively short time of two and one-half months. Three other divisions were given a last minute partial refit prior to the ARDENNES offensive. This heavy debit on German armored equipment took place in the fall of 1944, just after the strategic air forces had abandoned attack on tank plants and ordnance depots — for the moment — to pursue a series of attacks on marshalling yards throughout Western Germany.

GERMAN ABILITY TO RECOVER FROM ARMAMENT ATTACKS

Along with fighter aircraft, Operation POINTBLANK singled out the ball-bearing industry of Germany for attack. Missions against bearings began in August 1943 and carried through March 1944. From the qualitative evidence of German opinions at hand, it seems probable that lack of ball-bearings impeded the fulfillment of schedules of tank and truck output as well as occasioned difficulties in the manufacture of airplane engines and airframes. How significant this interference was, however, cannot be judged quantitatively. Attacks on tank engine plants in FRIEDRICHSHAFEN and BERLIN, and on the gear-plant in the former city, had some effect on tank production and serviceability (the latter through its workings on the supply of spare engines for field replacements). Ground intelligence reported tank engines as the most critically short tank component. But again no quantitative estimate is possible. Attack on tank assembly plants themselves is known to have produced set-backs in production schedules. While the manager of the Krupp plant at MAGDEBURG reports that he suffered heavily as a result of transport difficulties, production was maintained at 100 Mark IVs monthly until the plant was heavily hit. As in most factories engaged in heavy steel fabrication, bombing failed to knock out production altogether; and amidst the ruins of several buildings, assembly continued at Krupp at 30 a month, and at similarly reduced rates in the damaged plants at KASSEL, NURNBERG, and ST VALENTIN. Recovery moreover was rapid; so that the annual increases shown in the Speer statistics

ASPECTS OF TANK PRODUCTION

may not be altogether misleading. Finally, attack was conducted against main tank ordnance depots at MAGDEBURG/KOENIGSBORN, BIELEFELD, KASSEL/BETTENHAUSEN, and GRAFENWOEHR (very late in the war). Some considerable damage was done to stocks of tanks, but the functions of the depots were moved elsewhere or, after slight interruption, resumed.

Again, while strategic bomber attacks doubtless had some effect on tank production and deliveries to the Western Front, and held actual output below scheduled figures, the results were probably not large in comparison with wastage of tanks in the field brought about by fighter bomber attacks on the one hand, and the combined fire of ground weapons on the other. German tank strength finally sank irreparably after the withdrawal from the ARDENNES at the end of January 1945. But the heavy losses of tanks in battle suffered at CAEN, ST LO, MORTAIN, in retreats across the SEINE, at MONS, and at LUNEVILLE were practically made up by the time of the ARDENNES offensive on 16 December, 1944.

ATTACKS ON RUBBER

Attacks on rubber and tire factories, combined with the eventual halt brought to blockade-running operations, appears to have given some discomfort to the enemy, but had no major influence on ground operations. The successful attack of 20 June 1943 against the synthetic rubber plant at HUELS, though not followed up until the much later bombardment of OSWIECIM in Eastern Poland, and raids on tire factories in HANNOVER, HANAU and at MONTAUBAN in France each probably produced a temporary effect. This was mitigated for the German industry as a whole, however, by the reduction in the bomber program and the subsequent cut in requirements for large, heavy-duty airplane tires. Tires appear to have been a tight supply item for the enemy, but there is no evidence that the shortage produced a major strategic effect.

IMPORTANCE OF AUTOMOTIVE ATTACKS

The Speer report referred to above significantly makes no mention of truck production (nor for that matter of tires and rubber). Attack on this industry, which was pursued through the period 1943-45 as a secondary target system, appears to have produced important results on German tactical mobility and supply. In the first place, the industry operated under the handicap of high wastage in the field, as fighter bombers produced the row on row of wrecks with which the highways of France, Belgium and Germany are strewn. According to one German estimate, more than 30,000 trucks were destroyed by fighter bombers in Northern France alone. Secondly, a large number of trucks was tied up at all times in the process of conversion from gasoline to gas propulsion — a process which in the usual case took them out of circulation for two to three weeks. Finally, it would seem likely that the

Germans made a planning mistake in allocating so large a proportion of the capacity of the automobile industry to the production of V-weapons. If intelligence reports can be credited, at one time in the winter of 1944 only one German truck plant was operational: the long-lived Ford plant at COLOGNE-NIEHL which survived a prolonged series of blind-bombing attacks through cloud. The shortage of trucks in the German army, however, cannot be fully distinguished from the shortage of gasoline (see below). On many occasions it was difficult to tell whether trucks or gasoline were in shorter supply. The two shortages, in combination with the frequency of breakdowns (possibly an indirect result of bombardment), gave the Allied armies a marked superiority over the enemy in mobility in the tactical area and in ability to supply it. Combined finally with tactical programs of rail attack, designed to push railheads well back of the front, the two shortages created a deficit economy in the enemy forward tactical areas, where supplies were consumed faster than they could be replaced.

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Allied superiority over the Germans in mobility in the tactical area, to which strategic bombardment of automotive factories contributed a substantial portion, must be set in proper perspective. Like Allied superiority in air power, in artillery fire power and (on the Western Front) in trained manpower, it constitutes an ingredient of victory only if it can be exploited. An overwhelming superiority in trucks was of little value to the Allied armies in the narrow confines of the NORMANDY bocage, or in the gruelling winter fighting of the HURTGEN Forest or of the SIEGFRIED LINE. Once a breakthrough had been made, however, superior mobility became of immense importance. Increasing German reliance on horsedrawn vehicles and on foot marches for once-motorized infantry reduced German opportunity to establish new lines of defense or recover troops by-passed by Allied armored spearheads. In open warfare, the German shortage of trucks and gasoline made an important contribution to Allied success, but in the process of breaking through a solid line of defense, this superiority expressed itself only in the gradual attrition of enemy supplies brought forward from rear areas by rail and road, and was less significant than other aspects of Allied military strength.

Finally in the field of armaments, some mention may be made of the fact that attack was not conducted to any significant degree against German ammunition — at the propellants, explosives, or shell-filling stage of manufacture — or against German production of small arms. According to the Speer table above, increases in ammunition output in 1943 and 1944 over

1940 fell far short of increases in production of "automatic infantry weapons", "mortars" and "guns from 75 mm upwards". This discrepancy might have a statistical explanation, were production significantly out of balance in the base year 1940. But evidence uncovered since V-E day makes it entirely clear, as it had theretofore only been strongly suggested, that German difficulties in the field of ammunition production had been substantial without the handicap of direct bombing attack. Whether the results of systematic attack against ammunition production at some stage of the process would have been superior to those of other bombing attacks carried out cannot be established. However, there is a strong presumptive case that they would have been. German ammunition shortages in light and medium field howitzer ammunition appeared in Italy as early as December 1943, existed in NORMANDY, and were especially acute in the final stages of the fight from the SIEGFRIED LINE to the ELBE in February, March and April 1945. Perhaps propellant manufacture was the weak link in the chain; stocks of propellants, as revealed by German statistics now at hand, were as low as 7,500 tons in April 1944, as compared to an estimated normal of 100,000 tons. If so, the oversight resulting from the failure of air and ground intelligence was unfortunate. The possibility of shortage in this field was explored but the evidence at hand was too meager to establish a case one way or the other. As to small arms, it now seems clear that the August 1944 mobilization decrees, combing out industry, trade and government to furnish replacements for the Volks Grenadier divisions, increased German requirements for small arms in a measure that could not be met. Shortages first appeared in ground force intelligence in October and November 1944, when the enemy held the SIEGFRIED LINE with a variety of odds and ends, while newly-formed and re-equipped field units were being readied for the ARDENNES offensive. The substitution of attacks on the few large centers of small-arms manufacture for some of the less important bombing ventures appears now as a useful alternative in the schedule of strategic missions.

FAILURE TO ATTACK AMMUNITION PRODUCTION

THE ATTACK ON OIL

In the attack on oil, strategic bombers made their greatest contribution to military operations in Europe. While provisions for this attack had been made in the CASABLANCA directive of January 1943, only after a heavy inroad had been made in the German aircraft industry was it begun, and then in

May 1944 less than a month before the invasion. With this start, though, the attacks of the initial month are estimated to have reduced enemy production by 20 %, the program is unlikely to have affected enemy reaction to the invasion. Thereafter, however, persistent attack from the air, coupled with Russian capture of the Rumanian refineries in August 1944, brought a sharp reduction in oil output, to an estimated 50 % of pre-raid production in July 1944 and to 23 % in September. Bad weather and a slight shift to strategic rail attacks in the fall of 1944 permitted some stabilization of output at the low level of September until the end of the year. Thereafter a renewed onslaught, followed by rapid and far-reaching advances on the ground to surround or capture damaged installations, reduced German output to the vanishing point.

OIL ATTACK DID NOT AFFECT INITIAL INVASION

From the present short historical perspective, lack of oil was the greatest German strategic weakness, aside possibly from manpower. After the loss of the Russian campaign of 1941, the Germans set out in 1942 to capture MAIKOP and the Caucasian oil fields. The defeat at STALINGRAD in early 1943 and the withdrawal from MAIKOP, after the 1942 failure to take BAKU, set the seal of defeat on German plans to ensure the safety of their oil supply. Similarly, German strategic plans in the Middle East, defeated in June 1942 at EL ALAMEIN, can be interpreted in the light of a pressing need for more oil. The result of these strategic failures, and the slow progress made by the Germans in building up synthetic oil production in continental Europe, is revealed in a captured document from the Italian Theatre dated December 1943, which urges further measures to conserve fuel supplies and warns of an impending oil "crisis".

EFFECTS OF TACTICAL OIL ATTACKS APPEAR ON THE BATTLEFIELD

Coupled with the more immediately effective attacks on rail transport, and fighter bomber strafing of trucks (especially gasoline tank trucks) and forward oil stores, the enemy shortage of gasoline began to play a part in the ground campaign in the west immediately after the break-out from the ST LO-PERIERS road, 25—27 July 1944. The German lateral move of armor from CAEN to MORTAIN and VIRE was handicapped by lack of fuel; the counter-attack at MORTAIN itself was delayed waiting for further accumulations of gasoline; and German capacity for attacking the Third Army thrust to the east on its left flank was rendered illusory by the inadequacy of his fuel. With the closing of the FALAISE — ARGENTAN gap and the race across France and Belgium, the enemy's weakness in gasoline told even more. Thousands of vehicles were destroyed by the Germans for lack of fuel, at the same time

that odd dumps scattered here and there were being destroyed as they were about to be overrun by Allied forces. Both the enemy defeat and his failure to rally during the sweep of our armies across France and Belgium were attributable in no small part to lack of fuel, even though the enemy was falling back on continuously shorter supply lines.

Continued strategic air success against enemy oil production in September failed to bear full fruit during the autumn of 1944 as the German army successfully dug in along the SIEGFRIED LINE. Enemy mobility was sharply limited by lack of fuel, but requirements were held at very low levels in static warfare.

In addition, poor weather restricted air attack on the military operation by the enemy of his highly developed German rail network; in some instances, supply railheads were as little as ten miles behind the main line of resistance. The enemy conserved fuel with a series of stringent orders, and attempted to reconstitute a reserve.

The enemy offensive of 16 December 1944 was undertaken as a gamble. Stakes were high and oil was the joker. A successful left hook from the EIFEL across the MEUSE River to BRUSSELS and ANTWERP, the enemy calculated, would split the Allied forces and pin the British and Canadian forces of 21 Army Group against the sea. The capture of the First U. S. Army supply center of Liege would set back offensive operations by that army some three months. German risks were great. Eight panzer divisions were to be tossed into the fray (two more were not refitted in time to participate), and a painfully hoarded reserve of fuel — including gasoline, alcohol, benzol and ad hoc mixtures — was readied for use. This fuel, however, was far from sufficient to reach the objectives sought. The Germans accepted heavy odds against the success of the gamble in the hope, officially promulgated by Hitler, that large amounts of Allied gasoline would be captured en route.

ASPECTS OF GERMAN OIL SHORTAGE IN THE BATTLE OF THE ARDENNES

A full account of the defeat of the Germans in the ARDENNES must treat of a variety of subjects — of the great successes of the fighter bombers in the early stages of the campaign under adverse conditions; of the heroic stand made by American ground soldiers in division after division, battalion after battalion; of the forced march of Third Army from the SAARBRUCKEN area 150 miles north in one and one-half days; of the success of the heavy and medium bombers in driving back enemy railheads from the edge of the ARDENNES to the RHINE River. The present review will treat certain of these subjects which relate to air power, below. It is appropriate here to emphasize again the fatal weakness of the enemy in the matter of gasoline. The following story is illustrative: at the end

of December 1944 the German colonel in command of 3 Panzer Regiment of 2 Panzer Division returned from a staff conference to his command post at the end of the day. He asked his G-3 one question: "How much gasoline did we capture today?" Upon being told "None", he went to his office and locked himself up, without asking for changes in front-line positions of his regiment. The loss of the bulk of this regiment at CELLES a few days later when it ran out of gasoline indicates how pointed the single question was.

With the defeat of the German gamble in the ARDENNES, when the Allies were again in a position to resume the war of movement — in the east as in the west — lack of oil which the strategic bombing campaign had enforced upon the enemy told handsomely. The retreat from the ARDENNES was an agonizingly slow and costly affair — for the enemy. The withdrawal of 6 SS Panzer Army, begun in daylight on 22 January 1945, was marked mainly by successes of fighter bombers against its tanks and trucks. These successes, however, took place against a background of painfully exiguous oil reserves — with supply trucks being drained to fill the tanks of fighting vehicles — and a long pull to the distant loading stations. When the Allied threat shifted north to the AACHEN sector, the enemy was unable to sideslip his "mobile" formations to meet it in the measure he sought — again for lack of gasoline. When the Allied breakthroughs followed west of the RHINE in February, across the RHINE in March, and throughout Germany in April, lack of gasoline in countless local situations was the direct factor behind the destruction or surrender of vast quantities of tanks, guns, trucks and of thousands upon thousands of enemy troops.

On the testimony of Marshal Stalin, the strategic bombardment of oil played an important part in the sweeping Russian victories. In so doing, this effect reacted favorably on our own ground operations on the western front. The great Russian offensive of 1945 jumped off on 14 January. On 22 January, the Germans withdrew 6 SS Panzer Army (five divisions and two brigades) along with several other units, from the west front to the east.

THE ATTACK ON RAIL TRANSPORTATION

The subject of aerial attack on rail transportation has been and continues to be studded with controversy. So wide are divergences in points of view that it may be doubted whether present detailed studies, going forward on

all the various aspects of the campaign will resolve them. The views expressed here have been formulated at the close of the campaign, with the benefit of only a few of the studies which will eventually be devoted to the subject. Based though they be on only a partial reading of the evidence, they represent the best opinion which can now be offered in this muddied field of controversy.

DISTINCTION BETWEEN STRATEGIC AND TACTICAL ATTACKS ON RAIL TRANSPORTATION

It is important to define the distinction between strategic and tactical attacks which is used in this paper although the dividing line in some instances cannot be clearly drawn. By strategic attack, however, is meant all bombardment of railroad facilities well behind the enemy forward railheads and not a part of the isolation program. Tactical attack embraces all forms of level, glide and dive bombing, and strafing attack on rail installations, bridges, open lines, designed to drive back enemy railheads, or to destroy enemy equipment in freight cars or adjacent to stations and sidings in use as railheads, and all fighter bomber operations against trains in movement wherever they be found. Three major strategic operations were undertaken from the air against enemy rail transport:

(a) The large-scale attacks on French railroad marshalling yards outside the SEINE-LOIRE area in March, April and May 1944.

(b) The attack on German marshalling yards in October, November and December 1944.

(c) The "interdiction" of the RUHR in March 1945.

By the same definition, the interdiction of the SEINE-LOIRE triangle prior to and during the invasion, and the all-out attack on railroads in the EIFEL area during the ARDENNES offensive, are examples of tactical bombing of railroads. As such they are treated in Chapter IV. Falling between the categories "strategic" and "tactical" are the continued attacks on French marshalling yards after the invasion in the summer of 1944 — some of which were designed to destroy military traffic (a tactical objective), while others were directed against railroad facilities (strategic); and the final wave of attacks against marshalling yards in Central and Southern Germany in April 1945, when the effort was made to cut lines by attacks on marshalling yards.

The direct effects on ground force operations of strategic attack on railroads are not readily apparent. Some delay has been caused to enemy military rail movements, and some enemy troops and supply trains have been destroyed. But it seems likely that the direct effects of these strategic attacks are less sig-

nificant than either the long-term indirect effects, or the direct effects of tactical attack on transport in the enemy forward supply area. In the case of the attacks in France, it may be granted that the attack on marshalling yards weeks in advance of D-day reduced the overall capacity of the French railroad system, and prevented the enemy from accumulating the full store of supplies he had planned for last-minute shipment to NORMANDY and the PAS DE CALAIS. It and similar rear-area attacks after D-day had some part in slowing down troop movements to the invasion area, and eventually in combination with the shortage of labor, in preventing a systematic evacuation of German supplies from France. Finally, on the German showing, these attacks played a role in limiting the shipment of fortification materials to the AISNE-MARNE line and helped to render futile the German hope of making a stand there. Yet these effects were less significant than the ring of interdiction along the SEINE and LOIRE Rivers, and between them from MANTES to BLOIS, which forced German divisions to detrain for the most part 50 to 150 miles from the battle area. In the case of the panzer regiments of two divisions — 9 SS Panzer Division HOHENSTAUFEN and 10 SS Panzer Division FRUNDSBERG, travel time from the detraining station at FONTAINEBLEAU to CAEN was as long — eight days — as the rail journey from the Eastern Front to the PARIS area. The effects of the strategic bombing of rail communications in reducing railroad capacity in France and later in Germany were felt mainly in the first instance by the national economy, where they were diffused over the civilian as well as over the armament phases.

DIRECT EFFECTS OF STRATEGIC RAIL ATTACKS SEEM DOUBTFUL

INTERDICTION OF THE RUHR WAS NOT TACTICAL

The attacks on German railroads from October to December 1944 failed to produce significant military effects, as is evident by the success of the German Reichsbahn in transporting by rail 22 divisions and three brigades to the starting line for the ARDENNES offensive in a period of one and one-half months. These divisions, with their associated GHQ troops but without supplies, accounted for more than 1050 trains, which were brought forward through the area of marshalling yard attacks. There is some evidence to suggest that the railroad attacks of the period, together with the highly successful strategic attacks against the DORTMUND-EMS and MITTELLAND Canals, cut deeper into German industry as a whole than had the previous heavy raids on cities and against individual industries. In this connection, however, it is difficult to disentangle the effects of the high level strategic attacks on marhsalling yards from the successful efforts of the fighter bombers to bring all daylight rail movement to a halt in good weather for a distance some 100 miles or more in

INDIRECT EFFECTS OF STRATEGIC RAIL ATTACKS

front of the forward line of Allied troops. The establishment of Allied fighter bombers on forward fields in Belgium and Eastern France in October 1944, brought a considerable portion of Western Germany under normal range for the first time. And there is additional evidence to suggest that it was this factor, rather than the high-level attacks, and despite the long nights and bad weather, which played the major role in reducing enemy rail transport capacity for armament production. However the credit for this reduction in economic and armament traffic be allocated, the indirect effects of the loss of output were later felt on the front line and were salutary. The so-called "interdiction" of the RUHR was the result of adding in March 1945 a series of attacks on bridges stretching from the RHINE River south of the RUHR to the WESER River to BREMEN, to the then current program of strategic attacks on marshalling yards east of the RUHR. Some sixteen single, double and triple track lines were attacked, and eventually all but one of twenty-eight tracks leading to the east and south of the RUHR were simultaneously cut off. The purpose of the attack was admittedly not tactical, since it was clear that, for most of the period involved, the small amount of through-way required to bring military traffic to the front line would be available to the enemy. The primary objective was to deny the RUHR's coal to the remainder of Germany following Russian capture of the great bulk of the SILESIAN hard coal fields. This was expected to affect production of steel and electricity and thus to react adversely on the German economy, including the war economy as a whole. The larger objective, however, was to deprive the German railroad system of locomotive coal, which, it was hoped, would cripple military as well as civilian traffic. While the operation was a great technical success, its importance was perhaps overshadowed by the fact that eight days after its successful completion a link-up of the ground forces of Ninth and First Armies on 2 April 1945 itself completed isolation of the RUHR from the remainder of Germany. The loss of RUHR hard coal on top of SILESIAN did occasion serious difficulties to German public utilities and industries, but the rail system continued in operation in the remainder of Germany, using hard brown coal in place of anthracite at the cost of some power and the necessity to haul a more bulky fuel. The interdiction of the RUHR by air power, therefore, came too late as an operation to have much importance, and in no event could have fulfilled the extreme hopes of those who urged its adoption. Had it been achieved earlier, there is a distinct possibility that it might have had important indirect effects on German ability to resist through loss of coal in the armament industry.

INTERDICTION OF THE RUHR WAS NOT TACTICAL

The fact of the matter is, however, that it could not have been completed earlier, since the medium bombers, which destroyed the greater portion of the bridges, were earlier engaged in their priority tactical cooperation tasks of driving back the railheads in the ARDENNES.

INDIRECT EFFECTS OF STRATEGIC BOMBING

The foregoing catalogue of results of attack against the major strategic systems fails to suggest the full range of indirect effects of strategic air bombardment on ground operations.

The principal indirect effects of strategic bombing can be catalogued as follows:

(a) Manpower — Strategic air attack, through its demands on the enemy to provide flak defenses, passive air defense, large-scale repair gangs, as well as labor for the restitution, dispersal and underground excavation for damaged plants tied up probably 2,000,000 of Germany's available manpower. While it may be doubted that manpower suitable for training as fighting troops was kept out of action in this fashion, the forces engaged would otherwise have been available for use as service troops, for the building of fortifications, or in the enemy's armament economy.

IMPORTANCE OF PRINCIPAL INDIRECT EFFECTS

(b) Dispersal — The necessity for constant guard against air attack required dispersal not only of factories, but of corps area installations such as ammunition and fuel dumps, barracks, etc. This dispersal soaked up more manpower in its origin and thereafter entailed a constant drain on efficiency of operation.

(c) Morale — While the direct effects of air attack on the morale of the German home front cannot be readily assessed, it is clear that the large area raids on German cities adversely affected fighting spirit at the front line. Whereas the families of American soldiers were safe from bodily harm and loss of property, German army security of mind was continually disturbed by the thought of heavy raids on home cities. Compassionate leave given to men whose families were bombed out is an evidence of the morale effect of area raids on cities.

Strategic air attack, then, contributed to the success of the ground campaign in the west in several ways — weakening enemy in manpower, airpower,

in land armament, in rail and road transport capacity and finally, in combination with tactical air power and ground advances giving the coup de grace to the German economy. By far the most important of these contributions were the achievement of air supremacy and the destruction of Axis oil production.

NECESSITY FOR EXPLOITATION OF STRATEGIC AIR ACTION

These two great accomplishments, however, while they made a decisive contribution to the ground campaign, were not in themselves decisive. Both required exploitation. The exploitation of air supremacy by the tactical air forces and by the freedom of movement given to Allied sea and ground forces was the sine qua non of the invasion of NORMANDY. Once the landings had been assured, the continued exploitation of air supremacy shortened the land campaign many months by allowing our armored and infantry divisions to obtain full advantage of their superior mobility and by obviating the inherent dangers open to such mobile forces. In similar fashion the destruction of Axis oil supplies, leading to the relative immobility of German troops, required exploitation by Allied armored thrusts and maneuver on the part of all Allied ground forces.

CHAPTER II

AIR SUPERIORITY

CONCEPT OF AIR SUPERIORITY

SECURING CONTROL OF THE AIR

Granting the axiomatic and supreme importance of air superiority, it is deemed worthwhile to review the manner in which freedom from air attack proved to be of most benefit during operations in this theater. This subject is approached with the realization that the defensive aspect of air superiority is only a part of its strategic and tactical meaning. A proper conception of the term regards it as securing control of the air in order to insure the unresticted use of that element in carrying out offensive operations against the enemy not only in the air but on land and sea.

It may well be that the over-emphasis placed on the air defense role of an air force by some authorities and surely by the GAF accounted not only for the enemy complacency in watching our build-up but also for his own failure to build a suitable air force. In retrospect it appears almost inconceivable that the German High Command could have allowed and so unconcernedly permitted the tactical assembly of the greatest air and amphibious armada in history upon the threshold of Europe.

However, it is profitable and pertinent to examine the degree of vulnerability of our forces to air attack and to discuss the effect on our ground forces of almost complete freedom from enemy air action.

VULNERABILITY AND EFFECTS DURING THE BUILD-UP IN ENGLAND 1943-44

ACHIEVING LOCAL SUPERIORITY IN UK

A study of the build-up discloses that suitable air objectives and critical targets did exist. The fact that the GAF as constituted was not in every case capable of the most effective air attack must, of course, be considered, but again that weakness in itself was an aspect of our superiority, which can be clearly attributed to the strategic air battles which forced the enemy to a defensive air role.

The Battle of Britain no doubt gave the RAF local air superiority over the United Kingdom, and the inherent capabilities for air defense above the strategically placed aircraft carrier which was England helped to maintain that superiority. Passive air defense measures were thorough and rigorously applied. Active air defense was organized by the British on an area or sector basis under

highly centralized control and profited from the relatively small area for defense. Active air defense for our own forces, except the antiaircraft artillery, was not only unnecessary but hardly considered.

In view of local air superiority in the UK, an intelligent estimate of the situation by the Luftwaffe in the middle of 1943 would have required either extensive air attack on the shipping lanes or action to reduce our air superiority and attack the build-up at ports and supply bases. However, the decision by the enemy just before this time to foresake the long range bomber program (FW 200) and concentrate on fighter production obviated the first capability, and no well planned effort was ever put into effect to carry out the second. As a result, our shipping lanes were never subject to attack, and dependence need be placed solely on our naval superiority for their protection. Accordingly, nearly a million men with their equipment were shipped to the UK and maintained through five principal ports during the period June 1943 to June 1944. The influx reached a peak in April 1944 when 97,373 troops were unloaded on the CLYDE alone, and in May when 619,739 tons of supplies were received. By 6 June 1944 there were 1,426,678 troops in the U. S. Forces. This included eight corps for a total of twenty-one divisions plus the imposing total of fifty-one bomber groups, thirty-three fighter groups and the entire airborne lift. April was also the peak month of the Air Force build-up when 1050 bombers and crews were flown in through three air terminals and 795 fighter aircraft were unloaded from ships.

AIR SUPERIORITY DURING BUILD-UP

During this period our ports were most vulnerable to air attack. All port areas were congested and no temporary storage facilities were built. The British government had granted a waiver which permitted the build-up at ports of a back log of dangerous proportions. When moved, 62% of this tonnage was handled by rail, 33% by truck and 5% by water. In addition, it must be remembered that a large part of this was equipment of a bulky nature such as tanks, guns, and vehicles. While many ports were used, the great proportion of supplies came through BRISTOL, LIVERPOOL and SOUTHAMPTON and most of the troops to the CLYDE. In February, while the enemy was conducting his ineffectual "little blitz" on LONDON, 115,703 tons were unloaded at BRISTOL alone.

VULNERABILITY OF PORTS TO ENEMY AIR ATTACK

Likewise, the GAF might have found four or five renumerative targets among our crowded depots. The ordnance depot at ASCHWICH had at one time 90% of all sheds filled, plus 70% of the available open space. Several others were equally congested. Most of our fighter modification was done at BURTONWOOD and WHORTON and in April 1944, the period of greatest congestion, 1314 aircraft was the average on hand daily.

VULNERABILITY OF SUPPLY DEPOTS TO ENEMY AIR ATTACK

COUNTER MEASURES AGAINST ENEMY AIR ATTACK

The possibility of extended counter-air force action during the period can be more properly weighed by our air force experts. During the year, the number of our airfields increased from 18 to 88. The Air Ministry constructed all air bases in the UK with utmost provision for dispersion of both aircraft and facilities and our own experience has indicated the difficulty of neutralizing air fields for any considerable period. The monumental task of air attack against this number of fields is obvious and perhaps even with a GAF much more effectively constituted, would have proven unfeasible.

PRESTWICK was our key air terminal, handling 21,794 incoming passengers during the period as well as most of the bombers which were ferried across the Atlantic. However, if the threat of air attack had warranted, there was a great amount of flexibility in shifting air terminals compared with the limited number of ports.

Other more transient but quite sensitive targets did, of course, exist from time to time. For example, during the fall and early winter of 1943, 1500 gliders, yet in their crates, the entire airborne lift for the invasion, were parked in an open field at GREENHAM COMMON, uncamouflaged and unprotected by AAA, subject to complete destruction by fire if attacked with a very few incendiaries.

It appears that the most suitable worthwhile targets were the ports of LIVERPOOL, SOUTHAMPTON, BRISTOL and CLYDE, and perhaps depots such as BURTONWOOD and ASCHWICH. No doubt their attack could only delay the build-up and mounting of the invasion, but a delay of even one and surely two months might have been crucial. Utmost effort by the GAF to effect such delay within its capabilities could not have been other than a sound decision.

ENEMY AIR EFFORT DURING PERIOD

Actually, the enemy air effort during the period was never directed at these most vulnerable targets and had no detrimental effect on our build-up. From May 1943 to June 1944, the GAF flew 16,754 sorties over the UK. This includes about 500 recce sorties per month, or 43 % of the total effort. About 52% of all sorties flown were by day, while night bombing comprised 33% of the total. During February, one of the peak periods of our build-up, 1092 night bombers operated over the UK, mainly on the "little blitz" of LONDON area. Many of these sorties were of the "scalded cat" variety and of only nuisance value, if that.

ASPECTS OF OUR ATTACK ON V WEAPONS

There can be no doubt, that notwithstanding the difficulty of effective bombing of V weapon sites, our air superiority during this period allowed us to place a tremendous weight of attack against this threat and delayed the launching of the V weapons. The enemy attempt to substitute strategic artillery for air

power thus came too late to be effective. A very large air effort had to be diverted to these attacks, which, if the margin of our superiority had not been so tremendous, might have had a serious effect on our other air programs. During the period from 27 August 1943 to 11 June 1944, we flew 22,989 sorties and dropped 33,112 tons of bombs against these objectives.

VULNERABILITY AND EFFECTS DURING THE MOUNTING AND LAUNCHING OF INVASION

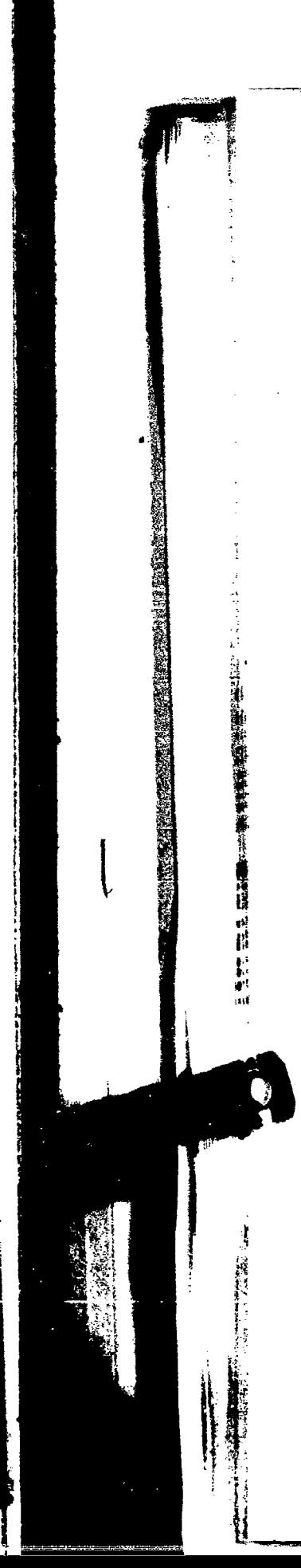
MOUNTING THE INVASION

The week prior to D-day to D plus 2 inclusive was probably our most vulnerable period to air attack during the mounting for and launching of the invasion. The troops had been moved to marshalling areas close to the ports in Southern England. Great flexibility had been allowed in the plans for the use of these ports and we were even prepared to accept complete neutralization of SOUTHAMPTON. Nevertheless, there was great congestion. 50,040 troops and over 5,000 vehicles were loaded at SOUTHAMPTON. 46,725 men and over 6,000 vehicles were loaded at DARTMOUTH and PLYMOUTH. Loading time varied between six and forty hours. Other ports were equally crowded and vulnerable.

It is true that by this time our fighters had been moved to forward bases in the same general area and that a very intense AAA defense had been provided. For example, PLYMOUTH was defended by sixty-four heavy guns, or as many as the Germans maintained at BREST. The NEW HAVEN and SHOREHAM area had twice as many heavy guns as defended CHERBOURG before invasion.

THE ASSAULT

In any event, we were enabled to assemble, load on ships and aircraft, and move to NORMANDY the largest striking force the world had ever seen, practically unopposed by the enemy air forces. During May the GAF did conduct 1306 sorties ever Southern England, over one half of which were reconnaissance They were directed at a variety of objectives, including some ports but were committed in driblets and had no effect on our preparations. On the night before D-day there was no enemy air action against the airborne lift or landings in NORMANDY and there was no air attack on the beaches on 6 June until nightfall, when 115 to 150 enemy aircraft attacked the shipping off shore with bombs, torpedoes and mines. A few bombs fell on the beaches, but there was no effort directed at the troops ashore. The concentration of AAA fire from 4000 ships was the greatest ever witnessed in any operation. Our plans



and the resulting AA defense had been based on a capability of the GAF for approximately 1800 sorties against the landings. Actually only 244 day sorties and 438 night sorties were flown during the period D-day to 30 June, although there can be little doubt that well directed low level attacks against troops on the beaches and the beach exits during the very critical period on OMAHA Beach might have caused decisive delay. Probably the only effect of the GAF was the negative one of causing our forces to build up rapidly antiaircraft defense at the expense of some infantry. This build-up commenced at H plus 17 minutes when Army AA units were landed. Four hours later barrage ballons were brought in, and 90 mm guns had been landed and were ready for action by dark of D-day. As these guns were used initially to knock out pill boxes and strong points, their early arrival was not a total loss of lift.

VULNERABILITY OF THE BEACHES TO AIR ATTACK

The beaches, of course, remained vulnerable to air attack for many weeks due to the congestion of supplies on them. By D plus 4 we had unloaded approximately 18,852 tons and by the 22nd of July 39,000 tons were unloaded on that day alone. However, the enemy had lost his opportunity for effective attack during the first few days and even his feeble efforts were completely frustrated by a well organized fighter and AAA defense.

FAILURE OF GAF IN BEACHHEAD

As a result of this failure of the GAF and our decisive air superiority, the campaign of NORMANDY proceeded unhindered by air action. The ground fighting was grueling and bloody and at no time perhaps was it more of an advantage to be freed of an additional hazard to our troops. Plus the decisive effect of the all-out offensive battle of our air forces against the enemy, the free use of the air above us for all purposes allowed unrestricted use of air transport for supply, evacuation, and liaison and, — a most important factor at the time — permitted the maximum use of artillery air O P s in terrain where no other observation of fire was possible.

VULNERABILITY AND EFFECTS DURING THE LAND CAMPAIGNS

During the rest of the campaign, our air superiority was so conclusive that it was an accepted factor in all planning and, of course, forms the underlying theme of this report. Never again were we as vulnerable at a critical time and place, but our whole method of operation was based on the vulnerable process of massing, breaking through and freely exploiting. Various aspects of

AIR SUPERIORITY FROM NORMANDY TO ELBE RIVER

this effort will appear in the narratives of the specific operations which follow. Suffice it to say we were vulnerable always, in the manner in which we moved, fought and were supplied, but that vulnerability had practically turned into immunity. There were spasmodic threats, sporadic efforts. ANTWERP, bombarded for months by an erratic artillery weapon with a probable error measured in miles, lay open as a fruitful target to a well concentrated and far more accurate bombing attack. The enemy found that a Buck Rogers missile could not occupy the air as an element — could not substitute for the Air Power he had forfeited.

Finally, air superiority permitted the unrestricted use and full weight of all our tactical air forces in carrying the war to the enemy forces on the ground, unremittingly and without respite.

CHAPTER III

THE AIR FORCES IN A TACTICAL ROLE

INTRODUCTION

The overall planning for an effective land-sea-air team necessary to breach the defenses of the continent of Europe, and exploit the initial lodgement, included the formation of a tactical air force. Its use was to be correlated with the tactical activities of a strategic air force, and, more particularly, with the ground armies with which such a force must cooperate closely. It was agreed that the successful application of direct air support or cooperation with the ground forces depended upon certain basic principles, namely: (a) that the support afforded conform with the military plan, (b) that the air power applied achieve the maximum possible effect, and (c) that War Department doctrine on air matters be adhered to. In this connection, frequent mention

GENERAL

will be made of the types of missions flown by the tactical air force in cooperation with the ground forces, i. e. whether of first, second or third priority. In order to clarify these, reference is made to Field Manual 100-20 "COMMAND AND EMPLOYMENT OF AIR POWER", in which it is stated in substance: The mission of the tactical air force consists of three phases of operations in the following order of priority: (a) First priority — To gain the necessary degree of air superiority. This will be accomplished by attacks against aircraft in the air and on the ground, and against those enemy installations which he requires for the application of air power, (b) Second priority — To prevent the movement of hostile troops and supplies into the battle area or within it, (c) Third priority — To participate in a combined effort of the air and ground forces, in the battle, to gain objectives on the immediate front of the ground forces.

EFFORT AVAILABLE

To meet these requirements, the Ninth Air Force was reconstituted on 16 October 1943 in the European Theater of Operations as the tactical striking power of the United States Strategic and Tactical Air Forces. Its initial composition included a medium bombardment division, two tactical air commands composed of fighter wings and fighter and tactical reconnaissance groups, a troop carrier command, and the necessary service installations. Of these various components the bombardment division and the tactical air commands produced the principal tactical efforts and will be the units referred to most frequently in this chapter.

In order to insure success in joint cooperative action, provisions were made whereby the Ninth Air Force Commander and his staff could work closely with the 12th Army Group Commander and staff. Operations officers of each headquarters worked together in a combined air-ground operations center where control of the aircraft was centralized. It was believed that this procedure would permit the most effective effort, and would insure the required flexibility to shift or mass aircraft to meet changing tactical situations.

Control of the 9th Bombardment Division (m) was exercised by the Tactical Air Force Commander through the combined operations center. The available medium bomb groups were employed largely on second priority interdiction and third priority close support missions on the fronts of the First, Third, and Ninth Armies. Control of the tactical air commands was decentralized to army level, with the Ninth Air Force Commander intervening only to take advantage of the inherent flexibility of this type of organization. This permitted decentralization of control of the fighter bomber and tactical reconnaissance groups to tactical air commands charged with cooperating closely with a specific army.

ALLOCATION TO ARMIES

During the pre-invasion stage and until 1 August 1944, when Third Army and XIX Tactical Air Command became operational on the continent, IX Tactical Air Command had assigned or under its operational control, eighteen groups of fighter bombers and two groups of tactical reconnaissance aircraft. In effect, this gave First Army the cooperation and close support of a formidable striking air component to assist it in invading the continent and securing a lodgement thereon. This allocation in the American zone proved effective in securing and maintaining air superiority, assisting in isolation of the battle area, and providing close support to the corps and divisions. The fighter bomber effort was, of course, a part of the closely correlated overall effort involving the medium bombers of the Ninth Air Force and the heavy bombers and fighters of the Eighth Air Force and the RAF.

When Third Army and XIX Tactical Air Command became operational on 1 August 1944, the latter resumed operational control of the fighter and tactical reconnaissance groups assigned to it. Later, when the Ninth Army became operational on the continent, a further division was made of the fighter bomber groups and thenceforth IX, XIX, and XXIX Tactical Air Commands provided effective close air cooperation with First, Third, and Ninth Armies, respectively.

ALLOCATION TO THREE PRIORITY MISSIONS

An analysis of the tactical air force's allocation of its medium and fighter bombers to first, second, and third priority missions is shown in chart form herein. This division of effort may not have been the ideal, but it demonstrated the application of air power as the needs for it arose.

The effects obtained by the air forces in a tactical role will be discussed in succeeding paragraphs, first in general by type of effort, i. e., strategic air forces, medium or fighter bombers, and reconnaissance and liaison aircraft and then more specifically in Part Two by type of ground operation. For the latter, examples of the various types of engagements were chosen to give as broad an estimate as possible of the effects. (Air-ground operations sketches covering the various phases of the land campaign have been included as Annexes IV through IX.)

THE STRATEGIC AIR FORCE

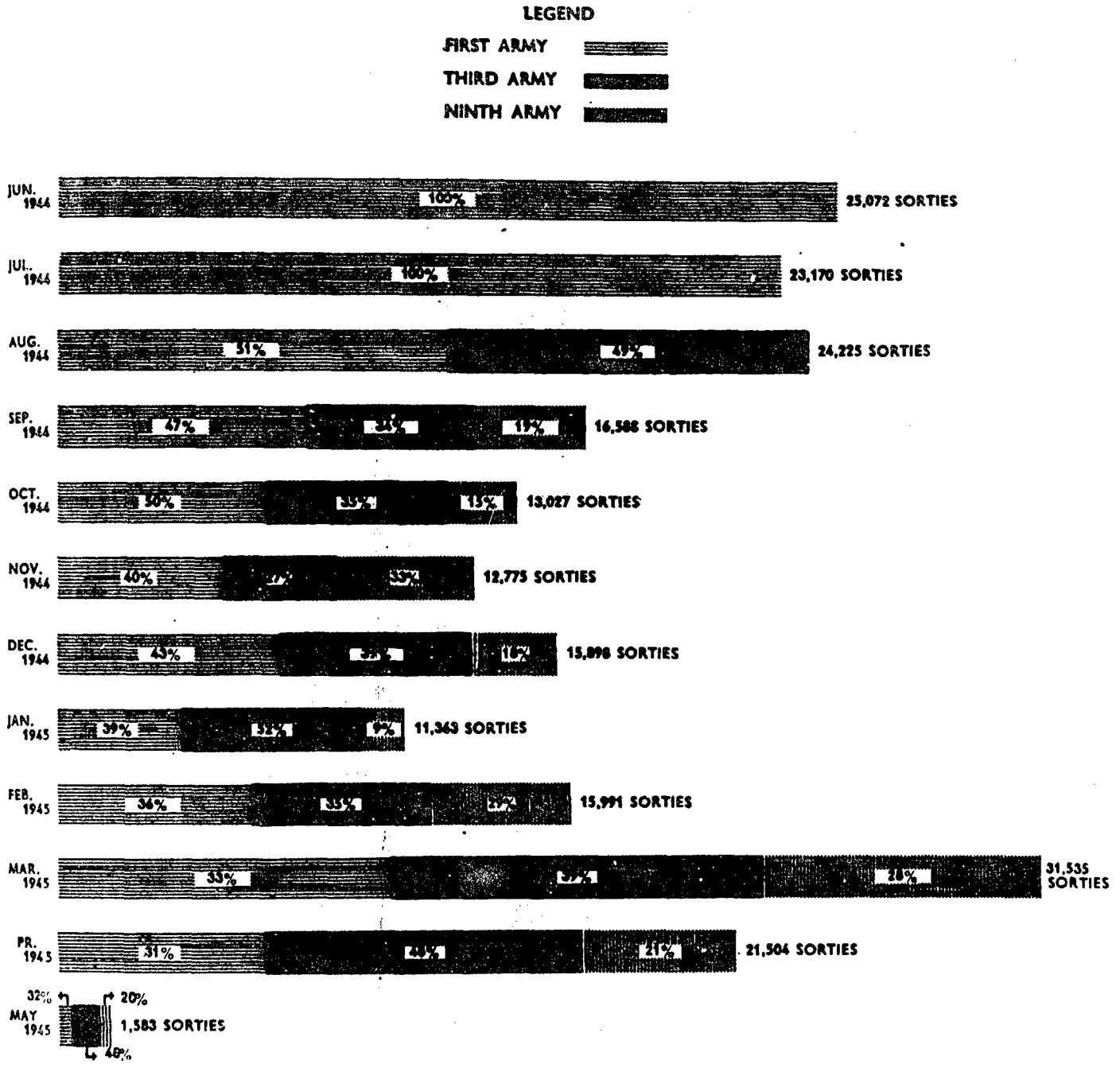
Strategic air forces were made available for certain large scale or special tactical operations during the Western Europe campaigns; and as the war approached its finale, most of their effort was tactically directed. On the occasions when diversion from their primary role was permitted, we learned how effectively they could be used,and with the further development of accuracy cnd safety aids to insure optimum results in future joint engagements, it is felt their employment will always be desirable. Fighter aircraft of the strategic air forces contributed to the tactical effort in their secondary role of attacking road and rail targets in enemy rear areas. The reconnaissance wing of the Eighth Air Force was a continuous source of information to us.

AVAILABILITY

It must be admitted that the employment of the heavy bombers of the Eighth Air Force and RAF, as a striking force, was a tempting potentiality for the augmentation of a fire plan. The use of the strategic air forces for tactical purposes was controlled at the SHAEF level, and was based upon the overall requirements of the theater. Requests for tactical air cooperation were normally processed through existing air-ground channels from lower echelons to SHAEF, although on occasions plans for tactical use were originated by SHAEF. It is interesting to note that during 1944 approximately 8% of the effort of the Eighth

MONTHLY DIVISION IN FIGHTER BOMBER COOPERATION

ARMY	SORTIES	PERCENTAGE
FIRST US ARMY	114,644	53.9%
THIRD US ARMY	66,564	31.3%
NINTH US ARMY	31,523	14.8%
TOTAL	212,731	100.0%



(This division between armies of actual fighter bomber cooperation sorties is based on location of targets attacked and is believed to be generally accurate, being the result of a study of Ninth Air Force Daily Summaries of Operations.)

PLATE 1

FIGHTER BOMBER COOPERA

6 JUNE 1944 TO 8 MAY 1945 INCL.

FIRST, THIRD AND NINTH ARMI

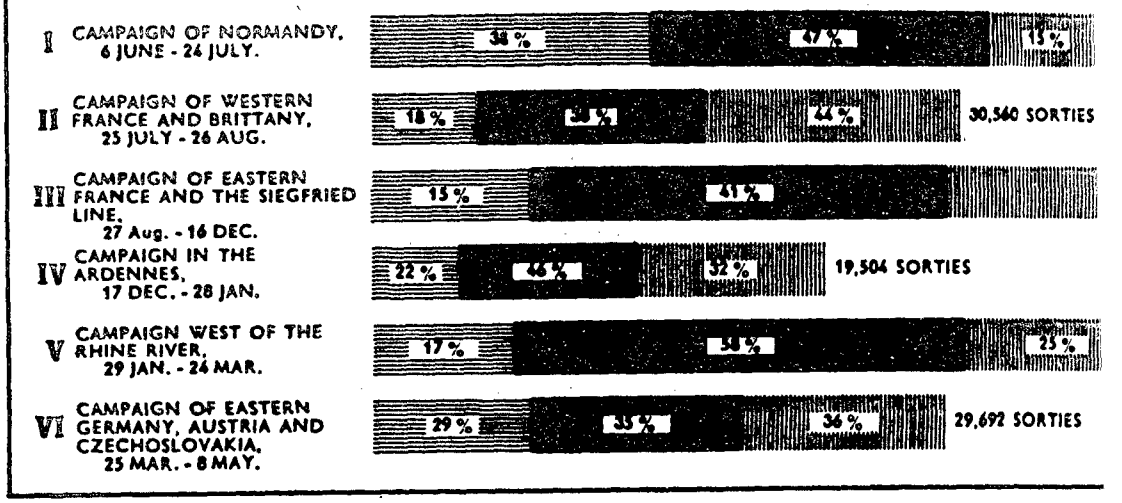
PRIORITY	SORTIES	PERCENTAGE
I	48,635	22.8 %
II	94,770	44.6 %
III	69,326	32.6 %
TOTAL	212,731	100.0 %

LEGEND

PRIORITY I

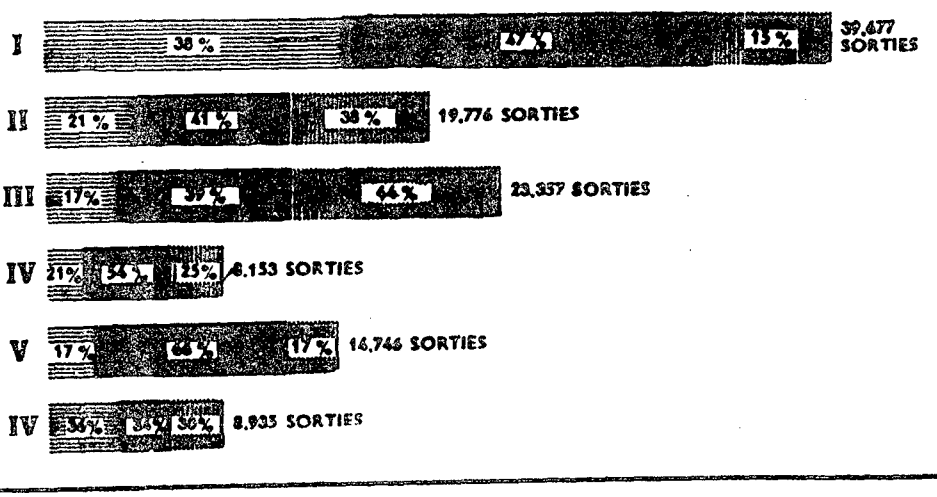
PRIORITY II

PRIORITY III



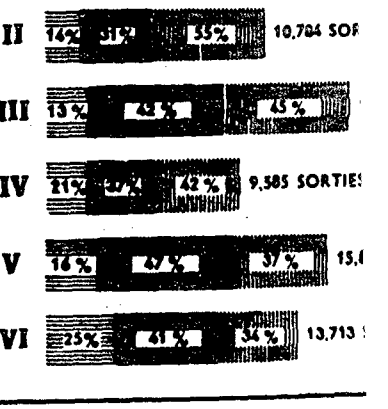
FIRST U. S. ARMY

PRIORITY	SORTIES	PERCENTAGE
I	30,374	26.5 %
II	53,250	46.4 %
III	31,020	27.1 %
TOTAL	114,644	100.0 %



THIRD U. S. AI

PRIORITY	SORTIES
I	11,872
II	26,742
III	27,950
TOTAL	66,564



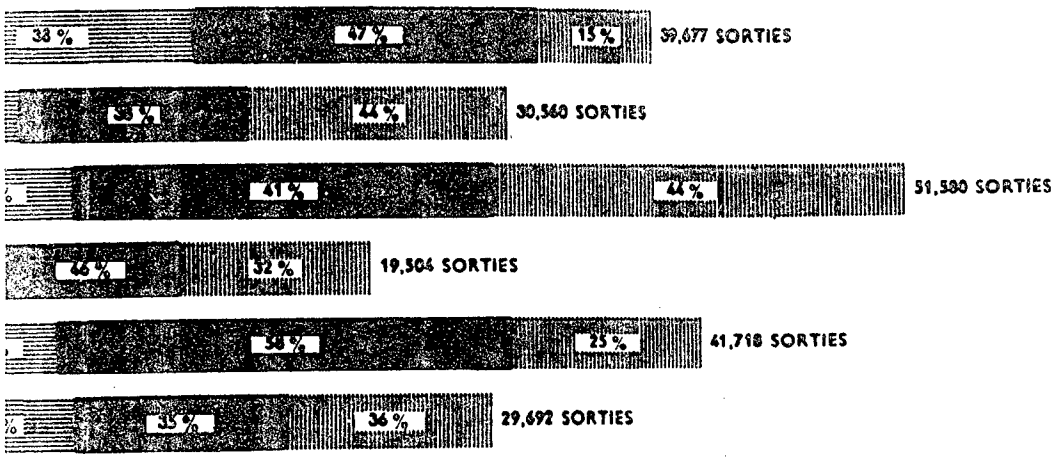
(This priority division of actual figther bomber cooperation sorties is based on principal
believed to be generally accurate, being the result of a study of Ninth Air Force Daily Sun

TER BOMBER COOPERATION

6 JUNE 1944 TO 8 MAY 1945 INCL.

RST, THIRD AND NINTH ARMIES

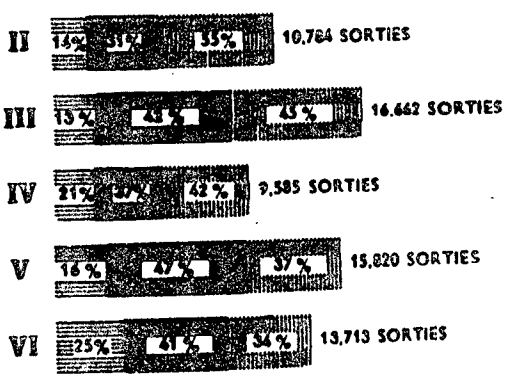
PRIORITY	SORTIES	PERCENTAGE
I	48,635	22.8 %
II	94,770	44.6 %
III	69,326	32.6 %
TOTAL	212,731	100.0 %



15 % 59,677 SORTIES

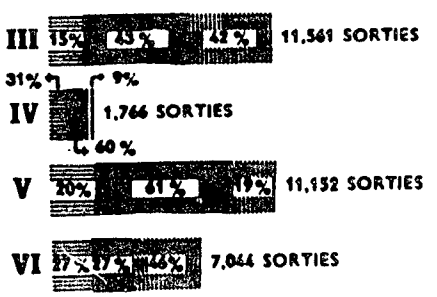
THIRD U. S. ARMY

PRIORITY	SORTIES	PERCENTAGE
I	11,872	17.8 %
II	26,742	40.2 %
III	27,950	42.0 %
TOTAL	66,564	100.0 %



NINTH U. S. ARMY

PRIORITY	SORTIES	PERCENTAGE
I	6,389	20.3 %
II	14,778	46.9 %
III	10,356	32.8 %
TOTAL	31,523	100.0 %



of actual figther bomber cooperation sorties is based on principal results claimed and is lly accurate, being the result of a study of Ninth Air Force Daily Summaries of Operations.)

PLATE 2

2

MEDIUM BOMBER COOPERATION

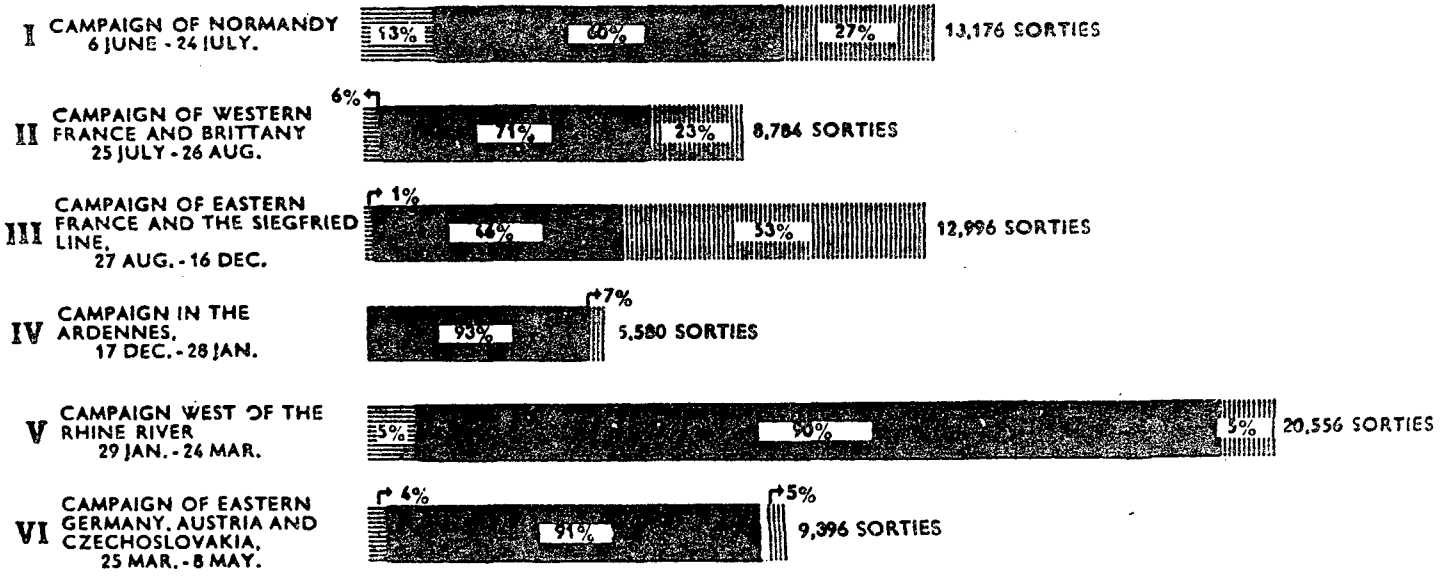
PRIORITY	SORTIES	PERCENTAGES
I	3,660	5 %
II	52,128	74 %
III	14,672	21 %
TOTAL	70,460	100 %

LEGEND

PRIORITY I

PRIORITY II

PRIORITY III



(This priority division of medium bomber sorties is based on type of target attacked and is believed to be generally accurate, being the result of a study of Ninth Air Force Daily Summaries of Operations.)

PLATE 3

Air Force was tactically employed. Among other factors which influenced this employment are the following: (a) the importance and magnitude of the ground action, as for example, the ST LO and ESCHWEILER operations; (b) the emergency of the situation, such as in the ARDENNES counter offensive; (c) the inability of the tactical air force to place the desired weight of effort on an area, as at BREST; and (d) an overall interdiction system like that of the SEINE-LOIRE.

ADVANTAGES

The advantages of help from the heavies are rather obvious. The tremendous bomb weight which they can apply and the resultant destruction and demoralization far exceeds anything that either the ground forces or the tactical air force can muster. Von Rundstedt considers an operation like the heavy bombing at ST LO to be the most effective (as well as the most impressive) tactical use of air power in his experience. The extreme range of the heavies gave them the capability of operating from distant bases to any part of a long front. The organization and equipment of the strategic air forces enabled them to concentrate large formations on a single target, or to give area coverage, an adaptability which was an added asset. In addition, they were less restricted than the mediums by weather conditions because of their greater operational altitudes.

LIMITATIONS

Commitment of the strategic air forces to their primary programs permitted little flexibility for operations in tactical roles, except, as mentioned, on special occasions. While it is agreed that strategic missions should have priority, it was usually too difficult to get timely decisions from higher echelons as to the availability of heavy bombers for tactical cooperation. The length of time involved at SHAEF-AIR and USSTAF in reviewing and taking action on requests from lower echelons caused delay in affecting coordination of air effort with ground operations. The procedure established was felt to be too ponderous. An integrated air and ground operations center, at SHAEF level, able to act immediately on requests would have facilitated planning, and expedited decisions and execution of programs.

The time necessary for the preparation of tactical missions by the strategic air forces varied according to the nature of the target, terrain, availability of auxiliary aids, and collation and dissemination of target information, and was a consideration in the availability of heavy bombers. Base weather conditions were a major factor in limiting the use of heavy bombers, and the peculiarities of weather in this theater, particularly in England, often forestalled execution of planned missions. Terrain which offered poor aiming

points in relation to targets affected accuracy of strikes, and dangerous spillage resulted. Enemy flak restricted operations by necessitating a high altitude approach to targets. Movement and installation of accuracy and navigational aids added to the difficulty of timely execution of tactical missions.

TACTICAL EMPLOYMENT

Specific instances of tactical employment of the strategic air forces are treated separately; generally they fell into the categories of interdiction and close support. The first tactical commitments of the strategic air forces were during the period 6 May to 17 June, 1944. The purpose was to: (a) disrupt rail and highway transportation, and (b) neutralize coastal defenses. It was necessary to spread the attacks over a large area in order to preserve security in the identity of the locations for landing operations. The attacks against the rail transportation system centered for the most part on key marshalling yards, service and repair facilities, and important bridges of the major rail systems. A few of these were at PARIS, BOULOGNE, AMIENS, CAEN, LE HAVRE, BRUSSELS and HAMM. Eighty-two rail yards and service centers were attacked in Northern France, the Low Countries, and Germany by the Eighth Air Force, RAF Bomber Command and the AEAF prior to the invasion of NORMANDY. Others in Southern France were attacked by the Fifteenth Air Force. Bridges over the MEUSE, SEINE and LOIRE were included in the overall effort. Air attacks on the highway net were centered upon key bridges and choke points in important communities. Emphasis was placed on the MEUSE River rail bridges and later on the SEINE between PARIS and ROUEN. During the invasion phase, choke points in CAEN, VILLIERS-BOCAGE, ST LO, PONTAUBAULT, COUTANCES, THURY HARCOURT, LISIEUX, FALAISE, VIRE and ARGENTAN were selected as targets. Fighter bombers of the Eighth Air Force attacked seventeen road and rail bridges on the LOIRE between NANTES and ORLEANS as well as ten marshalling yards in the invasion area on D-day. Concurrently with the interdiction programs, prior to D-day, attacks were executed against coastal defenses along the Channel coast in the vicinity of the landing areas, as well as diversionary attacks at LE HAVRE and in the PAS DE CALAIS area. Coastal batteries and gun emplacements capable of firing upon naval craft in the Channel, and approaches to the beaches were targets for attacks. The culmination of this phase occurred during the night and early morning of D-day and is treated later in the discussion of the landing operations.

EFFECTS

The effects of the interdiction were multiple in scope. Attrition of railway equipment and facilities for service, repair and maintenance throughout a large area was achieved. The damage and destruction to rolling stock, facilities,

and structures reduced the enemy capability for prompt movement of large quantities of supplies, equipment, and reserves into the NORMANDY region in time to be offensively employed during the beachhead phase. The effects of the attacks on the highway net were not of a high order, although delay and rerouting did result. The extensive road net and favorable terrain permitted by-passing of obstacles and the use of alternate routes. The bombing of the coastal defenses on a broad front, coupled with the large area interdiction of transportation, caused a favorable degree of uncertainty as to the location and timing of our actual landing in strength. The extent of damage to permanent fortifications could not be accurately evaluated because of D-day bombing and naval bombardment of many of the same targets. The net effect was reduction of fire from these batteries, some of which were rendered inoperative by destruction or damage.

CONCLUSIONS

Heavy bombers were effectively employed in certain of the large-scale ground operations. Their relative effect will be later brought out in the treatment of specific operations such as the landing in NORMANDY, and operations at BREST, METZ, ESCHWEILER, the ARDENNES, and the RUHR. In general, they were particularly effective against field fortifications through damage and destruction of installations, disruption of communications, and shock to personnel. They could saturate an area from the point of contact back into the support and reserve positions. They were not effective, however, against permanent fortifications, except in a few instances of direct hits.

MEDIUM BOMBERS

This campaign has proven that tactical air forces require organic tactical bombardment, in order that both interdiction programs and the application of mass and weight on appropriate objectives can be made available directly and without interference to the priorities of strategic air forces. This requirement for tactical bombardment necessitates aircraft capable of precision pattern bombing on relatively small target areas. Such an aircraft must carry a navigator and the necessary bomb sights, radar and radio devices to insure maximum accuracy at varying altitudes and in various types of weather. 9th Bombardment Division, consisting of eleven groups of medium bombers, performed this role in the European Theater.

CAPABILITIES

Tactical bombing demands great accuracy and careful technique. The first attacks of this type were made before invasion against the V-weapon sites. To effectively attack pinpoint targets like these ingeniously camouflaged launching sites was a new experience for the air forces and the first missions against them were unsatisfactory. However, the experience gained and technique developed during this period allowed the 9th Bombardment Division to prepare itself to meet the later requests for accurate bombing which paid dividends from D-day on. In addition, medium bombers provided the necessary great weight of effort plus pattern effect which is required by some objectives and were able by the flexibility of their formations and variety of bomb load to cover either a relatively large area or to concentrate on a small target in order to obtain whatever effect was desired.

Weather in this theater was a critical limitation on the use of air power. However, becaus of the capability of this type aircraft to carry necessary navigational and radar equipment, it did have an advantage over the fighter bomber in certain types of weather. The development of blind bombing techniques represented a concerted effort to reduce weather limitations. Through their use the number of operational days was measurably increased. While the bombing accuracy was less than that of visual attacks, and certain weather conditions precluded operations in spite of this technical aid, blind bombing proved invaluable in some critical situations. A series of marshalling yard attacks in the interdiction program around the REMAGEN bridgehead, which were made during bad weather, is an outstanding example of the effectiveness of blind bombing.

LIMITATIONS

Inherent limitations peculiar to this aircraft plus certain operational procedures placed definite restrictions on the tactical effectiveness of medium bombers. Operational procedures generally required forty-eight hours for the development of a target from acceptance to completion of a mission. With a rapidly changing situation, targets of opportunity — lucrative targets — would develop many times. With rare exception, however, such targets could not be accepted because of the time required to prepare for and complete a medium bomber mission. Again this type aircraft was considered highly vulnerable to antiaircraft fire. Many important targets therefore, were not acceptable because of their heavy flak protection. In the latter months of the war this limitation was reduced somewhat through the use of a counter-flak program. Coordinated with the flight of the aircraft, friendly artillery units fired at known enemy antiaircraft positions, in an attempt to neutralize their fire.

This resulted in an appreciable reduction in losses and battle damage from enemy flak. As a result many targets previously considered impractical were accepted and effectively hit.

MANNER OF EMPLOYMENT

The medium bombers were principally employed in priority II missions (isolation of the battlefield) with 74% of their total sorties so directed. The bulk of this effort was, of course, placed on the interdiction programs, the very profitable effects of which are fully discussed in Chapter IV. The most frequent targets in this connection were bridges, rail installations, and supply facilities on or within the line of interdiction.

Twenty-one percent of the effort for the entire period was in priority III (close support) and the remaining five percent on airfields in priority I. Priority III objectives consisted of troop concentrations (either in the field or in defended villages), communication centers near the front, field fortifications, and permanent fortifications.

OVERALL EFFECTS

There can be no doubt that the most effective application of medium bomber capabilities was in interdiction. This was due to their specific ability for precision bombing of the well defended but small targets which interdiction entailed, particularly bridges. While the destruction of even one bridge often required repeated attacks involving many sorties and a tremendous weight of bombs, no other aircraft were available which could attain anywhere near comparable results. The only limitation to this profitable, although admittedly costly, employment of the mediums was their vulnerability to flak, mentioned above, which prevented the attack of the well-defended RHINE bridges, and, as will be shown in Chapter IV, the consequent use of the RHINE River as a line of interdiction.

There was still much to be desired in effects obtained by medium bombers in close support operations. This was probably due to two causes — first, a misconception on the part of the ground forces of the capabilities of the aircraft, and in the second place, a hesitancy on the part of the air forces to employ bombers in close support for fear of violating the sacredness of the three priorities for air action. Initially, many ground force requests were for targets which could not be definitely located by aircraft forced to fly at medium altitude and to make a bomb run. Furthermore, ground commanders making requests failed to furnish adequate target information necessary for both planning the attack and for briefing the combat crews, and often failed to coordinate their own ground plan of action so as to follow closely the air attack. On the other hand, the air forces, at times, failed to apply the Principle of Mass and followed

the three air priorities blindly. There was a tendency to have a lack of confidence in the considered judgment of a ground commander for the necessity of obtaining the neutralizing effect of the rapid delivery of the great weight of projectiles which no ground weapon can deliver as effectively. Requests for missions were sometimes judged not on their effect on the enemy but by a worn-out rule of thumb in regard to their distance from the front line. At times this resulted in piece-mealing close support operations which detracted from their effectiveness as much as it deteriorated the higher priority effort to which the remainder were diverted.

Another factor which entered into the problem of close support was the centralization of the entire tactical bomber force under the tactical air force headquarters. This was necessary in order to obtain maximum effect on priority II missions but more flexibility might have been obtained by allotting, for specific close support missions, the required number of bomber groups to the operational control of the tactical air command which was cooperating with the requesting army.

However, considerable improvement was made during the course of the operation. The dispatch of liaison officers from the Bomb Division to forward elements and the exchange of visits between staff and combat personnel of both services broadened the point of view. Experience taught that the effects of bombing will vary because of many factors — nature of the target, weather, location of opposing forces, location of targets, etc. We learned that while bombing in close support is, like other types of fire power, only to obtain neutralization, its effect in that role often justifies its employment. Furthermore, the destruction of enemy morale and the building-up of morale of our own troops was the one constant in all close support operations.

EFFECTS ON FORWARD SUPPLY INSTALLATIONS

The direct effects of medium bombardment on the various type objectives mentioned above varied considerably and merits discussion. While forward supply installations are probably more properly classed as priority II objectives, their attacks were of immediate interest to forward units. A total of seventy-three attacks on army, corps, and division supply points was made by 9th Bombardment Division during the campaign. In general these were in two classes — fuel and ammunition dumps. These attacks supplemented strategic attacks on supply as well as the planned interdiction program. They were designed to deprive front line units of fuel and ammunition in sectors already experiencing shortages due to transportation difficulties. Generally, due to the care with which the Germans dispersed supplies within a dump, complete

destruction could not be obtained. The fuel dumps were, of course, the more remunerative targets of the two. In some cases these attacks were definitely disappointing. They did serve to harass an already sensitive supply system, they impeded movement at the dumps, and by the mere fact that the enemy was forced to maintain this dispersal, added to his supply difficulties.

An example of this type of attack was the bombing of the LE LUDE ammunition dump on the 2d and 7th of August. The dump originally contained 20,000 tons of shells. It was a central supply point for units opposing the First Army. On 2 August, 89 aircraft and on 7 August 104 aircraft dropped 100 and 500 lb. GP bombs on the target. It was impossible to evaluate the detailed effectiveness of the bombings due to explosions, smoke, and fire. However, PWs later reported the bombing was exceptionally effective, destroying a substantial portion of the ammunition and personnel. They stated, in addition, that it caused a serious set-back to German operations and was the subject of much discussion in the units affected.

In addition attacks aimed at other primary objectives oftentimes resulted in incidental damage or destruction to supply installations. This was especially true where bombs were dropped on defended villages or on troop concentrations massed in towns. An example of this is in the bombing of BOCHOLT which was aimed at harassing personnel; later examination revealed that a complete clothing dump had been destroyed. Especially during the bitter winter weather when supplies as well as troops were sheltered in buildings, excellent results were obtained by bombing.

EFFECTS ON TROOP CONCENTRATIONS

The bombing of troop concentrations could in general be divided into two separate types of targets, first, where troops were deployed in defensive positions as discussed in other sections, and second, where troops were housed in barracks areas, or in buildings. This second type of target was most worthwhile during the winter months. This was especially true along the First and Ninth Army fronts during the static situation prior to launching the attack to the RHINE.

Fifty-one attacks were made on defended villages. Information reports as to results obtained are conflicting. Investigation showed that while civilian casualties were considerably higher than military, these bombings did create confusion, disruption of control, interruption of communications, and some losses, and definitely did make the villages easier for our ground troops to attack.

The effect of bombing attacks on troop concentrations in the open, deployed in defensive positions, was found to depend largely on the dispositions in each case and upon the ground plan to follow the attack. Generally, it was found that such attacks, if made, should be done in mass and should be immediately followed by a ground attack. The details of this type of operation on large scale are fully discussed in Chapter X under such operations as COBRA and QUEEN. One effective example of this type, which was not part of a large scale operation, was the use of fragmentation bombs on enemy troops in the woods just west of NANCY (see Chapter XIV, FORET DE HAYE). This produced a great slaughter and permitted our troops to advance with only minor opposition.

EFFECTS ON COMMUNICATION CENTERS

Communication centers were usually bombed as part of a local interdiction program to prevent or delay the movement of reserves and supplies, to impede the enemy's withdrawal, or to delay his advance. In some instances where the targets were in close proximity to the front they served as both priority II and priority III targets by delaying the enemy and at the same time aiding our advance through the resulting confusion.

During the campaign 9th Bombardment Division attacked ninety communication centers with varying results. Experience has shown the effect on the enemy from the bombing of such targets depends on several factors: whether it is a chokepoint in the lines of communication — road or rail; whether there is a satisfactory alternate road net in the area around the target; the disposition of the enemy troops; the tactical situation; the means of transportation available to the enemy; and the type of friendly troops affected, i. e. armor or infantry. Results varied in each case depending on these factors. An example of bombing of communication centers in preparation for the assault was the bombing to the front of Ninth Army and 21 Army Group in the area west of the RHINE in March 1945. Seven communication centers within two to thirty miles of the front were bombed for the harassing effect, and to destroy and delay reserves. Subsequent investigation revealed military casualties were light as most of the troops were deployed outside the towns. Roads were blocked in the centers of the towns; however, since many alternate routes were available plus the fact the enemy had practically no vehicles, the results were minimized. The main routes were also cleared in a short time. Rail lines were affected but single tracks were in use in a very few hours. Telephone lines were cut and were not reestablished. Thus, because of the extensive network of roads, troop disposition, and distance from the front permitting

ample time for rehabilitation the tangible effects of the bombing were not appreciable.

During the ARDENNES offensive medium bombers made seventeen attacks on eight communication centers within the enemy salient. The object of all these attacks was to prevent movement through the towns by cratering the roads and filling the streets with rubble of destroyed buildings. While the overall effect served to beat back the enemy offensive the results obtained from each target varied.

Three of the communication centers, HOUFFALIZE, LA ROCHE, and ST VITH were ideal targets since the main north-south and east-west roads pass through them and there are no satisfactory alternate routes. Also any delay caused the enemy in his movement and build-up was vitally important as it permitted time for our forces to establish defensive positions. Reconnaissance showed traffic was delayed for twenty-four hours through HOUFFALIZE and LA ROCHE by the attacks. ST VITH was attacked on 25 December and twenty-four hours later only one-way traffic at reduced speed could move through the town. The destruction of the town was completed by heavy bombers on 26 December. PWs state that no traffic was permitted to move through the town and it was placed off limits to civilian and military personnel. Maintenance work in the area was also abandoned due to strafing, harassing, and bombing by Allied aircraft. The attacks on the other communication centers aided in the overall plan to delay the enemy by forcing him to use alternate routes.

EFFECTS ON FIELD FORTIFICATIONS

In assaults on defended localities and where a static situation permitted time for construction, field fortifications or open emplacements were encountered. These included gun emplacements, tanks in hull defilade and hasty fortifications. These targets are well-suited to attack by medium bombers due to the capability of the aircraft of placing a heavy concentration of bombs in a designated area. Experience has shown, however, the bombing must be coordinated with a ground attack to gain maximum benefits from the effect on the enemy; shock, disruption of communications, casualties from direct hits or near misses, and loss of control.

Medium bombers attacked such targets at DEMOUVILLE (south of CAEN), ST LO and at SAARLAUTERN. The attacks by ten groups of mediums on strongpoints at DEMOUVILLE followed the capture of the northern half of CAEN by the British 21 Army Group on 18 July. Following the bombing, the British forces advanced six miles with no opposition and reported the 16 GAF Division was probably destroyed.

At ST LO the mediums were assigned targets, along with the heavies, to the southwest and west of ST LO. The mission was to reach strong points inaccessible to the artillery. There were thirty attacking boxes, twenty-one of which placed their concentrations in the target areas. Examination revealed approximately 80% of the target areas had been saturated. Practically everything above ground was damaged. Enemy troops in fox-holes suffered casualties and were demoralized. Several PWs stated their officers had deserted them due to loss of control since communications had been severed. PWs also reported substantial damage was done to vehicles. The will to resist was generally weakened except in cases of SS troops and some paratroopers. Front line observers reported that hundreds of steel fragments had shredded light vehicles, perforated heavier equipment, and cut tank treads.

Throughout the period of operations there were several other attacks of a similar nature — attacks against field fortifications — only on a smaller scale. In each case the effects were comparable with relation to the weight of effort used. The main benefits were disruption of communications and control along with shock effect on enemy troops. Personnel casualties and damage to equipment were achieved only by direct hits — which were rare — or by fragmentation hits on troops and equipment not under cover.

EFFECTS ON PERMANENT FORTIFICATIONS

Permanent fortifications subjected to bombing attacks in this theater were generally of two types — the citadel or fortress and the pill-box. Destruction of either by bombing has proved only a remote possibility with our present weapons. In the case of the fortress 2000 or 4000 pound bombs generally have been ineffective. A typical example is the citadel at ST MALO — bombed on 8, 11, and 15 August 1944. Subsequent examination revealed that due to the type structure there the bombs had no effect. A report of ground observations states, "The ground south of the fortifications and within the perimeter of the fort was well saturated with bomb craters of varying sizes. There were indications that bombs had hit on top of the concrete structure but with damage almost negligible. No appreciable damage was done by bombing except to antiaircraft guns; other guns continued to fire". After capitulation the commanding officer and nine of his staff were unanimous in stating that the bombing had no effect whatsoever on the surrender. In fact, most of the officers stated that inside the innermost parts of the fort, the bombs could scarcely be heard or the shock felt. (This was corroborated by some released U. S. prisoners who independently made the same statement).

ST MALO

The fortifications at METZ, attacked on 11 and 16 September presented a somewhat similar problem although the structure and layout of the

METZ

series of forts made them more vulnerable to air attack. Unlike the Citadel at ST MALO many of the installations — barracks, utilities, and gun positions — were either in the open or of less formidable construction, and were hit with better results as related elsewhere.

BREST

At BREST, fortifications were not destroyed, but the resultant disruption, harassment, and attrition aided in forcing the garrison to surrender, as replacements were not available to the surrounded troops.

CHERBOURG

In support of the assault on the CHERBOURG fortifications the medium bombers attacked eighteen positions, with results ranging from excellent and effective to worthless and ineffective. Concrete revetted entrenchments were effectively hit, destroying several large-calibre guns and causing casualties. Bombs dropped on reinforced fortresses caused no damage. It is interesting to note that First Army reports of this first close support mission by medium bombers after D-day showed that the bombing had a definite effect in that it had a demoralizing and softening-up influence on personnel and positions, in addition to destroying the open gun emplacements, thus making the final assault of the city easier.

SIEGFRIED LINE

In contrast to these more formidable structures, smaller pill-box installations of the SIEGFRIED LINE type were bombed in several operations. The structure of these made them vulnerable to bombing only with a direct hit of sufficient weight .However, due to the small size and camouflaged or concealed positions of these less massive structures, direct hits were rare. Demoralization, neutralization and disruption were an immediate after-effect of the bombing. In many instances, communications were cut, causing a loss of control. Surprise, if gained by the air, plus an immediate assault by the ground forces, were necessary to achieve maximum benefit. Personnel deployed in open emplacements if bombed before they could seek cover were killed or wounded from direct hits or near misses. Troops in the area were dazed. With proper saturation, interlocking bands of fire of the pill-boxes were also affected by the piling up of dirt in the fields of fire resulting from the bombing. Conversely, the craters provided excellent protection for the assaulting troops. Due to the factor of probable error of medium bombers, a minimum of 1500 yards "safety margin" between the aiming point and the front line troops was generally deemed necessary. Without integrated artillery fires to fill this gap and neutralize the fire of the "crust" of the enemy defense, plus an immediate assault by the infantry, the benefit of two important effects — shock and demoralization — was lost.

CONCLUSION

Bridges, communication centers, fortifications, supply dumps — all assumed considerable tactical importance throughout this campaign. These pinpoint targets are extremely difficult to bomb accurately. The valuable contribution of medium bombers has resulted from this capability. In the majority of their operations the bombs were placed on or near the target. Accuracy has proved to be the greatest guarantee of effectiveness of bombers. The type of bomber is unimportant — the importance is in having a tactical bomber capable of precision bombing of well defined targets as well as capable of laying down an effective pattern bombing.

FIGHTER BOMBERS

Fighter bombers, known by the enemy as "Jabos", performed a most influential role in helping to crush the German war machine. Flying first, second, and third priority missions throughout the campaign, their performance was singularly constant, and their effort was distinctly felt by all elements of the ground forces down to the lowest echelons. Even in regrettable instances of bombing or strafing of our own troops, the American soldier was quick to realize that while such cases were unfortunate, they were greatly outweighed by the beneficial effects gained in the relentless effort to assist in defeating the enemy.

AVAILABILITY

The number of fighter bomber groups available varied as the campaign progressed. In general, however, an equal proportion of fighter bomber groups and one tactical reconnaissance group in each of the IX, XIX, and XXIX Tactical Air Commands was available to provide air cooperation and close support to the First, Third, and Ninth Armies respectively. While usually adequate, at times the strength was insufficient for all demands. Due to the great width of the Western Front, especially after the West Wall defenses had been reached, the various armies, did, at times, launch semi-independent attacks, without sufficient cooperating air strength. This was despite the flexibility of the air organization mentioned previously, and was due to a reluctance on the part of both air force and army group commanders to weaken a tactical air command supporting one army in order to strengthen another, when the importance of the effort of the two or more armies might be nearly equal.

SUITABILITY

It would be difficult to attempt to isolate or segregate any one activity of the fighter bomber and make a positive statement that this, or that, effort

produced the greatest effect. Rather, it is a combination of fighter and escort activity in first priority effort, armed reconnaissance to isolate the battle area in second priority effort, and armored column cover and other close support action in third priority activity that resulted in a more rapid progress of the armies.

In this connection, combat experience of fighter bomber cooperation and support has tended to emphasize certain overall effects and conclusions:

(a) The system of separate tactical air command operating closely with respective armies, but subject to shifting or massing in support of one army by a tactical air force headquarters produced the desired flexibility in their use and control to meet changing tactical situations.

(b) Armed reconnaissance by fighter bomber aircraft to isolate the battle field on the front of an army, corps, or division, and subject to vectoring to targets on close support missions on approved requests from the ground unit produced positive results.

(c) A variation of the above was the system of armored column cover. Here continous air alert over a column to run interference or to strike close-in targets on the front of advancing columns became recognized as a sound tactical principle.

(d) The previous conception that fighter bomber aircraft should not be used on targets within the range of artillery was proven unsound. Acceptance or refusal of requests for strikes against close-in targets should be considered with relation to the nature of the objective, the availability and location of artillery, and other tactical considerations.

(e) Fighter bombers were effective against enemy artillery positions, fortified positions, or dug-in infantry both in direct destructive action and by demoralizing the enemy troops.

(f) Fighter bomber action against concrete pillboxes, bunkers, casemated gun positions, etc. was not particularly effective.

(g) There was an ever present need for increased night fighter and night intruder activity by our tactical air force.

FLEXIBILITY

It was, of course, axiomatic that before any campaign could be initiated the air forces must secure and maintain air superiority. It is important to note, however, that continuous occupation by our tactical air force of the air over the front in second and third priority missions assured the maintenance of air superiority without loss of close cooperation. Our

fighters jettisoned their bomb loads and accepted, or forced combat upon, the GAF when the occasion arose.

The fighter bomber cooperation and support available to the armies varied according to the demands of the moment. First priority missions of providing escort to medium bombers, and, when the tactical situation warranted it, of flying area cover or fighter patrols detracted from the total number of aircraft available for close support in some instances. However, due to the flexibility of the organization achieved by the Ninth Air Force, fighter groups were shifted from one tactical air command to another according to the immediate needs of the armies or according to the particular phase of ground operations. This provided an arrangement suitable for the best interest of the air-ground overall effort, and on certain occasions, such as during the ARDENNES counter offensive, provided maximum fighter bomber effort to combat commanders of the units engaged in that sector.

ARMED RECONNAISSANCE

One of the outstanding developments of the tactical air forces supporting our armies was their armed reconnaissance missions conducted to the front and flanks of the ground units. Reports from army, corps, and division commanders are unanimous in this respect. From the initial beachhead in NORMANDY, through the breakthrough at ST LO, the pursuit across France and Belgium, the winter position warfare, the crossing of the RHINE and the final drive, the fighter bomber, ranging forward on rail and road cutting missions, harassing troop concentrations, strafing and bombing of enemy columns on foot or in motor or rail transport, harried the enemy and delayed his shifting of reserves and supplies. This in turn helped army and corps commanders to strike hard at weak spots and exploit advances while limiting the enemy's ability to strike back effectively.

Armed reconnaissance of fighter bombers as far south as the LOIRE River in NORMANDY aided in sealing off that battle area. Deep armed recce uncovered the possibilities in the FALAISE-ARGENTAN trap, harassed the enemy's attempt to pull out of the ELBOEUF pocket and escape across the SEINE, and, by battering elements of twenty German divisions in the MONS area in their desperate attempt to reach the SIEGFRIED LINE, shared the First Army's decisive victory at MONS in September 1944.

To the end of the campaign, armed reconnaissance missions continued. Variations in procedure were developed, and one in particular is mentioned

here to show its effectiveness. The period was the enemy's ARDENNES counter-offensive in December of 1944 and January 1945. Weather was unsuitable generally for air operations throughout this period, but full advantage was taken of such periods as did permit sorties. The area of the BULGE was divided, roughly, into three parts, i. e. a northern and a southern area of the salient, and the area east of the base of the wedge. Fighter bombers of the Ninth Air Force were assigned close-in armed reconnaissance missions within these areas, and were given the mission of attacking all enemy movement. In the early days when he was on the offensive this was to break up the enemy's attacking spearheads, and to disrupt his supply and reinforcement schedules; later it was to prevent his attempted orderly withdrawal from the salient. This effort was coordinated closely with the extensive interdiction program in the area to the immediate east of the base of the salient, which is described in Chapter IV. This alone was of material assistance in aiding the ground units to stop the counter-attack, and later to turn the enemy's ambitious effort into a costly failure; but it did not stop there. By means of close planning between air and ground staff officers at army-TAC level combined operations centers, fighter bomber aircraft were vectored from armed reconnaissance missions in the battle area to specific targets on the front of corps and divisions. While this was not new in theory it was developed to a high degree during this period. In some instances the time lag between the receipt at the combined operations centers of a specific request from corps or divisions, the consideration and acceptance of the request, the passing of it to the controller at the fighter control center, and the diversion of fighter bombers to the target where the leader checked in by means of VHF radio to the forward ground controller, was a matter of minutes only. This time interval varied, but where communication facilities were adequate, and the target requested urgent, beneficial results were obtained quickly.

VARIATIONS OF ARMED RECONNAISSANCE

Another variation of armed reconnaissance missions was made possible by the installation of VHF radios in the lead tanks of armored columns and the establishment of two-way ground to air communications between the armor and the fighter bomber over the column. This action was taken just before the break-out at ST LO, and produced a form of air-ground cooperation known as "Armored Column Cover". Armored column cover, which might well be termed "the flying commando", was of particular value in protecting the unit from enemy air attack and in running interference for the spearhead of the column by destroying or neutralizing ground opposition that might slow it down or stop it. The amount of armored column cover varied with

ARMORED COLUMN COVER

the ground situation -- how fast the front was moving, whether the armor was spearheading ahead of the infantry, and, if so, how far, and the nature and strength of enemy opposition being encountered. Flights of from four to twelve fighter bomber aircraft were usually provided. When enemy air attack could be expected, twelve ship flights were used with four of the aircraft flying top cover for the other eight. Four-plane flights were used when available aircraft were limited or when little opposition from the air or ground was being encountered. Eight-plane flights probably were used most frequently. Flights operated on the rotation plan, one flight remaining over the column until relieved by another, thus assuring continuous cover during daylight hours.

The decision of the Ninth Air Force to give high priority to armored column cover in a fast-moving or fluid situation from the break-out in NORMANDY to the final drive across Central Europe made a successful contribution to the success of the ground units in breaking through and encircling the various elements of the German armies. The flights allotted to column cover habitually checked in by radio with the forward ground controller, and, in the case of relief of a flight already over the column, with the flight leader present. This permitted the attack of any immediate, specific targets. After this had been disposed of the flight leader patrolled ahead of the armored column, as deep as thirty miles along its axis of advance, in an intensive search for enemy vehicles, troops or artillery. This effort permitted our armor far greater freedom of action than would have been otherwise possible. Several examples are quoted herewith:

"In one typical example of the effective air support, eight aircraft of the 362 Fighter Group were vectored by 4th Armored Division to five 88 mm guns northeast of LORIENT. They circled until the area was marked with white smoke then destroyed the guns with eleven direct hits".

"Flying close cover to armored units in the DREUX—MANTES GASSICOURT—CHARTRES — ETAMPS area eight P-47 aircraft chased away eighteen enemy fighter planes apparently dive bombing five miles east of DREUX and destroying two for no loss of their own".

"Covering the 5th and 79th Infantry Divisions in the MANTES—GASSICOURT area 358 Group destroyed or damaged several tanks, shot up barges carrying enemy tanks across the SEINE, chased away two FW 190s and scored a direct hit on a machine gun nest marked with smoke".

As stated in conclusion (d) above, the previous air force conception that fighter bomber aircraft should not be used on targets within the range of

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ground artillery should not be an inflexible rule. Early in the beachhead phase in NORMANDY it became apparent to staff officers in the combined air-ground operations centers that various factors affected this preconceived tenet, and that each request should be considered from all angles rather than denied because the target was within the range of artillery. If for no other reason than that of the storms that swept the OMAHA and UTAH beaches in late June 1944, causing a serious disruption of the scheduled supply of artillery ammunition, and in some instances a delay in the arrival of supporting artillery units, a refusal of requests from corps and divisions for close air support against targets that were within artillery range could have had a serious effect on our efforts to consolidate the beachhead and capture the Port of CHERBOURG.

FIGHTHER BOMBER VS. ARTILLERY

Furthermore, best results were obtained from fighter bombers in their close support role when the fighter bomber attack was concentrated on key points of resistance within very close range. Range dispersion of our heavy artillery capable of firing an equivalent weight of projectile, i. e., the 240 mm howitzer or the 8" gun or howitzer would not permit fire this close, even if this artillery or the ammunition therefore were always available. On the contrary, effective bombing with 500 lb. GP or 260 lb. fragmentation bombs was conducted by fighter bombers against close-in enemy positions sometimes within 300 to 500 yards of our own forward elements. Moreover, it was felt by many commanders that the terrific destructive effect on personnel, materiel, and morale of a fighter bomber attack concentrated on close-in enemy positions was worth more than any artillery preparation, if the air attack was followed immediately by a determined infantry attack. Cooperation of the tactical air commands in this matter was noteworthy, and operations officers, both air and ground, judged the validity of the request on these factors in their acceptance or refusal of the mission.

REQUEST MISSIONS

During periods when movement was relatively slow, requests were numerous and frequent from corps and divisions for close support fighter bomber attacks against enemy strong points, dug-in infantry, dug-in tanks and self propelled guns as well as other artillery. This condition existed in the NORMANDY beachhead area, in the drive to capture the Port of CHERBOURG, in the area between the SIEGFRIED LINE and the ROER River, in the ARDENNES salient, and at all times except in the mobile phases when such support was more or less furnished automatically by armored column cover. Aircraft were available in sufficient numbers only to accept the most pressing of these requests, and then only after commitments for first and second priority missions had been fulfilled.

This required careful screening and sifting of such requests at the combined operations centers so as to insure that the maximum available effort could be funneled into the sector where the main effort was being made. Here again the advantages of the flexibility attained in a combined operations center became apparent. It was agreed generally by all commanders that the fighter bomber produced direct, tangible and effective results in softening up and blasting out enemy strong points and other defensive positions and enabled the infantry to push ahead more rapidly and successfully.

It is true that in the early stages of the campaign certain targets close-in to the forward ground troops were accepted, which later experience proved to be unsuitable for attack. Concrete pillboxes, and casemated guns were among these. It was found that, except for blast effect or the effect on the morale of the occupants, no worthwhile results were achieved. In some cases, too, where infantry was well dug in and dispersed, the results were disappointing. However, out of this early experience there was developed the really fine team work of the air-infantry and air-tank combinations.

TACTICAL AIDS DEVELOPED

Many aids to this effective teamwork were developed. The effectivness of the armored column cover has already been discussed. In addition, other procedures were developed to improve the close-in bombing of enemy dispositions. These included counter-flak fires by our own artillery before and after the bombing run of the fighter bomber; deception attained by fighter bombers in remaining over the area after an attack and making feints at the enemy to keep him down while our infantry closed in, marking the target by colored smoke and other details not necessary to mention here. That these were successful and effective may be shown by the fact that early in the campaign fighter bomber strikes seldom were called for on targets closer than 1000 yards to our troops, while later experience showed that seasoned troops welcomed a strike sometimes within 300 yards of their own position.

RADAR AND RADIO CONTROL

Concurrently the air forces developed a method of control that should be mentioned here, and its effectiveness noted. This was the extensive use of the MEW and SCR 584 radar sets by forward controllers in controlling and directing fighter-bomber aircraft to targets during the winter months when adverse weather conditions prevented visual selection of objectives. Without going into the technical aspects of this procedure, forward director posts close to the leading tactical echelons were established by the tactical air commands. Fighter bombers were led to the target area by radar and radio control, over the overcast, put into the proper approach and taken down through the over-

cast directly over the target where the pilot made final adjustment for the attack. Accurate results generally were achieved, and the effectiveness of the effort testified to by ground commanders. To mention specific instances, ZULPICH, SCHLEIDEN and EUSKIRCHEN, in the western RHINELAND, were harassed by fighter bombers on days when visual observation and selection of objectives were impossible. Reports from prisoners of war, together with observation after the centers fell into our hands showed that these "blind bombing" missions curtailed effectively the enemy's use of these towns as supply centers, troop concentration areas, or centers of communication.

NECESSITY FOR INCREASED NIGHT AIR ACTIVITY

There was one deficiency in tactical air action that was evident throughout the campaign in Europe. That was the dearth of night fighter and night intruder operations. When weather permitted, the two night fighter squadrons turned in a good performance, but there was never enough. From the early days in NORMANDY when reports from PWs, French civilians and our patrols showed that the enemy formed his columns at last light preparatory to moving throughout the night, through the ARDENNES Counter Offensive phase, during the early stages of the REMAGEN Bridgehead over the RHINE, and to the end, it was apparent that a lack of night air activity allowed the enemy the freedom of movement which he had lost by day and permitted him to redispose and resupply his forces with little danger of interference. There were many instances of considerable enemy air activity at dusk, and quite often at night. While the number of these sorties was never enough to cause a serious threat to our ground activities it did appear to be a greater effort than we could summon.

RECONNAISSANCE AIRCRAFT

Any discussion of strategic and tactical air power must necessarily include the effects of reconnaissance aviation which supplied much of the information upon which our intelligence was based.

Prior to D-day, tactical reconnaissance, as well as strategic reconnaissance, provided much and supplemented all information concerning targets for preliminary air operations. A wealth of information was furnished on aircraft concentrations, airfields, and aircraft production facilities which eventually

OPERATIONS BEFORE INVASION

resulted in large scale attacks on these potentials of enemy resistance to the landing and subsequent operations. Although considerable information on enemy airfield and aircraft production came from other sources, aerial reconnaissance furnished a major portion of the information necessary before an operationally sound aerial attack could be undertaken. Confirming ground intelligence, photographic reconnaissance was employed to determine exact locations of V-weapon sites, beach defenses, and other similar enemy installations.

During this same period, prior to D-day, basic photographic cover was flown repeatedly to provide map supplements to troops for use throughout the campaigns of NORMANDY and Northern France. Supplementing the photography as it was being made, visual reconnaissance maintained a steady patrol throughout the area that was soon to have an immediate tactical interest, alerting invasion forces to such enemy troop dispositions that were observed. Simultaneously, the beaches themselves were photographed at very low altitudes to enable intelligence agencies to make minute investigations of the defenses and obstacles to be encountered, and reconstruct defensive installations in England and elsewhere for use by the invasion forces in perfecting a technique of attacking them. The work of tactical reconnaissance also furnished much of the information necessary to construct the detailed scale models of the beaches which the assault forces used in pre-invasion planning. The V Corps which conducted the landing operation on OMAHA Beach, in recounting the activities of the air forces prior to D-day, had this to report:

> "In landing operations the most beneficial effects of air support are derived from fighter bombers and reconnaissance planes. The reconnaissance planes provide photographic cover of the area to be assaulted and thus supplement the available maps. These photographic reports greatly facilitate the planning of an operation and make possible the preparation of detailed plans for the assault upon enemy strong points which might otherwise have escaped notice and greatly hampered the landing and reinforcement of assault forces. Reconnaissance aircraft also provide a reasonably accurate means of determining what artillery support is available to the defending force, and make possible the early neutralization of this fire power by fighter bomber attacks and naval gun fire".

The role of reconnaissance during the isolation of the battlefield, both before and after D-day, was clear cut. It furnished the bulk of the information required to accomplish that mission. Surveillance of highways, railroads, troop

concentrations and movements enabled bomber forces to strike critical points and thus disrupt the flow of units and reinforcements destined for the battle area. The information obtained by aerial reconnaissance on supply and storage facilities, coupled with surveillance of routes of communication also enabled bomber forces to attack key targets, thereby preventing the flow of vital supplies to enemy units already in the battle areas. Also, during this phase bomb damage assessment missions supplied information on the condition of railways, marshalling yards, rolling stock, rail and highway bridges, supply dumps, warehouses and other installations. In addition to its value in planning air attack, and its aid in determining the necessity for further attacks, the same information was vital to ground forces in determining the actions and in estimating the capabilities of the enemy.

ROLE IN ISOLATION PROGRAMS

The importance of photographic reconnaissance to troops in combat varied with the degree of mobility along the line. In a rapidly-moving situation, photo reconnaissance fell into secondary importance while close visual reconnaissance came to the fore. In a static situation or in operations against highly fortified areas such as a defended river bank, fortified cities, or complex defenses like the METZ forts or SIEGFRIED LINE, ground forces relied on photo reconnaissance to provide them with detailed information of enemy activity and for close terrain study for coming operations against a stabilized front. Lieutenant General Collins, commanding general, VII Corps says of the operations of aerial reconnaissance in connection with the ROER River crossings:

TACTICAL USES

> "As with landing on a hostile shore, aerial reconnaissance is particularly valuable prior to and during a river crossing. The photographic coverage, particularly of obliques, for the ROER crossing was splendid. They showed every detail both as to the status of the river bed, banks, enemy defenses and the terrain beyond the far bank. They were distributed down to battalions and were of tremendous help. I have never seen better aerial photography. Daily visual reconnaissance by armed reconnaissance planes was also of great help especially after the crossing had begun. Artillery liaison planes, as usual, were invaluable for aerial adjustment."

It was often possible when time was available, or when the need for them could be anticipated, to provide at battalion level or lower, large scale photographs on which were annotated the major enemy defense installations and from which offensive action could be planned, even to the extent of briefing combat patrols. These advantages were for the most part denied the enemy. An attempt was made to provide daily photographic cover across the army

PHOTOGRAPHY

group front to depths from 10,000 to 15,000 yards. Weather was the only limiting factor.

One of the developments involving photo reconnaissance was the preparation of obliques for artillery. By use of the Merton grid superimposed on obliques, accurate fire could be placed on targets suitable for corps and army artillery. The combination of information from vertical photographs, and firing aids from obliques provided offensive capabilities superior to any enjoyed by the enemy. Flak positions located from photographs provided targets for the counter-flak programs for protection of low-flying aircraft, thereby permitting the aircraft to give more effective cooperation to the ground forces. Engineers used photographs extensively for mapping and for map supplements.

In addition to mapping and intelligence photography as flown for front line troops and artillery, photography was used in the planning stages of all operations by the various staff sections at all echelons of command. Photo reconnaissance was helpful in staff work involving route planning where bridges were encountered, the passage through or occupation of inhabited areas which had been affected by bombing, terrain studies for all purposes, and the location of headquarters and hospitals. It was considered a part of planning for operations against particular objectives, such as fortified positions for example, to provide assault troops with individual prints or large scale mosaics. Town plans were prepared from photographs and used for control in street and house-to-house fighting.

VISUAL RECONNAISSANCE

Of particular note and value was the development of close cooperation between visual reconnaissance aviation and fighter bombers. Having located a suitable target for attack, reconnaissance pilots, through their own VHF sets, or by actually leading available fighters to the location, got immediate action and profitable results over and above those preplanned or requested from the ground.

During daylight, the visual reconnaissance employed against routes of advance available to the enemy provided an early warning against any large scale enemy movement by road or rail, enabling ground commanders to take adequate preventive measures. Plotting all observations of movement made it possible to establish trends of movement, although it was seldom that the actual nature of the movement was revealed.

The full effect of reconnaissance aviation was limited by several factors, which included the inherent limitations of the aircraft, weather and difficulties

incident to the planning for and distribution and evaluation of the information obtained.

LIMITATIONS

It was found that in our necessarily high-speed reconnaissance aircraft a pilot-observer could not discover or pick up enemy front line dispositions — nor could he often enough identify forward elements of our own troops when in deployed formations. This requires detailed observations immediately over the heaviest flak areas and probably cannot be solved without the use of an aircraft capable of carrying an observer. As a result, aerial reconnaissance did not provide adequate information of enemy front line dispositions and strength of or changes and shifts in the order of battle of his forward elements.

While reconnaissance was effective in discovering large movements of troops in all areas, this too was partly nullified by the limitations of an aircraft unable to perform tactical reconnaissance at night. As has been mentioned previously, the enemy moved freely at night and almost at will. During the long period of bad weather through the early winter, and at the very time that von Rundstedt's armies were massing for a counter-offensive, the nights were often clear and reconnaissance would certainly have disclosed the unusual activity in the EIFEL. Bad weather, the crucial factor in all air action has, of course, a catastrophic effect on the continuity of reconnaissance and in this case permitted the build-up for the battle of the ARDENNES without our knowledge. The extreme necessity of maintaining this reconnaissance demands that reconnaissance groups be based much closer to the front than was done in this campaign. This would have permitted advantage to be taken of transient but favorable local weather.

SHORT-COMINGS

The difficulties encountered in planning for and in distribution and evaluation of information obtained from reconnaissance were in part due to the centralization of reconnaissance at army levels but also were largely attributable to deficiencies of the ground forces in this respect. No doubt, the shortage of reconnaissance units demanded their centralization at the army level in order to provide flexibility and economy of force. An expansion of the force might have permitted some very worthwhile decentralization — but under those conditions it then became imperative to insure rapid distribution and evaluation down through the chain of command, which of course, was a ground force responsibility. As a whole, this distribution was too slow — it took too long to get both reports and photographs to division levels. Again in presenting re-

quests for reconnaissance, in many instances, there was a lack of direction or failure to coordinate with well-planned essential elements of enemy information. Also there was a noticeable lack of evaluation of information obtained from tactical reconnaissance. The tabulation of every horsedrawn cart or "lone vehicle travelling south" in the enemy area is insignificant until it is carefully judged chronologically in combination with information from PWs, ground reconnaissance agents, and other sources. More prompt and better coordinated evaluation would have relieved the strained communication channels of a mass of useless data and permitted a more rapid transmission of the resulting intelligence.

LIAISON AIRCRAFT

EMPLOYMENT

Commanders have been emphatic in their praise of the value and versatility of liaison aircraft. The artillery liaison planes flown by artillery officers were invaluable as air observation posts, their primary role. Battle experience developed a noteworthy by-product to the primary mission in that the presence of field artillery liaison planes in the air greatly reduced enemy artillery fire and enemy movement in the forward areas. These same liaison aircraft were effective in providing a readily available source of close-in enemy battle information. During mobile phases of the campaigns, commanders made use of their organic liaison aircraft to control the movements of their columns. The ability of the aircraft to operate from improvised fields near the division command posts made them particularly suitable for these missions.

Artillery liaison aircraft were called upon to carry out emergency supply missions. In February, 1945, the 76th Infantry Division developed an acute shortage of critical items of supply in the SAUER Bridgehead. More than forty flights were made by artillery aircraft, which delivered sufficient quantities of ammunition, rations, signal equipment and medical supplies to front line elements to accomplish relief for them until normal supply channels were established. During the same operation, the 5th Infantry Division made use of its artillery aircraft to deliver emergency supplies to the 417th Infantry Regiment, making forty-one flights and delivering ammunition, rations, medical supplies and communications equipment.

The following reports of the XII Corps, covering operations of the corps artillery planes for the widely separated months of September, and December 1944, further indicate the extent and variety of uses of this type of aircraft.

(a) XII Corps Artillery Air OP Statistical Report for September, 1944:

TYPE	MISSIONS
Adjustment of fire (combat)	828
Rcn patrol (combat)	2325
Night (combat)	2
Other combat	257
Training	15
Administrative	407
Total	3834

Total hours flown in these missions: 3853

(b) XII Corps Artillery Air OP Statistical Report for December, 1944:

TYPE	MISSIONS
Adjustment of fire (combat)	963
Rcn (combat)	610
Patrol (combat)	721
Night (combat)	0
Other combat missions	19
Training	4
Administrative	428
Total	2745

Total time flown by all aircraft during period: 2878 hours 35 min.
(1.05 hrs, (ave), per mission) one pilot lost during period.

LIAISON

The tactical air force provided the armies with liaison squadrons consisting entirely of L-5 liaison planes, which were directly at the call of the respective army or corps commanders. These aircraft were used principally for long range liaison and for timely movement of key personnel to necessary conferences and staff meetings. They provided a rapid courier service and an effective means of transporting field orders and other types of dispatches requiring immediate transmission.

RECONNAISSANCE

In many instances liaison aircraft were used for individual tactical and photo reconnaissance missions close in on a division front. Artillery observers, thoroughly familiar with the ground situation, the terrain and the plan of attack, were able to fly closely behind our front lines and obtain excellent

oblique photos. These aircraft provided an immediate means for making air photographs, and were able to take advantage of local weather conditions when high performance photo aircraft were grounded at their relatively distant bases.

AIR-GROUND CONTROL

In addition to adjusting artillery fire for normal artillery support missions, observers in liaison aircraft were able to adjust smoke upon a target which was to undergo a fighter bomber attack, as well as to report results following such an attack. L-5 aircraft were used in the role of directing fighter bombers to their targets on close cooperation missions. By equiping an L-5 with VHF radio, direct communication was possible between the observer in the liaison plane and the flights of fighter bombers making an attack against close-in ground objectives. Thus there developed an effective means of directing fighter aircraft on a pre-briefed target, or in other instances of directing these same aircraft to targets of opportunity discovered by other observation planes. A liaison plane so equipped has been termed a "horsefly".

When properly briefed on the existing ground situation, the pilot or observer of a liaison aircraft was able to assist greatly in the problem of identification of armored vehicles, whereas the pilots of fighter aircraft were normally too far removed from the immediate situation to do so themselves. The fact that liaison aircraft operated from nearby bases was the determining factor in this capability.

SUMMARY

To summarize, the following functions and capabilities of liaison aircraft have facilitated operations in this theatre:

(a) Artillery observation.

(b) Reconnaissance, both day and night.

(c) Traffic control.

(d) Contact with and coordination of fast moving armored columns.

(e) Last minute briefing of fighter bomber pilots on close cooperation missions.

(f) Emergency supply of isolated ground forces.

(g) Photographic missions.

(h) Liaison with higher headquarters and adjacent units.

(i) Dropping of surrender leaflets.

(j) Courier service.

(k) Establishment of wire communications over local barriers.

The employment of liaison aircraft on these types of missions has effectively increased the control and coordination of the combined arms.

While liaison aircraft generally were supplied in sufficient quantities, commanders of armies, corps and divisions strongly recommend an increase of present T/E allotment with an addition of at least two L-5 type aircraft for each division headquarters. In periods of heavy combat, artillery liaison planes were available in adequate numbers only because the organic planes of the division artillery were supplemented by additional planes of supporting corps artillery.

ASPECTS OF WEATHER

Ground forces join wholeheartedly in singing the praises of their flying partners, although to their hymn, "Nothing can stop the Army Air Corps" they add, "but weather". Such poetic license seems permissible in the light of our experience with the uncertainty in establishing invasion date, the delay before Operation QUEEN, and the period of anxiety following the ARDENNES breakthrough. Needless to say weather is the only wholly uncontrollable factor in the employment of air power. Although predictable to a certain degree, the interruptions imposed by periods of non-flying weather create special problems in planning for and execution of joint operations. Unlike the war on the ground, where continuity of tactical action is possible under almost all but the severest weather conditions, aerial combat is restricted to favorable weather unless uneconomical risks are to be assumed.

Weather which prohibited the use of friendly aircraft normally curtailed enemy air effort likewise. The necessity for priority I missions was temporarily removed, and the ground forces were permitted freedom of movement equal to that enjoyed in a situation of complete air supremacy. However, with the superiority we enjoyed, during such periods the advantages invariably accrued to the enemy. In poor weather our own forces suffered primarily from a lack of priority II and priority III missions, to include reconnaissance and air resupply. The problems of locating the enemy and maintaining effective blockades of the battlefields increased in difficulty, and ground action lost the added striking power of the air on close cooperation missions.

Because tactical air action did not, and probably cannot, have continuity comparable to that of ground tactical action, it is imperative that in compen-

WEATHER INTERRUPTS CONTINUITY OF ACTION

sation for its intermittent availability, its use be carefully planned to take full advantage of favorable weather conditions, when its flexibility can be exploited to the utmost. Further, through concentrated effort, we may enjoy its greatest potentiality— the Principle of Mass.

In implementing plans so as to provide this flexibility, joint planning must consider the variable of weather which specifically requires

(a) Careful consideration of priorities by both ground and air planning staffs,

(b) Flexibility in the air program.

(c) Joint operations staffs to put (a) and (b) into effect.

WEATHER LIMITED OPERATIONS

Weather makes it impossible for ground commanders to depend entirely upon air cooperation when planning day-to-day operations. Frequently, weather conditions change so rapidly that not until the last minute can the availability of air be determined. In such cases, the ground forces must plan to carry out their missions without assistance from the air. However, when planning large-scale ground offensives in which the weight of air power is an integral and vital part, it is necessary to set the date and hour of attack upon favorable weather conditions. Such an operation must be made sufficiently flexible, from standpoints of both air and ground, that undue delays caused by poor weather will not completely jeopardize the eventual accomplishment of the mission.

FORECASTS AID PLANNING

Accurate weather forecasts play a crucial part in air-ground operations. In recognition of this fact and as an example of the further development of air-ground cooperation, Ninth Air Force provided mobile weather stations to armies and corps. These stations prepared information for use by both air and ground in operational planning. Many times such forecasts alerted the joint planning staffs to the possibility of local air operations during both day and night periods.

SUPPLY ANI MAINTENAN PROBLEMS

Few places in the world experience more erratic conditions of weather than the European Theater of Operations. Following several weeks of exceptionally good flying weather during the summer months of 1944, an abrupt change occurred in the latter part of September, and fighter bomber activities, particularly, decreased sharply. The month of November had 30% more rain than normal, and weather records show that in January, 1945, more snow fell than in any January for 175 years. Although the weather conditions have been generally worse than normal since September, except for

the latter half of December, the scale of fighter bomber operations during the months since D-day, with two exceptions, equalled or surpassed the mean possibilities as computed from a study of historical maps of the eight-year period, 1931—1938. The two exceptions were November and December.

WEATHER LIMITED OPERATIONS

During the 337 days of the campaigns in Western Europe, medium bombers were able to operate on a total of 228 days, and fighter bombers on a total of 289 days. In the period there were only 138 days on which optimum operational conditions existed. A number of the missions flown were abortive due to weather, as in the month of October when 43% of all medium bomber missions were unsuccessful for that reason. Medium bombers operated sixteen days in December, on nine days of which only blind bombing technique could be used. The problem of maintaining the isolation of the battlefield became critical at that time when it was of greatest importance to the ground battle.

In an attempt to overcome the restrictions imposed by adverse weather, air units flew oftentimes when sub-minimum weather persisted. Fighter bombers, for instance, normally require at least a 3,000-foot ceiling with broken cloud and 3 miles visibility. In cases of great urgency the fighter bombers have operated when ceilings over target areas were down to 1,500 or 1,000 feet. Similar adverse conditions were being fought by the medium bombers, flying in weather which was previously considered non-operational.

SUPPLY AND MAINTENANCE PROBLEMS

In spite of winter weather which decreased the operational rate (sorties), the flow of the reinforcement aircraft was inadequate to maintain tactical groups at full strength, and consequently at times the maximum effort was not available when weather conditions improved. Weather had caused erratic ferrying and delivery of reinforcement aircraft from the base depots. Assembly points were closed in for periods of two to three weeks. As a result, the tactical groups dropped far below authorized strength in aircraft, with a proportional drop in the weight and effectiveness of fighter and bomber operations. In order to take full advantage of the limited number of flying days, every available aircraft was used.

In XIX Tactical Air Command, aircraft maintenance increased from 20 to 30% due to the need for additional inspections and winterization precautions on aircraft. The effect of cold weather upon the working conditions of the ground crews reduced the efficiency of the personnel and facilities for repair, adding to the length of time aircraft were withheld from an operational status.

Although operations were curtailed during fall and winter, with short days and relatively poor flying weather, compensations were made to some

extent by bringing the bases closer to the front, thus reducing the time required for a mission. As the rains of October came, however, more and more difficulty was experienced in preparing new fields. On soft ground, airfields could be considered operational only after the runway, taxiways, and a sufficient number of handstands had been constructed. Such construction was at times impossible in the weather experienced. Weather forced the abandonment of airfields which would have been excellent in dry weather, and delayed forward movement to fields closer to the ground units being supported.

OPERATIONAL PROBLEMS

Weather allied itself with terrain to present new problems during the intensive winter operations over the rugged ARDENNES country of Belgium, Luxembourg and the EIFEL region to the east in Germany. Deep valleys, steep slopes and peaks often hidden by fog or by poor visibility made operations especially difficult and hazardous for fighter bombers, reconnaissance aircraft, and night fighters alike. Winter conditions of snow-covered ground and limited visibility increased the difficulties of navigation, orientation, and recognition of ground activities. This in turn necessitated closer air-ground control and greater care in briefing in order to prevent accidental attacks on friendly installations, and to permit the aircraft to strike their targets with minimum delay.

To summarize:

(a) Fundamentally air operations are peculiarly susceptible to adverse weather conditions and as a result thereof are not capable of the continuity of tactical action possessed by ground operations. This necessitates flexibility in ground and air plans, as in all cases ground attacks cannot be delayed until favorable weather permits air participation.

(b) In order to offset the weather factor, or variable, proper evaluation must be made of its influence and must be compensated for in planning through the use of alternate plans and courses of action.

(c) Accurate weather forecasts, supplied in part by the mobile weather stations, play a crucial part in planning ground-air operations.

(d) Erratic and severe weather such as that experienced in the European Theater of Operations, intensifies the problems of tactical air action through:

(1) Inability to plan and execute long-range programs,

(2) Existence of sub-minimum conditions for operation of aircraft,

(3) Delay of arrival of badly needed reinforcement aircraft,

(4) Increase of aircraft maintenance,

(5) Delayed preparation and movement to new fields closer to the supported troops, and

(6) Operational delays caused by difficulties of navigation, orientation and recognition.

(e) The curtailing influence on tactical air action has proved the necessity for the employment of the Principle of Mass, wherein the air forces put forth the greatest effort possible when good weather conditions prevail.

CHAPTER IV

INTERDICTION

Operations in Western Europe have proved the soundness in concept and execution of second priority missions — isolation of the battlefield. In a campaign involving great distances and rapid movement, the means to limit or deny supplies and restrict maneuver in the battle area constituted one of our most decisive weapons. With this weapon, air power made a valuable contribution towards acceleration of the land battle.

INTRODUCTION

As later references to specific engagements will indicate, interdiction has sometimes been too remote for evaluation but it has often been applied as an immediate influence on tactical action. Its overall effects have been so widely noticeable that it seems appropriate to consider interdiction as a whole and to describe the manner in which it was employed. All types of aircraft have played a part in interdiction: reconnaissance planes through surveillance and bomb damage assessment; fighter bombers on armed reconnaissance patrols, mediums and heavies by obstruction of the arteries of movement and destruction of the things to be moved. However, in the attacks made on lines of interdiction, medium bombers of the tactical air force played the major part, and it is to them that reference will most frequently be made.

TYPES OF INTERDICTION

Interdiction is generally thought of as cutting off an area by a definite line of destroyed bridges or transportation facilities. It may take that form around large areas, but may be varied according to the results desired by ground plans. Small areas can be effectively throttled through rail and road cuts, and intense bombardment of towns and villages, filling the streets with debris. Isolation may be designed to impede the retreat of enemy forces or to canalize their routes of retreat. In this case, the means may be the same, with a shift in targets from the perimeter of the tactical zone to expedient ones: defiles, marshalling yards, bridges, signal communications, and moving columns themselves. Destruction of supply dumps, ordnance, and the attack of hostile troop concentrations in rear areas contribute to isolation of the battlefield, for they deny the enemy food, supplies, and reinforcements.

Our experience has covered all types of interdiction by all kinds of aircraft, with results varying from questionable to superior. From this experience many lessons have been learned, particularly in joint planning, and these in turn have led to several conclusions which are illustrated by reference to the interdiction programs themselves:

PRINCIPLES OF INTERDICTION

(a) From a tactical standpoint any isolation program must be built around a ground plan, either offensive or defensive, and must be closely related to it.

(b) The tactical area must be clearly delineated, and the line of interdiction, if it takes that form, must be set to coincide, with proper consideration for air capabilities and the necessity for getting maximum results from the minimum number of strikes

(c) The program must enjoy high enough priority to insure timeliness of completion.

(d) Leaks in the system and the isolated area must be effectively policed.

(e) Advantage should be taken of the targets offered by the build-up around the sealed off area.

SEINE—LOIRE INTERDICTION

Two interdiction programs were particularly noteworthy: the SEINE—LOIRE, and the ARDENNES—EIFEL; the success of both was attributable to adherence to the principles outlined above.

Had the enemy been in unrestricted control of the rail system of Northern France, he would undoubtedly have been able to surpass the Allied rate of build-up in the lodgement area once the invasion took place. With that in mind, in preparation for the invasion, communication targets enjoyed a high priority. As early as February 1944, attacks on rail facilities began. In May, the emphasis shifted to rail and road bridges, and eventually the SEINE—LOIRE interdiction program emerged as defining the tactical area. Consistent with security, action during the preliminary phase was widespread; second phase strikes concentrated on the SEINE and MEUSE Rivers, but it was not until D—day that the LOIRE was undertaken. However, by that time, all but one of the rail bridges over the SEINE and all but five of the road bridges from PARIS to the sea had been rendered impassable, and ample effort was allocated to immediate completion of the job.

With the invasion under way it was no longer necessary to observe security in attacking vital rail points. An enlarged and more obvious plan for rail interdiction was designed to deny the enemy the use of communications into the battle area and within it. This program was built upon earlier accomplishments, in close relation to the SEINE—LOIRE program now nearing completion, and was planned to seal leaks and police the area within. Eight bridges in the PARIS—ORLEANS gap, marshalling yards, rail cutting, and rolling stock within the circle were the objectives.

RESULTS

The early attacks on marshalling yards brought results which are difficult to assess. Notable damage was done to rails, but traffic on through lines was, in most instances, interrupted only for a short space of time. Civilian economic traffic suffered first and most, although enough rolling stock was destroyed, particularly locomotives, so that replacements had to be brought from Germany to continue normal traffic. These attacks led to dispersion, delay, and uncertainty in preparation for counter measures, and at the same time kept our plans veiled.

Attacks on bridges, however, imposed a maximum of delay on the movements of German forces and supplies, increased the fuel shortage in the battle area by forcing long road detours, and aggravated the maintenance problem for armor and motor vehicles which had to take to the roads. In addition, destruction of the bridges created temporary blocks behind which rail and road traffic piled up, thus affording admirable targets for fighter bombers. Congestion of traffic on the remaining rail communications and increased vulnerability on the roads provided similar targets.

The enemy was unable to use the rail system inside the SEINE—LOIRE area for any large scale movement of troops and the most significant delays were hose imposed by detrainment at the rim of the arc. Rail movement within the area was principally devoted to the carrying of supplies. The continued attacks by patrolling aircraft caused virtually all movements to take place at night, with resultant disorganization and loss of time. Attacks on marshalling yards required the enemy to disperse his locomotives. They decreased his coal supplies, and made rail transportation more difficult to arrange. They frequently denied the capacity to route his movements by the shortest direct route, and forced him to submit to the disadvantage of delays and detrainings.

Half of the troops detrained at the LOIRE marched six to twelve days into battle, and those who crossed on bridges temporarily operative did not advance more than fifty miles before detraining. The movement into the SEINE—

LOIRE area, particularly that from BRITTANY, suffered repeated delay due to fighter attacks. Many moves took place in company and platoon units, entirely by road.

A German general officer captured in August referred to the difficulty of moving reinforcements and supplies and attributed it to two factors; the skill of bombing, and its scientific use by the Allies. He added that the process in reverse — the withdrawal — was just as difficult by the same means at a time when the few escape routes were already overtaxed.

Von Rundstedt himself added that in spite of the fact that the railway network was highly developed in the west and that innumerable highways and secondary roads existed, the Allies succeeded, by concentrated and ceaseless attacks from the air, in disorganizing supply to such an extent and to cause such losses of railway rolling stock and vehicles, that supply became a serious problem.

During the rapid advance from the SEINE to the SIEGFRIED LINE, interdiction was planned to disorganize and harass the enemy's retreat. It is impossible to measure the success of this effort, although it was apparent in the BELFORT Gap, and by the few attempts at a defensive stand in First Army zone. At that time rolling stock assumed importance in a new form — vital to supplement our strained highway supply lines. In the middle of August, air effort was diverted from all communication targets in the path of the armies except for trains in motion, or those positively identified as military type. More careful preplanning would have excepted also key marshalling yards which later could have been most useful to our own supply system.

INTERDICTION BY ATTRITION

In October and November the bulk of medium bomber effort was turned on active marshalling yards, troop training centers, POL and supply dumps, ordnance, and other military installations as a program of attrition to the forces that were building up behind the WEST WALL. To some it appeared as if the tactical air force had forsaken its primary role for a strategic one. Most of the targets, however, were within the tactical area, although results were not immediately apparent. An analysis of the opinions of German supply agencies and G—4s in the forward areas has not yet disclosed how much the German effectiveness was reduced by goods destroyed in the marshalling yards at KAISERSLAUTERN, NEUNKIRCHEN, ST. WENDEL, COBLENZ, DUREN or BINGEN. There are no statistics yet to show what disorganization and delay

were caused by attacks on the barracks at DIEUZE, BITBURG, BITSCHE and BAUMHOLDER. One cannot tabulate the counterattacks that were frustrated by bombing headquarters and defended towns along the front, nor what frantic efforts were made by the enemy to keep his rails in order or to replace material damage. It is probable though, that the program decreased his ability to resist, delayed his reorganization, and had a "beneficial" effect both physically and psychologically on him and his resources.

At the same time an "inner" line of rail interdiction was planned west of the RHINE River on a series of bridges extending from GREVENBROICH in the north through EUSKIRCHEN, AHRWEILER, MAYEN, BULLAY, SIMMERN, and KAISERSLAUTERN to NONNWEILER in the south. Supplemental rail cuts on twenty-seven lines were outlined for fighter bombers. It was an ambitious plan covering all east-west lines in the tactical area, and it demanded more effort than was available for timely completion. Concurrently with the "inner line", a great deal of fighter bomber effort was expended on a nebulous "outer line", cutting rails east of the RHINE. With no relation to the tactical area, no correlation to immediate ground plans, and insufficient effort to accomplish its purpose, it represented the "questionable" in our interdiction experience.

RHINE INTERDICTION

Had it been within the capabilities of the air force to complete the task in time, this effort might better have been put on the RHINE bridges. The RHINE was a natural line of interdiction. It delimited the tactical area and was the objective of the winter campaign. True, it is now a matter of conjecture to entertain the possibilities of such an undertaking, but the enemy was afraid of it; Reichsminister Speer expressed amazement that we passed it up, adding that he built four pipe lines across the river for delivery of gasoline in anticipation of what seemed obvious. Heavy flak defenses, and the size of the task itself prohibited the mediums from undertaking it. Previous commitments to higher priority targets, and the uncertainty of weather for visual bombing kept the heavies from any but sporadic attacks on the bridges. The same effects possible in the RHINE interdiction could never have been achieved from the alternate, the "inner line" which was designed to stop only rail traffic. This in part was successful, but was never completed, nor adequately policed, and it is doubtful if the overall effects of it were more than an inconvenience to the

enemy. It took the ARDENNES Counter Offensive to crystallize a portion of that program.

ARDENNES-EIFEL

Isolation of the ARDENNES-EIFEL in December 1944 was an emergency measure, and the urgency of it gave it the priority and effort neccessary for rapid and thorough execution. Every type of interdiction target was attacked. Medium bombers made the most of their particular suitability for accurate bombing and by destroying the rail bridges at KONS KARTHAUS, BULLAY, COBLENZ, MAYEN, AHRWEILER, and EUSKIRCHEN, they sealed off most of the area from rail traffic. Both mediums and heavies struck communication centers like ST. VITH, HOUFFALIZE, PRUM, BITBURG, and PRONSFELD, creating traffic delays, disrupting supplies and communications, and forcing the enemy from shelters. Fighter bomber patrols policing the gaps and the road nets left open, destroyed countless supply and combat vehicles and restricted movement to darkness. British night intruders, filling the gap in our own tactical air force, helped to keep up the program on a twenty-four hour basis. Supplies in marshalling yards and storage areas around the perimeter at BRUHL, KOLN, SIEGBURG, BERGISCH-GLADBACH, BONN, COBLENZ, and TRIER were hit repeatedly. Aircraft claims during that period are impressive, not alone for the havoc created, but because they demonstrate the potential flexibility which permits the rapid massing on a limited target area. In less than a month, forty-two bridges, seventy-five towns, and forty-five marshalling yards were hit by mediums and heavies. Unsubstantiated fighter bomber claims in the area surpassed those in the FALAISE-ARGENTAN pocket.

The enemy's whole scheme in this ARDENNES Counter Offensive was predicated on the capture of enough gasoline to continue the momentum of the breakthrough. Failing in that he stopped. Strangling the flow of his meager supplies and attrition of his equipment helped in no small measure the counter-attacks of the First and Third Armies which caused him to retire.

REMAGEN BRIDGEHEAD

A great contribution to the protection of the REMAGEN bridgehead was the effective, thorough, and rapidly executed interdiction by the 9th Bomb Division. Hitler himself had ordered reduction of the bridgehead and directed

every available reserve toward it. By a concentrated program on the marshalling yards from WIESBADEN through GIESSEN, ALTENKIRCHEN, MARBURG, to SIEGBURG, rail traffic into the bridgehead area was interrupted. The delay imposed by the necessity of using inadequate roads prevented the arrival even of enough force to contain it, permitting our build up and subsequent breakthrough with a minimized cost. Most of this bombing was done under adverse weather conditions, and by blind techniques, but it was so accurate, well-timed, and thorough, and so closely calculated to assist the ground forces that it is exemplary in the use of air in cooperation with the ground.

OPERATION CLARION

On 22 February, Operation CLARION was ordered by SHAEF. CLARION was a plan of long standing involving all aircraft in the European and Mediterranean Theaters on a harassing attack against the railroad system of Germany. Targets were bridges, marshalling yards, roundhouses, loading platforms, rolling stock, crossings, stations, and signal installations, chosen with regard to flak so that bombers might come low enough to insure accuracy, and to strafe after bombing. Each air force was given a sector of the country; coverage was wide. The following figures (approximate in some cases) indicate the scope of the operation.

Air Force	Heavies	Mediums	Fighters	Targets	Tons	Losses B	Losses F
2nd TAF		244	540	4	500	21	12
1st TACAF		171	675	28	350	0	2
RAF Bomb Com	34			2	181	1	0
RAF Ftr Com			328				
Eighth Air Force	1358		776	57	4064	8	16
Fifteenth Air Force	700		361	32	2000	?	
Ninth Air Force		445	708	86	1276	3	12
	2192	860	3388	209	8371	75	

Had CLARION been one of a series of attacks in a strategic plan to cripple the German rail system, or, had it been confined to the tactical area in coordination with any army offensive, one might refer to it with enthusiasm.

Such a method of interdiction is good. The ARDENNES-EIFEL air program was in fact a CLARION and a highly successful one. As an isolated experiment, however, CLARION had no immediate or apparent results on the ground battle. Experience has shown throughout that attacks on transportation must give priority in time and space to those transportation facilities immediately available to the opposing forces or their reserves.

CHAPTER V

SYSTEM OF AIR-GROUND COOPERATION

INTRODUCTION

The overall system of air-ground cooperation developed within the Ninth Air Force — 12th Army Group tactical team had a direct and highly satisfactory effect upon operations. It assured close coordination in combined operations, joint planning at all levels, and the continuous exchange of information between the services. The cloud of mystery with which even now some authorities tend to surround air cooperation was dispelled in the clarity of mutual confidence and simplicity.

ORGANIZATION AND FUNCTIONS

The keynote of the Air-Ground Cooperation System was the mutual exchange of staff personnel with the authority and training to act in an operational capacity.

COMBINED OPERATIONS

Within the limits of terrain and the tactical situation the parallel echelons of the air and ground forces were located together. Since the actual tactical control of the air force or the tactical air command is centralized at these respective headquarters the "Combined Operations" center was formed there. Into this center went the G-3 (Air) and G-2 (Air) from the ground forces to function alongside the air personnel who controlled the tactical operations.

G-3 (AIR) SECTION

The G-3 (Air) Section maintained a complete situation map, and by briefings kept the air force fully informed on the ground battles. It announced priorities of subordinate units for tactical air action, and the ground force plan of action. Jointly with the air operations personnel it handled mission requests, engaged in air-ground planning, and coordinated the bomb line. It transmitted the situation to the Ground Liaison Officers at airfields, and furnished them with information necessary for briefing of combat crews. It was responsible for the interchange between ground and air units of all the necessary operational data and details for coordination of the tactical action of those forces.

G-2 (AIR) SECTION

Similarly, the G-2 (Air) Section presented the enemy situation, submitted requests for air reconnaissance, and collected and disseminated information resulting therefrom. In addition, G-2 (Air) maintained complete target intelligence collected from ground force sources on suitable air objectives and with G-3

(Air) and the air operations personnel, engaged in the staff planning necessary for the attack thereof.

TACTICAL AIR LIAISON OFFICER

At the lower echelons of corps and divisions there is no equivalent air force headquarters such as at army group and armies. Nevertheless, the principle of the "Combined Operations" was extended forward in the close association of the G-3 (Air) and a Tactical Air Liaison Officer (TALO). The latter, an experienced pilot, was detached from the tactical air command, and was provided with suitable HF and VHF radio equipment for transmitting air requests to the TAC headquarters, and for the ground control of aircraft from forward positions with the supported ground force units. This afforded the flexibility in both control and communications, and permitted the close cooperation of our fighter bombers described in Chapter III.

GROUND LIAISON OFFICER

Again, in conformance with the system of exchange of staff personnel and of joint planning, the ground forces provided a ground liaison officer (GLO) to operational units of the air force. The ground liaison officer maintained situation maps and reports for the pilots and crews, and briefed them on bomb lines, army plans, problems, and tactics. They gathered information of the enemy obtained through air crew interrogation, which was passed to the ground forces through the G-3 (Air) and G-2 (Air) at "Combined Operations" at the next higher echelon.

COMMUNICATIONS

Communications were the essence of effective air ground cooperation in this theater. Without adequate, reliable and often continuous communication the close coordination necessary between air and ground could not have been maintained. To achieve this the tactical air liaison officers with ground units were provided with radio and wire lines to "combined operations". Air force and army telephone and teleprinter lines supplemented the air force radio channels to ground units.

These means generally furnished adequate communication between air and ground headquarters. In static situations the teleprinter and telephone were relied upon to a great extent, both to forward ground units and to the air bases. In rapidly-moving, or fluid situations the radio became most necessary since wire lines to the ground units could not be maintained. However, the necessity for radio communication between the forward ground units and the combined operations center in these situations was largely obviated by armored column cover.

It was found that the allotment of separate communications channels for the sole purpose of transmitting air-ground cooperation information and requests was a basic principle. When this principle was not adhered to,

or the channels were not adequate, the efficiency of air cooperation was seriously impaired. Messages regarding air cooperation can be generally classified as "Operational Priority" if not "Urgent", and time did not permit their routine handling through the usual command and staff channels.

DEVELOPMENTS OF THE SYSTEM

The spirit of teamwork that was characteristic of the air-ground cooperation system is apparent in some of the developments peculiar to joint operations. Aids for close bombing indicated not only a regard for troop safety, but for bombing accuracy. The ground contributed colored smoke, and "line of flak". The air furnished forward radio and radar control. Counter-flak programs for protection of aircraft were developed to the point of an SOP. Both forces participated in a crew rotation program whereby pilots shared fox holes with the doughboy, and the artillerymen saw flak from the receiving end.

CHAPTER VI

SUPPLY AND EVACUATION BY AIR

USES OF AIR LIFT

The logistical difficulties which are attendant to highly mobile operations over long lines of communication caused the need for and effect of air supply and evacuation to assume an importance quite out of proportion to the actual total lift. While only a small percentage of the total volume of supply to the armies was transported by air, in most cases these supplies were critical items requiring delivery at a critical time and place. It can be confidently stated that, although the full potentialities of air supply were not attained, the air lift during certain crucial phases of the campaign assisted the continued advance of our spearheads and in particular gave the final impetus to the operations east of the RHINE. Air lift established itself as the logistical partner of the armor-fighter bomber team and as will be shown below, when due to various difficulties in command and control or in the cases where it was diverted to other missions, its loss keenly affected the efficiency of that team.

NORMANDY

Air supply was first used in the campaign to resupply the 82d and 101st Airborne Divisions during the period D-day until D plus 7, when approximately 500 tons were transported and in the main either dropped by cannister or in gliders. By D plus 6 two emergency landing fields were completed within the beachhead, and the volume of air supply was increased by the end of the seventh week to a weekly total of 2000 tons and an overall total of 6600 tons. The bulk of this supply was Class I and Class V, and critical items such as blood plasma, maps, and signal equipment. The most crucial period was just after 19 June, when severe storms broke up the artificial harbors and halted unloading on the beach for three days. First Army was faced with a threatened deficit in 105mm howitzer and small arms ammunition, and received a total of 1500 tons of all types by this means during the period of the storm.

Air evacuation may be judged to have been as valuable as air supply during the early weeks of invasion. While air evacuation was accepted as a bonus in planning, it was a most important factor and not only relieved the strain on the evacuation system but without doubt saved many lives. Out of a total of 27,387 casualties evacuated during the first three week period, 6,469 patients were moved to the UK by air. During the month of July, 19,490 casualties were evacuated by air and 18,195 by boat.

Difficulties which existed during the NORMANDY campaign were principally the cumbersome channels in the bidding for and control of air lift, the initial lack of coordination between the air and ground staffs responsible therefor, and the shortage of adequate airfields. The control of air lift rested with the Combined Air Transport Operations Room (CATOR), an agency of AEAF, but which dealt with the Communications Zone directly. While this condition improved when AEAF was dissolved and absorbed into SHAEF-AIR, the close tactical coordination which existed between air and ground never found its logistical counterpart. Furthermore, due to tactical requirements for combat aviation, there were insufficient landing fields which could be used entirely for resupply aircraft. Again on newly constructed airfields, the number of landings per hour was extremely limited, and the unseasonable weather of that period restricted flying operations.

As a whole, outside of its essential role in resupply of airborne units, air lift cannot be said to have had a predominant effect on the NORMANDY campaign. It did help to fill the gap during the period when beaches were immobilized by weather, it provided another means of assisting the initial build-up and of providing critical items, and lastly it added ease and flexibility to evacuation at its most difficult period.

BRITTANY

Following the breakthrough at ST LO, and the rapid advance of First and Third Armies to the southeast and southwest, VIII Corps was given the mission of clearing the BRITTANY Peninsula. This was accomplished by long armored thrusts deep into a disorganized enemy, with a resultant by-passing of many small enemy units. This type of tactics gave rise to very long, difficult, and hazardous overland supply routes, as well as a rapid consumption of critical items such as gasoline and rations, which could not be carried with the spearheads in sufficient quantities to maintain minimum levels. At this time CATOR was called upon to deliver supplies by air to VIII Corps, and an airfield was put into condition at RENNES. The supplies which were delivered to BRITTANY by air arrived at least two days earlier than if they had been brought in from the beaches by trucking companies, already operating on a full scale delivering supplies to First and Third Army units to the east. The existing condition of local air superiority in the BRITTANY sector insured that this air lift would be virtually unhampered by enemy action. Later on during the siege of BREST a field was put into operation at MORLAIX, which was used for evacuation of casualties as well as resupply; the former factor enabling the removal of wounded to the rear areas to be accomplished within hours instead of days. Again, the air lift during the BRITTANY phase was not great,

but did fill a definite need, and, probably most important, afforded experience and improvement in methods for the more crucial supply operations which followed as our armies moved east.

CENTRAL FRANCE TO SIEGFRIED LINE

The advance of Third Army, less VIII Corps, across Central France introduced for the first time air supply as a real factor and exemplified not only the crucial need for it but the effect on our mobile operations when it was diverted to other missions. The rapid extension of our lines of communications from the original beachhead, eastward through LAVAL to the south and east of PARIS demanded maximum augmentation to other major types of transportation, which were already severely overtaxed. To meet this situation, in the middle of August two fields were made available for resupply aircraft, one at BRICY the other at LE MANS, and delivery of supply at these points was initiated. During a two-day period near the end of August 2250 tons of Class I and II supplies were transported by air, with an overall delivery of 7000 tons between 8 August and 27 August. This lift was a factor in relieving the overland routes of that much tonnage, which otherwise would have had to come an average of 340 miles turn-around by truck. Throughout the same period 11,600 casualties were evacuated by air to the U. K. This again not only facilitated evacuation problems and reduced the rate of fatalities but also was found to have a decided morale factor, in that personnel felt that should they become casualties, they would be hospitalized quickly. Furthermore, it prevented the frequent movement of hospitals over roads already badly congested.

Nevertheless the full effect of air lift was lost at the time due to the fact that a large portion of the aircraft available was diverted during this period to airborne operations which were abortive.

INTERFERENCE BY AIRBORNE OPERATIONS

The first of these was Operation TRANSFIGURE, scheduled for 17 August in the area of CHARTRES-RAMBOUILLET. This operation was cancelled upon representation to SHAEF of the proximity of our own columns, but aircraft had been diverted in preparation therefor from 14 to 18 August. The second, Operation LINNET, in the area of TOURNAI, Belgium was scheduled for 3 September. From 30 August until Operations LINNET and an alternate in the LIEGE — MAASTRICHT area were cancelled on 5 September, no planes were available. This operation was predicated on the use of 1542 aircraft with 436 planes in reserve for resupply. The third, Operation COMET, was scheduled for 10 September after a delay of forty-eight hours. Because of the ground situation the operation was cancelled on 11 September and planes

were released for air supply on the following day. Operation MARKET which followed Operation COMET was scheduled for not earlier than 14 September and was put into effect on 17 September. For several days preceding the withdrawal of transport aircraft for this operation, air supply had averaged 600 tons per day with 1600 tons on a peak day. Had the planes not been withdrawn at this time an average of 1200 tons per day could probably have been achieved during the subsequent four or five weeks. This would have provided gasoline to keep Third Army's spearhead divisions moving forward to the RHINE River. A conservative estimate indicates that during the latter half of August and the first three weeks of September there were fifteen days when airborne operations diverted the greater part of the planes from air supply.

Concurrently it was necessary on 27 August to fly more than 500 tons of food to PARIS for the relief of the civilian population and subsequently to continue with aircraft of the Eighth Air Force. It was during the last weeks of August and the first week of September that First Army swept into Belgium and Third Army established bridgeheads over the MOSELLE River and halted in front of METZ due to the shortage of supply.

During the period between 12 September and 1 October the Eighth Air Force again flew supplies, chiefly Class III, to the continent. There were numerous complications due to bomber squadrons being employed without prior experience on supply missions under vastly different operational technique than for combat. The heavy bombers had to land on active tactical fields requiring close coordination with combat operations. The extraordinary weight of the loaded planes required constant maintenance repairs on runways which were not built for planes as heavy as Fortresses and Liberators. Despite these and other difficulties, including days on which no transport planes were available, a substantial amount of Class III supplies was delivered to forward fields at a time when it was desperately needed.

Later during this period, when it became apparent that a winter campaign was unavoidable, air lift was effectively used in delivering to the armies their initial allotments of winter clothing, blankets and sleeping bags; items which otherwise would have been long delayed into the colder weather had this air lift not been available.

Thus it should be noted that throughout the Central France campaign the effect of air supply was to augment the other major types of transportation.

which were under constant strain because of long routes and rapid advances, and to relieve these agencies of the problem of transporting supplies for civilian use, as well as providing an extra means of communication between rear and forward echelons.

It has been generally agreed that the ability of the 101 A/B Division to hold the control of the vital communications center of BASTOGNE played a large part in frustrating the enemy plans for crossing the MEUSE River, following the December attack in the ARDENNES. When the division became completely surrounded, on 20 December a request was made for air resupply. Approximately 850 tons of materiel, including gasoline, rations, blood plasma and other medical supply, and ammunition were delivered by parachute and glider. The effect was to permit the division to withstand unrelented ground and air attacks, until relief from the ground could be effected. The final result was not only the relief of the division, but the securing of ground from which to launch an attack which finally drove the enemy back to the SIEGFRIED LINE.

ARDENNES

Following the BASTOGNE resupply mission further improvements were made on the technique of air drops and air lifts. A new SOP was developed to speed up the methods of air supply, and lists of pre-stocked supplies were prepared, giving rise to more comprehensive assortments designed to make packs more usable to isolated units

The improvements in the technique were evident in a resupply mission to VIII Corps on 13 February. The Corps was located in the area east of BURG-REULAND and isolated to the extent that the roads in the OULDER, ST VITH, SCHONBERG sector were almost impassable due to bombing and thaw. Two hundred tons of Class I, Class III and Class V supplies were dropped. Ninety-five percent of all supplies dropped was recovered in good condition and much of the dropping equipment was salvaged.

During the winter months, prior to the breakout operations of early spring, air supply fell to an average of fifty tons per day. Continued bad weather reduced the effectiveness of aircraft, and the supply net behind the armies rapidly improved with the advancement of railheads into forward areas and the continued improvement of roads. During this period the effect of air lift was negligible.

As the weather continued to improve in March and the tempo of the offensive was stepped up, there was a gradual increase in air supply. By 26 March the number of divisions across the RHINE River had increased to five armored and fifteen infantry and as yet no railroad bridges were in operation. While the building of rail bridges in each army was progressing with all

possible speed, nevertheless it was evident that if supplies were to keep up with the speed of the advancing armies, air supply would be essential. During the month of April, 19,550 sorties were flown and 47,709 tons of supplies were delivered by CATOR to forward areas. Between 30 March and 9 May 22% of all the gasoline delivered to the Third Army arrived by airlift. This delivery by air prevented the army reserves from falling to a dangerously low point. Eleven percent of all rations received during this period was delivered by air. Only the most critical Class II and IV items were transported by air at this time. Included among these supplies were bogie wheels and treads for medium tanks, spiral-four cable, medical supplies, and blankets. During this last phase all Third Army medical patients, a total of 19,905, were evacuated by air as no hospital trains ran east of TRIER. During the period in which the First Army advanced beyond the RHINE bridgehead 10% of all supplies transported to that army was delivered by air. At that time this 10% margin, which consisted of critical items, was delivered directly to forward truckheads and army supply points involving an average saving in truck miles from the nearest railhead of 213 miles. First Army stated this made the difference between the success and failure of the supply situation in support of the army. A total of 14,137 casualties and 23,260 Allied PWs were evacuated by air from the First Army area during April.

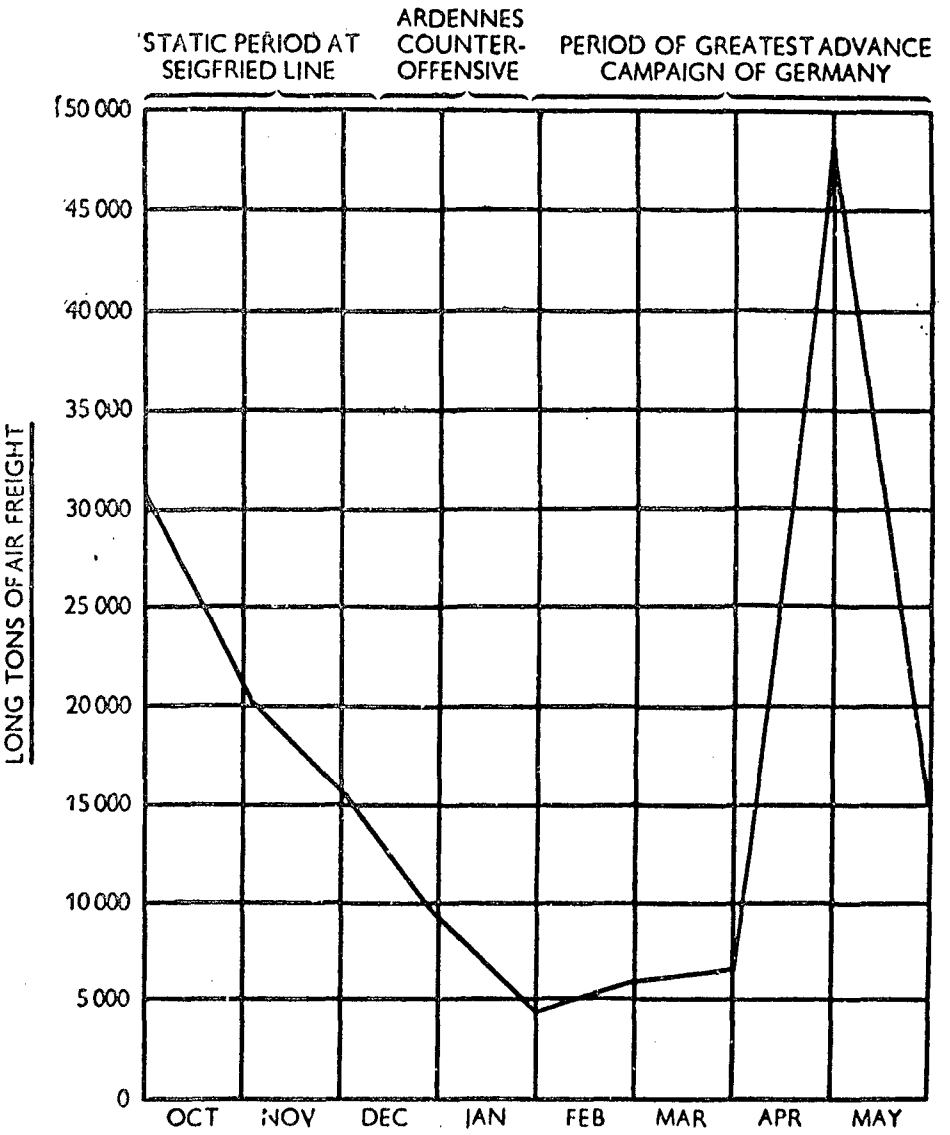
RESULTS OF AIR SUPPLY AND EVACUATION

It was during the later months of the war that supply and evacuation by air proved to be most successful and therefore most useful to the units supplied. As a result of these later operations the following points in the technique of air supply and evacuation were conceived.

The need for a simple procedure in calling forward supplies was demonstrated. Very often communications were lacking and this added to the difficulty in requesting supplies. A liaison plane could be used to advantage for this purpose. Armies should obtain the necessary clearance for the use of air fields for supply and their retention for that purpose if air tactical operations permit. Armies should have centralized control on the field and maintain trained personnel at the fields to unload planes. The evacuation of wounded by air is essential in a rapidly moving situation and the movement of evacuation hospitals by air is both practical and desirable.

LONG TONS OF AIR SUPPLIES DELIVERED BY CATOR

OCT 1944 TO MAY 1945



Graph shows the effective use of air supply during periods of rapid advance. Complete figures are not available for the months of July-August-September 1944. All classes of supplies were considered in totals, however, air supply was chiefly confined to critical items such as POL, ammunition, medical supplies & rations.

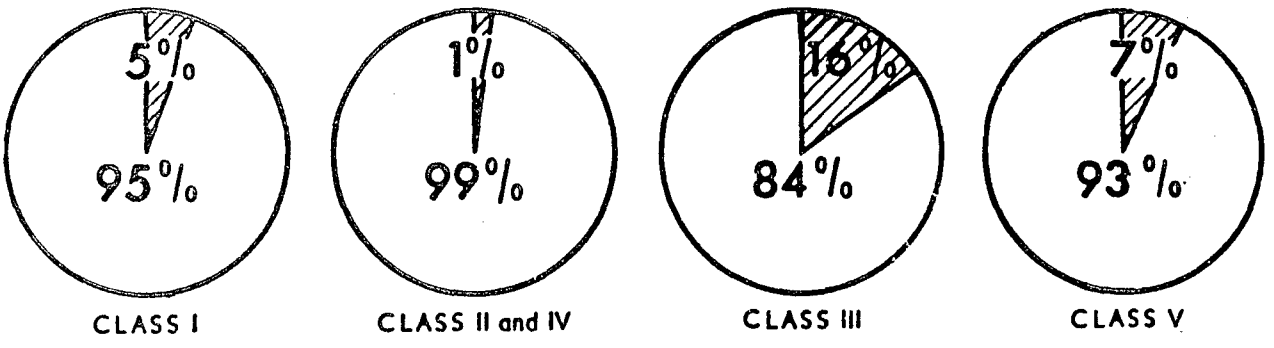
Monthly Average Tonnage: **15922**

Total Tonnage Delivered: **127377**

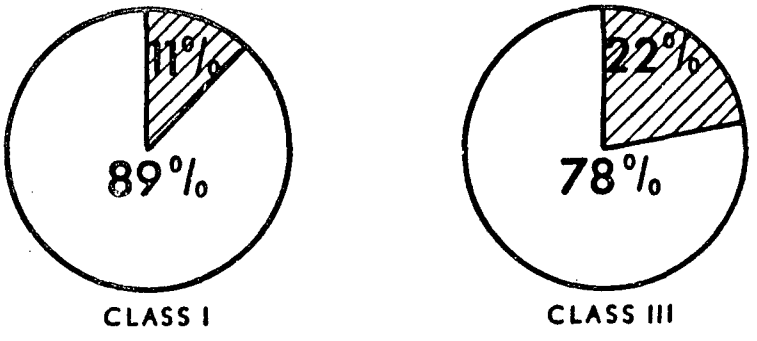
Totals include supplies delivered to all army groups.

PLATE 4

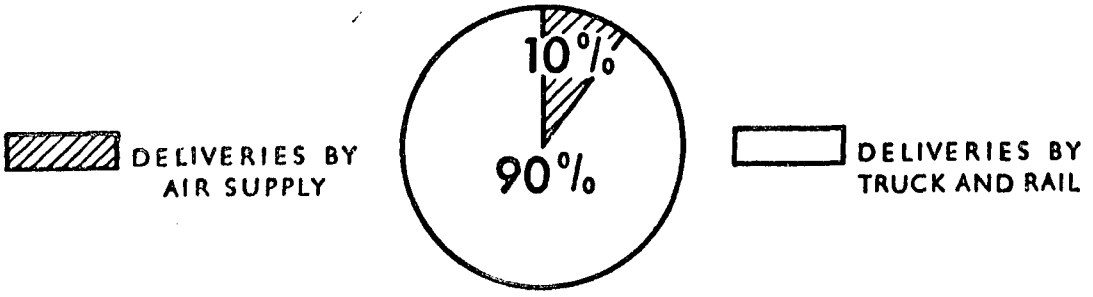
COMPARISON OF DELIVERIES
BY AIR AND DELIVERIES BY RAIL AND TRUCK FOR THE PEAK MONTH
(APRIL 1945)



FIRST ARMY



THIRD ARMY



TOTAL OF ALL CLASSES OF SUPPLIES
DELIVERED TO FIRST ARMY IN APRIL WAS 143741 TONS OF WHICH 14921
TONS WERE DELIVERED BY AIR

PLATE 5

The results obtained through resupply have proven to be invaluable in maintaining supply levels of rapidly moving armored units and isolated units. It has been pointed out that rarely does air lift provide the major means of transporting supplies, but that this means of transportation did provide the much needed items in the shortest possible time. Air supply, then, provided the extra augmentation to other types of transportation, which in several cases made the difference between success and failure of an operation. Furthermore, the effect on the medical problem should not be overlooked. The high rate of recovery of wounded personnel can be directly attributed to rapid removal to well equipped centers of hospitalization. Air resupply and evacuation were responsible for the slight extra push which the armies needed occasionally to execute the tactical missions assigned them.

CHAPTER VII

EFFECTS OF AI.. ACTION ON OUR OWN MAINTENANCE AND SUPPLY

GENERAL DISCUSSION, TRANSPORTATION AND COMMUNICATION

In any attempt to evaluate the effect of our own strategic and tactical bombing on the supply and maintenance problems of our armies, certain factors are at once apparent. First, Europe, prior to the war, had the most highly developed transportation system in the world. Continental road and rail nets were in many instances duplicated with the view of meeting possible military needs. The same situation existed in signal communication; the telephone net was so designed as to permit the widest flexibility in event of damage to any part of it. Of equal importance is the fact that while our supply systems eventually supported sixty-one divisions over supply lines reaching from CHERBOURG in the NORMANDY Peninsula to the DANUBE and ELBE Rivers, nevertheless this problem was met by the use of only a fraction of the existing transportation system. The high degree of industrialization that existed in Europe prior to the war also made it physically impossible to destroy all heavy industry. Accordingly, many facilities were left in France, Belgium, Luxembourg and Germany which could be put to use in restoring the transportation and communication system.

NOR

TRANSPORTATION

EFFECTS ON RAIL TRANSPORTATION

It is extremely difficult to distinguish between the damage done to the transportation system by bombing and by enemy demolitions. This was especially true during the period of the drive across France, Belgium and Luxembourg. Opinions expressed here as to the damage attributed to air and to enemy demolitions or battle damage are based upon records maintained by Engineer and Transportation Corps which made the repairs and operated the lines, and upon the problems encountered by army commanders in maintaining supply as our forces moved east. These studies lead to the opinion that bomb damage of the transportation system, while considerable in certain instances, was not a major factor in influencing the flow of supplies. The general opinion expressed was that our bomb damage merely augmented the damage caused by enemy destruction of bridges, rails, and road facilities. The overall effect of our air attack on the transportation system was not felt

to a great extent by our supply system. If the main routes were severely damaged we were always able to utilize alternate rail or road nets without making extensive repairs. Meanwhile the main routes were usually put back into service without seriously delaying our supplies. There follows an analysis of studies on each of three rail systems which were of major importance in the campaign; i.e., rail system from NORMANDY to PARIS and next the two principal rail routes leading out of PARIS to First and Ninth Armies on the north through LIEGE and to Third Army on the south through REIMS and VERDUN.

During the first weeks of the war while the First and Third Armies were contained in a relatively small area in the beachhead, there was no problem of delivering supplies by rail since all supplies were picked up at the beach and delivered by truck to the ultimate destination. Therefore, whatever damage air bombing had on the rail system was not felt immediately.

NORMANDY

A study made of the damage to the rail net in NORMANDY indicates that in the repairs made on the railroad from CHERBOURG to ST LO, completed by 12 August, air bombing had been responsible for only 5% of the damage to the railroad tracks from CHERBOURG to the rail junction of SOTTEVAST and that enemy demolitions and sabotage by the French themselves, to prevent the removal of rolling stock, had caused the damage to marshalling yards. This destruction by the Germans and French required a total of 125 company days of engineer maintenance to put the double track rail lines back into operation. From SOTTEVAST to ST LO a total of four major railroad bridges were rebuilt; of these, three had been destroyed by enemy demolitions, the fourth was 80% destroyed by air. The open track and marshalling yards in the vicinity of LISON and ST LO were greatly damaged due to air attacks. However, in the overall company days required to put the line into operation, the engineers estimate that of 155 company days of labor only 50.5 company days (or approximately one third) were due to air damage. This is of note because this sector was bombed extensively by our air force prior to the invasion and in conjunction with the attack at ST LO.

An analysis of the work required to repair the two way track from ST LO to VERSAILLES indicated that air bombing was responsible for most of the damage done to the marshalling yard at COUTANCES, FOLLINGY, DREUX and TRAPPES. Of the 250 company days required to restore the line to use, 144 days or 57% of the total company days were charged against air damage. The southern route which ran through AVRANCHES, RENNES, VITRE, LE MANS, CHARTRES and ETAMPS, eventually to be extended to NANCY, was rebuilt with considerably

less effort per mile of track although complete figures as to the company days of work required are not available.

After the fall of PARIS on 27 August it became apparent that road transportation had reached its limit and that operations would suffer until the railroads could assume a large share of the traffic of supplies to the forward depots. As of 27 August the rehabilitation of railroads was accomplished only to LE MANS (double track) and CHARTRES (single track). Throughout September and October the reconstruction of the railroads was pushed to the utmost. From PARIS the northern route ran through SOISSONS, LAON, HIRSON, GEMBLOUX and LIEGE with a north and south link through NAMUR, BASTOGNE, LUXEMBOURG and joined the southern route at CONFLANS just west of METZ.

NORTHERN ROUTE TO FIRST AND NINTH ARMIES

The damage to the railroads from VERSAILLES northeast to LIEGE required a total of 71 company days to repair. Of this total over 53 days were charged against damage by air attack or slightly over 70% of the effort expended to repair the line was attributable to air damage. The repair of the rails from LIEGE to AACHEN, a period when the Army was fairly static, required 174 company days of work of which 20% or 27 company days of work were charged to repair of damage done by air. This is a startling reversal from the preceding period when over 70% was charged to air damage.

As Ninth Army advanced east to the RHINE in Operation GRENADE, of the time required to restore the rails from BAAL to KREFELD to WESEL 30 company days of the total of 99 company days were charged against air damage. This is slightly less than 30% of the total company days which are chargeable to damage by air power. Engineers estimate that air bombardment was responsible for only 10% of the damage done to the RHINE River bridge at WESEL and charge only 177 company days of the total 1774 company days against air damage.

SOUTHERN ROUTE TO THIRD ARMY

Along the southern route which supplied the Third Army, the damage caused by air attack was very much less than on the northern route. On the repair of track from LAON, REIMS, VERDUN, ARNAVILLE, only 12 company days of the total of 90 company days were charged to air attack. This indicated that only about 13% of the damage was due to the air effort.

During the static period of the Third Army in October, November and December, when rebuilding the THIONVILLE-BOUZONVILLE sector, of the 124 company days of work required only 12 were due to air damage. This gives the very low figure of slightly over 10% damage due to air.

AIR ATTACK ON MARSHALLING YARDS

Air attacks on marshalling yards in front of our advancing forces were of course, directed at these facilities to destroy the rolling stocks and the goods therein as often as to interfere with the rail net. For this reason, aspects of these attacks as they affected our own problems desire some special consideration. As a rail facility, marshalling yards received the greatest damage and from that point of view were generally destroyed beyond any actual need to render them unserviceable. Despite the fact that engineers who repaired and maintained the railroads feel that marshalling yards had been damaged 60% beyond that necesssary to obtain interdiction in France and Belgium and at even a higher percentage in Germany, they found that the determining factor in opening lines to our own rail traffic was the rebuilding of bridges, such as over the RHINE, and the repairing of through lines to the armies.

DIFFICULTIES ENCOUNTERED

Generally, while large amounts of rolling stock were destroyed in the yards, an adequate amount remained to meet our requirements. In this connection, the chief difficulty in obtaining rolling stock lay in the fact that it was often loaded or located in areas of the yards that had been cut off from the main line by bombing and could not be made available until considerable rail trackage had been restored. Soon after the first bridges were open across the RHINE there was a critical shortage due to this factor and due to the fact that we had insufficient yards reconstructed for off-loading to utilize our own rolling stock.

The first objective of the Railroad Construction Engineers was to open up a line to the destination desired. To this end often a single track or possibly a double track only was laid through a bombed-out marshalling yard. This was sufficient for the movement of a very limited amount of freight, for the main line soon became choked with traffic which could neither be unloaded properly nor switched for storage. It is essential that storage and facilities for unloading cars be available at the railhead. This was emphasized in the latter part of April when the railroad into the Third Army area was geared to clear one train each hour over the RHINE River. It was, therefore, necessary to unload or arrange for storage for one train per hour since there was but a single line operating into the Third Army sector at that time. This led to the Army railhead being located in several instances in less desirable places, because the yards were captured in better condition. As an example, the marshalling yard at FURTH, Germany, was selected when tactical conditions dictated that the yards at NURNBERG would have served best.

Another particularly important result of the attack on rail facilities was the damage caused by strafing and bombing of water tanks along the right-

of-way or in the yards. This created considerable difficulty in reopening the lines and at one time during Third Army's push from the MOSELLE to the RHINE, threatened seriously to curtail railroad service. This was averted by hauling water and by constant effort directed at putting the water system back in partial operation.

In summarizing effects of air attacks on our own use of rail transportation, it can be concluded that the effect on the enemy far outweighed the later inconvenience to our own forces, and that usually the damage to these facilities caused by the enemy as he withdrew was at least two to three times as great as the damage by our own air forces except perhaps in the case of marshalling yards. It is believed, however, that a more careful fitting-in of our interdiction programs with the proposed areas of communications for supply would exempt certain sections of rail lines, and a few key marshalling yards, from air attack without interference to the interdiction of the enemy areas and with a great simplification to the problem of rail rehabilitation.

Air attack on road communications did not materially affect our own supply problems. The only real effects were in some instances the destruction of road bridges. However, except along the SEINE-LOIRE interdiction line, road bridges were seldom a part of the bombing program. In addition, when the movement of our ground forces was rapid, the air forces were specifically requested to desist from bombing road bridges along the route of advance. In December and January the road nets along a front that had been stabilized suffered greatly from lack of maintenance and the winter weather. While the situation was serious for a time it was not due to prior bombing. Incidental effects of our strafing and bombing attacks of enemy vehicles on roads did, of course, add to their deterioration to a degree, but are minute compared with other factors.

Attack of communication centers along main routes did, at times, exert a local reduction in the rate of flow of our motor traffic but this effect was more than outweighed by the previous disadvatage to the enemy. Some difficulty was experienced during the last phases of the battle of the ARDENNES in following closely the disengagement of the enemy from the bulge through a restricted road net which had been well bombed at the choke points. Usually, the road net was so extensive that by-passes could be made about towns which the enemy himself had not already cleared.

As has been brought out in previous chapters, our air attacks on German motor transportation was one of our most effective offensive measures and

ATTACKS ON ENEMY MOTOR TRANSPORTATION

paid rich dividends. This destruction of his military MT, and considerable civilian transportation which had been impressed, had no effect on our own logistics because we had never planned to use it and had based our own supply plan on complete independence in this regard.

Some indirect effects of the dearth of motor transportation in liberated and conquered countries resulted in slight diversions of army transportation to maintain civil economy, such as the supply of food to PARIS by both air and other means, and towards the end of the war in the movement and supply of great numbers of displaced persons.

EFFECTS ON PORTS AND INLAND WATERWAYS

The bomb damage to port installations and ports was negligible compared to the enemy's own detailed and thorough demolition of these facilities. In the second place, once invasion was launched, particular care was taken by both air and ground forces to avoid bomb damage to ports which were to be on our own supply lines. While it is estimated by the Communications Zone that 15% of the total damage to the Port of CHERBOURG was caused by our bombing, only 1% of the total effort necessary to put this port in operation could be allotted to repair of bomb damage. This was because the enemy had previously made some repair and also due to fact that all facilities were not needed to meet our military requirements.

Granted that the delay in opening ports created a serious situation in the fall of 1944, when on 30 October the backlog of ships awaiting discharge numbered a total of 243, air attack of ports, which, after invasion was made only to assist their capture by the ground forces, was not a factor worth consideration.

Similarly, bomb damage to inland waterways, particularly as it affected locks and barges, had no real adverse reaction to our own supply situation. Again most of the damage was caused by enemy demolition. While many barges were sunk by our own air forces, there were sufficient remaining to meet the requirements of the Communications Zone when it commenced to use these inland waterways. It is estimated that not over 8 to 10% of the damage to inland waterways can be attributed to bombing. In some cases extra difficulty was caused through the bombing of bridges over canals which required additional labor in their reconstruction due to necessity of making removable center sections which would permit the passage of barges. Otherwise, bomb damage was repairable to the extent that from January through May 1945 a total tonnage of 1,065,964 long tons was transported on inland waterways by the Communications Zone.

UTILITIES AND SIGNAL COMMUNICATIONS

The damage to utilities and signal communications was generally incidental to bombing of cities, rail installations and other objectives, and except for the signal communications feature of Operation CLARION, no concerted program was launched against these facilities.

There is no doubt that a secondary effect of the bombing of many types of objectives had a distinct harassing and temporary paralyzing effect on the enemy signal communications. This effect on both his military and civilian systems far outweighed the inconvenience and time which was required to put the system back in operation. And again, the systematic demolition by the enemy of repeater stations and signal centers created more damage than our bombing.

DAMAGE TO MILITARY AN CIVILIAN HOUSING

Actually, at levels below the army, it was not practicable except in stabilized situations, to use the existing telephone systems. However, at levels of army group, communication zone, and army, enemy signal facilities were always converted to our use as rapidly as possible. Some difficulties and delays were, of course, encountered, but were obviated by original plans to install from our own sources at least 50% and if necessary 100% of the required trunklines and cables.

Water supply systems were damaged but it was not until other rear area installations or hospitals had moved into the districts affected that it was necessary to repair them for military use. Although attacks prior to D-day damaged some of the large transformers and substations of the main French transmission grid, service was readily restored due to the highly integrated nature of transmission systems which permitted alternative lines and power sources.

FIXED INSTALLATIONS

DAMAGE TO HEAVY INDUSTRIES

The damage bombing caused to the enemy's heavy industries was great and accounted in a measure for his inability to continue the war. However, because of the highly developed and decentralized industry that had been organized and the fact that attacks on industries in France and Belgium were not concentrated, the air did not destroy all the installations which could be used by our armies to augment supplies. There were several outstanding examples in which we were able to take over the operation of plants and turn the output to our supply needs. The most striking example was the DIFFER-DANGE Steel Mills which were captured intact. These mills manufactured

rolled steel "meter" beams so necessary in the repair of railroad bridges. Without the use of the facilities of these mills the rehabilitation of the railroad systems would have been seriously delayed. There are other examples of Communication Zone taking over existing factories to manufacture such important items of supply as steel tracks for tanks, cloth, camouflage nets and tire manufacturing facilities. This saved a considerable total tonnage of shipping. The general opinion is that there were sufficient manufacturing facilities remaining undamaged to meet our requirements.

DAMAGE TO MILITARY AND CIVILIAN HOUSING

It has been estimated by the Installations Branch of Communications Zone that about 80% of the overall damage to civilian and military housing was caused by bombing. Only in static situations, such as existed in the attack on the SIEGFRIED LINE and the counteroffensive of the ARDENNES, did the destruction by artillery exceed the damage by air. In spite of this extensive damage caused by aerial bombardment the armies were not seriously affected by the lack of housing during the campaign as a whole. In the case of billets, for example, it had been anticipated that only one third of the requirements would be met with existing structures. Actually about half of the number required were found in usable condition. Many others could be put in condition for occupation with minimum of repair. It was only during the winter months and particularly in the Campaign of the ARDENNES, that the divisions and corps reported a serious shortage of housing for the troops.

PART TWO

COMBINED EFFECTS OF TACTICAL AIR EFFORT ON VARIOUS TYPES OF MILITARY OPERATIONS

INTRODUCTION

The preceding chapters of Part One have treated of overall effects of the various air forces and types of air effort on operations. Inasmuch as this campaign was a series of joint air and ground battles, it is believed worthwhile to investigate the combined effects of air effort on the various types of ground operations, such as landing operations, limited objective attacks, assaults of a defended river line, fortified areas, and others. Accordingly, the following chapters will each deal with a definite type of ground force action and will narrate several examples thereof, with emphasis on the combined air effort which was employed.

It will be found that in all these examples, the full benefit of air superiority was enjoyed and again, in every case, formed the outstanding contribution of the air force. The contribution made in the pursuit of the remaining two missions, of isolation and close support, which perhaps are more closely allied to ground operations, are accordingly analyzed in the chapters that follow. These cases have been selected from campaigns conducted at various periods so as to represent as well as possible the air cooperation given the ground forces throughout the campaign. The air cooperation encompassed not only the efforts of the tactical air force, but also the efforts of the strategic air force operating in a tactical role.

CHAPTER VIII

LANDING OPERATION

NEPTUNE (6 JUNE 1944)

The assault on the continent of Europe, made over the beaches of the COTENTIN Peninsula in NORMANDY was the most difficult of all the various types of operations we have entered upon in this campaign. Months of careful searching and all-encompassing planning in the pre-invasion period stood to be lost if the assault forces could not get ashore over the sometimes cliff studded, sometimes marshy areas with shallow beaches that had been selected as our points of entrance; and once ashore, hang on, fight forward, and secure a lodgement area for the build-up of fighting and service forces and supplies that must follow.

For weeks the area chosen for the assault was, prior to the actual invasion, the object of intensive reconnaissance and of softening-up and interdiction attacks by the American Eighth and Ninth Air Forces and the RAF. Concurrently with these air attacks on the actual area chosen, this same scheme of attack was extended along the French channel coast area to the PAS DE CALAIS as a part of the general cover plan.

AIR PLANS FOR INVASION

For D-day itself an air plan integrated with the ground plan and of a scope never before reached, was developed. The plan envisioned participation by all elements of the Eighth and Ninth Air Forces and the RAF. The RAF coastal command would patrol the channel for submarines. A constant fighter cover would be flown to protect the endless convoys from the air. During the night 5—6 June, two American airborne divisions would drop near the base of the COTENTIN Peninsula and a British airborne division on the ORNE River near CAEN. Also during the night, the RAF Bomber Command would attack a possible total of ten coastal batteries in the immediate invasion area. At daybreak 1200 heavy bombers of the Eighth Air Force would attack eight enemy coastal defense batteries in the OMAHA Beach area, and additional batteries on the British beaches as far east as the SEINE River Estuary. Simultaneously with the effort of the Eighth Air Force, eight groups of medium bombers of the Ninth Air Force were to attack seven coastal defense batteries on the south coast of the COTENTIN Peninsula in the UTAH Beach area. Fighter bombers were to be employed as stated above in area cover to protect the convoys both

in the transport area and the channel generally, to fly armed reconnaissance over the beachhead area, to fly preplanned request missions from the assaulting ground units, and to provide area cover of the beachhead to a depth of several miles. This ambitious plan, covering all three priority phases of maintaining air superiority, isolation of the battle field, and close support to the ground forces was effective, as we shall see, but could have been more so had we been able to utilize experience gained in later operations.

AIR ATTACKS BEGIN

Prior to daylight on D-day the RAF initiated attacks on the coastal defense batteries. At daylight and just prior to H-hour 320 medium bombers of the Ninth Air Force attacked seven coastal batteries on UTAH Beach plus the MAISY and POINTE DU HOE batteries to the east, dropping a total of 606 tons of bombs. At the same time 1077 B-17 and B-24 heavy bombers attacked coastal batteries in the American OMAHA Beach area and the British sector with 3096 tons of bombs. The coastal batteries were the primary targets, but at the same time it was hoped that the combined efforts would produce a saturation bombing of the areas attacked and destroy or neutralize all materiel, and kill or make impotent through shock effect the personnel therein.

Heavy and medium bomber attacks were repeated throughout D-day with varying degrees of success. For its second mission the Eighth Air Force dispatched 480 heavy bombers to attack targets in the CAEN area, although weather prevented all but thirty-seven of these aircraft from attacking. On a third mission 53 heavy bombers again attacked targets in the CAEN area dropping 157 tons of bombs, and on the fourth mission 220 B-17's dropped 590 tons of bombs in separate attacks on targets in the LE HAVRE and LAVAL areas. In succeeding missions of the Ninth Air Force, medium bombers made attacks on VALOGNES, CARENTAN, ECOUCHE, GATTEVILLE, FALAISE, CAEN, TROUVILLE, BENERVILLE, and HOULGATE. A total of 335 medium aircraft made these attacks dropping nearly 500 tons of bombs.

The bombing prior to H-hour on D-day did not achieve the saturation effect, nor was it sufficiently intense, but the coastal fortifications in CALVADOS and the east COTENTIN proved much less formidable than had been expected. This part of "Fortress Europa" failed to function as a fortress. A contributing cause of this failure was the intensive air bombing before D-day and combined air and sea bombardment in the opening stages of the operations. A number of batteries were put out of action before the landing began. A few batteries capable of firing acquitted themselves creditably until they were put out of action finally or captured. The subsequent bombing of VALOGNES,

CARENTAN, CAEN, and other communication centers was effective in harassing the enemy's effort to put into execution his plans for the shifting of reserves to meet the invasion, as shown in an analysis of statements of von Rundstedt and others in Part Three hereto.

V CORPS ASSAULTS OMAHA BEACH

The V Corps had the mission of assaulting OMAHA Beach to the east of the VIRE River Estuary. The 1st Infantry Division made the initial assault with the 16th Regimental Combat Team of that division and the 116th Regimental Combat Team of the 29th Infantry Division attached, together with elements of the 2d Ranger Battalion which were given the special mission of destroying the enemy coastal battery at POINTE DU HOE. When the initial assault had been made the remaining elements of the 1st and 29th Divisions were to come ashore rapidly, followed on D plus 1 by the 2d Infantry Division.

This assault landing was made at 0635 on D-day on schedule, but great difficulty was encountered initially by the leading elements and it was not until late afternoon that the beach had been cleared of organized resistance and the high ground rising abruptly from the beach secured. That the air forces assisted materially in this landing is shown by a statement of the 1st Infantry Division Commander who became, later, the V Corps Commander. This statement in substance was: "The air force [fighter-bombers] gave assistance by area cover which was superb, fighter sweeps, and dive bombing and strafing which proved effective, preliminary communication disruption, and continuous interruption of enemy troop movements. Sorely needed was a softening-up of the beach defenses by medium and heavy bombers. This would have to be accurate and of sufficient strength to insure the elimination of certain strong points immediately prior to the assault. The lack of this success was keenly felt during the NORMANDY assault".

While agreeing with the statement of the 1st Infantry Division Commander quoted above it should be added here that the matter of control of fighter bombers, in operations on D-day, and subsequently until the First Army—IX TAC Combined Operations Center was established, left much to be desired. Armored column cover, as outlined in the chapter on fighter bomber activity, had not been accepted at this time, and its absence as a planned part of the assault retarded the effort of the ground echelons.

PROCEDURE DELAYS AIR SUPPORT

Requests for pre-arranged (planned) air support were submitted by armies to Main Headquarters 21 Army Group G (Air) Section at UXBRIDGE (England) which in turn forwarded them to the air force for execution. Requests from advanced ground units for direct support were transmitted by tactical air

liaison officers with these ground units, directly over tactical air communication channels to UXBRIDGE. Requests from corps or army headquarters were transmitted over the same channel direct to UXBRIDGE. In theory, air officers on headquarters ships in the assault area controlled fighter bomber aircraft already in the area, and, when possible or deemed advisable, vectored the aircraft to urgent targets.

The ineffectiveness through excessive delay of such a system became apparent quickly after the initial assault in both the V Corps and VII Corps zones of attack. In the light of our later experience it is evident now that our great need at that critical time was for "armored column cover", called, if you will, "assault area alert" or "air alert." Tactical air liaison officers, or as they were known at that time, air support party officers, with the assault ground echelons were among the first to realize this, and, having realized it, improvised as much as possible to secure the fighter bomber aircraft. In these instances of urgent necessity, TALO's made radio contact directly with squadron leaders in the air, and by persuasion, cajoling, or entreaty, sometimes succeeded in diverting these squadrons from the missions they might be on at the moment to their own unit's immediate needs. While this was not condoned, the practice produced results, however inadequate, at an opportune time.

The VII Corps, given the mission of assaulting and securing UTAH Beach to the west and north of the VIRE River Estuary, initially landed with greater speed and less opposition than the V Corps units. Prior to H-hour, and during the night of 5—6 June 1944, the 82d and 101st Airborne Divisions had made successful though scattered drops in the rear areas of the VII Corps assault zone. This is discussed more in detail in a later chapter. At H-hour (0630) on 6 June 1944 the first elements of the 8th Regimental Combat Team of the 4th Infantry Division went ashore, followed later that same day by the 12th and 22d Regimental Combat Teams of the same division. The initial assault progressed rapidly and although the enemy kept up a sporadic fire on that beach all day, the movement ashore proceeded in an aggressive fashion and without excessive losses.

UTAH BEACH TAKEN

A great deal of the success of these beach landings was due to the information furnished and the support rendered by the Ninth Air Force. During the period from 15 May to 5 June 1944, tactical reconnaissance planes frequently had been over the proposed beachheads on low-level oblique photographic missions of proposed landing zones, and drop zones for the airborne divisions. At the same time, for deceptive purposes, double the number of missions was exe-

NINTH AIR FORCE PLAYS IMPORTANT ROLE

cuted over the PAS DE CALAIS area to assist in holding there as many enemy divisions as possible and to furnish information of movement from that area to the assault area.

Ninth Air Force bombers flew an approximate total of 2250 sorties during this same period against enemy airdromes, bridges, tunnels, marshalling yards, and coastal defenses.

On D-day between 0352 and 2340 hours, eighteen groups of Ninth Air Force fighters flew an approximate total of 2300 sorties, accomplishing planned missions of area cover, armed reconnaissance, escort to bombers and troop carriers, and to a lesser degree, close air support. That the fighter cover was adequate is attested to by the fact that during daylight hours of 6 June, only two or three single enemy aircraft were sighted! Enemy air activity was more intensified on the night of D-day, and subsequent nights, which reflects the effectiveness of our day fighters, but showed a need for more extensive night air activity on our part. Although the other air missions did not completely reduce enemy resistance on the beaches, it was of assistance to the ground forces, and, undoubtedly, kept them free from serious enemy attack. At the same time it gave the ground troops confidence in the protection that they were receiving from the air while they were accomplishing their difficult assault missions. The commander of the VII Corps assaulting UTAH Beach states, "the air forces provided their greatest assistance in these operations by protecting our troops from enemy aerial attack and by disrupting his communications and limiting the movement of enemy reserves". These three factors were essential for success of the ground attack.

A study of this most difficult operation shows that, in summation, the air was effective on D-day by its (a) air superiority, (b) previous reconnaissance and interdiction programs, and (c) sheer weight of mass. For our effort on that, and succeeding, days of the initial assault, the contribution of the air forces was extremely valuable. However, if more direct air-ground communications had been established, the effect could have been better in third priority missions of close support to the ground forces.

CHAPTER IX

LIMITED OBJECTIVE ATTACKS

ELLE RIVER TO ST LO BAYEUX ROAD (7—18 JULY 1944)

ATTACKS TO IMPROVE POSITION

When the port of CHERBOURG had been captured, there was a regrouping of units within the First Army preparatory to a drive toward the base of the COTENTIN Peninsula to the south. Limited attacks were made by the various corps from the period 26 June to 24 July 1944. The object of these attacks was to get out of the swampy areas to more solid terrain, and to a road net which would permit a powerful concentrated attack to break out of the beachhead. These limited attacks were directed at objectives along a general line from COUTANCES on the west, east across the army front through ST LO to the left boundary of the British sector.

TERRAIN AND COUNTER-ATTACKS SLOW PROGRESS

XIX Corps was assigned the mission of attacking and securing the key communication center of ST LO and surrounding area. The 29th and 30th Infantry Divisions attacked abreast, the former being given the mission of assaulting the town. The terrain over which the battle had to be fought was low and rolling, divided by thick hedges into relatively small fields. This "Bocage country" afforded an abundance of natural fortifications to the enemy, with ample concealment, many narrow sunken roads, and other advantages of which maximum use was made.

ATTACK

This limited objective attack was launched in the early part of July 1944. The divisions made steady, though slow progress against extremely well emplaced infantry and self propelled guns. The enemy fought determinedly to maintain his lines as he was pushed back by the weight of our attack, and for several days gains were reported in terms of 200 to 500 yards. Throughout this attack the enemy launched repeated, small-scale counter-attacks to hold or regain dominant terrain features. However, on 18 July, after much bitter fighting, ST LO fell to a special task force of the 29th Division while the surrounding area was being mopped up by other elements of the corps.

AIR SUPPORT

Direct tactical air support was available to the XIX Corps units during this attack. On request to the IX Tactical Air Command — First Army Combined Operations Center, fighter bombers attacked specific targets on the front, and armed reconnaissance missions were flown to the front of the XIX and adjacent

corps, to deny the enemy use of road nets. Attacks were made against all movement seen.

AIR CLOSE SUPPORT SOFTENS DEFENSES

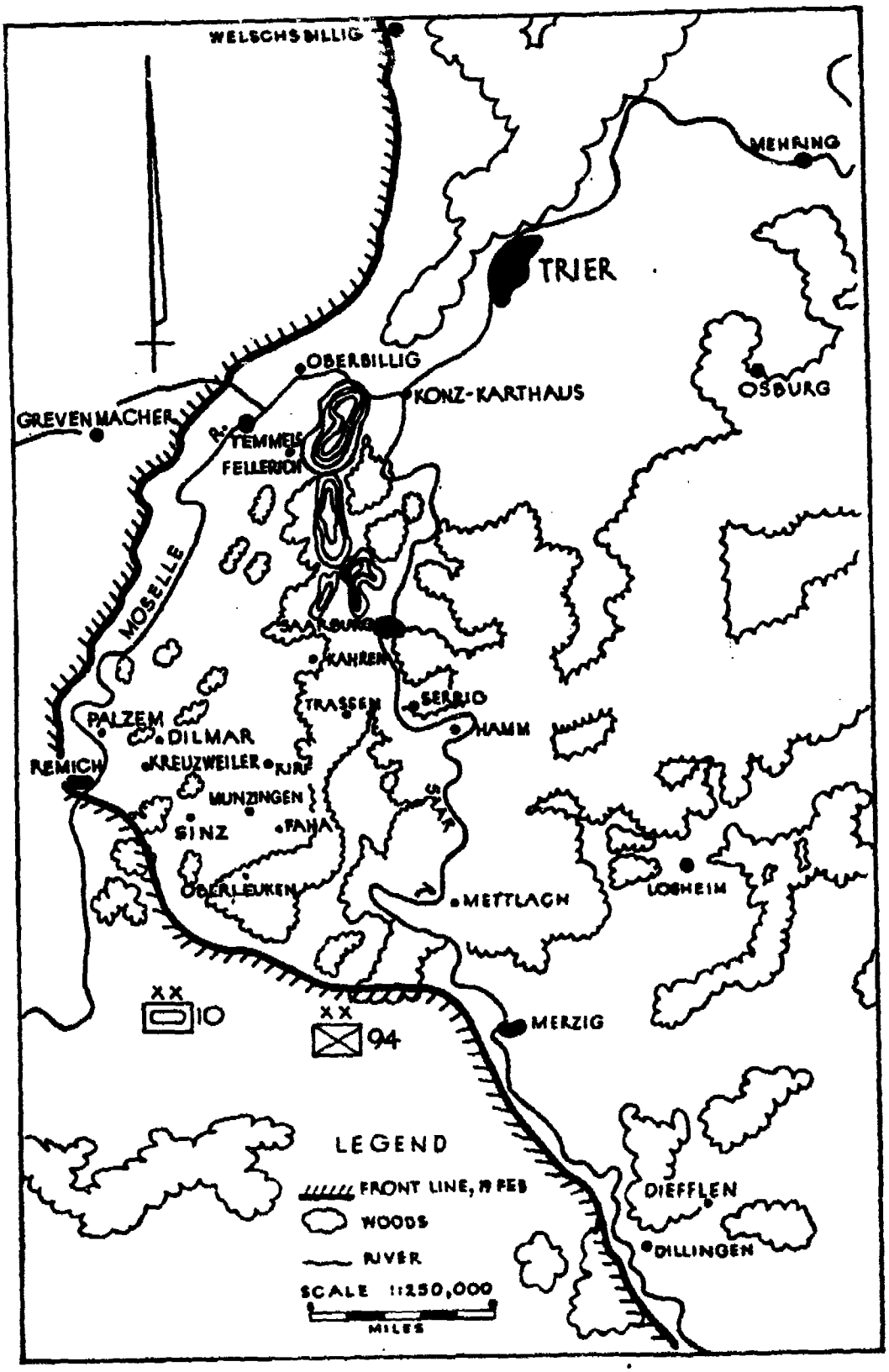
Close support attacks by fighter bombers during this battle were made chiefly against strong points, enemy troop formations, gun positions, field fortifications, self propelled guns, etc. In addition to actual attacks made, and as attested by reports of the commanders concerned, great benefit was derived by the mere presence of fighter bombers in the area. Enemy artillery was noticeably quiet when they were present. Attacks on defended villages consistently made them easier to occupy by our troops, as was also the case in most instances of attacks on field fortifications and key centers of resistance.

During this attack, as was true with similar attacks being made concurrently by other corps of the First Army, the fighter bomber appeared to be one of our most effective weapons. For example, at the beginning of this advance to secure ST LO, elements of the XIX Corps attacked southwest across the VIRE River at 0430 on 8 July. German plans called for their crack Panzer Lehr Division to attack north along the VIRE River on the same day with the mission of containing our advance and, if successful, driving a wedge into the American sector. According to a statement of General Bayerlein, commanding Panzer Lehr, he desired to move into position to attack at night, but was overruled by higher headquarters and ordered to move and attack in daylight. At 0530 on 8 July his attack was launched as planned, and gains were made during the morning. However, fighter bombers of IX Tactical Air Command were brought into play and assisted the corps in breaking up the attack and forcing the enemy to withdraw to defensive positions in the vicinity of PONT HEBERT.

ARMED RECONNAISSANCE HARASSES REINFORCEMENTS

At noon on 9 July to recoup the losses incurred on 8 July, Panzer Lehr Division attempted to bring up reinforcements. A formation of partially trained paratroopers, being brought forward to fight as infantry, was hit near LE CHAMPS DE LOSQUE by ten fighter bomber aircraft using bombs, machine guns and 20 mm cannon. Again, according to Bayerlein's report, within five minutes there were more than two hundred casualties out of a total of 1500. This baptism of fire so shook the reinforcing unit that it was unreliable for the rest of the campaign.

Armed reconnaissance missions by fighter bombers were so effective that General von Rundstedt, in describing Allied air dominance during the NORMANDY Campaign stated that "aircraft were dominating the main combat area and main supply approaches to a depth of 150—200 kilometers — — — the closer the area is to the combat zone, the more frequently appear fighter



BOMBERS CONTINUE INTERDICTION

CLEARING APPROACHES TO TRIER

SAAR - MOSELLE TRIANGLE 19 FEB 1945

PLATE 6

and fighter bombers in road hunting — — — the main effort of enemy air attacks now is directed in a zone of about twenty kilometers behind the main line of resistance, against any kind of movement, be it secondary road or cross country — — — Whenever assembly areas are detected an attack by fighter bombers is launched without delay".

BOMBERS CONTINUE INTERDICTION

During this same period, the medium bombers were pursuing their mission of isolating the SEINE — LOIRE River area. Though this was not direct support in the sense of the fighter bomber action just reviewed, it was of direct, tangible service to the ground forces by isolation effort. Piecemeal commitment of enemy troops into the battle was the result. Coupled with the armed reconnaissance missions of the fighter bombers, this priority II action provided valuable assistance to the ground troops.

In summarizing, it is believed that the greatest benefit derived from the tactical air forces in this limited objective attack was by means of interdiction and armed reconnaissance missions with emphasis on the latter. This operation, as is usual for limited objective attacks, was of comparatively short duration. The plan of maneuver was well worked out in detail with the full effort of all available ground weapons brought to bear on the objectives. This is not to say that there was no need for fighters in a close support role on specific targets. The contrary is brought out very forcibly above. However, it was the effort of the fighter bomber on armed reconnaissance to deny all enemy movement by day that most decisively aided ground units.

CLEARING THE SAAR-MOSELLE TRIANGLE
(19—23 FEBRUARY 1945)

CLEARING APPROACHES TO TRIER

The SAAR-MOSELLE Triangle was an area amounting to approximately 130 square miles formed by the SAAR River to the east, the MOSELLE River to the west, and the SIEGFRIED LINE to the south. Clearing this triangular area was necessary for the subsequent attack to capture the city of TRIER. The period of this XX Corps attack came after the U. S. Armies had regained the territory seized by the enemy in his December breakthrough. The 94th Infantry and 10th Armored Divisions were in position for the offensive on 19 February, 1945. Detailed plans called for the capture of the high ground west of SAARBURG running generally parallel to the SAAR River, and for an advance to the east and northeast to positions south and southeast of the city of TRIER in order to block enemy exits from that city, preparatory to

[illegible] The terrain over which the attack had to pass was rugged, [illegible] wooded [illegible] presented both natural obstacles to armored attack and well-located sites for defense by the enemy. Many cross-compartment ridges [illegible] the area.

The attack was launched [illegible] by the 94th Infantry Division on 19 February at 0830A hours after [illegible] advanced up to one mile on a four-mile front. The latter was reduced to [illegible] advanced against moderate artillery fire and extensive [illegible] Unfortunately, heavy fighting continued in the 26th Infantry Division's [illegible] Bridgehead to the south.

WEATHER LIMITS AIR SUPPORT

Two [illegible] air [illegible] was prepared to support the ground attack. Fighter bombers were grounded until noon 19 February, but in the afternoon they were able to fly air cooperation for XX Corps and armed reconnaissance in the [illegible] area. Low clouds and poor visibility made targets hard to locate and difficult to observe. Highlighting the day's air activity in providing assistance to the ground attack were claims of nineteen motor transport, twenty-four defended buildings, thirty-five railroad cars, four gun positions, and seven armored vehicles and tanks destroyed or damaged. Several towns in the path of the attackers were bombed and fired by attacking planes, and shortly thereafter our troops entered. Surrender and other leaflets were dropped on the enemy by one 4-plane flight. Bridges on routes leading into the Triangle were attacked, although with generally unobserved results.

ATTACK MAKES PROGRESS

The 94th Infantry Division on 20 February advanced five miles east against heavy artillery fire and stubborn resistance, capturing OBERLEUKEN, FAHA and MUNZINGEN. Reconnaissance units swept north to an east-west line running through KREUZWEILER, made contact with the enemy and were subsequently passed through by the 10th Armored Division. This division, with the 376th Infantry attached, attacked on the left of the 94th Infantry Division at 0700A hours and advanced one and one-half miles north against scattered resistance but through heavily mined areas. Units of the 376th Infantry attacked from the vicinity of SINZ and advanced one and one-quarter miles north against heavy small arms resistance.

Throughout the day fighter bombers were operating under adverse weather conditions to provide air cooperation with the corps. Flying 4-plane missions in close cooperation, they attacked two command posts, destroying several buildings. The towns of ESCHEID, TABEN, and TRASSEN were set afire. Principal claims for the day were thirty-nine motor transport, twenty-two buildings, six locomotives, twenty-eight railroad cars, and fourteen armored vehicles and tanks destroyed or damaged.

FIGHTER BOMBERS SWEEP THE AREA

Good weather on 21 February enabled fighter bombers to continue air cooperation while ground units continued their successes as on previous days. Flying thirty-two 4-plane cooperation missions for XX Corps, XIX Tactical Air Command maintained aircraft over the general area throughout the day to destroy or damage one hundred and forty motor transport, fifty-three buildings, four locomotives, one hundred and eighty-eight railroad cars, one gun position, and seven armored vehicles and tanks. Many towns within and immediately outside the perimeter of the Triangle were bombed and strafed at the request of ground control.

SAARBURG BRIDGEHEAD ESTABLISHED

On the following day, 22 February, 94th Infantry Division units reached the SAAR River in the division zone as far north as SAARBURG. Meanwhile, south of SAARBURG units crossed the SAAR River in strength on a two-mile front and established a firm bridgehead against some small arms and artillery fire. Several more towns, including HAMM and TRASSEN, were captured.

The 10th Armored Division continued its rapid advance to the east to capture KAHREN, SAARBURG, FELLERICH, and TEMMELS. Contact was made with the 94th Infantry Division in the vicinity of SAARBURG. The 376th Infantry followed the advance of the armored units, mopping up isolated pockets of resistance.

During this ground action the bulk of XIX Tactical Air Command aircraft were committed to medium bomber escort. However, two missions, totaling twenty-three sorties, were flown for XX Corps. Because of the early successes of the air-ground team in this limited objective attack, the enemy had largely been cleared from within the Triangle itself. Consequently, almost without exception, air targets were outside the SAAR-MOSELLE Triangle, where fighter bombers continued their assistance by operating on the corps and army front essentially on armed reconnaissance-isolation missions. Claims amounted principally to three tanks, one hundred and forty railroad cars, and twenty motor transport. Night fighters added to the day's efforts with nine patrol and four intruder sorties along the army front. Principal targets were towns, trains, and convoys.

Finally, on 23 February, the last remnants of the enemy were cleared from the Triangle as the 94th Infantry Division continued to cross the SAAR River into the bridgehead area which was strengthened and fortified. House-to-house fighting continued in SERRIG, on the east bank of the SAAR River. The 10th Armored Division mopped up the remainder of the division zone north from SAARBURG and along the SAAR and MOSELLE Rivers to OBERBILLIG. Units of the 376th Infantry established a bridgehead over the SAAR River in the

vicinity of OCKFEN but met resistance west of the town. The fighter bomber aircraft again hit targets which had little bearing or the events already concluded within the Triangle. Flying twenty-three 4-plane flights, one group attacked marshalling yards and rail traffic with high claims, as well as targets on the immediate corps front. Many flat cars were attacked carrying tanks or motor transport with violent explosions resulting. Bombing of the marshalling yards at OBERSTEIN destroyed or damaged thirty cars and caused four large explosions, apparently from ammunition. Nine tanks and armored vehicles were claimed destroyed and four damaged.

CLOSE SUPPORT BECOMES ARMED RECONNAISSANCE

From a study of the ground situation, the progress of the attack, and a consideration of the extent, nature, and timeliness of the air support rendered by cooperating aircraft, we can come to the following conclusions as to the most beneficial effects of air power in this limited objective attack:

ENEMY DEFENSES WEL ORGANIZED

(a) The fighter bomber attacks did not constitute a deciding factor in the success or failure of the coordinated attack to clear the SAAR-MOSELLE Triangle.

(b) The fighter bomber attacks made positive contributions to the ease, speed, and thoroughness with which the ground plans were carried through to fruition. Bombing of defended towns, armored vehicles and tanks, gun positions, motor transport, and horsedrawn vehicles within the area, and attacks against locomotives, railroad cars, supply points, and bridges both outside and inside the Triangle weakened the enemy and added to the confusion and limitations already imposed upon him by the force of attrition.

(c) The effects of attacks of medium and fighter bomber aircraft on special targets and armed reconnaissance, respectively, well beyond the immediate tactical area of the Triangle were to be felt and appreciated later as further drives toward the city of TRIER and deeper into Germany were executed.

PROGRESS FOUND SLOV AND COSTLY

(d) It is significant to note that during the initial stages of this limited objective attack, fighter bomber effort was effectively employed primarily on close cooperation missions. However, as the ground attack gained momentum, aided by the aircraft, the speed of the advance forced the enemy to withdraw. In some cases ground contact with the enemy was lost. Therefore, after 21 February, air targets were generally outside the Triangle, and cooperating aircraft on close support were usually released by the corps and divisions to execute what actually

were armed reconnaissance-interdiction missions to the corps and army front, extending their assistance to a larger area of operations, soon to be entered by XX Corps.

ATTACK TO THE ROER RIVER
(16—29 NOVEMBER 1944)

ENEMY DEFENSES WELL ORGANIZED

The inability of the First and Ninth U. S. Armies to force a quick breakthrough from the AACHEN — ESCHWEILER — JULICH area to the COLOGNE Plain, as discussed in the chapter that follows on Operation QUEEN, turned this operation into a limited objective attack to reach the ROER River. The defense in depth which the enemy had organized in this area west of the ROER, together with the long period of rainy, murky weather that had grounded the supporting tactical air force, for many days turned this into an operation of slow advances, often measured in terms of yards. It became almost wholly an infantry-artillery team action reminiscent of so many similar engagements of the First World War.

The area over which this attack took place was well prepared for defense. The enemy plan here was one of organizing a perimeter of villages as strong points to protect a single larger town. Instructions issued to German soldiers were to hold each foot of ground regardless of the cost. Thus, confronting our attack over this well-populated area, were towns and villages, each well organized for defense and each tenaciously held. The small villages were so closely spaced that they were almost mutually supporting and had, in fact, the effect of an oversized hedge-hog.

PROGRESS FOUND SLOW AND COSTLY

After initial though somewhat limited advances, which followed the heavy and medium bombing on 16 November, the daily ground progress became a costly battle of attrition. Our troops pushed on, however, and reached the vicinity of the west bank of the ROER in early December. Here the situation became static along most of the Ninth and First Army fronts, while an intensified effort was made by First Army to capture the ROER River dams, in the MONCHAU area. The control of these dams was necessary before a full scale crossing of the ROER could be made. Their capture had not been effected, however, by the time of the launching of the German counter-offensive on 16 December 1944.

The nature of this ground situation and the adverse weather conditions directly affected the character of air operations during the period. In furnishing

close cooperation, the air provided considerable assistance, when weather permitted, in reducing the cost of our advance and in speeding up the offensive at points of greatest resistance. In a number of instances during the conduct of this attack fighter bombers assisted materially by helping break up enemy counter-attacks. For example, on 23 November nineteen missions totalling 209 sorties were flown by seven groups of IX TAC fighter bombers. 365 Group supported the 104th Infantry Division on four missions, and on a fifth intended mission, jettisoned their bombs to engage forty FW 109's. In four air attacks on three villages requested by the ground units, fires were started in one, in another two strongly-defended buildings were destroyed, and in the third town a tank concentration was bombed after smoke had been placed in the vicinity, although the planes here reported no results observed. Two towns holding up the advance of the 1st Infantry Division were bombed and strafed by the 368 Group with good hits observed. The town of KLEINHOW was attacked with blaze bombs by a P-38 Group, and the 8th Infantry Division reported that all bombs hit in the town (pilot reports and Tac/R photos showed extensive fires).

CENTERS OF RESISTANCE ATTACKED BY AIR

During the period the effort of the 9th Bombardment Division was divided almost equally between attacks on enemy communication centers in rear of the enemy's forward positions and isolation targets such as bridges, marshalling yards, supply, POL, etc. The heavies' only close-in effort in support of this attack came on 16 November 1944 as described in the paragraphs on Operation QUEEN.

REAR AREA TARGETS BOMBED

The nature of the enemy defense of this well-populated area differed a great deal from previous engagements of this category. In contrast with the hedge-row type of defense experienced during the ST LO limited objective attack, the enemy conducted a village defense; and in contrast with the natural camouflage available to enemy defenses in the SAAR-MOSELLE Triangle, the enemy did not have the advantage of concealment, either of defenses or routes of approach. In the attack to the ROER River the action took the form of reducing, one by one, the system of heavily defended towns and preventing the enemy freedom of movement in his rear areas. Objectives were clear-cut and readily distinguishable from the air.

The principal close assistance provided by fighter bombers were attacks on defended villages, supplementing the weight of fire which the ground forces were able to bring to bear on these objectives, and by striking reinforcing or counter-attacking enemy units on their way to the front. Less apparent,

but probably of equal importance was their effect in "freezing" rail and road traffic in rear areas during daylight, thus further decreasing the enemy's ability to conduct a sustained defense.

Medium and heavy bomber attacks assisted this action by helping prevent the enemy from bringing to bear against us the full weight of effort he had set aside to prevent our reaching the last natural barrier west of the RUHR. The most beneficial effects of the medium and heavy attacks are concluded to be (a) interruption of supply routes, (b) destruction of supply and communication installations.

CHAPTER X

BREAKTHROUGH OPERATION

ST LO BREAKTHROUGH-COBRA (25 JULY 1944)

STAGE SET FOR BREAKTHROUGH

As stated in earlier chapters, when CHERBOURG had been captured, First Army units made limited objective attacks all across the army front to set the stage for a breaking out of the beachhead. These preparations were completed during the third week in July, and the ground situation at that time was generally as follows: VIII Corps units extended from the west coast of the peninsula east along the PERIERS — ST LO highway to the vicinity of le MESNIL VIGOT; VII Corps units from this point east to the VIRE River and ST LO; XIX Corps units from ST LO (inclusive) to a point near LA BARRE DE SEMILLY; and V Corps units from there east to the inter-army boundary. The time was propitious to put into execution Operation COBRA, an operational plan that had been conceived early in July.

ATTACK INCLUDES AIR AND GROUND PHASES

In general, Operation COBRA called for piercing the enemy lines with great power along a narrow front. VII Corps in the center was to make the main effort while V, VIII and XIX Corps were to keep continuous strong pressure against the enemy, harassing any withdrawal he might attempt to make, and prevent him from disengaging. The plan was to be divided into three phases. Phase One was to include an intensive aerial bombardment by heavy, medium and fighter bombers, coordinated with heavy artillery fire, to be followed by a breakthrough of the enemy positions by three infantry divisions. These divisions were to open up a hole and block off the flanks of the breakthrough area.

In Phase Two the exploitation of the breakthrough was to be effected by moving two armored divisions and one motorized infantry division through the hole and down the two main routes uncovered. Phase Three was to be the consolidation and follow-up of any advantages gained and the pressing home of the pursuit.

The operation started 25 July 1944 and, in effect, did not stop until the SIEGFRIED LINE had been reached. Details of the ground action are omitted here since it is felt that all concerned with this report have a general knowledge of the swift action following the breakthrough. It marked the beginning of the most effective sustained close air support in history, and

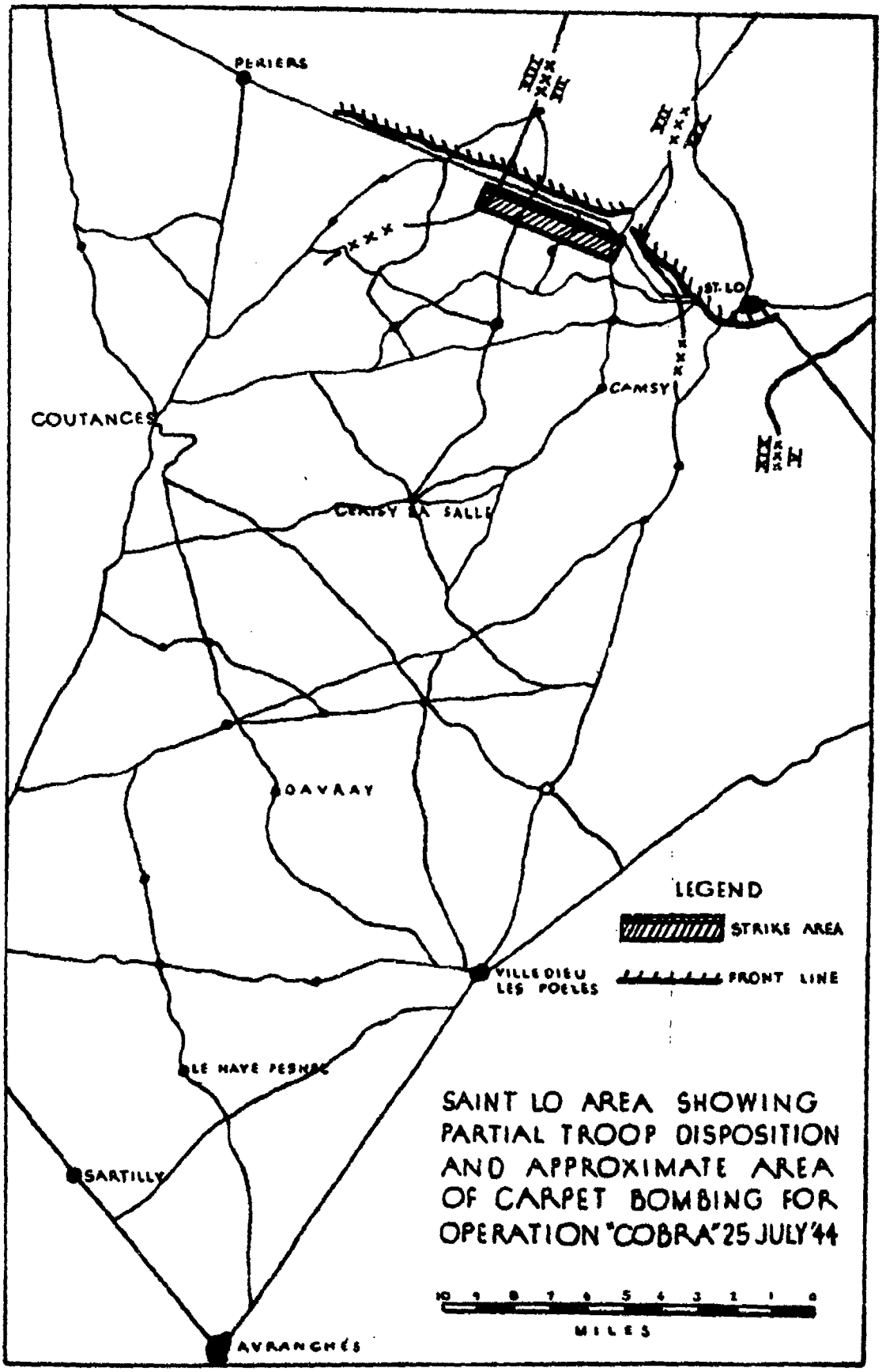

PERIERS
ST. LO
CAMSY
COUTANCES
CERISY LA SALLE
GAVRAY
LE HAVE PESNEL
SARTILLY
AVRANCHES
LEGEND
STRIKE AREA
FRONT LINE
SAINT LO AREA SHOWING PARTIAL TROOP DISPOSITION AND APPROXIMATE AREA OF CARPET BOMBING FOR OPERATION "COBRA" 25 JULY '44
MILES

PLATE 7

the first real third priority operation by heavy bombers in this theater. Saturation bombing of an area approximately three thousand yards by seven thousand yards south of ST LO — PERIERS highway was conducted by approximately fifteen hundred heavy bombers, four hundred medium bombers and five hundred and fifty fighter bombers during a period of two and one-half hours beginning at 1030 hours on 25 July. It is interesting that this large scale effort was the only time saturation bombing of an area in the form of "barrage fire" was employed. During the remaining daylight hours of this day and for the two succeeding days, armed reconnaissance missions were flown to the west, south and east of the breakthrough area to prevent movement of enemy reserves and to destroy forces attempting to withdraw. From 26 July to 1 August 1944. over four hundred armored column support missions were flown by fighter bombers over the spearheads and accounted for the destruction of vast numbers of enemy armored vehicles, motor transport and personnel. For example, fighter bomber claims for 28 July were over 1000 vehicles destroyed or damaged. In addition, three hundred other fighter bomber attacks were made on specific targets reported by air and ground units. Night movement of enemy troops and supplies was hampered by the use of delayed-action bombs dropped on key crossroads and timed to explode during the hours of darkness.

AIR DELIVERS OPENING BLOW

The air effects of Operation COBRA, culminating in the breakthrough and pursuit of the German Armies to the SIEGFRIED LINE, were tangible and invaluable to this type of operation. The effects of the fighter bombers in conducting armed reconnaissance to the front and flanks of the advancing units have just been described. The bombing by medium and heavy bombers preceding the breakthrough failed to achieve maximum results, although certain areas within the target area received a very heavy concentration of bombs. As stated in a preceding paragraph this was the first, and only time that saturation bombing by heavy bombers on a large scale was attempted in this theater. Disruption of enemy communications in the area chosen was a direct effect of this. Casualties inflicted on the enemy were not excessive, although there was a definite shock effect as testified to by reports from PWs coming into the army PW cages. An unfortunate short bombing in friendly territory by some "boxes" caused casualties among our troops waiting to attack.

ENEMY STUNNED AND DISORGANIZED

These effects can best be summed up by reference to a statement of the commander of VII Corps that made the breakthrough. His statement, in part,

is quoted as follows: "Heavy and medium bombers were extremely effective in pattern bombing of front lines and supporting defenses. Enemy communications were disrupted completely and the effect on enemy morale was shattering. Fighter bombers provided column cover which was highly essential in the relatively narrow gap through which the initial break was made. This was particularly effective for the armored units. This column cover not only protected ground troops from enemy air attack, but discovered and broke up enemy reserves or possible counter-attacking forces. Armed reconnaissance out ahead of our columns gave timely information of the enemy and frequently gave the earliest report of our own front line locations."

Air-ground coordination in Operation COBRA was effected through existing liaison methods. Coordination with Ninth Air Force and its tactical air commands was effective due to our air-ground combined operations centers which had become operational shortly after D-day and already had enjoyed the advantages of joint planning. This was not true in the case of the Eighth Air Force with which liaison was then distant if not non-existent, although, as will be pointed out in later paragraphs in Operation QUEEN, this lack of liaison subsequently was more than rectified.

JOINT PLANNING AN ELEMENT OF SUCCESS

Planning for the air strike of COBRA was based on this previous experience with the tactical air force. For this attack the forward edge of the target area was the straight ST LO—PERIERS road. Front line troops were withdrawn 1200 yards to the north of this road and the new front line marked with fluorescent panels. The enemy's forward positions were marked with red smoke by the artillery, and a strip 300 yards wide on the forward edge of the target area was to be bombed by fighter bombers only. Plans also included the marking of tanks and armored vehicles with cerise panels, repainting Allied white-star markings on all breakthrough vehicles, and the installation of two-way ground-air radio sets in tanks and armored vehicles leading the combat command columns of the 2d and 3d Armored Divisions. Pilots from fighter bomber groups were assigned to go forward in these vehicles, communicating with close supporting air units by means of radio, designating targets for attack by air. Ground liaison officers at airfields of the tactical air force assisted in briefing pilots on air cooperation missions, familiarizing them with the ground situation, and in interrogating pilots upon the completion of the mission.

As a result of this close support of ground troops the lesson was learned that methods of air-to-ground identification suitable for fighter bombers, or even relatively small formations of medium bombers, was unsuitable for high

altitude heavy bombers. One unforeseen result was that after the first bombings, the smoke and dust resulting obscured the panel markings, and, to some extent, the ST LO—PERIERS highway, because of a southerly wind. An extremely valuable lesson learned was that one of the very real requirements for an operation of this nature is the need for centralized VHF radio control of bomber formations. It is felt certain that had this control been available for Operation COBRA much of the short bombing caused by inadequate communications and by difficulties in visual identification could have been obviated.

RESULTS SHOW NEEDS FOR FUTURE PLANNING

ESCHWEILER ATTACK — QUEEN

(16—29 NOVEMBER 1944)

As pointed out in the preceding discussion of Operation COBRA, after the breakthrough, the pursuit of the enemy did not stop until the SIEGFRIED LINE was reached by First Army in the north and the line of the MOSELLE River by Third Army in the south. Here along the western fringes of the approach to Germany proper our armies finally had outrun an ever lengthening supply line, and it became necessary to pull up for regrouping and resupply. This pause gave the enemy an opportunity to man the defenses of the WEST WALL as well as to prepare additional field fortifications, thus forcing us into positional warfare for the winter months.

BEGINNING THE DRIVE TO THE RHINE

The attack and the subsequent capture of AACHEN and the slow cutting of our way through the SIEGFRIED LINE to the north of AACHEN and the HURTGEN Forest to the south and east required several weeks of effort, and it was not until the first of November that the First and Ninth Armies were in position and prepared to start a drive to the RHINE River.

It was planned to launch a coordinated attack of First and Ninth Armies in direction of JULICH—DUREN, cross the ROER River and break out into the plain in the area of COLOGNE and BONN. To protect our north flank the plan envisioned a 21 Army Group advance to the RHINE in conjunction with our two armies.

An air plan known as Operation QUEEN was formulated as a cooperative effort of the strategic and tactical air forces. Key strong points, troop concentrations, the outer crust of enemy defensive positions and communication centers in the area of ESCHWEILER, JULICH, LINNICH, and DUREN were selected as air targets in the zone of VII Corps and contiguous areas in the zone of XIX Corps.

ENEMY CONCENTRATIONS OBJECTIVES OF AIR ATTACK

A careful study was made of targets to be attacked within this area. No attempt was to be made, as in Operation COBRA, to place a saturation bombing on the general area. Rather, the target was divided into smaller, specific areas where photo coverage and intelligence reports showed enemy defensive installations were thickest. Individual targets or target areas then were assigned by the air staff to heavy, medium and fighter bomber units of the Eighth and Ninth Air Forces. The RAF was assigned the objectives of JULICH and DUREN. Target date was to be the first day weather permitted air operations on the scale envisioned, but not later than 16 November 1944. The armies concerned were to wait until this date, but were to attack without air support if weather still prevented.

Accuracy aids and safety precautions far more elaborate than at ST. LO were devised for Operation QUEEN. These consisted of measures taken by both air and ground forces to insure maximum accuracy of bombing and minimum chance of casualties to our own troops, as had happened during COBRA. These measures are the features of this operation inasmuch as they proved that this type of attack by heavy bombers was feasible and that bombing could be accurately placed close to our forward lines with little danger to the troops.

MEASURES TAKEN FOR ACCURACY AND SAFETY

Great credit is due the Eighth Air Force for the extensive preparations made in this regard. The bulk of their aircraft were equipped to receive signals from a vertical beacon SCS 51, and from two marker beacons. The SCS 51 was placed a short distance in rear of the front line and indicated to the pilots and bombardiers their exact position in reference to both the front line and the bomb release point. The marker beacons kept the aircraft on course as they approached the vertical beacons. In addition, a ground control station was established to maintain radio contact with the air formations. Every other precaution was emphasized, including careful briefing of crews and provisions to open the bomb doors over the channel rather then over the forward areas.

On the ground force side, and as a result of joint planning, detailed measures were also employed to obtain the same ends. White panel markers were placed on the line of approach of the Eighth Air Force which paralleled the First Army's left boundary and led to the target area. The first of these panels was placed northeast of LIEGE approximately nineteen miles in rear of the front line; the second panel northeast of AACHEN and approximately 4000 yards from the front line. These two markers definitely established the line of approach for the bombers. A line of cerise and orange panels each 36 feet by 7 feet was laid down 500 yards in rear of the front line at a density of four

per mile from the First Army's north boundary to the vicinity of STOLBERG. A line of eleven very low altitude captive balloons, attached from the RAF, was placed approximately 4000 yards in rear of the front lines astride and perpendicular to the direction of approach of the bombing formations. These balloons were flown at approximately 2000 feet elevation with intervals of 300 yards between balloons. Four batteries of 90 mm antiaircraft guns firing from positions approximately 8000 yards in rear of the front line, maintained a line of red smoke shell bursts on the same line as and above the balloons. These were fired to produce eight simultaneous bursts every fifteen seconds at a height of 2000 feet below the altitude of the separate successive bomber formations. The timing of these bursts and the altitude at which they occurred were coordinated by direct telephone and radio communication between IX TAC controller and the group controlling the antiaircraft guns.

ACCURACY AIDS EFFECTIVE

Elaborate though this scheme appeared, it nevertheless achieved the desired results in that all targets received their proportionate share of hits and no bombs were dropped on friendly troops during the approach of the bombers to their targets. The most effective of the measures were found to be the use of the beacons by the air force, and the line of colored flak fired by the ground forces. Not the least of the new features introduced was the provision for ground radio control of the bombers approaching the target, although it was found that it would have been more efficient to have tied in this ground control radio station established by Eighth Air Force to the fighter control center of IX Tactical Air Command. Had this effective facility been available on the occasion of the ST LO bombing some of the casualties suffered by friendly troops might have been avoided. Marker balloons and ground panels used to mark the front lines were not particularly effective. The balloons, being subject to direct enemy fire, were nearly all shot down, while the panels were not always visible from the altitude of the bomber formations.

On 16 November, beginning at 1115 hours, the first heavy bombing started. Approximately 1200 heavy bombers of Eighth Air Force, 250 medium bombers and 300 fighter bombers of Ninth Air Force and 1000 bombers of the RAF took part in the air strike. Eighth Air Force fighter aircraft participated also by furnishing area cover.

Approximately 300 heavy bombers and 350 medium bombers were unable to participate because of adverse weather conditions. The bombing continued for about two hours followed by the jump-off of ground troops.

ARMED RECCE COVERS FRONT AND FLANKS

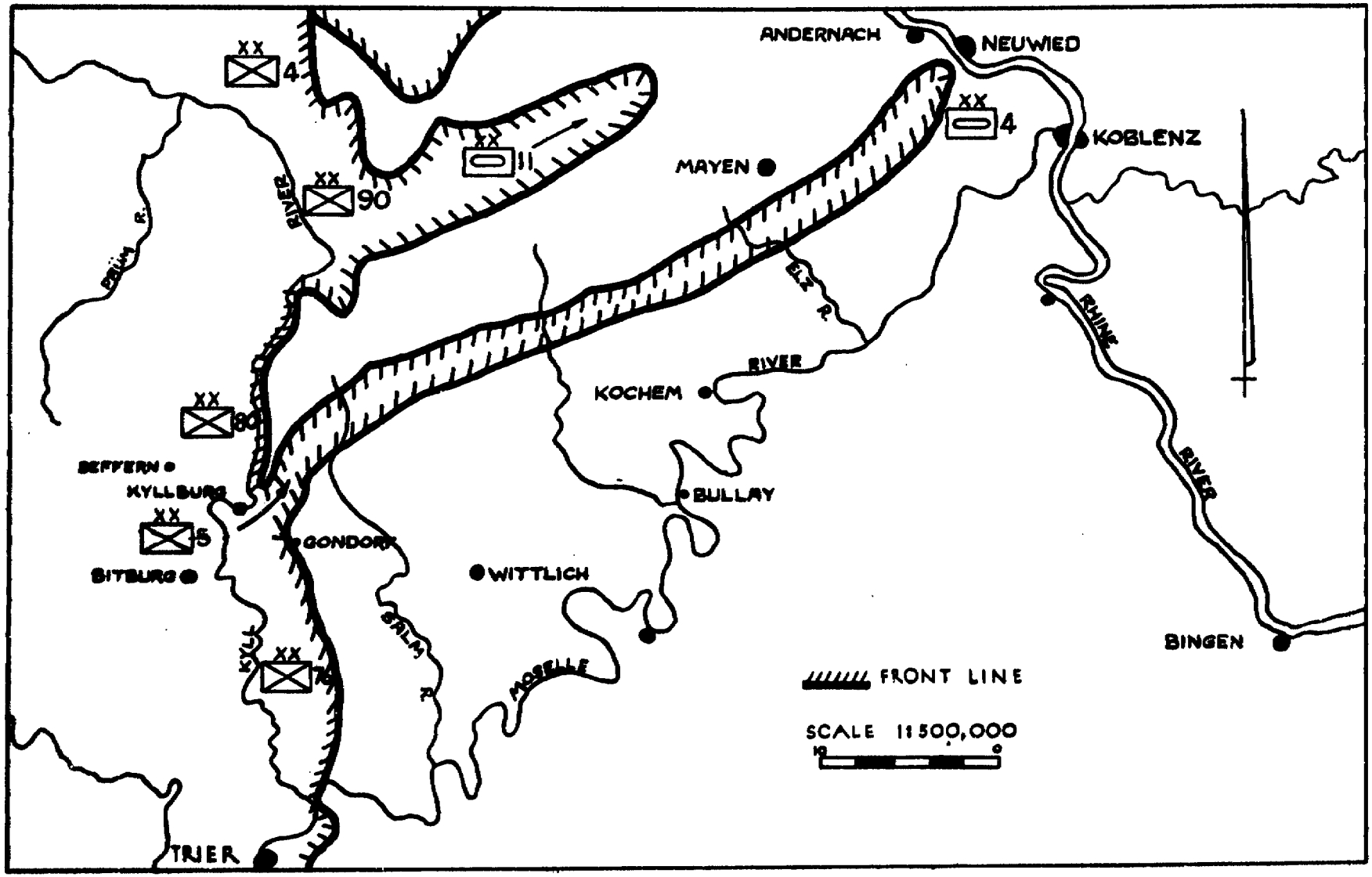
Fighter bombers of IX and XXIX Tactical Air Commands continued to support the attack, after the initial bombing, by covering the advance of the infantry divisions. For example, in the First Army zone, three fighter bomber groups provided cover and conducted armed reconnaissance to the front of three infantry divisions, and three other fighter bomber groups were assigned special targets in front of the attack, after the attack of which armed reconnaissance was to be conducted to the front and flanks of VII Corps. Medium bombers of Ninth Air Force continued attacks in the ESCHWEILER—DUREN area on 17, 18, and 19 November.

GROUND FAILS TO ACHIEVE BREAKTHROUGH

The ground attack, despite extensive ground and air preparation did not achieve breakthrough proportions. There was an initial disorganization of enemy defenses and we were fortunate in having the bombardment catch some enemy troops at the time of their relief, resulting in heavy losses in some units. However, the advance of the infantry, supported by artillery and air, was slow against determined, and costly, resistance. The enemy had had time to organize his position thoroughly and it was two or three days before his outer defenses were pierced. By that time, the effect of the air bombardment had been dissipated and lost. It was regrettable that the effects of the accuracy and safety aids had not yet been proven, and that memory of the unfortunate short bombing at ST LO prevented complete confidence on the part of both air and ground staff officers in arranging for this second large scale close support effort. We know now that with the satisfactory safety and accuracy aids devised, the heavy bombing effort could have been placed much closer to the front line, thus permitting the infantry to press home the advantage of the shock effect.

CLOSE SUPPORT NOT ACHIEVED BY AIR

In evaluating the effects of the air effort on these two operations, it is evident that saturation bombing of the areas by heavy and medium bombers did not produce excessive casualties, but did have a specific shock effect and a destructive effect on materiel and communications. Pattern bombing of a large area by the bombers was effective at ST LO where the air attack was exploited quickly by the ground forces. Pattern bombing of selected smaller areas within a larger area as in the QUEEN operation, while effective to a degree, was too far forward for maximum exploitation by the assaulting troops, and hence had little direct effect in reducing the resistance offered. With regard to fighter bombers, armored column cover as used after ST LO, and as modified to provide close cooperation at ESCHWEILER—DUREN, produced the outstanding supporting effect after the initial penetration.



BREAKTHROUGH - KYLL RIVER TO THE RHINE. SITUATION: 8 MARCH 1945

PLATE 8

BREAKTHROUGH - KYLL RIVER TO THE RHINE. SITUATION: 8 MARCH 1945
PLATE 8

KYLL RIVER TO THE RHINE (1—12 MARCH 1945)

CORPS ATTACKS PRECEDE RHINE DRIVE

Previous orders for the maintenance of an aggressive defense had been given 12th Army Group by SHAEF on 7 February, but an exception was made for Third Army which was permitted to make probing and single corps attacks toward critical objectives. Accordingly, the advance on PRUM continued, while elsewhere in the zone the army went on the defensive.

Acting under orders, XII Corps executed aggressive reconnaissance plus limited attacks on division scale which placed units of the corps in position by 2 March to force a crossing of the KYLL River and set the stage for the 4th Armored Division's dash to the RHINE.

Third Army ground units were reporting excellent air cooperation, as on 2 March when the fighter bombers of XIX Tactical Air Command struck at supply dumps and enemy movement. Claims from these strikes show that the most effective results were obtained against enemy movement.

On 3 March the 5th Infantry Division established a bridgehead across the KYLL River, while the 4th Armored Division advanced only one mile.

FIGHTER BOMBERS PROTECT BRIDGEHEAD OPERATIONS

"Superior and accurate" close cooperation was provided by XIX TAC fighter bombers, one squadron of which "completely silenced more than four artillery positions that had been heavily shelling the near bank of the crossing site".

Despite low cloud conditions, fighter bombers completed a full day of operations through the use of blind bombing technique. Claims were limited. Principal targets were motor transport, armored vehicles and tanks, locomotives, railroad cars, gun positions and buildings.

On 4 March the 76th Infantry Division established another bridgehead across the KYLL River, and at the same time the 5th Infantry Division expanded its bridgehead against moderate to heavy resistance. Consolidation of the two bridgeheads allowed the 4th Armored Division to cross into the bridgehead area, pass through the infantry on the night of 4—5 March, and begin its spectacular advance to the RHINE River, a distance of 52 miles completed in 58 hours. A regiment of the 5th Infantry Division was motorized to follow closely behind the armored spearhead while other elements followed in the rear. By 8 March positions along the RHINE River were held by the 4th Armored Division, with patrols across the RHINE. Meanwhile, the 5th Infantry Division was mopping up by-passed enemy pockets en route. From 8—12 March the two divisions cleared ground north of the MOSELLE River up to the RHINE River.

ARMOR SPEARHEADS THE ATTACK

During this breakthrough little or no support was received from cooperating aircraft. A period of bad weather sharply restricted air operations from

4 to 8 March, when fog and rain completely grounded all aircraft. Although adverse weather conditions continued on 9 March, fighter bombers were able to fly thirty-two missions against a wide variety of targets.

Third Army, on 10 March, cleared enemy pockets and formed new ones, penetrating north of the MOSELLE through the heart of the HOHE EIFEL to make contact with First Army units. Fighter bombers flew thirty missions totalling 323 sorties. Ten column cover missions were flown for the 4th Armored Division, and eleven defended localities were attacked. Low clouds on 11 March prevented dive bombing operations, but ten communication centers were attacked through the overcast at the direction of forward ground controllers. Finally, on 12 March continuing low cloud limited cover operations to thirteen missions with practically no claims. Night fighters flew seven sorties with unobserved results.

COLUMN COVER PROVIDES CLOSE SUPPORT

This breakthrough operation was featured, insofar as supporting air operations were concerned, by the reinstitution of armored column cover, reminiscent of last August's offensive across France, necessitated by the new rapid armored and motorized infantry drives to the RHINE River. Many commendations were received from ground elements for whom paths were made by bombing of gun positions and fortified towns, and by reason of enemy information furnished by the aircraft, including that gleaned by night fighters in their limited operations. During this period a great number of surrender leaflets was dropped; the effectiveness of which is attested by the use made of them by the record number of prisoners.

In conclusion, air power did not directly contribute to the success of the actual breakthrough during the initial penetration and drive to the RHINE River, inasmuch as no missions were flown for XII Corps during the period 4—8 March. However, during the period 1—3 March when corps units cleared to and established bridgeheads across the KYLL River preparatory to the breakthrough, supporting aircraft augmented ground action in setting the stage for the breakthrough by attacking ground positions and maintaining air superiority over the tactical area. Similarly, during the exploitation of the breakthrough, the period 9—12 March, fighter bombers assisted the ground units in forming and then reducing enemy pockets through armored column cover and armed reconnaissance attacks. Enemy aircraft which rose to meet the attack were destroyed or dispersed and their efforts thus neutralized. No heavy or medium aircraft were used during the period. The principal contribution of air power to this operation was made by fighter bombers in attacks before the initial penetration and afterwards during the exploitation and mopping-up period.

RHINE BRIDGEHEAD NORTH OF THE RUHR

(29 MARCH — 11 APRIL 1945)

RAPID MOVEMENT CHARACTERIZES OPERATIONS

In the Ninth Army's attack from the RHINE bridgehead to the ELBE River during the latter part of March and the first part of April 1945, elements of the army covered more than 200 miles in a period of two weeks. Between 24 and 29 March the bridgehead was being built up and expanded. Gains during this period, except for the day of crossing, ranged from 1 to 4 miles daily. By 29 March, the British, on the north of Ninth Army had made good advances to the northeast. First Army, attacking south of the RUHR, had made a rapid penetration deep into the German lines east of the RHINE and had begun to advance north toward PADERBORN. The actual breakthrough out of the RHINE River bridgehead north of the RUHR industrial area occurred during the last two days in March.

On 30 and 31 March and 1 April, Ninth Army made spectacular advances to the east, and First Army continued its thrusts to the north. On 1 April the two armies met, trapping in the RUHR pocket more than 350,000 members of the Wehrmacht. The armies then continued their sweeping attack to the east, making great advances daily until on 11 April Ninth Army reached MAGDEBURG on the ELBE River. Occasional strong points offered some resistance to this rapid advance, however, for the most part opposition was comparatively light. Concurrent with the advance east, elements of the First and Ninth Armies attacked to reduce the RUHR pocket.

AIR-ARMOR TEAM ROLLS ON

During the period 1–3 April, just after the breakthrough was underway, weather limited flying considerably. On the 1st and 2nd, no close support missions were executed and on the 3d a total of thirty-eight sorties was flown in close support and an additional thirty on second priority missions. However, during the remainder of the operation the weather was such that air activity was stepped up tremendously except for one non-operational day. Of all the missions, the great proportion was armored column cover.

There is no question that this was the most beneficial manner of employing fighter bombers in this operation. Column cover enabled the attacking echelons to reduce road blocks and overcome strong points, armored vehicles and tanks, defended or occupied buildings, troop concentrations and field fortifications.

The essential roles of armed reconnaissance for this operation were:

(a) Providing aerial protection to attacking armor, which by the very nature of the type of operation was very vulnerable to aerial attack, especially during build-up stages when concentrations of troops and vehicles were heavy; and

(b) Preventing the rapid and orderly withdrawal of enemy troops to positions in the weakly defended avenues of advance which were the objectives of our armored attacks.

Tactical reconnaissance operations during this same period informed leading ground units of the location of demolished bridges, road blocks and enemy strong points. It alleviated to some extent the difficulties of control due to extended distances and speed of movement.

LIMITED USE OF HEAVY AIRCRAFT

Heavy bombers were not employed in this breakthrough operation; it is believed that there was not a place for their use, in a close support role, in this attack. Medium bombers were employed in attacks against marshalling yards and oil refineries on 3, 7, and 8 April and on 17 April, against MAGDEBURG on the ELBE River, at the limit of Ninth Army's advance. Had it been intended to press the advance beyond the ELBE River, it is highly improbable that the leading elements would have fought for the town. It is more likely that it would have been by-passed in order to maintain the momentum of the advance. The situation in which Ninth Army found itself at the time of the medium bomber attack on MAGDEBURG had passed the breakthrough stage and, to place it in a category, had become involved in an attack on a defended city. There is no suitable mission for medium bombers in a close support role in a fast-moving operation. After the initial penetration, armed reconnaissance and armored column cover produced the outstanding supporting effect.

CHAPTER XI

ASSAULT OF A DEFENDED RIVER LINE

MOSELLE RIVER
(8—12 SEPTEMBER 1944)

Third Army continued its rapid offensive across Eastern France in August, and on 1 September the 5th Infantry Division had completely occupied the city of VERDUN. By 5 September the troops had advanced east of VERDUN to the line JEANDELIZE—LABEUVILLE—ST. MAURICE. The 5th Infantry Division then received orders for an attack to the east to secure a bridgehead over the MOSELLE River and capture METZ.

MOSELLE CROSSED AGAINST HEAVY RESISTANCE

The attack started at 0800 on 7 September. Little resistance was encountered initially, but as the troops progressed heavy small-arms fire, artillery, and mines slowed the advance. On 8 September, however, a crossing was forced and by the close of the day a bridgehead had been established in an arc of about 1000 meters. The initial force was reinforced with armored infantry elements of the 7th Armored Division. The enemy counter-attacked the bridgehead with tanks and infantry but was repulsed with heavy losses. Troops in the bridgehead and at the crossing were unable to advance without suffering heavy casualties.

AIR AUGMENTS FIRE POWER IN CRITICAL SITUATION

Throughout the initial crossing and later during the establishment and consolidation of the bridgehead, the enemy offered extremely heavy resistance and launched repeated counter-attacks with tanks and infantry. During this period, aircraft of XIX Tactical Air Command executed armed reconnaissance and provided column cover in the assault area. Fighter bombers on column cover operating directly with ground controllers again and again attacked enemy tanks, gun positions, and personnel, all of which were involved in the many counter-attacks designed to throw the attackers back across the MOSELLE and prevent their further crossing. Fighter bombers on armed reconnaissance, ranging beyond and to the flanks of the actual sites of the crossings, sought to destroy the reinforcements, reserves, and supplies which the enemy was trying to move into the bridgehead against our troops.

By the end of 10 September, additional units of the 5th Infantry Division had crossed, and the bridgehead was expanded although with continued heavy casualties on both sides. On 11 September counter-attacks by the enemy con-

tinued but were beaten off after some initial loss of ground. By 12 September maintenance and consolidation of the bridgehead was reaching its final stages. Fighter bombers continued to lend their assistance by bombing gun positions in the area. Strafing attacks were carried out against tanks and infantry moving between nearby towns. Generally, the bombing attacks, followed by strafing, of enemy gun positions, artillery observation posts, and fortifications on the division front had good results, serving to harass and delay the enemy. One large German patrol in the area was engaged by the planes, indicating the extent to which the aircraft participated in the details of the ground action.

INTERDICTION RELIEVES ENEMY PRESSURE

The 5th Infantry Division reported that in its operations the greatest difficulty experienced was in the maintenance and expansion of this bridgehead during the period 9 September to 20 October, 1944, following the actual river crossing. During the operation sufficient air and artillery at times were lacking. It was felt that great value could be rendered by increased availability of support by fighter bombers, and by medium and heavy bombers prior to the actual crossing.

AIR EFFECTS VITAL TO SUCCESS

In 5th Infantry Division reports covering the action, the statement is made that "air played an important part in enabling the division to hold the bridgehead and attack to expand it. During the first few days after the crossing by the 10th Infantry, the air provided ample cover and scattered enemy personnel and equipment when the enemy was forming up for a counter-attack. The cooperation was excellent and in one case support was as close as 200 yards from our front lines. Close support of ground troops was provided without pilots being briefed prior to take-off, targets being indicated by coordinates or colored smoke, using the communications of the air support party".

The division further reported that the principal lesson learned in the crossing was that enemy small-arms, machine-gun, and mortar fires on the proposed bridge site must be neutralized before crossing is attempted. Specifically, fighter bombers took advantage of this opportunity for effective strikes against the enemy as the 5th Infantry Division was moving up to the site, by attacking tanks, gun positions and personnel.

CROSS DELAY BY FL

With respect to the employment of aircraft in support of this river crossing we may come to the following conclusions:

(a) Fighter bomber aircraft were used very effectively to provide column cover and execute armed reconnaissance during the advance of the troops to the crossing site.

(b) Fighter bomber aircraft were of assistance during the period of actual crossing, in neutralizing and destroying enemy positions seeking to bring fire on the attackers.

(c) Fighter bomber aircraft were of greatest value during the consolidation and expansion of the bridgehead, both for close-in work at the direction of ground control and on armed reconnaissance beyond the immediate area. In the latter case, the interception of reserves (troops, vehicles, supplies) moving into the bridgehead area as reinforcements had a high priority in planning air employment to assist the operation.

ROER RIVER
(23 FEBRUARY 1945)

After the German counter-offensive in the ARDENNES had been thrown back, plans for the crossing of the ROER River and an advance to the RHINE in the vicinity of the RUHR were given final study. To the north, Ninth U. S. Army, under operational control of 21 Army Group, completed by the end of the first week in February 1945 the necessary details to launch its part of this attack from the JULICH—LINNICH area, across the ROER into the COLOGNE plain between NEUSS and MORS, and seize the west bank of the RHINE. Attacks to the RHINE by the First Canadian Army on the left and the First U. S. Army on the right were to be coordinated with the Ninth Army advance.

CROSSING DELAYED BY FLOOD

The time for the attack was to be at the earliest practicable date in February, but was dictated by the flood condition of the ROER River. The dams on this river finally had been secured by First Army, but not before being partially blown, and, in consequence, the river was a definite obstacle from the standpoint of width and rate of flow. Beginning about 12 February the attack was delayed on a day-to-day basis until 23 February 1945.

In conjunction with the preparation and completion of ground plans for the attacks, a very detailed study was made regarding the most effective means of employment of the available air power for this operation. Large scale attacks against enemy air fields in the immediate area and against the RHINE bridges at first were planned. These were discarded, however, due to (a) other air commitments, (b) effort and time required to accomplish this task. From the standpoint of close air cooperation the first, and basic, decision

was whether or not to request a carpet bombing of the east bank of the ROER. This plan was eliminated also since (a) the most desirable time to initiate the river crossing was prior to dawn, and (b) sufficient artillery was available to achieve neutralization of the enemy "crust". When the decision had been made, the next and final plan was to employ medium bombers on the major communication centers immediately in rear of the enemy front to cause maximum possible damage to supply, communication and reserve facilities. Plans also envisioned medium and fighter bombers in attacks against marshalling yards and enemy airfields between the ROER and the RHINE with the bulk of the fighter bomber effort available committed to close cooperation missions with the attacking ground troops.

PLANS CONSIDER ALL AIR CAPABILITIES

It is not necessary to give a detailed account of the ground operations here other than to say that the assault crossing began at 0330 on 23 February after a long and intensive artillery preparation, and was completed that same day without serious opposition, and with moderate losses only. The crossing was exploited rapidly and by 11 March 1945 the RHINE had been reached and the west bank in the Ninth Army area cleared of the enemy.

CROSSING RAPIDLY EXPLOITED

This ground success was contributed to, in no small manner, by the cooperation of the tactical air forces, with the strategic air forces assisting indirectly through their attacks against deeper marshalling yards and bridges. Medium bombers obtained excellent results in their attacks on key communication centers, and marshalling yards, in the closer area, both before, after, and on the day of the crossing and contributed to the inability of the enemy to marshall his forces effectively for either a counter-attack, or a coherent defense. It is certain that widespread and severe destruction was achieved in the attacks on towns; reconnaissance aircraft reported that almost all important rail centers were destroyed or damaged on the day of the attack. Fighter bombers of XXIX TAC rendered excellent close support to the ground troops by attacks on defended villages, enemy tanks, motor transportation, and gun positions, and by providing cover for engineer bridges during daylight hours.

AIR ATTACKS SHOWED VERSATILITY

In connection with the preceding paragraphs it is desired to point out that the cooperating air force could have been more effective in certain ways. For example, during the night of 23—24 February the GAF was successful in destroying two engineer bridges that had just been completed and this loss delayed the movement of much needed equipment to the east side of the river. A stronger night fighter defense of the area might have been helpful in preventing such an instance both at this and at other times. Furthermore, it is believed that

additional advantages would have accrued had the RHINE bridges at WESEL and DUISBURG been destroyed. Despite the subsequent rapid advance of Ninth Army to the RHINE River, many of the enemy were able to escape over these bridges.

In conclusion, an analysis of the effects of the air as it influenced this operation to cross the ROER shows that the greatest benefits were derived from fighter bombers in (a) armed reconnaissance missions to interdict enemy lines of communication, (b) protection from enemy air attack during the concentration phases on the near bank of the ROER, (c) close cooperation missions in attacking enemy strong points, armed vehicles, and artillery opposing our advance.

RHINE RIVER — THIRD ARMY
(23 MARCH 1945)

Previous planning had anticipated the RHINE River to be a formidable barrier that would involve considerable delay and high casualties when the crossing was forced. Third Army took the river in its stride and surprised not only the enemy, but the Allies as well, with the relative ease of crossing and the rapid advance east even before the west bank had been completely cleared.

PATTON'S AIRBORNE ARMY

Preparations for the crossing consisted of continued attacks to clear all enemy from the army zone. No elaborate air plan was devised, other than one incorporating the normal fighter sweeps over the crossing and close cooperation (air alert) for the corps, the latter to operate under ground control. It should be mentioned that in order to expedite the operations, definite plans had been crystallized whereby an "airborne" crossing was to be made on 23 March, using all available liaison type aircraft of divisions and corps in transporting men, weapons, and ammunition to the east bank. Employment of such air lift was predicated upon non-availability of heavier aircraft, and further on the belief that liaison aircraft transport would be faster than assault boat crossing (considering the width of the river and speed of the current). Crossing schedules involved the use of approximately one hundred aircraft, requiring an estimated ten minutes for each trip across and return.

This air lift was never used. Assault boat crossings met such little resistance that the air plan for liaison aircraft was cancelled. The enemy was effecting a rapid withdrawal east of the RHINE following his disastrous losses in the

SAAR-PALATINATE, and the corps crossing proceeded with greater ease and speed than had been believed would be the case.

CROSSING BEGINS AT NIGHT

Units of the 5th Infantry Division began crossing the river at OPPENHEIM at 2200A hours on 22 March, and by noon of 23 March the entire division had crossed, followed by the 90th Infantry Division plus one complete combat command of the 4th Armored Division. Within thirty-six hours of the initial crossing, a treadway bridge and a pontoon bridge had been completed across the river. At the close of 23 March, four complete regiments supported by attached tanks and tank destroyers had crossed into the bridgehead which had been expanded at this time to the size of eight miles wide by five miles deep. Troops were continuing the advance.

LUFTWAFFE THREATENS BRIDGEHEAD

XIX Tactical Air Command during daylight hours continued its stepped-up air offensive to keep pace with the ground success, and in ideal weather flew area cover and direct cooperation missions for the RHINE operation, and executed armed reconnaissance in the MAINZ—FRANKFURT area. XII Corps evaluated the air effort and results as being "excellent". For the day twenty-one missions (147 sorties) were flown on close cooperation. Principal attacks were directed against gun positions, motor transport, and railroad facilities. On area cover twenty-three missions (180 sorties) were flown, during which nineteen enemy aircraft were destroyed in the air and four damaged. This indicated a revival of enemy air activity over the bridgehead area. A total of five missions (178 sorties) were flown on armed reconnaissance, resulting in destruction of further enemy transportation and aircraft. Night fighter patrols flew seven sorties, operating against a small number of unidentified aircraft, and strafed convoys on the roads. Pursuit of unidentified aircraft was unsuccessful, while strafing of the convoys resulted in fires being observed.

The corps continued the expansion of the bridgehead against strong enemy counter-attacks which were launched both day and night. By this time, 24 March, the 4th Armored Division had passed through the 5th and 90th Infantry Divisions, and had driven twenty miles eastward. Hostile air continued active over the bridgehead area.

AIR STRIKES ENEMY MOVEMENT

Cooperating aircraft continued their excellent support of the attack of the divisions and on area cover flew fourteen missions (112 sorties) in the ASCHAFFENBURG—MAINZ—WIESBADEN area with claims, paradoxically enough, primarily of enemy rail and motor equipment. On close cooperation with the ground units, aircraft flew seventeen missions (125 sorties) to destroy or damage ad-

ditional motor transport, railroad cars and locomotives, tanks and armored vehicles, and gun positions. Armed reconnaissance in the ASCHAFFENBURG area netted five missions (73 sorties) with claims almost entirely related to railroad equipment. Hence, we can see that cooperating aircraft primarily directed their assistance along the lines of denying and delaying enemy movement.

XII Corps had this to say about the contribution made by cooperating aircraft in connection with the ground operations: "XIX TAC continued its excellent support of the attack of the divisions. Fighter cover was continuous from first light until dusk. Fighter bombers effectively attacked gun positions, vehicles and command installations".

BRIDGEHEAD EXPANDED WITH AIR ASSISTANCE

The corps continued the expansion of the bridgehead, now firmly established, and in the afternoon of 25 March an attack of fighter bombers against heavy troop concentrations was reported by "Cub OPs" as having achieved excellent results. Another attack on enemy troops and guns produced similar results.

The effects of air on this military operation, the crossing of the RHINE River, may be concluded to be as follows:

(a) The most beneficial effect of cooperating aircraft was the maintenance of complete air superiority over the area of the crossing throughout the period of operations, when the enemy aircraft attacked in considerable force.

(b) Fighter bombers on close cooperation and armed reconnaissance assisted in the establishment, consolidation, and expansion of the bridgehead by destroying, neutralizing, and harassing enemy gun positions, armored vehicles and tanks, troop concentrations, and motor and rail movement--all directed against the crossing.

(c) The effect of night fighters initially was negligible due to limited operations resulting from a scarcity of targets. However, after the actual crossing, the night fighters continued the maintenance of air superiority and the harassment of enemy ground troops on a small scale.

(d) The absence of fighter bomber cooperation during the initial crossing was not deleterious to the success of the operation, because the actual river crossing — the initial critical phase — was made during the hours of darkness.

RHINE RIVER-NINTH ARMY
(24 MARCH 1945)

By the middle of March 1945, Ninth Army's advance from the ROER River to the RHINE had been successfully completed. The First Canadian Army and elements of the Second British Army had cleared the remainder of 21 Army Group's sector to the RHINE, and to the south, First Army was strengthening and enlarging its bridgehead at REMAGEN.

In conformity with directives from higher headquarters, plans were completed to launch an attack across the RHINE north of the RUHR industrial area. A firm bridgehead was to be secured from which to develop operations to isolate this industrial area, and to penetrate deeper into Germany.

The crossing operation was to be conducted under 21 Army Group. Second British Army and Ninth U.S. Army were to attack abreast; the Second British Army between WESEL and REES, and the Ninth U. S. Army between the RUHR and WESEL. XVIII U.S. Airborne Corps with 17th U.S. Airborne and 6th British Airborne Divisions attached was to accomplish an airborne assault in an area several miles northeast of WESEL.

AIR PLAN THOROUGH IN SCOPE AND DETAIL

The following remarks deal in particular with that part of the overall operation (PLUNDER) that pertains to Ninth Army (FLASHPOINT). It must be remembered that air plans were designed to implement the operation as a whole; therefore much air effort expended to the front of British Second Army was also beneficial to the attack of Ninth Army. A definite line of action for Ninth Army was decided upon prior to the time air planning of the close support phase had begun; therefore alternate air plans were not required. However, maximum flexibility in the plan was sought.

CROSSING LIGHTLY OPPOSED

It was considered impractical to attempt an interdiction program against the extensive road net in the proposed battle area. The task of preventing movement on vital waterways and through important rail centers was largely undertaken by heavy and medium bomber units. An interdiction line was set up at a considerable distance to the east of the RHINE, to isolate the area. It was further planned to prevent enemy movement between the RUHR and the area in the path of our advance. This was to be accomplished largely by rail cutting, as there was no well defined natural obstacle north of the RUHR on which to attempt interdiction, and on certain rail bridges on the River EMS and the DORTMUND-EMS Canal. Attacks were also planned on the stations

in the battle area most likely to be used as railheads. These were DORSTEN, BORKEN, and BOCHOLT.

Fighter bombers of XXIX TAC which supported Ninth Army's ground effort were to concentrate their efforts against rolling stock, rail bridges, rail choke points, and rail cutting within and adjacent to the zone of operations. In addition, a number of targets, including ammunition dumps, POL dumps, storage areas, MT parks and other military installations were selected for attack.

Close cooperation with the ground troops commenced on D-day minus one. Night fighter defense was provided for the assaulting troops, and as late on this day as possible, the DINSLAKEN communication center, which was reported to house concentrations of troops, and WESEL, an initial objective for elements of the British Second Army, were attacked by medium or heavy bombers. Ranging from the night before the attack through D-day, a series of the larger communications centers immediately east of the RHINE were attacked by the RAF and Ninth Air Force medium bombers. A portion of XXIX TAC's strength provided continuous cover for each division making the assault crossing. In addition, fighter bomber attacks were made against smaller communication centers relatively close to the front of the assaulting troops. The general area KOLN, BRUGGE, HALTERN, WESEL was covered by armed reconnaissance. In order to prevent GAF interference with the preparation for and the conduct of our assault crossing, attacks by heavy and fighter bombers were made on airfields from which the enemy would most likely operate.

CROSSING LIGHTLY OPPOSED

The attack of XVI Corps, Ninth Army, began at 0200 on 24 March 1945 following an intensive one-hour field artillery preparation. Both attacking divisions of the corps made very good progress and the bridgehead was established within a short time and with minimum casualties. The following day excellent progress was again made by both attacking divisions. Build-up in the bridgehead progressed rapidly — resistance to our advance was light to moderate. However, after the second day of the attack enemy opposition which was principally from mines, anti-tank fire, automatic weapons and artillery, became increasingly heavy until the last of the month when elements of XIX Corps achieved a breakthrough and raced thirty-five miles to the east against scattered enemy resistance. From then on the operations took on the aspects of a breakthrough and have been discussed earlier. Both the ground and air operations (as they affected the army attack) were executed virtually as planned.

The bridgehead was not threatened at any time by a German counterattack with any strategic reserves they may have had. A vast amount of de-

struction was in evidence in practically every major city; no city in the path of our attack was able to put up a sustained defense. Elements of XVI Corps that attacked DINSLAKEN, which had been hit by medium bombers twice during the week preceding the attack, entered that town with "less than anticipated difficulty". PW reports indicate that the air attacks on this town came unexpectedly and resulted in its complete disruption as a communications center.

MEDIUM AND HEAVY BOMBERS AID OPERATION

These medium and heavy bomber attacks contributed to the RHINE crossing by: (a) impeding enemy movement of reserves, (b) disruption to some degree of signal communications, (c) demoralization of some rear area troops, and (d) destruction of supplies and equipment.

The attack on the complex of air fields north of the RUHR and west of BERLIN also produced very good results. Whether the lack of effectiveness of the GAF can be attributed to the air attacks on the fields and supplies, or the adequacy of aerial defense, or both, is immaterial — no damage was caused during the establishment of the RHINE bridgehead due to enemy air attack.

RESISTANCE DISPERSED BY FIGHTER BOMBERS

The contributions of the fighter bombers again provided the army with most valuable assistance. There were no attacks of consequence on our troops during the preparation for assault crossing. Leading formations were aided by fighter bomber attacks on armored vehicles, tanks, defended buildings, artillery positions, and troops. Planes on armed reconnaissance and division cover prevented movement of enemy forces in the battle area. In describing one such case the Commanding General XVI Corps said: "A large movement of enemy tanks was observed and attacked on 25 March. A PW (116 Pz Division) stated that his unit was attacked while forming up for a counter-attack. He stated that the counter-attack was cancelled because of the losses and confusion resulting from the air attack".

In summarizing it is concluded that the fighter bombers assisted most in this operation by: (a) providing aerial protection from enemy air and ground forces for the concentration of personnel and materiel prior to the crossing, (b) providing protection against enemy aerial attacks on assault forces and bridging operations during and after the assault crossing, (c) assisting the ground forces by attacks on enemy positions resisting the advance, (d) freezing enemy movement within the battle area in order to prevent counter-attacks.

An analysis of the effects of tactical air power in the assault of a defended river line in these three cases produces the conclusion that in the assault crossing of a river, fighter bomber protection of our units from attack by enemy

air or ground forces in the bridgehead area served best to assist the operation. Such protection may have been in denying the air to the enemy, in isolation of the bridgehead area, or in striking close-in targets on the front of the assault units, according to the particular need of the moment.

REMAGEN BRIDGEHEAD — FIRST ARMY (9—27 MARCH 1945)

The "heads-up" play of the 9th Armored Division in the capture intact of the LUDENDORF Railroad Bridge over the Rhine at REMAGEN opened new opportunities for the further exploitation of the break-out from position warfare that had confronted us during the winter of 1944—1945. It permitted a change in the plan for First Army due to this success of one of its divisions. The first requisite in the plan was to assure the continuance and enlargement of the unexpected bridgehead so that follow-up forces could be gotten across the river quickly and securely on the LUDENDORF Bridge and pontoon bridges that were built subsequently.

AAA AND FIGHTERS PROTECT BRIDGE

This was not done easily or smoothly. On the contrary, many difficulties were encountered. One of the first considerations, and on a parity with the necessity for getting a sufficient number of troops over to defend the bridge itself from counter-attacks by enemy ground forces, was to insure the protection of the bridge and contiguous areas from enemy air attacks which were certain to materialize quickly. Antiaircraft units were given a high priority on the troop movements schedule, and within forty-eight hours of the initial seizure of the bridge, there was a formidable antiaircraft defense. In a consultation of First Army and IX TAC commanders, and as elaborated by air and ground staff officers at the Army-TAC combined operations center, it was agreed that IX Tactical Air Command would participate in the defense and exploitation of the area by a continuation of its normal support, chiefly by armed reconnaissance to the front of the bridgehead area to prevent movement of enemy reserves to the area. This was to be amplified by a continuous area patrol to intercept enemy fighters. This patrol was to be kept high, leaving the immediate close air defense of the area to the antiaircraft batteries. In addition, a definite program of interdiction by the medium bombers, to supplement and increase the fighter bomber action in the isolation of the battle area, was requested from the army group-air force level.

ENEMY BUILD-UP PREVENTED BY INTERDICTION

The combined effort and team work between all elements of the ground forces in the area and the components of the tactical air force was effective, though not before some anxious periods had been experienced. While the infantry and artillery defended and enlarged the area the ack-ack defenses took a heavy toll of enemy fighter bombers that attacked the bridge. In this operation it is believed that the antiaircraft units were more effective than the aircraft in providing air defense for the immediate area. Adverse weather reduced air operations to a large extent and, simultaneously, permitted single enemy fighters to sneak in through the overcast, under the fighter patrol flying above it, and make quick strikes at the bridge and surrounding areas. However, the fighter bombers on armed reconnaissance, and the interdiction program of the medium bombers striking at key communications centers on the perimeter of the bridgehead, aided materially in preventing the movement of enemy reserves to contain and eliminate this initial crossing of the RHINE.

As a result of the combined efforts referred to in the preceding paragraph, First Army used the REMAGEN area as its point of crossing the RHINE barrier, and as a spring board from which to launch subsequent attacks to seal off the RUHR Valley from the south and east. In assessing the effects of the tactical air force in aiding the army in this crossing it must be stated that its foremost contribution was a continuation of its normal support plus an effective interdiction plan. However, the air as an agency did not exploit the bridgehead, and alone it could not keep enemy fighters from attacking the bridge.

CHAPTER XII

ASSAULT OF A LINE OF PERMANENT FORTIFICATIONS

SIEGFRIED LINE NORTH OF AACHEN (SEPTEMBER—OCTOBER 1944)

ARMIES FACE WEST WALL DEFENSES

Following the swift drive across Northern France and Belgium, First Army was forced to halt along the SIEGFRIED LINE in its area for regrouping and resupply. Literally, and similar to the Third Army to the south, the army had far out-distanced all available supply facilities. This pause gave the battered German forces a chance to draw breath, regroup, and build up their defenses in the SIEGFRIED LINE.

Elements of the First Army had gotten into the outer fringes of this defensive line in the AACHEN area before halting. Accordingly, it was decided to take advantage of this and to breach the line north and south of AACHEN, concurrently with an attack to reduce this city which was a well-fortified bastion within the WEST WALL defenses. The period from 15 September to 1 November was, approximately, the time required for these operations, and to set the stage for the next phase — Operation QUEEN.

RETURN TO NORMANDY TYPE AIR SUPPORT

Ground progress during this period was slow and against heavy opposition. Air cooperation during this period was characterized by a return to a modification of the original system of air support used in the NORMANDY Beachhead area. Close coordination was required for air attack of enemy key positions close in front of First Army troops, and the use of colored smoke for marking again became necessary on an increased scale. The battle area between the German west border and the RHINE required isolation by destruction, and interdiction of enemy rail, communication, and supply lines. That the air contributed materially to the progress of the First Army will be shown despite the fact that the desired degree of air support was reduced greatly by the shortening of hours of daylight, and the ever-increasing number of non-operational days due to bad weather.

The ground force plan for piercing the SIEGFRIED LINE north of AACHEN called for the XIX Corps to force its units through the defenses in the vicinity of HEERLEN, and, by turning to the southeast, link up with the 1st Infantry

Division of the VII Corps in the AACHEN area. The IX Tactical Air Command was to cooperate by continuing its normal mission of conducting armed reconnaissance to isolate the battle area along the First Army front, and to render close support to the attacking echelons by air strikes on specific targets on the immediate front of the ground units. This was accomplished in a suitable manner by arranging for squadrons of a designated fighter bomber group to check in, either to the XIX Corps TALO, or to the TALO of a division designated by him for specific targets before continuing on an armed reconnaissance mission on the corps front. This plan provided for squadrons of the group to check in with the ground units at one hour intervals, and rendered material assistance to the advance, slow as it was, through this dense system of defenses.

Aside from the normal air cooperation of IX Tactical Air Command during this phase, one reasonably large scale air strike was planned as an aid to the ground effort. This was scheduled originally for the last week of September, but was delayed on the request of XIX Corps until 2 October 1944.

MEDIUMS USED AGAINST SIEGFRIED DEFENSES

The plan for the air strike gave the medium bombers the mission of attacking numerous defensive positions consisting in the main of pill-box type fortifications within an area outlined by the WURM River and a railroad track paralleling this river, and extending for a distance of about 2000 yards on either side of the town of PALENBURG. Fighter bombers in close support using blaze bombs (jellied gasoline) were assigned specific targets on enemy forward positions consisting mostly of concrete pill-boxes.

MEDIUM ATTACK INEFFECTIVE

The air strike as executed on 2 October did not aid the ground forces materially. Five and one-half groups of medium bombers attacked designated targets, but their effort was dissipated largely, by reason that in the planning stages, the lower ground staffs had been unable to choose between a desire for saturation bombing and attack of pinpoint targets, and a compromise resulted. The size of the area designated for the medium bomber effort attests this fault. To achieve a true saturation effect of such an area would have required many times the force of medium bombers available. This uncertainty in the lower channels of command affected the ability of higher levels of both air and ground staffs in their combined operations centers to plan with maximum effect and to achieve the best results. It is mentioned here, only to re-emphasize the axiomatic tenet that before any air cooperation mission with the ground forces can be planned and executed properly, a clear picture must be had of the effects desired.

It was unfortunate that, with the failure of the medium bombers to achieve the degree of success required to best assist the ground effort, the fighter

bomber effort in this strike did not obtain the desired results. The fighter bombers hit their targets in a satisfactory manner, but the blaze bombs used did not have the effect on the pill-boxes that had been desired. Notwithstanding the failure of this effort, units of XIX Corps, assisted by the tactical air force in a daily role, completed their mission and made contact with VII Corps on the northern fringes of AACHEN about the middle of October.

From the above it is considered that the greatest effects of the tactical air forces during this period lay in the maintenance of our always present air superiority and on the execution of second priority missions, with the medium bombers working on interdiction and the fighter bombers conducting armed reconnaissance missions to isolate the battle area. The modified form of "column cover", i. e., having the leader of fighter bomber groups or squadrons check in with the ground forces before proceeding on their primary mission of armed reconnaissance was of direct benefit to the ground units. The forward movement of the attacking ground forces was expedited by destruction or neutralization of enemy defensive positions impeding their progress.

ATTACK IN THE HURTGEN FOREST (SEPTEMBER 1944)

Concurrently with the action of XIX Corps units described above, divisions of VII Corps were cutting a path through the SIEGFRIED defenses in the HURTGEN Forest area south of AACHEN. Some of the most sanguine and bitter fighting of the European Campaign took place in this heavily wooded area. The forest was dense, with few openings, and this, quite naturally, precluded direct air support by the tactical air forces, although their interdiction and armed reconnaissance programs here were of tangible, if indirect benefit to the ground forces.

A few direct support missions were executed with fighter bombers striking targets impeding the progress of the ground units in this area, especially as the troops neared the eastern edge of the forest, but they were few in number. Perhaps the only opinion that can be formulated with regards to this phase of the campaign is that the nature of the terrain affects directly the air cooperation and close support that may be given by a tactical air force.

CHAPTER XIII

ASSAULT OF A FORTRESS CITY

BREST (26 AUGUST—18 SEPTEMBER 1944)

By 8 August the rapid advance of Third Army through the BRITTANY Peninsula placed armored elements in the area north of BREST. Eleven days later the important port with its deep water harbor facilities was successfully contained, and preparations were under way to launch a coordinated air and ground attack against it.

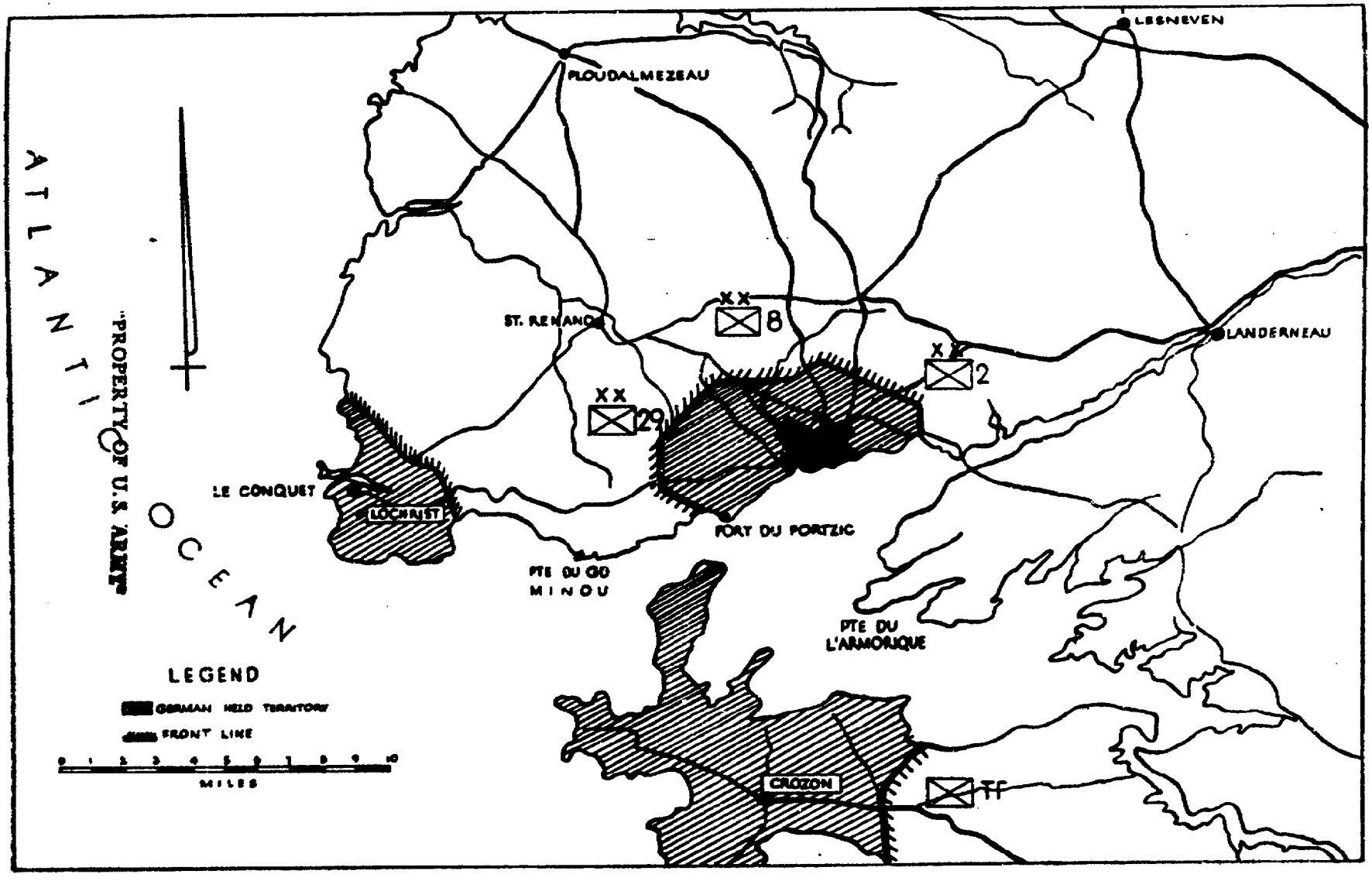
The assault of the Fortress City of BREST was a unique operation. The enemy was isolated on a peninsula, cut off from all other German forces, with virtually no hope of accomplishing more than the delay of the employment of some of our forces farther east, and the denial of the port facilities for our use.

DEFENSES OF BREST PERMANENT AND FORMIDABLE

The city was extremely well organized for defense. Outer lines consisted of well developed strong points of field works supported by a string of old permanent forts. The inner line of defenses was an intricate system of very heavy pill-boxes — many of very low silhouette and connected by underground passages — and heavily defended dominant terrain features, which were integrated with the moat and massive wall of the "old city" proper. The large calibre coast artillery and antiaircraft artillery pieces which were designed to protect BREST from attack by sea and air, were found capable also of assisting in the defense of the city against land attack. These formidable defenses were manned by the troops of three divisions reinforced by a number of miscellaneous port units which in total numbered approximately 43,000 men. In command of the determined defenders was General Lieutenant Hermann Ramcke, fanatic veteran of African and Russian campaigns.

EARLY CAPTURE IMPERATIVE

It was desired that the port of BREST be taken at the earliest possible time since it was, according to the then current plan, neccessary if the advance to the east was to be adequately supplied. Consequently, strong ground and air forces, reinforced with some naval fire power, were allotted to the task. The mission of reducing BREST and the LE CONQUET Peninsula was given VIII Corps which for the operation consisted of the 8th and 29th Infantry Divisions and supporting troops. The corps ground plan called for a determined and relentless attack on the entire land perimeter of the city.



BREST, SITUATION 082400 B SEPTEMBER 1944

PLATE 9

The accompanying air plan envisioned attacks by heavy and medium bombers, prior to the day of the assault, on the coast artillery batteries, heavy AA batteries, blockhouses, strong points, and defensive installations on the CROZON Peninsula, Pte du l'ARMORIQUE, FORT DU PORTZIC, and the inner defenses of the city. Strikes on the same targets were to be made by medium and heavy bombers again on this D-day and in addition, the old wall defenses of the city were to be attacked. Fighter bombers were scheduled to furnish support to each attacking division. On D plus 1, medium and heavy bombers were to hit all known defended positions west of the PENFELD River.

Because it had such a profound effect upon the manner in which air was employed, it must be remembered here that the communications system between corps and higher ground headquarters and corps and air force headquarters was completely inadequate. In effect, the corps was conducting an independent operation several hundred miles from the scene of the remainder of the active campaign moving eastward across France — which itself presented difficult problems of control and coordination due to the rapidity of the advance. Consequently, normal channels were, to an appreciable extent, abandoned. Lack of suitable communications made itself felt in the planning stages and throughout the entire conduct of the operation. Locations of front line troops, bomb lines, target information, cancellations, and other information of absolute necessity for the proper execution of joint air-ground operations were not, in many cases, received in time to allow effective coordination. All of this contributed, undoubtedly, toward making the medium and heavy bomber effort less effective than it might otherwise have been. For example on 7 September, all medium bombers of Ninth Air Force remained on the ground when they might otherwise have been attacking targets to the east. In addition, ground force advances were held up as much as twenty-four hours due to lack of knowledge of action taken on the requested air strikes. While the above was true primarily of medium and heavy bombers, it did to some degree, and for the same reasons, affect the operations of fighter bombers. However, this difficulty was largely overcome by having them operate from an air alert status.

POOR COMMUNICATIONS IMPEDED AIR-GROUND COORDINATION

On 25 August, after a long period of bad flying weather, seven groups of medium bombers of 9th Bombardment Division plus one hundred and fifty-eight Flying Fortresses attacked the heavy defenses of BREST. On the next day VIII Corps launched its coordinated ground attack against all sides of the city. The Royal Air Force continued the aerial assault started the previous day. Three hundred and thirty-four aircraft attacked defenses which consisted

AIR ATTACKS AND GROUND ACTION MEET STUBBORN RESISTANCE

principally of large calibre coast artillery and antiaircraft artillery batteries, blockhouses, strong points, and heavy defensive installations on the CROZON Peninsula, Pte de l'ARMORIQUE, Port du PORTZIC, and the inner defenses of BREST. All medium and heavy targets were well to the front of the attacking ground troops. Fighter bombers were assigned to close support of the infantry.

During the days that followed the initial attack, day-to-day progress was very slow, usually measured in terms of 500 to 1000 yards. The Germans defended fanatically, surrendering key positions and giving ground only when forced to by the overwhelming weight of our attack and fire superiority.

BREST was heavily bombed by medium or heavy bombers, or a combination of both, on five of the first six days of September. Targets continued to be primarily the heavy guns and permanent fortifications on the CROZON Peninsula and inner defenses of the city. The string that was choking the city had been drawn so tight that it was felt no longer safe for our troops to employ medium or heavy bombers against targets in the city proper and thus, although an attack by heavier aircraft had been planned for 7 September, it was necessary to cancel it.

The American forces were now fighting against three pockets. The enemy forces on the LE CONQUET Peninsula were cut off from those at BREST and the CROZON Peninsula. To the east of the sector very bitter house-to-house fighting was taking place, and to the west the enemy's positions on the LE CONQUET Peninsula were tenaciously held. Our efforts to break through the ring of "modernized" ancient forts, guarding the western approaches to BREST, were opposed bitterly. The attack to reduce the LE CONQUET Peninsula progressed steadily — one by one, the enemy's fortified positions and heavy artillery pieces were reduced by the combined effects of our ground and air attacks. On 9 September, the battered "Lochrist Battery" of 320mm naval guns, which for days had been used in practically direct fire against our attack, fell with the surrender of the Peninsula.

The enemy's lines around BREST proper were being continuously forced in by the intense pressure exerted by our troops. Fighter bombers probably never before worked so closely with attacking ground forces. On many occasions fighter bombers made attacks very close to our front, on strong points, armored vehicles, defended buildings, and other defenses resisting the advance of our infantry. Of a total of ninety-seven missions (seven hundred and five aircraft), flown in support of the 2d Infantry Division after 23 August, 65 % were results of requests from front line battalions or forward observers.

FIGHTER BOMBERS ACCURATE IN CLOSE COOPERATION

In the attack of the Fort at Pte du GRAND NINOU by elements of the 29th Infantry Division two flights of P-47s attacked with bombs. Two direct hits were observed — the balance were near misses. Twenty minutes later the Fort was occupied by our own troops. The 38th Infantry of the 2d Infantry Division in describing an action, reported: "Hill 100, which is the dominating terrain feature at the eastern edge of BREST, was completely neutralized by air missions. The enemy had excellent observation to the east and northeast and with the large AA guns (with 360° traverse) was able to harass our troops and retard our advance. With the large guns and operating installations destroyed, Hill 100 fell without excessive loss to the infantry".

Our forces had reached the old wall of the city by 13 September, and on that date, General Ramcke was offered an opportunity to surrender his macerated forces. This was refused, forcing the costly battle to continue. The heavy batteries on the CROZON Peninsula, which still harassed our flanks, were again bombed by mediums on the 14th. By the 17th we had a sizable force inside the city wall, and on the next day, BREST — of the fearful coastal guns, 6' reinforced concrete pill-boxes, heavy steel turrets, ancient forts, and once-determined defenders — surrendered. On the following day, 19 September, the forces on the CROZON Peninsula also surrendered, bringing to an end organized resistance in the area.

For months before the beginning of our operation on the continent, BREST had been subjected to heavy bombing raids designed to interfere with its use by the Germans as a base for submarine warfare and other military purposes. In consequence there existed an adequate system of air raid shelters and air warnings within the built-up part of the city. Civilians stated that though much of the town was destroyed long before the invasion, very few casualties to personnel occurred as the shelters were sufficiently strong to withstand the attacks.

It is important to consider the effects of these early attacks when studying the results of the aerial bombardment of BREST during the ground attack; the protection afforded by the shelters, built to withstand these early raids, undoubtedly enabled the enemy to hold forth in the face of our ground attack longer than he would otherwise have been able.

Extracts from the diary of a captured German naval artilleryman describe the nature of the damage and, to some degree, the morale effect of the bombing:

> "Bombers, dive-bombers, pursuits, all flying rather low. No flak battery is still shooting against planes, and bombers are flying unhindered.

ENEMY COMMENTS ON AIR ACTION

Hundreds of bombers systematically are throwing their bombs along the coast — a veritable fireworks — parachutes with flares like Christmas trees. Attacks by dive-bombers and pursuits with heavy bombs and strafing. Direct hit on light AA gun. American Luftwaffe attacks our positions with Stukas and pursuit planes. No defense, neither flak nor our planes. Direct hit on our bunker. Almost 3 meters of reinforced concrete is too much for a bomb. Only effect: Everything is full of smoke."

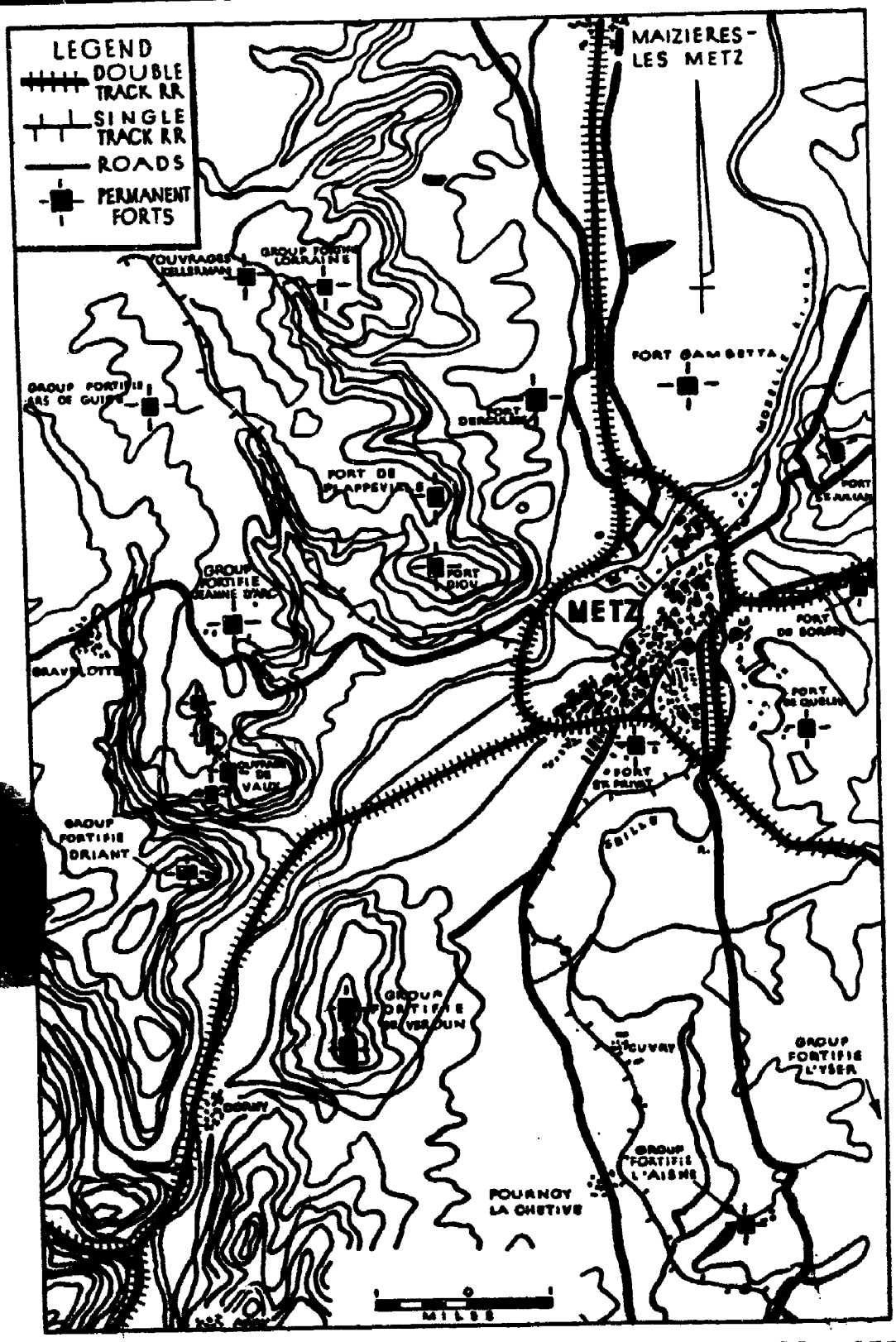
Problems normally associated with the maintenance of air superiority and movement of enemy reserves were conspicuosly absent for this operation. Generally, the weather after the commencement of the attack was good for aerial operations. These factors tended to make available the maximum amount of effort for attacks in close conjunction with the ground attack. Confined in as small an area as the Germans were, each bomb dropped produced beneficial results.

RESULTS NOT COMMENSURATE WITH EFFORT

Probably a greater quantity of fighter bomber support was provided the attacking divisions for close support work than for any other major operation we have yet undertaken. 430 air missions involving more than 3200 sorties were flown by fighter bombers on air alert status alone; this in addition to planned missions against at least fifty targets. This, added to the effect of the expenditure of 478,628 rounds of artillery ammunition, the heavy and medium bomber attacks and the effect of the other weapons employed, caused BREST to be reduced almost completely to rubble.

The attacks of heavy and medium bombers of the Eighth Air Force, Royal Air Force and 9th Bombardment Division were so closely related as far as objectives (other than shipping) are concerned, that it is difficult to assess the value of the contribution made by each type aircraft. Tactically, heavy and medium bomber strikes had little positive effect on the reduction of the heavy forts and gun emplacements on CROZON, Pte de l'ARMORIQUE, Fort du PORTZIG, and the blockhouses, and other installations of the inner ring of defenses at BREST and RECOUVRANCE.

An aggregate of several factors tended to make the heavy and medium effort expended at BREST less effective than expected. Primary among these factors were: (a) the absence of adequate communications described above, (b) assignment to heavy and medium bombers of tasks beyond their capabilities, (c) disruption of normal command channels brought about by the location of the isolated operation, and (d) the ineffectiveness of the bombing on the invulnerable targets selected for attack. While it is doubtful whether the results



PERMANENT KEY FORTIFICATIONS OF CITY OF METZ

PLATE 10

AIR ALERT
PROVIDED
SATISFACTO
COOPERAT

achieved by medium and heavy bomber attacks at BREST justified the expenditure of means, the attacks hastened surrender due to attrition, by either wounding or demoralizing irreplaceable personnel. Other benefits derived from these attacks were: (a) destruction of equipment, (b) destruction of supplies, (c) disruption of communications.

The capability of the fighter bombers to attack the enemy installations retarding our ground advance made them most valuable. Specifically, their main contributions toward the successful completion of this siege were: (a) attacks against motor transport, gun emplacements, defended buildings, tanks, strong points, and forts, (b) reduction in amount of enemy artillery fire, (c) destruction of enemy supplies, ammunition, and POL. In addition, the frequent bombing and fearful strafing attacks, to which the enemy was constantly subjected produced a reduction in their will to resist which in instances undoubtedly made the seizure of objectives less costly than they would otherwise have been.

AIR ALERT PROVIDED MOST SATISFACTORY COOPERATION

The manner in which they were employed, i. e. "air alert", provided for maximum flexibility and minimum time lag from time of request by ground unit to time of execution of attack. The 8th Infantry Division reports that at BREST preplanned fighter attacks required between two and six hours against ten to twenty minutes when aircraft were on air alert. They report further that preplanned medium and heavy attacks required two days.

Fighter bombers accomplished the most beneficial effects contributed by the air-arm in this operation by making precision strikes on heavy gun emplacements, strongpoints, and permanent fortifications in close cooperation with the infantry.

In negotiating with the German commander for surrender of BREST, the Assistant Division Commander, 8th Infantry Division, was asked for his credentials to which he, turning to his soldier escort, replied, "These are my credentials!" One of the members of this escort might well have been a fighter bomber pilot.

METZ (17 SEPTEMBER—20 NOVEMBER 1944)

The city of METZ, the key to the entrance to the SAAR Valley, lay on the east bank of the MOSELLE River. Across the river to the west, a series of hills and ridges overlooked the city and its western approaches and provided nat-

ural barriers to attack from the northwest, west, or southwest. The natural avenues of approach from the north and south were under surveillance of the high parallel ridges on the eastern bank of the MOSELLE.

TERRAIN AND DEFENSE DETERMINE PLAN OF ATTACK

All available intelligence showed that Fortress METZ consisted of an outer and inner belt of mutually supporting permanent forts and field fortifications, situated on the commanding ground and individually capable of all-around defense. The approaches were difficult and well-covered by fire. The original construction by the French had been strengthened by the Germans since 1940 by the addition of reinforced concrete. The Fortress was highly impregnable to a frontal assault.

An extensive and adequate network of highways and railroads was being actively used by the enemy to supply and sustain the defending garrisons in the Fortress. Similarly, a complex and efficient system of communications was operating for control and coordination of the various forts within the system.

Troops of the Fortress were primarily fanatical officer candidate students and SS personnel. The area had long been used in connection with officer and noncommissioned officer training programs, with the result that the defending troops had executed many field problems throughout the area and had intimate knowledge of the organization of the ground and capabilities of the system.

A coordinated attack was launched on 17 September by XX Corps to capture this formidable stronghold. The 90th Infantry Division attacked from the west, and the 5th Infantry Division from the south, while one combat command of the 7th Armored Division attacked to seize the high ground northeast of METZ. By 19 September the general advance was continuing slowly, and the units began to realize the immensity of their task. It was obvious that the corps could contain the troops opposing it, but equally obvious was the fact that an unsupported assault was out of the question. The plan, therefore, was to nibble at the defenses by making a series of limited objective attacks, to harass the enemy by fire, and to keep him off balance by aggressive patrols.

Subsequent attacks in force proved to be of no avail. The enemy reaction initially made itself felt with increasingly heavy mortar and artillery fire.

A plan, known as Operation THUNDERBOLT, was devised as a large scale operation to reduce Fortress METZ by the coordinated efforts of XIX TAC and XX Corps. The all-out effort against METZ was not carried through to fruition because of an order of 25 September to assume the defensive. Nevertheless, from September to November a series of limited objective attacks were ex-

ecuted which involved close cooperation by fighter bombers and assistance from medium and heavy aircraft. However, these attacks were only partially successful. For instance, on 26 September a combined air-ground attack was launched against Fort DRIANT. Three missions, comprising thirty-five sorties, were flown. The first squadron of twelve aircraft had eight P-47s carrying one blaze bomb each and four carrying two 1,000 lb. GP bombs each. Six GPs and six blaze bombs were dropped inside the fort. A large explosion with intense white smoke to 4,000 feet resulted. The area was afterwards strafed. Five minutes later the second squadron, with the same loading put six 1,000 lb. bombs and all eight of the blaze bombs inside the fort, reporting many direct hits and many fires. In the last attack, a third squadron dropped seven 1,000 lb. bombs and seven blaze bombs.

AIR SUPPORTS LIMITED OBJECTIVE ATTACKS

During this attack, the 5th Infantry Division elements were in position preparing for the assault. Strong patrols were sent out, after the air bombardment, and encountered heavy mortar and machine-gun fire prior to reaching the position. It became apparent that despite the weight of effort and accuracy of bombing by the fighter bombers, the effect on the concrete and steel type of permanent fortification, such as DRIANT, was comparatively negligible. The inadequacy of the fighter bomber on such a target seems unquestioned.

FORTRESS METZ WITHSTANDS SMALL SCALE ATTACKS

Again on 27 September, with strong air and artillery support, 5th Infantry Division troops attacked Fort DRIANT only to encounter heavy fire from within the fort itself. All efforts to reduce the fortifications were unsuccessful and the force was withdrawn under concealment of darkness.

In the adjacent 90th Infantry Division a subsequent attack on Fort JEANNE D'ARC, another fort in the system, produced similar unsatisfactory effects. The ground controller reported that the twenty-one 1,000 lb. bombs and the twenty-four blaze bombs had only negligible results on the intensity of the resistance encountered as ground troops advanced to close with the defenders. Perhaps more effective during this period were the bombing and strafing attacks of other missions on supply and communication facilities in the general area of METZ, inasmuch as the roads and railroads in the vicinity were extremely active in the processes of supplying troops in the various forts.

By 18 October and following a period of see-saw action between the opposing ground forces, XX Corps plans were developed for the continuation of the offensive. Commanders were in unanimous agreement that direct assault of METZ was out of the question. Envelopment was indicated.

RESISTANCE REQUIRES LARGE-SCALE EFFORT

Thanks to favorable weather during the period 19—22 October, close support fighter bombers stepped up their attacks against installations in the METZ area, striking command posts, supply points, communications and troop concentrations.

On 9 November, XX Corps, with the 90th Infantry Division making the main effort, initiated an encircling attack designed to reduce and trap the garrison of Fortress METZ. On 19 November, the division joined hands with the 5th Infantry Division east of the city, and on the following day the METZ garrison, less the fanatics in a few forts, succumbed.

COORDINATED AIR-GROUND ASSAULT VICTORIOUS

In this last offensive, both medium and heavy aircraft were used to interdict enemy fire from the forts and thus permit attacking ground forces of infantry and armor to outflank them. Bombardment formations came over in force. Seven key forts in the zone of the 5th Infantry Division were attacked by a force of 679 heavy bombers of the Eighth Air Force; 47 attacked in the zone of the 90th Infantry Division in the THIONVILLE area; 432 hit the SAARBRUCKEN marshalling yard; 34 dropped on SAARLAUTERN; 31 struck targets of opportunity. The 9th Bombardment Division dispatched 514 medium bombers, but because of the cloud conditions only 74 were able to attack. Aiming points in most instances were missed. Strikes were made, however, on vital installations; strong points were destroyed, roads and railroads were cut, and field communications were severely damaged. The intensity of the bombing produced great shock effect on the enemy troops in the field fortifications. The effect of the medium and heavy bombers at METZ was the local destruction of enemy installations when direct hits were made on bunkers, emplacements and fortifications.

The rapid follow-up by the ground troops found the enemy incapable of sustained defense and major forts were by-passed without heavy casualties. The ground forces reported that the attack caused reduction of fire from the forts while the by-passing took place, and that bombs were seen to fall, with highly destructive effect, upon enemy occupied towns in their path. The effect on the scheme of maneuver was greater than expected, and key objectives were secured without heavy casualties. The disruption of communications and shock to enemy personnel were two prominent effects of the bombing.

The effect of fighter bombers on the heavy concrete fortifications was negligible, despite accuracy and the cumulative weight of bombing. Probably the greatest contribution of the fighters at METZ was the persistent harassing effect of bombing and strafing which served again and again to break up en-

emy troop concentrations forming for counter-attack and to disrupt and destroy command, supply, and communication installations within the area, together with neutralization and destruction of fortified towns and emplaced artillery which supported the fortified area proper.

We can conclude that in the attack on Fortress METZ, all types of aviation made worthy contributions, but that of these the combined efforts of the medium and heavy bombers on 9 November undoubtedly produced the most significant and decisive results. In the final analysis, the ground attack in time could have and would have reduced the fortifications, but the shock effect on the enemy troops and resultant reduction of fire, together with the disruption of control communications, produced the conditions whereby the objectives were captured with minimum casualties in minimum time.

CHAPTER XIV

ASSAULT OF A FORTIFIED AREA

FORET DE HAYE (10—14 SEPTEMBER 1944)

On 9 September XII Corps was continuing its march to the east in the direction of NANCY, its objective. The main attack on NANCY was launched by the 35th Infantry Division on 14 September, with positions south, southeast and southwest of the city secured. Meanwhile, the 80th Infantry Division was moving south to NANCY from the vicinity of PONT-A-MOUSSON. On 15 September a task force, composed of regimental combat teams from both the 80th and 35th Infantry Divisions drove the enemy from the FORET DE HAYE, and captured the important city of NANCY.

FORET AN OBSTACLE BEFORE NANCY

The FORET DE HAYE was a well fortified and heavily wooded area west of NANCY. Containing a network of excellently defended roads, well organized and manned strong points, and being located in a hilly area, the FORET presented a particularly difficult obstacle and one which had to be taken before capturing the city of NANCY itself. Corps estimates placed from 5,000 to 6,000 enemy troops in NANCY and the woods to the west. Mine fields were reported extending along the western edge of the FORET. Every indication was that the woods would be strongly defended. FFI reported five trains arriving in NANCY on 6 September carrying fifteen 15-ton tanks which were driven towards FORET DE HAYE, and on 7 September more of the same type tanks were observed travelling in the same direction. For days, combat teams of the 80th Division reconnoitered and probed the west edge of the forest in force, finding the enemy shifting heavy reserves to meet our attack. In the vicinity of PONT ST VINCENT, the 35th Infantry Division found stiff resistance in the form of repeated enemy counter-attacks.

TASK TOO GREAT FOR FIGHTER BOMBERS

Throughout the period of 9—15 September fighter bomber aircraft of XIX Tactical Air Command provided close-in cooperation on column cover and armed reconnaissance missions in the corps zone. At the same time twenty-one missions were flown on the MUERTH-MOSELLE front where Third Army was beginning a coordinated attack to outflank NANCY. Aircraft of one fighter group, on close cooperation in the NANCY area, made forty passes at a concentration of fifteen tanks and destroyed all by strafing. However, with particular reference to the FORET DE HAYE, the need for medium or

heavy aircraft was apparent. The fighter bomber found it beyond its capabilities, economically, to attempt to neutralize and destroy this enemy position. Due to the density of the woods, the enemy had excellent concealment and the fighter bombers were largely reporting "no results observed".

MEDIUM BOMBERS PROVIDE WEIGHT AND COVERAGE NECESSARY

As a result of coordinated planning at Third Army — XIX Tactical Air Command, and XII Corps levels, medium bombardment aircraft from 9th Bombardment Division attacked the FORET DE HAYE on 10 September. The strong points and ammunition stores of the defended area were hit by 178 B-26s carrying 100-lb. GP and 100-lb. fragmentation bombs and by 73 A-20s carrying 500-lb. GP bombs. One field artillery battalion fired harassing and interdiction fires into FORET DE HAYE as part of the MOSELLE River crossing preparation. Immediate effects of the bombing and strafing of aircraft in cooperation can be determined to a degree by the fact that an infantry regiment immediately occupied GONDREVILLE SUR MOSELLE, just west of the forest, and LIVERDUN just north of it, and cleared the area west of the MOSELLE from LIVERDUN to BELLEVILLE. This represented a considerable advance in contrast to prior advances against the forest.

Once again, on the afternoon of 12 September, medium bombers attacked the FORET, delivering what proved to be a knockout blow. A total of one hundred plus aircraft dropped fragmentation and general purpose bombs close in front of the ground troops with decisive results.

On 13 September Task Force SEBREE, consisting of elements from the 35th and 80th Infantry Divisions formed a line around the forest. The task force concentrated in the river loop east of TOUL, and, following the bombing, sent patrols over one mile into the FORET DE HAYE, meeting no resistance. On 15 September at 0320 hours, the leading elements of the task force were on the main TOUL—NANCY road approximately one mile into the forest. At 0920 hours, they had reached a point near the eastern edge of the woods, reporting there was no enemy between them and NANCY. At 1140 hours, the first elements entered NANCY, pushing to the eastern outskirts. Later that day the task force was dissolved.

From a study of this action, in which medium bombardment aircraft, fighter bomber aircraft, and ground units played their parts successfully as members of a smooth-functioning offensive team, it is to be concluded that the enemy, being constantly pressed on the ground by our troops, had nevertheless been successful, at least temporarily, in stopping the eastward advance of the Corps. However, the attacks on 10 and 12 September by the medium bomber

aircraft were instrumental in influencing him to abandon his fortified position in the forest. Reports from XII Corps stated when troops entered the woods they found many dead and wounded, and others too dazed to offer resistance.

This tactical use of medium bomber type aircraft combined with the persistent efforts of the fighter bombers which destroyed specific enemy installations, troops, motor transport, armored vehicles and tanks, and railroad facilities, and maintained air superiority over the attacking ground troops, served to be the deciding factor in forcing the enemy to abandon his position in the FORET DE HAYE. Apparently his failure to reinforce the area sufficiently was due to his losses and difficulty in moving troops in under the surveillance of the fighter bombers on armed reconnaissance farther to the front. Therefore, in an attack of a fortified position, not involving permanent fortifications, fighter bomber and medium bomber aircraft, were profitably employed to influence the ground action.

ATTACK INVOLVE ENCIRCL AND REDUCTI

AACHEN (23 SEPTEMBER—21 OCTOBER 1944)

DEFENSES TOO DISPERSED FOR CONCERTED AIR EFFORT

The area defenses of the city of AACHEN had been planned as an integral part of the SIEGFRIED LINE fortifications, and were manned aggressively by the garrison installed there. These defenses of concrete construction, for the most part arranged in an outer and inner system of defense, did not lend themselves to successful mass air attack. Two alternatives faced us with regards to AACHEN. It could be attacked and captured as a part of the combined effort to force our way through the German WEST WALL or it could be bypassed, leaving a ground force sufficiently large to invest the city and take it in a more leisurely fashion.

The decision was made to attack the city and destroy its defenses. The plan of attack need not be given here except to show that units of VII Corps surrounded the city from the west, south and east. Concurrently units of XIX Corps moved down from the northwest to cut the area off from contact with the rest of the German forces, so that a demand for surrender could be backed forcibly with a statement that, otherwise, the city would be completely destroyed.

AIR SUPPORT DESIGNED TO ISOLATE AREA

IX Tactical Air Command was to cooperate with First Army by a planned program of armed reconnaissance to isolate the battle area. Squadrons were to check in with the TALOs of the 1st Infantry Division of VII Corps and 30th Infantry Division of XIX Corps for specific targets before proceeding to the armed reconnaissance area. In addition, a portion of the effort of IX TAC

was to be used in striking specific targets on request from the ground forces. Medium bombers of the 9th Bombardment Division were to cooperate during this period by striking rail and road bridges, and communication centers as a part of the interdiction program.

This combined air-ground plan was put into execution during the last week of September, and units of the 1st Infantry Division progressed steadily, though against determined resistance, to encircle the city. The air rendered material close support by striking at key centers of resistance, and in making attacks on pin-point targets such as defended road junctions, pill-boxes, and emplaced artillery.

ATTACK INVOLVES ENCIRCLEMENT AND REDUCTION

The attack had progressed sufficiently by the first week in October for the VII Corps Commander to request permission to issue an ultimatum to the city's defenders that if the town was not surrendered, it would be the object of an "all-out" air attack by heavy, medium and fighter bombers to destroy the city. This request was not favorably considered either at the Army — TAC level or the Army Group — Ninth Air Force level, on the assumption that such an attack would have required a greater air effort than could be marshalled effectively for the saturation bombing of such widely spaced defenses, would have little material effect on the outcome of the battle as a whole, and might easily produce another "Stalingrad defense". After this disapproval at higher command levels, an ultimatum was issued to the effect that should surrender within a specified time not be forthcoming, a combined artillery and air attack, coordinated with the advance of infantry and tanks, would be used to destroy the city.

The ultimatum was rejected, although several hundred of the city's defenders and civilians surrendered. Fighting continued on an increasing scale and the inner defenses of the city were pierced. Street fighting and attack of the city's many pill-boxes and concrete enclosures took a heavy toll of both attackers and defenders. Air attack on the city proper consisted in the main of close support missions against specific targets requested by the attacking ground units. In addition to this it was arranged that when the ground forces had no immediate targets, or when bombs were not used against targets in the armed reconnaissance area, squadrons and groups on armed reconnaissance, would fly over the city and bomb certain designated areas. This produced no specific effect, but did add to the overall amount of destruction.

The junction of the 1st Division troops with the troops of the 30th Infantry Division of XIX Corps moving into the northern edge of AACHEN was made toward the middle of October. On 21 October 1944 all resistance ended and

the first large city within the confines of Germany proper surrendered. The city was more than three-fourths destroyed and all its defenders either killed or captured.

AIR EFFORT HAS INDIRECT BENEFITS

In considering the effects of the air in this battle for AACHEN, it is believed that the most beneficial effect of the tactical air forces was the interdiction and armed reconnaissance missions to isolate the battle area. The outcome of this battle was determined by the application of approved ground principles of attack and the city was taken by the pressure of superior weight of ground forces alone. However, the continuation of second and third priority missions of the medium and fighter bombers, coupled with the continuation of maintenance of air superiority by the air forces permitted this victory in less time and with reduced losses in personnel or materiel.

CHAPTER XV

AIRBORNE OPERATIONS

Airborne operations are peculiar in that they are predicated on certain air capabilities, and their initial success or delivery to the drop and landing zones, is a responsibility of the air force. It may not be within our province to evaluate the technique of delivery, but we can judge the value of air power as it related to the effectiveness of airborne troops on the ground.

NORMANDY (6 JUNE 1944)

AIR PREPARATION INSURES SUCCESSFUL DELIVERY

Only in priority I action, air superiority and preparatory measures for successful delivery, has air power adequately assisted airborne operations in this theater. In NORMANDY the landing of the 82d and 101st Airborne Divisions was accomplished in three missions: Twenty aircraft were dispatched to arrive between 0016 and 0202 on 6 June to drop navigation aids in the drop zone. Eight hundred aircraft, with a loss of only twenty, were dispatched to drop paratroopers on six pre-determined zones. Drop zones were hit reasonably well with a few exceptions. Additional troops of the airborne divisions were carried in gliders, along with supporting weapons, vehicles, medical and signal units. Of 512 aircraft and 510 gliders in this unit only eight were lost.

The means taken by the air forces to prepare the way for surprise delivery, and to deliver these troops in fighting units with the few losses sustained was a creditable performance. Preliminary reconnaissance and pre H-hour attacks risked revealing intentions, but were accomplished without loss of tactical surprise. Reconnaissance is of particular importance since it must supplant ground reconnaissance for all planning. Carefully planned counter flak sorties and diversionary flights reduced the anticipated losses from enemy AAA and night fighters. Previous bombardment by both mediums and heavies on pre-invasion attacks of communication centers are believed to have been effective in disrupting communications and slowing down the enemy's reaction to the airborne landing. One target, ST. MARTIN BARREVILLE, was completely neutralized by bombing and easily taken.

The NORMANDY drop came during the pioneer days in close support. It is fortunate that a link-up was made on 8 June between airborne troops and the beachhead, since both fighter bomber cooperation, and aerial reconnais-

sance information were insufficient for those lightly-armed isolated units. Most of the missions flown to assist them were prearranged against bridges on the CHERBOURG Peninsula, on lines of communication facing the airborne units, or on armed reconnaissance of routes behind enemy lines. Request missions on critical close targets were practically non-existent; those effective were "stolen" from the air by circumventing the unwieldy procedure and channel set up, and by "talking the pilot" into the target — now an approved practice. More help might have been requested but casualties to TALO's and equipment in the drop reduced their potential effectiveness. Armed reconnaissance outside the drop zone delayed the 17 Panzer Division as it moved toward the assembly area and knocked out several tanks. Losses to the airborne units on the ground through lack of close support by fighter bombers were out of proportion considering the number of fighter bombers over the invasion area.

CLOSE COOPERATION WAS NOT PROVIDED

ARNHEM (18 SEPTEMBER 1944)

Operation MARKET at ARNHEM on 18 September faced the greater risks of delivery in a daylight drop. Flak suppression was accomplished by a heavy effort of 852 bombers attacking 112 antiaircraft installations along the route of approach. In addition, 693 sorties by fighters of the Eighth Air Force plus those of the RAF on area support, perimeter patrol, and strafing operations assured another successful landing; but with delivery into a hornet's nest which reconnaissance did not pick up — air cooperation practically ended, despite the planning and provisions made for it. It was to be hoped that the ARNHEM operation would show progress in this respect based on NORMANDY experience. However, the only help given for the first four days was armed reconnaissance in pre-determined areas. The air-ground team was still enmeshed in security regulations and bomb line restrictions, and the means set up defeated the purpose. Fleeting targets could not be engaged promptly when requests had to be sent from front lines to division to fighter control, to pilot, all through a system of ciphers and receipts that was far too restricting. Air-ground communications from pilot to TALO, and cooperation between the two in locating and attacking targets is the basis for successful close air assistance. Even if it necessitates relaxing security measures, it gains enough time to justify that relaxation. Without ground control of the aircraft, to talk it into a target, the bomb line becomes a restriction denying the close support which the airborne units needed and didn't get. Help from the experienced IX TAC was cancelled

DIFFICULTIES OF COMMUNICATION DENIED CLOSE SUPPORT

at ARNHEM, and a period of inclement weather curtailed much of the normal armed reconnaissance which would have reduced the costly counterattacks. The same labyrinthian channels of communication so delayed aerial reconnaissance information that it seldom got to the isolated units in time to help their planning.

There was no quick link up at ARNHEM. Supplies for the seven to eight day period of isolation had to come by air. Had air-ground communications been available even for that, much of the high loss could have been prevented. The excellent resupply missions at BASTOGNE in December indicate the progress made in that direction. A report on resupply at BASTOGNE by the corps pathfinder officer says in part "an emergency radio frequency common to ground and air units should be established that will allow direct communication between units on the ground and elements of aircraft dropping supplies".

WESEL (23 MARCH 1945)

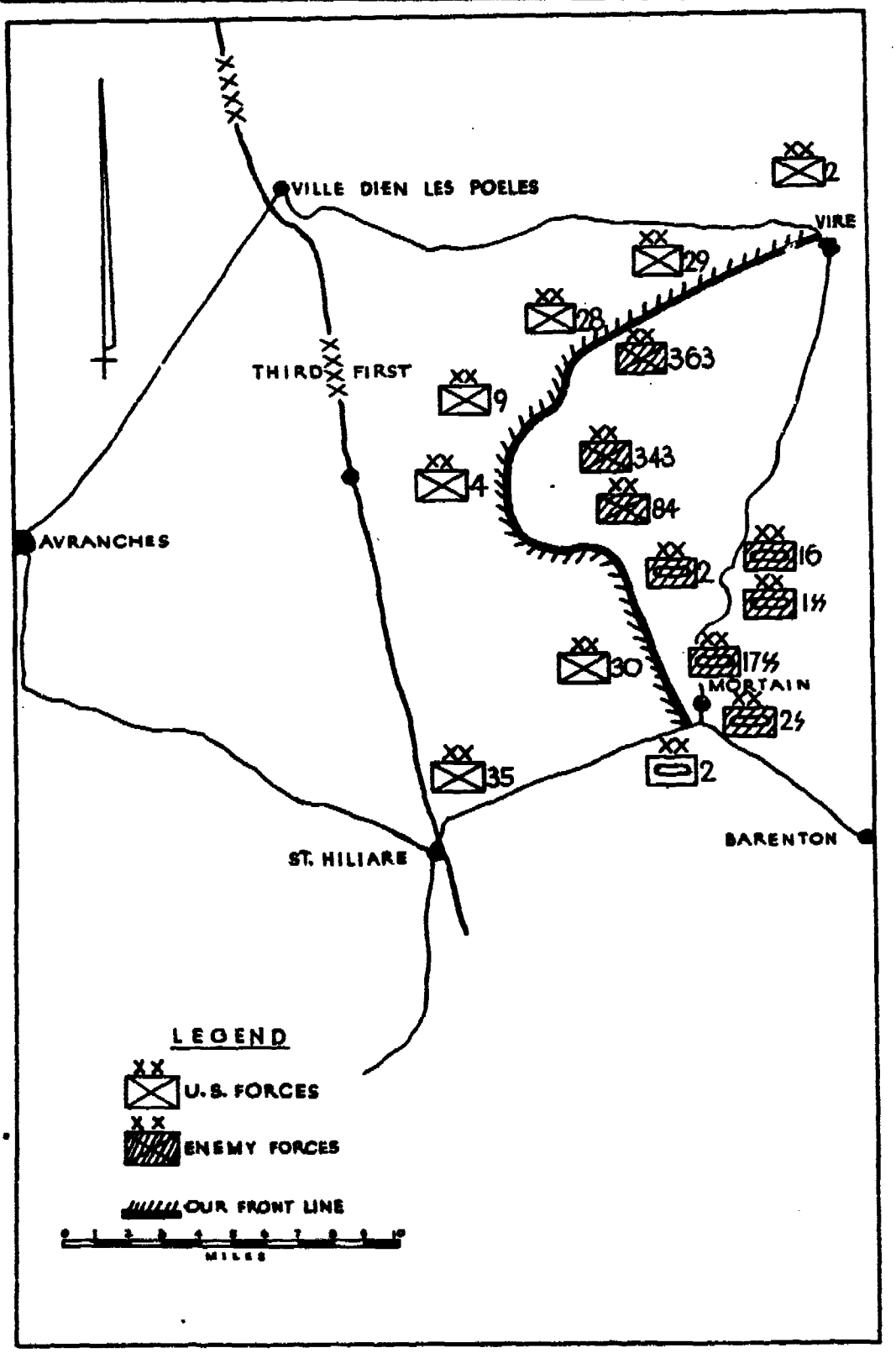
ADEQUATE PLANNING CORRECTED EARLIER DEFICIENCIES

Preparatory measures for the WESEL drop were ample, although they were largely indistinguishable from the overall air plan for the RHINE crossing. Protection from the air, particularly from jet aircraft, was accomplished by heavy and medium post-holing attacks on airfields in Northwestern Germany. Flak suppression and fighter cover were provided by an impressive effort of the TAC's and 2d TAF. Since the drop zone was within five to ten miles of the front lines most of the flak positions were hit by artillery. Liaison aircraft performed admirably in spotting and adjusting counter-flak fire before the drop. The Fifteenth Air Force flew a diversionary mission deep into Germany to draw off enemy fighters. Airborne troops were dropped more accurately than on previous operations. There was little test of the isolation program which was intended in the attacks on REES, BOCHOLT, BORKEN, DORSTEN and DINSLAKEN, for the enemy's effective reserves were by then almost mythological. Following the thorough air preparation and the rapid link-up, fighter bombers performed their normal armed reconnaissance which was constant until the divisions had assembled. By the afternoon of D-day an air support party of the 17 A/B Division had started operations, and on D plus I several close cooperation missions were performed; one within ten minutes of the request.

The WESEL drop, in contrast to the previous ones, had air cooperation of the type needed and possible when provisions are made for it. It profited not

CLOSE SUPPORT BUILDS MORALE

only from the results of air action but from the spirit of teamwork which accompanies joint operations. In no type of action does close air cooperation have such a positive morale effect as in support of an isolated unit of airborne troops. To be delivered and supplied by air creates a closer feeling between those forces than is generally realized. But to be delivered and deserted by air is a definite blow to the fighting spirit.



MORTAIN AREA, SITUATION 1200 HOURS 7 AUGUST 1944

PLATE 11

ENEMY ATTEMPTS TO SEPARATI ARMIES

CHAPTER XVI

DEFENSIVE OPERATIONS

The employment of air power in conjunction with defensive ground action has, as in every other type of operation, varied with each individual case. Generally, the manner in which it was utilized falls into two major categories, depending upon whether the defensive was active or static — that is, whether the enemy was attacking or containing our positions.

Active defensive operations were conducted at MORTAIN in BRITTANY by First Army and at BASTOGNE in the ARDENNES by Third Army, while a static defensive was assumed by Ninth Army along the ROER River during the period 16 December 1944 to 28 January 1945. A description of each of these operations and comments as to the effect upon them of air cooperation is treated in following paragraphs.

MORTAIN (29 JULY—14 AUGUST 1944)

As the action developed following the breakthrough of the ground forces at ST LO, First Army pressed the enemy's precarious defenses south and west of VIRE, and Third Army pushed south through AVRANCHES for a turning movement into the BRITTANY Peninsula or east toward MAYENNE. It was undoubtedly apparent to the enemy that his position was tenuous and that his forces were in danger of being trapped (as later happened in the FALAISE-ARGENTAN area).

ENEMY ATTEMPTS TO SEPARATE ARMIES

Heavy fighting developed in the VIRE-MORTAIN area during the period 29 July to 14 August 1944. The enemy was making a desperate bid to relieve the pressure against him and concurrently to cut through to the GOLFE DE ST MALO at AVRANCHES in order to separate First and Third Armies and sever the relatively narrow corridor held open along the western coast of the COTENTIN Peninsula through which reinforcing units and supplies were passing to Third Army. Nightly raids by enemy single aircraft or small formations were being made on the important bridge at AVRANCHES, and day and night attacks on friendly supply columns.

At MORTAIN on the morning of 7 August the Germans launched a heavy counter-attack against units of VII Corps with five panzer divisions in the assault

The ensuing fighting was determined and persistent, with the MORTAIN area changing hands several times. Close-in infantry fighting and tank battles were numerous, but by 14 August the threat had been beaten off and there were evidences of a general enemy withdrawal.

AIR ASSISTS IN COUNTER BLOWS

During this phase of the battle the value of the flexibility of a tactical air force was demonstrated forcibly. The intensity of the enemy attack in and around MORTAIN made it clear that he was determined to force this wedge between First and Third Armies. Infantry and armored elements of VII Corps fought bitterly to contain this effort but were waging an unequal fight against an armored concentration. It was at this time that First Army requested IX Tactical Air Command to give first priority on fighter bomber effort to units in the MORTAIN Battle. As a result, in addition to the groups providing column cover for the armored divisions, other groups were sent into the area to strike targets of opportunity and to be on air alert for requests for strikes against specific targets.

All fighter bombers of IX Tactical Air Command that were not committed irrevocably to beach cover or escort were thrown into the fight on 7 August and succeeding days. Cooperation between ground and air was excellent, with the fighters endeavoring to answer all calls from ground units for close-in strikes, in addition to armed reconnaissance in the area to strike at targets of opportunity and to break up enemy concentrations. A typical example may be mentioned where one fighter bomber squadron found an enemy column of twenty vehicles, including tanks and half tracks, and claimed destruction of the entire column.

MASSING AIR EFFORT PAYS DIVIDENDS

As the fighting developed, and there were more targets than aircraft with which to attack them, fighter bombers from XIX Tactical Air Command and a rocket-firing squadron of the RAF were called in to add weight to the IX Tactical Air Command attacks and to insure a continuous effort by the air until the attack had been beaten back. The amount of damage inflicted by the air in this close support work, by destroying or damaging enemy armored vehicles, breaking up troop concentrations, and actual bombing and strafing raids during the repeated enemy attacks, aided decisively in breaking up and beating off this counter-offensive. To cite only one of many similar claims, on 7 August seven P-47 fighter bombers claimed destruction of twelve tanks, five staff cars, four half tracks and four light flak positions, plus damage to four other tanks. Another IX Tactical Air Command claim was for thirty-six armored vehicles destroyed and nineteen damaged.

ISOLATED UNI ESTABLISH PERIMETER DEFENSE

The inherent flexibility within the Ninth Air Force organization to shift or mass fighter bomber strength to meet a particular need was a contributing factor to the success of the ground troops in defeating this enemy counter-attack. According to enemy information received later, he was convinced that it was unprofitable to attempt a major counter-offensive in the daytime against determined ground resistance and an intensive air effort.

An analysis of the effects of the overall air effort as it pertained to this phase cannot be drawn conclusively, for the ground action, while most important, was limited in area and scope. It can be concluded, however, that the most effective contribution of the air for this short period was the outstanding close support given by the fighter bombers to the ground units.

BASTOGNE (18—31 DECEMBER 1944)

As the action in the ARDENNES developed, with the enemy striking in force in the ST. VITH — BASTOGNE area, the 101st Airborne Division, at NEUFCHATEAU on 18 December, was moved to BASTOGNE to defend against the German counter-offensive. Little then was known of the enemy situation, but it was realized by the corps and division commanders that the enemy vitally needed that communications center. With this in mind, the 501st Combat Team moved to BASTOGNE, passed through the city and encountered enemy infantry and armor on the eastern edge. Contact was made with elements of Combat Command B, 10th Armored Division, Combat Command B, 9th Armored Division, and small elements and stragglers of the 28th Infantry Division. In the meantime, 506th Combat Team was ordered to attack on the left of 501st Combat Team, in the direction of NOVILLE. After stubborn enemy resistance NOVILLE was occupied by the 506th Combat Team, although enemy continued armor-infantry attacks on the town. Indications of attacks on all sides appeared and combat teams were promptly employed in a perimeter defense of BASTOGNE.

ISOLATED UNITS ESTABLISH PERIMETER DEFENSE

At 2200 on the 19th, an enemy attack cut off the division service area and captured the majority of the 326th Airborne Medical Company. At this time the supply situation was indefinite and inadequate. In an attempt to secure supplies for the division, organic $2^1/_2$-ton trucks had been dispatched to the division rear base and rear army installations to pick up ammunition. When the enemy succeeded in encircling BASTOGNE, there were approximately 100 of the division's trucks in rear areas.

By 21 December, the division was completely encircled by the enemy who continued his attacks. Armor and infantry repeatedly infiltrated, affording the organic and attached artillery battalions, in addition to tank destroyer units, an opportunity for direct fire. All attacks were beaten off. Although wire lines to VIII Corps had been cut, normal radio channels were open and, in addition, radio-link equipment attached to the signal company from VIII Corps provided radio telephone and teletype facilities throughout the operation.

TACTICAL AIR DEFENDS BASTOGNE

On 22 December, an enemy proposal that the division surrender or be annihilated was rejected by the acting division commander. Shelling on the scale threatened by the enemy did not take place, but infantry-armor attacks, artillery concentrations, and nightly aerial bombardment continued. As the weather cleared the first air support by fighter bombers was furnished on the 22d and proved to be of tremendous help in attacking close-in targets which could not be engaged by artillery due to ammunition shortages. Also, enemy armored columns northwest of BASTOGNE were attacked.

SUPPLY BY AIR SUSTAINS DEFENSE

By 23 December food supplies as well as ammunition had become critical, requiring requisitioning of food from civilian sources. On this day two division pathfinder teams parachuted into a field near the division CP and later in the day guided 241 planes on a re-supply mission to the drop zone. On the 26th and 27th, additional re-supply missions were flown, including the use of forty-two gliders. The percentage of recovery on parachute and glider re-supply was high and proved of great assistance to the hospital, as well as enabling the artillery to continue its vital mission. The rations which were dropped and the ten glider loads of gasoline helped alleviate the critical needs for these items.

During the 23d and 24th, enemy activity continued on all sides with particularly heavy attacks. In order to strengthen the sector, lines were shortened. On the night of the 23d, friendly night fighter cover was furnished to provide counter air measures against the nightly enemy aerial bombardment. In addition, during daylight, close fighter bomber support was maintained on all sides of the encircled area by IX and XIX Tactical Air Command. On the 24th, the division forces were regrouped with all four regiments in line, in perimeter defense around BASTOGNE. By this time contact had been made with eight enemy divisions.

On 26 December elements of the 4th Armored Division, attacking as a part of III Corps to relieve BASTOGNE, made contact with the 101st Airborne Division at an outpost at ASSENOIS, two miles south of BASTOGNE. Wire

communication was established with VIII Corps. By this time, five of the division liaison pilots had arrived and landed on an airstrip in the vicinity of BASTOGNE. Their arrival provided timely assistance in the functioning of the artillery battalions.

Until 31 December, the enemy continued his attacks against the city, including night bombing and strafing attacks. However, the corridor into BASTOGNE had been considerably widened and the defense line was no longer necessary in this sector. Supplies and evacuation were normal. The only definite contact with the enemy was with the 26th VG Division, although at one time or another at least four infantry and four armored divisions had been engaged.

From a study of the participation of various types of aircraft in the above defensive situation — one in which the predicament of the defenders could hardly be more critical — it is concluded that aircraft had a definite and important role to play. To assist in the ground action, it is felt that invaluable contributions were made by fighter bomber, tactical reconnaissance, and medium and heavy aircraft. Fighter bombers were used effectively on close-in missions, on armed reconnaissance, and on day and night fighter sweeps. Bombing and strafing near the front were well handled in attacks on assaulting units, tanks, enemy artillery, and reserves. Due to the fluidity of the situation, night fighters were restricted to limited use on intruder missions around BASTOGNE. Their most effective use was their patrol of the area; even so, the enemy air was able again and again to "get through" to attack the defended city with serious results. Generally, night fighter activity within the area was inadequate.

AERIAL RECONNAISSANCE PLAYS VITAL PART

Tactical reconnaissance aircraft, including photo reconnaissance planes, searched the area and located enemy movement and dispositions. Photo reconnaissance pilots penetrated the flak defenses of the enemy to drop aerial photographs to the BASTOGNE defenders. Also within the area tactical reconnaissance aircraft were used for spotting targets and leading fighter bombers to the attack and in adjusting long-range artillery and counter-flak fires. Liaison planes adjusted artillery to harass the enemy's movements during the day. Heavy and medium bombers continued their interdiction progress to the east, cutting enemy communications and destroying supplies, although they were not used on close tactical missions in support of the 101st Airborne Division. Due to the timely relief of the division on 26 December by the 4th Armored Division, the interdiction program successfully executed by the medium and heavy aircraft benefited the defenders at BASTOGNE only to a limited degree. How-

ever, had this defensive situation been prolonged, the enemy would have been forced to employ supplies and reserves on a greater scale. As these must have come from the areas in which the interdiction program was being conducted, he might have been able to employ these supplies and reserves freely to influence the action, in the absence of the successful interdiction program.

In the defensive situation the effectiveness of the fighter bomber, the tactical reconnaissance aircraft, and the medium and heavy bombers proved to be a necessary adjunct to an all-out effective counter-offensive. No particular communication or other operational difficulties arose to make their employment difficult or ineffective.

In a special defensive situation, such as BASTOGNE, where troops were completely cut off and air supply was mandatory for the successful continuation of the defense, the cargo-type ship, such as the C-47, and the gliders were indispensable. The result at BASTOGNE was such as to sustain the division until relieving troops could make contact.

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ROER RIVER LINE
(19 DECEMBER 1944—23 JANUARY 1945)

Most of our experience with the static defensive type of operation occurred on the north flank of the First Army at the time of the German counter-offensive in the ARDENNES during the latter part of December 1944, and in January and February 1945.

ROER SECTOR LIGHTLY HELD

Initially, the failure to capture the ROER River dams in early December prevented the continuation of the attack east of that river. Occupation and defense of the west bank was forced upon us pending the removal of this threat. Then, on the 16th of December 1944 the enemy launched a strong counter-offensive in the quiet VIII Corps sector with seven infantry and two Panzer divisions. A second drive with three infantry and two Panzer divisions, was begun on the 17th in the V Corps sector. Allied strategic reserves were quickly committed at BASTOGNE and NAMUR, and additional forces were drawn from the other armies to check this advance. So quickly were troops massed in the ARDENNES that by 22 December, only two divisions remained in defense of the fifteen-mile Ninth Army front which extended from a point north of GEILENKIRCHEN to a point south of JULICH. By 27 December VII Corps,

on the south flank of Ninth Army, had been withdrawn for employment in the "bulge". The Ninth Army zone was widened to include the former sector of VII Corps; its forty-mile front now extended from a point south of MONCHAU to a point just north of GEILENKIRCHEN and was held by five infantry divisions.

The ground was well suited for defense, with the ROER River providing an excellent barrier over most of the army front. Offensive ground operations on both sides during this period were limited to adjustment of front lines, aggressive patrolling and heavy concentrations of harassing artillery fire, especially in the rear areas.

AIR PROVIDES ONLY OFFENSIVE ACTION

Possibly for the first time the capabilities of the air force were considered in a planned ground defensive. A detailed air plan (Operation BOBTAIL) designed to thwart a possible enemy attack was devised jointly by air and ground staffs and placed in the hands of executing units in event necessity for its use should arise. Fortunately a major German attack on this front did not materialize, but we were awakened to a realization of the air forces' capabilities in such a role.

While the German counter-attack to the south was making way, the bulk of the available strength of Ninth Army's cooperating XXIX Tactical Air Command assisted First Army. Relatively few close support missions were flown on the Ninth Army front: the principal air action in this sector was in the form of armed reconnaissance with priority given to attacks on rail and motor movement towards the ARDENNES. British night intruders in limited strength, provided some night effort on the army front, as a part of the general coverage of the area east of the ARDENNES salient. The air effort that was expended close to the army front was against bridges designed to strengthen our defenses, or against communication centers and defended villages to assist the limited attacks made to improve positions.

By the end of December the German attack in the ARDENNES had been successfully checked. Air plans to assist the attack of Ninth Army across the ROER were in their first stages. During the latter part of January and February, the principal weight of XXIX Tactical Air Command went toward the destruction of rail facilities in an effort to weaken the enemy's ability to resist our pending attack effectively. By the time the army was ready to resume the offensive, the rail system east of the ROER and west of the RHINE River between KOLN and KREFELD was largely inoperative. Tactical reconnaissance missions were flown when weather permitted although the effort allotted the army front was much less than normal.

NEED FOR AIR LIMITED

There was little use in this static defense for medium and heavy bombardment in a strictly close support role. Fighter bombers were usefully employed on armed reconnaissance with principal targets road and rail movements. Effort of night intruders or harassers would have been most desirable if employed in adequate strength and over a protracted period, since, as usual, the enemy made all his major movements under cover of darkness.

In conclusion, then, we find that in active defensive operations such as at MORTAIN and BASTOGNE, the most helpful immediate effort was from close support fighter bomber attacks on specific targets and in breaking up enemy attacks. Interdiction reducing the strength and force of these counterattacks was second only to the immediate effort. In the static defense of the ROER River line, tactical reconnaissance contributed the most beneficial air effects by providing information that would have permitted the efficient employment of mobile reserves and artillery.

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CHAPTER XVII

RETROGRADE MOVEMENT

ARDENNES (16—27 DECEMBER 1944)

Part Two, relative to the combined effects of the tactical air effort, is completed with the following comments on the effects of air power on a retrograde movement. While the battle in the ARDENNES Forest area during December of 1944 was not a planned withdrawal, and as such fails to be a true retrograde movement, certain elements of the units defending in this area were forced to withdraw and salvage their remnants prior to and during the movement of our reserves into a position from which to counter this major enemy move.

GERMANS PLAYED FOR HIGH STAKES

The German counter-offensive in the ARDENNES Forest area was launched in the early morning of 16 December 1944. Preparations for the offensive began in November 1944 and for a month troops and supplies were moved into assembly areas adjacent to the points of penetration, mostly at night. Our intelligence generally was aware of this movement although adverse weather conditions, and a lack of adequate night photo reconnaissance, handicapped intelligence officers in predicting its magnitude or its probable purpose.

The German plan called for a quick penetration and a thrust west and then north to cut off the Allied armies east of LIEGE, BRUSSELS, and ANTWERP. Diversionary efforts were to be made all along the Allied front from MONCHAU to LUXEMBOURG city but the main effort was to be made in the MONCHAU — ST VITH, BASTOGNE sector. It is believed that the effort was planned to relieve the great pressure being exerted along the First and Third Army fronts and to gain some sorely needed time by disrupting the Allied schedule, but there was always the chance that by achieving surprise in the initial penetration, advantage could be gained to exploit any real breaks that might result. It was to be the first major offensive launched in this war by the German High Command without the assurance of complete local air superiority. However, and it is significant, the enemy planned to offset his lack of air superiority by timing the attack to coincide with predicted adverse weather that would preclude either effective aerial reconnaissance or offensive action by our own tactical air force.

INITIAL ATTACK WAS SUCCESSFUL

This counter-offensive met with initial success, and several units were overrun. The impetus of the attack carried the enemy westward at the farthest point to the vicinity of DINANT. However, the penetrations in the MONCHAU—MALMEDY and south LUXEMBOURG areas were sealed-off and contained; BASTOGNE was defended stubbornly and held, and ST VITH was held until a line could be established facing generally south in the MALMEDY, STAVELOT, LA ROCHE area. This line on the north, coupled with the defense and subsequent build-up in the BASTOGNE area, canalized the enemy thrusts along the east-west road net.

The threat was met with determined ground and air counter-action. From the ground standpoint it is necessary only to say that effective means were devised to defend against the enemy, during the early stages, and later, to attack simultaneously from the north, west, and south, thus turning the early enemy success into a costly failure. By the latter part of January 1945, all ground lost had been retaken, and efforts were centered again on breaking through to the RHINE River.

AIR RISKED ZERO WEATHER TO HELP

Turning to the air activity in this battle, the period from 16 December to 22 December was characterized by adverse weather that almost, but not completely, precluded air operations. Local successes were obtained by IX Tactical Air Command on 17 and 18 December by virtue of their risking operations at very low altitudes and under conditions of poor visibility. An enemy armored column was discovered moving westward toward STAVELOT. Nine bombing and strafing attacks by one group of fighter bombers, combined with three attacks by squadrons of other groups, resulted in over 150 vehicles being left damaged or burning along the road, thereby blunting the force of this column.

COUNTER AIR MEASURES INTENSIFIED

On 22 December a break in the weather came that lasted through 4 January 1945. The tactical air force made the most of the break, for the road nets were attacked by fighter bombers in a manner reminiscent of the battle in the ARGENTAN-FALAISE pocket. These close-in armed reconnaissance missions in the battle area produced genuine results, and the number of vehicles destroyed or damaged during this period was gratifying. The damage inflicted might have been greater had not a large percentage of the fighter bomber effort been diverted to fighter sweeps and bomber escort to counter the GAF effort whose activity was greatly intensified during this period. It was during this period also that the method of diverting fighter bombers from armed reconnaissance missions to close support missions on specific targets for the ground forces was employed so effectively.

MEDIUMS AND HEAVIES MASS EFFORT TO DELAY ENEMY

Concurrently with this fighter bomber action, medium bombers, and the strategic heavy bombers operating in a tactical role, were performing both interdiction and close support missions. A very thorough interdiction program designed to disrupt the road net available to the enemy both within and without the area of penetration was carried out. The enemy was never wholly cut off from his supply areas, but he was forced to exert an exhaustive effort behind his front to keep his supply lines open and to maintain an escape route.

It is apparent from the above that, despite adverse weather conditions, the tactical air force and the strategic bombers cooperating in a tactical role, produced excellent results in this battle both in the initial defensive stages, and later in the offensive actions. Scrapping the longer range programs for the time being, a true close support program was devised and carried out effectively. The enemy bid for temporary air superiority, as evidenced by his intensified air effort, was beaten down and made generally ineffective, except as a nuisance value, throughout the period. An effective plan of isolation of the battle area was carried out through interdiction and armed reconnaissance missions; and close support of the ground troops through attacks on specific targets was effective when weather permitted.

From the standpoint of the retrograde movement and defensive action up to 27 December 1944, it is believed that the greatest benefit derived from the tactical air force was in the offensive action of the fighter bomber in blunting the power of the armored thrust, and striking specific targets on the front of the ground troops. The bombing and interdiction programs of the medium and heavy bombers, started on 22 December 1944, began to be effective during this period, but their full benefit was not apparent immediately as was the case with the fighter bomber.

PART THREE

ENEMY VIEWS ON THE EFFECTS OF STRATEGIC AND TACTICAL AIR POWER

CHAPTER XVIII

SUMMARY OF PRISONER OF WAR INTERROGATIONS

While this report is intended to reflect our own views on the effects of strategic and tactical air power on military operations, it may not be inappropriate to summarize the views of the enemy both during the campaign and after its close. It is of course impossible to make sharp distinctions between the two because so much of our knowledge of the effects of air power has been gathered by accretion from enemy sources. The present section nevertheless attempts to regard Allied air power solely through German eyes. It consists of brief statements on various aspects of the air campaign, but is based on a long series of reports from prisoners of war.

THE ROLE OF AIR SUPERIORITY

VIEW OF THE GAF

We agree that the combination of all Allied arms and branches won the war, but there is a strong body of Luftwaffe opinion that the German Air Force alone lost it. There is, of course, no unanimity of specific errors and failures leading to the defeat; commanders of operational units pin the blame on lack of vision in the high command of the air force and interference at that level in matters of tactical concern, while the high command is inclined to point to the Fuehrer's interference in GAF matters and to his decision in 1941 to attack Russia. At the same time it tries to forget the failure of the 1940 attack on Britain, the boast of the inviolability of German air, and the thrill of horror which greeted the American achievement in getting fighter planes over BERLIN. Whatever the cause, be it German command inefficiency or the softening which resulted from Allied air attack, the German Air Force knew it was inadequate to the responsibilities thrust upon it by Allied air strength in the south and west. It battled on with courage, in part in the blind hope of eventual recovery with new types of aircraft, but for the most part hopelessly. The German Air Force suffered the frustration of inability either to attack the fat targets offered by Allied movement in broad daylight or to protect the furtive movements of its own ground forces. For young

pilots this frustration was felt mostly in inability to carry out assigned missions; for the older heads there was the galling conviction of the futility of continued operations.

VIEW OF GROUND COMMANDERS BEFORE D-DAY

German ground commanders appear to have had few illusions about the efficacy of the German Air Force, but those who had not felt the power of Allied air attack in Africa or Italy still had lessons to learn. The staff officers of C in C West claim that they fully appreciated the significance and extent of Allied superiority and that they knew the numerical strength of the Luftwaffe in the west, but they accuse the High Command of both Army and Air Force of unpardonable optimism in this respect. All their efforts to secure an increase in GAF strength were of no avail and, though four additional infantry divisions were allotted partly to compensate for Allied air power, the problem of a strong mobile reserve remained unsolved. Field Marshal von RUNDSTEDT himself hoped for some offensive operations by the GAF against our landings and for some protection of his land communications, but anticipated overall a high degree of interference with rail and road traffic and no German success from the air against Allied shipping. He was nonetheless surprised by the extent of the German failure and of Allied success in making it almost impossible for single vehicles to move. Similarly, General BAYERLEIN, commander of Panzer Lehr, knew from his experience in Africa that it was foolhardy to move a division in daylight, but his corps commander, whose experience had been limited to the Continent, ordered him to proceed to the beachhead on D plus 1 regardless. General GUDERIAN, Chief of Staff of German Ground Forces, and General von GEYR, General der Panzertruppen West at the time, agree that the failure of the GAF was responsible for Allied success in NORMANDY. Both these tank experts lay stress on anti-tank cooperation of air units as essential in modern warfare and attribute the breakdown of communications, which led directly to Allied victory in NORMANDY, to the inability of the GAF to cope with Allied attacks.

An interesting line of speculation is opened by German estimates of ground strength necessary to compensate for Allied air superiority. In anticipation of it, the staff of C in C West requested additional divisions before D-day. The 77th, 84th, 85th and 91st Infantry Divisions and 6 Para Regiment were allotted as a result, but nothing was done to supply an adequate mobile reserve. It is not known how far short of anticipated needs this number fell. Field Marshal von RUNDSTEDT is alone in venturing an estimate of actual needs in retrospect. With fifteen more divisions in all under his command, he would have

disposed three infantry divisions near the coast in NORMANDY and BRITTANY and five panzer or panzer grenadier divisions in mobile reserve near the invasion area. With this force, it might have been possible to throw the Allies back into the Channel before D plus 3, from that time on it would in any case have been impossible. He does add, however, the significant proviso that even with this additional strength success could not have been achieved unless his own troop movements were unhindered during these first three days. What von RUNDSTEDT seems to imply, then, is that the additional divisions might have compensated for the lack of an offensive GAF, striking at our troops and supplies arriving on the beaches.

VIEW OF GROUND COMMANDERS AFTER D-DAY

After the initial lessons of the NORMANDY campaign had been learned, the enemy took air power into account at every turn, on the assumption that the Allies held tactical supremacy, at least during daylight hours. Movement was confined to hours of darkness; camouflage discipline was pounded into the heads of the troops; dispersal was practiced in every conceivable regard. Allied air power was an ever present factor in both strategic and tactical plans. The MORTAIN counter offensive was delayed in the hope of bad weather. The ARDENNES offensive was planned for the worst period of the year, weatherwise, for the period of longest nights, in anticipation of optimum freedom from air interference. Measures taken by OB West to offset Allied air superiority reduced German capacity to move by rail and road and produced a loss of efficiency in handling dispersed stores in scattered dumps. Only in times of very great stress were these restrictions abandoned: in consequence, the great retreats from the FALAISE-ARGENTAN pocket, across the SEINE, from MONS, and in January 1945 from the ARDENNES, were carried out in daylight with fearful punishment from fighter bombers.

VIEWS ON MORALE EFFECTS

Allied air supremacy had a distinct morale effect on ground troops, from the top commanders down to the lowest private. Numbers of German commanders were killed or wounded by strafing missions and attacks on headquarters: General BAYERLEIN remarks on the brief but noticeable loss of morale which followed such losses; other commanders were accused by their peers or subordinates of being more concerned over their own safety than with discharge of their duties. As far as junior officers and enlisted personnel were concerned, Allied air supremacy frequently gave them a feeling of despair. The diary of Feldwebel LAUN conveys something of the continuous preoccupation with Allied fighters which prevailed in the German front line. Some emotional outlet was found in treating the GAF as the butt of ironic jokes, but at the basis of scorn of the Luftwaffe ran the fear of the Allied air forces.

Allied air supremacy was then a basic reality in the German scheme of things. Reactions to various ways in which this supremacy expressed itself are dealt with singly below. On an overall basis, however, it may be said that this supremacy was expected, though not in the crushing degree in which it finally manifested itself. It colored German strategy, tactics, maneuver, administration, and confidence.

ATTACK ON MATERIEL

Opinions collected from prisoners in the field on matters as complex as strategic attack on enemy armament are of necessity partial and undeveloped. Field commanders were generally aware of overall shortages when they occurred, but only in rare cases can they ascribe them to particular causes such as planning failure, damage to railroads or losses in transit, bombing attack on final assembly, inadequacy of ferroalloys, etc. Oberst JOHN, G-4, C in C West, points out that theater commanders had no access to production plans or to statistics or overall estimates of the effects of bombing and loss of territory. General information sheets were received at C in C West Headquarters, but they could not serve even as a basis for anticipating the flow of supplies and materiel. In addition to field commanders', certain opinions have been gathered from industrial specialists swept by total mobilization through the Wehrmacht and into the prisoners cage. Some reference has been made to opinions gathered from strategically located industrial figures; these sources of information are being more fully exploited, however, by the Strategic Bombing Survey. From the present vantage point, the welter of German opinion available on a variety of subjects offers comparatively little of value on Allied strategic attack on German armament. Shortages and delays in the arrival of supplies and reinforcements, inability to use certain units because of delays in re-equipping them, defects in quality of equipment—all these are noted and more, but the question whether any portion of the cause can be laid at the door of strategic bombing is not addressed.

OPINIONS VARIED AND INCOMPLETE

With particular respect to the attack on ball bearings a modicum of German opinion has been gathered. Several prisoners of various degrees of expertness have stoutly maintained that the shortage of bearings, created by bombing, was the major factor in slowing down expansion in tank output. As in the case of aircraft production, redesign and substitution were required in part;

BALL BEARINGS

in further part, the assembly line was forced to wait for deliveries from the bearing manufacturers. One school of thought attributes the high level of unserviceability among German tanks in the field to defective bearings on the transmission shaft. Whether air attack on bearing production led to this via redesign or lowered standards or whether the situation arose from reduction in alloy content, no one has been able to say. High officials in OKL and in the aircraft production field agree that the loss in bearing production reduced aircraft output only very slightly because reserves and redesign largely filled the gap while dispersed bearing production was adequately expanded to meet revised needs. One final aspect of this program of attack has been expressed in terms of symbolic significance: the third attack on SCHWEINFURT, in the last week of February 1944, convinced high German officials that planned strategic bombing was capable of playing a decisive part in war.

MOTOR TRANSPORT

Only a few opinions have been gathered from prisoners of war on the specific effects of damage on tank and truck assembly, on ordnance depots, vehicle parks and repair facilities. As already mentioned in Chapter I, one German source reported, probably on the basis of second-hand information, that there was only one motor truck factory operative in Germany at the turn of the year 1944—45. According to Oberst JOHN, the German automotive industry "showed alarming weakness when called upon to replace the enormous losses sustained on the Eastern Front. In March 1944 the situation was so critical that newly activated divisions had to be equipped with second-hand motor transport"; sequestration helped somewhat, but, "in the summer of 1944, German ordnance had to service more than 2000 different types of motor vehicles". Generalmajor TOPPE reports that in October or November, only 1100 vehicles were made available for direct delivery as replacements to units on all fronts. Allocations were made, as in the case of oil, according to strength rather than demands because the supply was in any case hopelessly inadequate and declined month by month. It has been implied that strategic bombing contributed something to this drastic situation, seriously aggravated as it was by the shortage and heterogeneity of spare parts. Von RUNDSTEDT was always more impressed by the impossibility to employ more trucks in the battle area than by the overall shortage, but the record of re-equipment after the French debacle, as presented by his G-4, sounds a very different note. In transport, the four divisions supposedly completely refurnished, received but 80%, and the other seven returned to battle with only from 50 to 70% of normal requirements. Again, no one has ventured an estimate of the extent to which strategic bombing was responsible for this unenviable position.

TANKS

The concensus of opinion with regard to tanks indicates a shortage, generally attributed to failure to expand production in step with ever-increasing demands. A good many comments, neither detailed nor authoritative, have been made on this subject, laying the blame on strategic bombing. One example is illustrative: a company commander in 501 Heavy SS Corps Tank Battalion was told on the eve of the ARDENNES offensive that his unit would receive only eight of their normal complement of fourteen Tiger tanks "because it was impossible to manufacture and deliver them in the face of Allied bombing activity". It is also noteworthy that the two divisions and the brigade which von RUNDSTEDT expected but could not use in the ARDENNES offensive were all Panzer units, not available "because of lack of replacements or slowness of re-equipment". G-4, C in C West, states that of the eleven panzer and panzer grenadier divisions refitted for the offensive, four received their full allotment and all the rest more than 60%, in contrast to the truck status as given in the paragraph above. In spite of these specific shortages, field commanders are generally agreed with von RUNDSTEDT in believing that replacement in tanks, while not all that could be desired, came up to expectations and was, on the whole, satisfactory. Thus it can be said, perhaps, that whatever strategic attack may have been made on tank production, it was not very effective in the eyes of the German commanders, whereas to industrialists, such as Dr. SAUER, the successful attacks on engine production struck at the weakest link in plans for expansion.

TANK MAINTENANCE

Tank maintenance in the field was, on the other hand, always a major problem. Again, strategic bombing is not given a high place among contributory factors, with the notable exception of replacement engines, the shortage of which is clearly attributed to the bombing of MAYBACH at FRIEDRICHSHAFEN and NORDBAU in BERLIN. Spare parts were always in tight supply, it is true, but General BAYERLEIN states that the shortage of tank spares in the ARDENNES was due to the difficulty of bringing up any type of supplies. Parts were not the only headache of maintenance units, however. Among losses to fighter bombers, the General rates the destruction of tank recovery vehicles second only to that of fuel tank trucks, both rated high because of the near impossibility of securing replacements. G-4, C in C West, also states that "very heavy motor vehicles, particularly tank retrievers, were almost unavailable". Here once more the question of cause is not discussed, but the possibility that faulty planning was fundamental to tank maintenance difficulties is strongly suggested by the following statement of Oberst JOHN, G-4: "Far

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more serious than tank production inadequacy were the shortages in tank spare parts and retrievers. German war industry concentrated on the output of the finished product to the detriment of spare parts production. When his most desperate requests were not complied with, C in C West finally jumped channels and established direct contact with the producer. The latter was surprised to hear of such shortages and immediately produced more spare parts for the front". Generalmajor TOPPE, GQM/OKH, indicates that spare parts production fell short of requirements as early as 1943 and that, though complaints from lower echelons were given wide circulation, nothing was done to remedy the situation. General BÜHLE, Chief of Armament procurement OKW, adds that the attack on the depot at MAGDEBURG threw the tank spare part supply system out of gear from February 1944 on. Though it might thus appear that air attack on German industry may not have affected parts and maintenance equipment, there is a possibility that what appeared to these officers to be faulty planning was no more than the best possible solution in the face of production limitations imposed by air attack on industry and transport among other factors.

GENERAL ORDNANCE

With regard to the effects of strategic attack on production of other types of ordnance, German views are almost unanimous and yet equally indeterminate. The replacement and maintenance of artillery equipment, particularly assault guns, was a severe problem, aggravated by the great variety which arose from the employment of non-German types, according to Oberst JOHN. The greater part of new production was diverted to the East where losses of this type were staggering in quantity. All the divisions refitted for the ARDENNES offensive, however, received their full quota of artillery. The Hoeherer Artillerie Kommandeur, General der Artillerie THOHOLTE, who was placed in charge of the ambitious scheme for centralized control of all artillery in the ARDENNES, likewise recognized no shortage of pieces, but points to hopelessly inadequate prime mover replacements as one of the reasons for the failure of the scheme. BAYERLEIN offers the only bit of evidence of direct effect of strategic bombing in his statement that extra-heavy prime movers were almost impossible to procure after the destruction, by Russian (sic) bombers, of the only plant which produced them, in BRESLAU. THOHOLTE adds his voice to the strident chorus of those who constantly felt that antiaircraft allotments to the west were hideously unrealistic. BAYERLEIN is partcularly emphatic on this point. Inadequate planning and inability to produce in ever-increasing quantities were then, in the view of German field commanders and staffs, at the root of the general ordnance problem, and but

little connection between the inadequacies and strategic bombing can be recognized by these sources.

German opinions on strategic bombing of ordnance and vehicle depots are thus far conspicuously absent. There have been accounts, of course, of the chain of disaster flowing from this or that single attack, but no appreciation of the overall impact of the series of raids has been forthcoming. Von RUNDSTEDT approaches an answer when he minimizes the effectiveness in general of such attacks in contrast to the immediate and serious effect of raids on forward dumps and concentrations of materiel. Von GERSDORFF and Oberst JOHN indirectly recognize the possible importance of systematic attacks on ordnance depots. Both officers remark that from January 1945 until the end, the German Army in the west survived largely on the quantities of equipment found in cities and depots as it fell back on them. None of the higher echelon officers comment specifically on the effect felt following the attacks on ordnance depots in March and April 1945, although individual commanders have complained that they were unable to re-equip at UNNA and GRAFENWOEHR.

DEPOTS

ENEMY REACTION TO OIL ATTACKS WAS IMMEDIAT

In conclusion, it is well to emphasize again the lack of access, among the officers used as sources here, to the type of information requisite for assessment of the effectiveness of strategic attack on materiel. A few random comments are worth noting however, because of their broad significance. GOERING, for example, is lavish in his praise of the priorities assigned by the strategic air forces to the target systems available, but points out that explosives production should have received far more attention. GQM/OKH would have assigned priority to this target system second only to oil. Von RUNDSTEDT and von GERSDORFF, Chief of Staff of Seventh German Army, agree that overall shortages of all types of materiel were much less impressive to them than the constant attrition of these supplies en route from factory to line. Oberst JOHN's apriori comment on the general subject is worth quoting in full: "Mistakes in war production policy, the demands of the East, lack of coordination among the services, an excessive number of types of German and foreign equipment made the German ordnance system (production, distribution, maintenance), strained and precariously balanced as it was, particularly sensitive to the dislocating effects of bombing attacks". Insofar as a consensus of opinion can be gathered together, it would appear to be somewhat as follows: production of materiel was often slightly short of requirements; expectations were generally scaled down, and so receipts usually balanced, the greater problem always being the critical losses sustained while materiel was on its way into the battle area.

AUGUST TO DECEMBER 1944

ATTACK ON OIL

ENEMY REACTION TO OIL ATTACKS WAS IMMEDIATE

In contrast with the poverty of views from German field personnel on armaments, oil provides an embarrassment of riches. After the first attacks on synthetic production in May 1944, oil became the top immediate concern in German planning. An emergency control of production and repair — the GEILENBERG program — was organized before the fires of the first attacks had subsided. Gasoline and diesel oil consumption became a standard against which the merits of various courses of action had to be measured. One by one the uses of fuel were sloughed off, beginning with the lowest priority, until finally only front-line combat requirements were met. To German officers whose duties confined their interest to the Western Front, distributional failure was often more convincing than the destruction of sources of supply as an explanation for the acute shortages of fuel which constantly restricted operations in the battle area. They were, however, painfully aware of continuous decreases in allocations, as less and less became available in Germany.

AUGUST TO DECEMBER 1944

General WESTPHAL and Oberst JOHN maintain that the German Military High Command remained hopeful about the adequacy of rationed oil supply until August, 1944, when the defection of Rumania and the extent of Allied success against German production together presented an insuperable problem. Up to that time, radical measures of economy had assured sufficient supplies to all theaters. Though there is some difference of opinion among the staff officers of C in C West as to the exact figures, all seem to be agreed that fuel supplies on hand when the invasion began were adequate for the first phase. Thereafter, and particularly as the Germans were pressed back to the SEINE and across it to the east, air interference with rail and road transport made fuel supply a grave problem. It became impossible, for example, to deliver by rail more than about one-fifth of estimated fuel requirements into the battle area West of the SEINE. As to allocation to the west, von RUNDSTEDT first noted decreases when he returned to command as C in C West in September 1944. He watched with growing anxiety almost daily decreases in gasoline provision during September and October. At the same time, many other effects of strategic attack on oil appeared, such as the fictitious character of tank training without fuel, as described by General BAYERLEIN and WESTPHAL; the stringently limited training of tank and truck drivers; the delay in refitting of certain divisions which, according to von RUNDSTEDT, was due to lack of gasoline more than anything

else. In the battle area itself, the overall insufficiency of gasoline supplies, always aggravated by losses and delays en route, put continuous limitations on mobility and contributed in turn to the difficulty of maintaining adequate supply by road.

The multifarious difficulties which arose from the loss and destruction of oil production facilities reached their greatest extent in the ARDENNES offensive and retreat. Thereafter, the German armies generally fell back on storage sites of the oil distribution system rapidly enough so that local transport became the only problem. (One commander was so much impressed by the quantity found "lying around" during the final retreat, that he was ready to believe there was no real shortage but only an incredible inefficiency in distribution toward the fronts). The staff of C in C West agree with von RUNDSTEDT that, even after part of it had been diverted for operations against the First Army attack east of AACHEN, the reserve of fuel painfully built up for the ARDENNES campaign was theoretically adequate for first objectives. They did not share the FUEHRER's view that captured stocks would then be sufficient, and for good reason. The units themselves had one or two days' organic supply. In addition, according to the General Quartiermeister of OKH, there were only 12,000 cbm in stocks on hand when the attack started (representing only three days' supply for the divisions involved), and only about one-half of this amount was immediately available west of the RHINE. Daily shipments from German reserves to the ARDENNES could be scheduled at only 600—700 cbm. This was hardly enough to keep three divisions rolling, after the total of (at most) five days initial supply had been exhausted. Even this meager commitment represented one-half of all motor vehicle fuel produced in Germany during November, according to SPEER. After the offensive began, road conditions were much worse than expected and, when air attacks on roads were added, fuel consumption increased 100%. Important early objectives, (von RUNDSTEDT cites BASTOGNE and MALMEDY in particular) were not reached soon enough for easy capture because fuel was insufficient. Coupled with lack of ammunition, the allotment of gasoline permitted only four of the Volks Artillery Corps, or less than half of those expected, to be engaged according to the top artillery commander, General THOHOLTE, at all, and even these were unable to follow except in bits and pieces after the first fifty km of advance. Thus, though it is generally agreed that the breakdown of rail and road transport was primarily responsible for fuel shortages at the front, there can be little doubt that the original stocks saved for the offensive were in fact insufficient.

FUEL FOR THE ARDENNES OFFENSIVE

THE ARDENNES: EFFECTS IN THE FIELD

The serious extent and consequences of the drought at lower echelons is illustrated, somewhat symbolically, by the view of prisoners from 9 SS Panzer Division, HOHENSTAUFEN. The ARDENNES offensive was lost, they said, when a gasoline truck belonging to the division and carrying four cubic meters (3 tons) of gasoline was sent up in flames on Christmas Eve, to bog down the division for two days and prevent the capture of LIEGE. Less egocentric views are held by General BAYERLEIN, whose remarks apply equally to all the campaigns of his division. To him a shortage of fuel was translated immediately into its effect on ability to move tanks, tactically, from the rear, and, when damaged, back to the workshops; to displace artillery; to haul ammunition and supplies; and to shift reserves — — in short to operate in mobile fashion. On this account, among others, he was conscious of the position of railheads, the condition of roads and the significance of detours. He bemoans the fact that Panzer Lehr Division had to leave behind, as it tortuously withdrew from ST HUBERT, some fifty-three tanks for which gasoline could not be brought up the long distance from the railheads at TROISDORF across the RHINE. For the same reason, 180 tanks were abandoned in the ARDENNES by Sixth SS Panzer Army according to its commander, Sepp DIETRICH. In the ARDENNES, as elsewhere, BAYERLEIN particularly noted the disastrous and calculated selection of fuel tank trucks as fighter bomber targets. He and others have vivid memories of precious forward gasoline dumps lost through air attack.

THE GERMAN REACTION

The description of the ARDENNES period by the German command provides a case study, making clear what several of them were driving at when they suggested that the oil campaign should have been started earlier. The tremendous overall reduction, to the point where total motor vehicle fuel produced in November was only sufficient to maintain fifty active divisions, if not one drop were diverted to other uses, was a climax reached after six months of air attack. Even in September after the fall of Rumania (whose oil production had been drastically reduced by the Fifteenth Air Force), the pinch was tortuously felt. When Generalmajor TOPPE became Generalquartiermeister, OKH, in July 1944, the problem was still largely one of distribution. Overall scarcity made a smooth-functioning distribution system necessary; when that system was disturbed, local shortages developed among units at the front. But by 15 September, he had to initiate a rigid plan for allocation among the various commands; for as he says, the demands from all sides were so much in excess of the supply available that a hard and fast procedure had to be followed.

whatever the reduction might produce. Rations were from then on allotted according to a fixed rule of thumb — — each command received a proportion of the total equal to the proportion of its divisions to the total of divisions in the Wehrmacht. Considerations of activity in any particular sector, with the exception of the ARDENNES, could not be adduced to secure more. Philosophically the High Command concluded that since there was not even enough for normal operations on any front, they might as well all share and share alike. And thus the TOPPE Rule was instituted within four months of the commencement of the oil campaign. Little wonder that KEITEL of the Wehrmacht and SPEER of the Economic Ministry unite in inquiring why we did not begin the attacks in March when a similar drought might then have been facing German quartermasters on all fronts at the time of our landings in NORMANDY.

STRATEGIC ATTACK ON RAIL COMMUNICATIONS

It has already been noted in Chapter I that the matter of bomber attack on railroads was one of considerable Allied controversy. Differences of opinion exist as well among the Germans. For Oberst HOEFFNER, who was in charge of military rail transport for C in C West from January to September 1944, strategic attack was unpleasant, but tactical bombardment which cut lines leading to the area of operations was the basic adversary to overcome. For his chief, Field Marshal von RUNDSTEDT, the strategic attack on railroads in France was more of a problem than tactical attack on bridges from the SEINE to the LOIRE and the fighter bomber attacks on movement combined, but only after the battle of NORMANDY proper was over. Von RUNDSTEDT's staff, while admitting that the attacks on the French RR system prior to and during the invasion were of decisive importance for the success of the Allied campaign, fail to differentiate between strategic and tactical attacks.

VIEWS OF OBERST HOEFFNER

An attempt has been made to summarize the views of HOEFFNER as they have been presented on separate occasions to different interrogators and to eliminate the inconsistencies in the various second-hand versions of these views. HOEFFNER appears to have maintained that while strategic attack is capable of accomplishing a substantial overall reduction of rail traffic capacity, and of lengthening time schedules on the remaining movements, attack in

France was not carried to the point where the bulk of the essential military traffic could not be brought to the line of interdiction created by the loss of the bridges over the SEINE and LOIRE Rivers and on the lines between these rivers. Certain sacrifices of military traffic had to be made; last minute supplies for stocking purposes could not be delivered; Organization Todt construction materials for the ATLANTIC WALL were gradually eliminated; and after the rout in NORMANDY, only 5% of German stores in France could be evacuated because of the chaotic condition of the railroads and the shortage of labor at the dumps. Troop trains were, however, run — in all 3800 of them — between D-day and the end of August 1944. V weapon trains were continued to the PAS DE CALAIS, with the elaborate special measures which these entailed, but not always exactly on schedule. In addition 40,000 wounded soldiers were evacuated from the hospitals of the PARIS area in the final retreat. On the whole, HOEFFNER states, the burden of the strategic attacks fell on the French civilian population and on French industry, a large portion of which was working in behalf of German armament undertakings (important to the German war economy, but making no deliveries to the armies in the West).

VIEWS OF VON RUNDSTEDT

Von RUNDSTEDT professes not to have been concerned over his inability to move troops into the SEINE-LOIRE triangle due to the loss of the rail bridges leading into the area. The inability to maneuver in the SEINE-LOIRE area was far more important to him than delays in bringing further troops and supplies into it. Thus strategic attack on the French rail system outside the battle area had little or no effect, in his opinion, on conduct of operations before the breakthrough at ST LO. Thereafter, large scale reinforcements, orderly retreat and the establishment of a new MLR east of the SEINE became the primary concern. During this later phase, it must be remembered that von RUNDSTEDT himself was not in command during most of this period, the accumulated effect of strategic attack on the French rail system was such that von RUNDSTEDT now rates that program of attack as the most important of all efforts directed against railroads. He feels, then, that these strategic attacks had their greatest effect in hindering maneuvers during preparation for operations at MORTAIN and AVRANCHES and in establishing a new line after the SEINE-LOIRE area had been lost.

Without attempting to resolve this difference of German opinion on the experience in France, it may be noted that similar differences do not exist on the experience in Germany, possibly because too little opinion has yet been collected. Von RUNDSTEDT states that the attacks of October to 16 December

1944 did not block railroad traffic altogether but that they did succeed in considerably slowing down troop and supply movements. His G-4 gives a supplementary detailed account: In September 1944, when the Allied advance was stopped, the German railroad system had to be reorganized and adapted to the new situation; in November the trains began to roll once more, and a daily average of 100 trains reached the Western Front in December, all this despite the Allied bombing of German railroad yards between October and December 1944. Such destruction of supplies as occurred was keenly felt, according to von RUNDSTEDT, because of the prevailing scarcity. Another source, a military railway official with Army Group B, maintained that the attacks imposed continuous delays, but that these rarely exceeded two days and never three. This PW stated that supply trains alone to the Army Group B area in early December 1944 averaged nine to twelve daily, that on the average one train a day was lost by bombing and accidents, but that 50% of its load could be salvaged. The loss in supply occasioned by strategic bombardment and fighter bomber attacks on rail movement, in combination, then may have been 5% of the total being brought forward. On this showing, interference of such bombing with German military operations existed but was not particularly striking.

TACTICAL EFFECTS IN GERMANY

The economic effects of systematic rail attacks, again in combination with the daily forays of fighter bombers against rail movement in good weather, were more significant. Coal began to accumulate at the pitheads in the RUHR until finally the miners were set in December 1944 to work a three day week to avoid hauling more coal to the surface than could be transported away. Repercussions from this loss of traffic were most acute in January 1945, after the concentrated tactical attack on German railheads along the RHINE and the RHINE bridges and the Russian capture of the bulk of Upper SILESIA. But the campaign of the end of the year saw the beginnings of strict rationing of household fuel, leading in some cases to its virtual elimination. Gas and thermal electricity undertakings in HAMBURG, BERLIN and southern Germany began to ration industrial users and limit the hours of household consumption. Most important, after the turn of the year, the delivery of coal to the power houses of industrial concerns was reduced, and many of them, including armament factories, were forced to work on a part time basis. At the same time, economic and armament deliveries by rail began to deteriorate. Special consignments of material, especially in full trains, managed to get through more or less on the new protracted schedules, but the odd shipments of less-than-carload-lots became increasingly difficult to count on. Factories developed the

ECONOMIC EFFECTS IN GERMANY

technique of sending their own employees to accompany shipments by freight car, and especially to fetch anticipated shipments. The opinion has been positively stated by the enemy that Allied bombardment of Germany had little or no effect on the economy as a whole until transport began to be attacked systematically. SPEER, Reichsminister for War Production, is reported to have attributed the gradual decline in supplies to Italy in November to railroad attacks. Unfortunately, this opinion is not concerned with the niceties of allocating to this or that type of attack the responsibility for the damage to the economy. There is a further body of German opinion, exemplified particularly in captured copies of official reports, which tends to suggest that the widespread attacks of October to December 1944 were not as effective in this connection as low-level strafing by fighter bombers operating in and about the RUHR on the one hand, or the concentrated attacks on bridges, marshalling yards, and moving trains of the last part of December 1944 and January 1945.

TACTICAL ATTACK ON RAIL COMMUNICATIONS

EFFECTS IN FRANCE

The curious opinion entertained by Field Marshal von RUNDSTEDT, on the unimportance of the line of bridge cuts from ROUEN to MANTES on the SEINE River, across country to BLOIS and down the LOIRE to NANTES, has already been mentioned. This damage, in his view, neither affected decisions as to troop movements (up to the end of June 1944) nor was moving divisions into the invasion sector the main problem. HOEFFNER, RUNDSTEDT's transport chief, says that the virtual elimination of troop movement by rail through this area was extremely serious, and particularly that it prevented the build-up required to accomplish a breakthrough to AVRANCHES. As for supply movements, General BAYERLEIN states that his division was quite conscious of the location of its railheads, and that those in NORMANDY were further than 150 km to the rear, with the result that irremediable delays occurred in the arrival of supplies in the front line. Fuel and ammunition often had to be fetched from east of PARIS or south of LE MANS and RENNES. Von RUNDSTEDT's G-4 explains further that oil shipments were given preferential treatment among the supply items. For this first priority, then, in spite of the devastating blows struck by the Allied air force against railroad and road transport it was possible to send a nightly average of about 1000 cbm by train from the PARIS area to NORMANDY. (1000 cbm was the amount required daily to keep five divisions in battle.)

It is from Oberst HOEFFNER that the most expert and detailed estimate of the difficulties experienced by the Germans as a result of tactical attacks on rail communications can be gained. With professional absorption in his own tasks, he is perhaps inclined to exaggerate the importance of these attacks; but he ascribes more than 50% of the cause of the German loss of the NORMANDY campaign to Allied attacks on railroads. Troops could not be moved to and unloaded at the base of the COTENTIN Peninsula, except in trifling numbers and after long delays. General BAYERLEIN considers it significant that Panzer Lehr, moving to the battle by road, took thirty-six hours to cover a distance normally travelled in twelve. Division after division moved by Oberst HOEFFNER's organization was delayed three, four, seven, ten days in getting to battle, because of attacks on separate trains of the divisional movement, and because of the necessity, for the greater part of the troops concerned, to detrain south of the LOIRE, north of the SEINE or in the PARIS area. In supplies, the loss of forward railheads, combined with shortage of trucks, and fighter bomber attack on daylight road movement, reduced total daily deliveries to the armies defending in NORMANDY from 5250 tons, which HOEFFNER thought would be sufficient (though the Quartermaster wanted 7,000) to 3300. The supply shortage then was a function of road and rail attacks. Finally HOEFFNER dramatizes the importance of quick unhampered movement by rail in his provocative statement about the AVRANCHES counter-attack. In his view, the Germans would have been able to cut off the Third Army at AVRANCHES, had he been able, without rail attack, to move four divisions from southern France to MORTAIN in the normal allotment of four days.

EFFECTS IN THE ARDENNES

With respect to Allied success in driving back enemy railheads supporting the ARDENNES offensive von RUNDSTEDT admits that it contributed "devastatingly" to the halting of the advance. Traffic was hopelessly clogged up, he claims, and in another connection he states that the breakdown of the transportation system (probably meaning both rail and road) caused the slowing down of the offensive and its eventual halt. The loss of forward railheads, to which the cutting of bridges and high-level attacks on stations in the EIFEL and along the RHINE contributed, caused a "decidedly serious problem". These statements are qualitative, to be sure, but they are unequivocal. The destruction of the bridges at EUSKIRCHEN, AHRWEILER, MAYEN, BULLAY, NONNWEILER, SIMMERN, BAD MUNSTER, and KAISERSLAUTERN had, a staff member points out, the disastrous result of eliminating the Moselle and Ahr rail systems; high-level attacks on small stations in the EIFEL wrought

havoc with the local traffic, and the inter-connecting railroad lines were eliminated. Finally, the effects of the bombing of large stations along the RHINE, though not immediately felt, contributed to the complete break-down of the whole transportation system.

REMAGEN BRIDGEHEAD

General BAYERLEIN's comment is sufficiently terse to be quoted ..... "During the ARDENNES offensive, fuel had to be fetched from TROISDORF (SE of KOLN), spare parts and tanks from BERGISH-GLADBACH, as the railways had been destroyed. The trucks were on the road six days. The troops got into critical situations. That is why so many tanks had to be left behind during the retreat from the ARDENNES for lack of fuel."

General BAYERLEIN also has an indirect comment to make on the tactical series of attacks conducted by Ninth Air Force against thirty-five small stations around the REMAGEN bridgehead, on which thirty-nine attacks fell in the brief period from 4 to 13 March 1945. He had recently been given command of a corps and was ordered to reduce the bridgehead. He states that there were few air attacks at the front but a constant drumming at rear areas. As an example of the effects of this he cites the 130 Inf Regt which, due to arrive from Denmark, was unable to detrain at ALTENKIRCHEN as planned and finally arrived on 13 March, after the American bridgehead had been building up for six days. Other examples have been cited in intelligence, including one unit which was forced, after considerable indecision, to detrain at WETZLAR and march 100 km to the battle.

Comment from German sources has thus been obtained on three specific instances of tactical attack on rail communications, when the attack was designed systematically to achieve a particular objective, to push detraining points and supply railheads as far from the battle as possible. With the exception of the von RUNDSTEDT comment on the SEINE-LOIRE interdiction program — he deemed it relatively unimportant — all Germans consider the operations very successful for the Allies.

Whatever the views held by German commanders, PW reports in France and Germany are replete with individual little stories of death and disaster met on the rails. Early in France two particularly gory incidents of fighter bomber activity in daylight led to the prohibition of daylight movement of full troop trains, and similar catastrophies in marshalling yards were followed by an order requiring dispersals and forbidding the parking of troop trains in station sidings. While special precautions were taken with troop trains,

these did not always serve to give protection, and some movements, like that of 11 Panzer Division from the ORSCHOLZ area to MUNCHEN GLADBACH in February 1945 were attacked entraining, enroute and at the detraining station. The division's vulnerability was increased by its having to follow a roundabout route as a result of the destruction of the rail bridges over the MOSELLE. Particularly difficult, however, were the movements to the front from November onward, of replacements of men and equipment, usually stowed in a few odd box cars, appended to normal freight or passenger trains.

OTHER EFFECTS

These lacked both AA protection and special handling, and in consequence, they suffered heavily on the numerous occasions where they were discovered by fighter bombers and attacked. Movement of high priority freight west of a line WESER River — Lake CONSTANCE was strictly limited after September 1944. At this time a joint order of the Reichsbahn and military transport chiefs restricted all such haulage to hours of darkness or bad flying weather. No German estimate is available of the net effect of these attacks on military operations, but the aggregate of individual accounts leaves a convincing impression: casualties, damage to materiel, delays, special limited schedules and loss of morale were all produced to lower the fighting value of the German army.

TACTICAL ATTACK ON ROAD MOVEMENT

As might be expected from their divergence in viewpoints, von RUNDSTEDT and BAYERLEIN put different values on Allied fighter bomber attack on road movement. To the former, it was somewhat less important than the attack on rail transport (although, in his opinion, lack of maneuverability was the prime cause of failure in NORMANDY and one of the two prime causes in the ARDENNES). To the latter, it was the largest contribution to Allied victory made by the air forces. The telephone diaries of Field Marshal von KLUGE (for 31 July 1944) and of the Chief of Staff of Seventh German Army seem rather to side with BAYERLEIN. Key members of von RUNDSTEDT's staff are not as positive as BAYERLEIN but state that fighter bomber operations against road traffic played a major part in the success of the invasion operations and the subsequent breakthrough. Troop and supply movements could be made only at night, which meant that volume and speed of traffic were greatly reduced.

EFFECTS IN FRANCE

To BAYERLEIN, the apogee of air power was reached in June, July and the first half of August in NORMANDY, when fighter bombers operating against the front line and supply routes pinned down the German forces, chopped them to pieces, and paved the way for the breakthrough at ST LO and its exploitation. Never again in the campaign was this mass of power seen (as the days became shorter, the weather worse, the front longer, and fighter bases lagged to the rear). General BAYERLEIN's experience is intensely personal; he was bombed by Thunderbolts on five occasions; and lost five drivers, as well as various subordinate officers, to fighter bomber attack; much of the time in NORMANDY was spent in ditches; and in looking out of one, he still remembers meeting the eye of a low-flying pilot. His estimate, however,

OPINION OF BAYERLEIN

seems to be based on the inability of his division to move, of his guns to displace, of his tanks to maneuver, and his supplies to be brought forward, except in inefficient night movement or under cover of welcome rain. Mention has already been made in this section of the sense of inferiority imparted to men and officers by the omnipresent fighters, and of the continuous necessity to disperse, camouflage and hide because of them. BAYERLEIN believes that the invasion could not have succeeded without overwhelming air power, and the implication of his opinion is that it could not have succeeded without air power directed against road movement. He thinks, for example, that a landing might have been made on the beaches of NORMANDY under the cover of naval guns, but that it would have been driven into the Channel on the fourth or fifth day had not air power prevented the timely bringing up of necessary forces and had it not at the same time harassed the rear supply lines of those which did arrive.

An impression of what the attack on road movement did to supply in NORMANDY is gathered from Oberst HOEFFNER, as he explains why road haulage could not take the load off the railroads in bringing supplies to forward units. He quotes for one thing, a figure of 30,000 trucks destroyed in the NORMANDY campaign, presumably calculated by some other section of C in C West headquarters, but which he remembered. In the second place, he states that capacity

OPINION OF HOEFFNER

was available to haul 2,000 tons of supplies forward per day, but that actually, only 1,200 tons daily were delivered by truck. Failure to meet anticipations may have been partly due to truck losses and to longer hauls from railheads, but the greater cause seems to have been longer turnaround time (for the same distances). The explanation seems to lie in the fact that movement did not take place by day. If the trucks were kept idle during sixteen hours of daylight each twenty four hours, capacity would have been reduced by two-

thirds in the absence of measures to use them more intensively at night. As regards night driving, members of von RUNDSTEDT's staff agree that blackout driving of widely-spaced convoys slowed down the traffic; control at night was difficult; and night driving put great strain on the driver.

It has already been mentioned that BAYERLEIN felt that the power of fighter bombers against road movement was never again exemplified to the same degree as in NORMANDY. Von RUNDSTEDT, on the other hand, says that the main reason for the failure of the ARDENNES offensive was his own lack of fighters and reconnaissance planes and the tremendous tactical air power of the Allies. BAYERLEIN's division suffered little from direct attack on forward elements during the advancing phases of the ARDENNES offensive, but his rear columns were heavily attacked, and he was aware that neighboring divisions were being severely punished. For a time the problem of protecting the supply columns was so acute that the staff of C in C West had under consideration the increased use of antiaircraft artillery to provide continuous protection of the supply lines against fighter bomber attack. The same staff members go on to state that "again the raids on supply convoys and vehicles resticted traffic to the hours of darkness; loss in time and traffic efficiency was irretrievable". Certain movements, such as the proposed relief of 2 Panzer Division by Panzer Lehr on 25 December 1944, were prevented by clear weather and the presence of hovering Lightnings. In retreat, moreover, and especially on 21 and 22 January, BAYERLEIN had the dubious privilege of again witnessing the handiwork of the fighter bomber at its best when he saw several hundred vehicles of all kinds and from many units wrecked and burned in two columns leading to the bridges at DASBURG and GEMUND. In the earlier static phase of the battle, the defense of the SIEGFRIED LINE from the end of September to mid-December, fighter bomber efforts were rated by von RUNDSTEDT as "decidedly unpleasant". Later during the ineffective attempt at containment of the REMAGEN bridgehead and the subsequent liquidation of the RUHR pocket, BAYERLEIN felt less concern with the fighters, except for such coups in the rear as the destruction of fuel trains. No opinions have yet been elicited on the role played by the fighters in the envelopment of the PALATINATE and the retreat across the RHINE River, or in the eastward movements through WESTPHALIA, HARZ, THURINGIA, FRANCONIA, and BAVARIA.

In summary BAYERLEIN states that movements became dependent upon the weather, so that it was no longer possible to fix definite schedules, and

SUMMARY

if movements had to be carried out regardless of weather, they became very expensive in casualties and loss of materiel. An example of the latter was the tortuous withdrawal East of 6 SS Pz Army at the close of the ARDENNES offensive (needless to say, C in C West and his staff were furious at the autonomous decision). Dive-bombers, according to von RUNDSTEDT, prevented reliable supply of ammunition and fuel and the tactical air power of the Allies almost completely paralyzed the maneuverability of the German ground forces. Von KLUGE and the Seventh German Army furnish support for similar views in explanations for their inability to throw the Allies into the sea on the first few days after the landing, to stop the capture of AVRANCHES and VIRE, and to launch the attack from MORTAIN to AVRANCHES. Von RUNDSTEDT, BAYERLEIN, von KLUGE and the staff of the Seventh German Army can agree then that the mass employment of fighter bombers effects command decisions by making troop movements and supply uncertain, thus preventing command from replying with tactical maneuver to the moves of the attacker. German commanders agree that a considerable part of the art of war consists of concentrating more force at key points than the enemy; when mobility and maneuver are lost, the loss of battles and campaign follows.

ATTACK ON COMMUNICATION CENTERS

There is a surprising degree of uniformity in German opinions from high commanders that the attacks on road communication centers in NORMANDY, in the ARDENNES and EIFEL, and in Germany were a paying proposition. The concensus differs from the views held by some Allied air commanders, and is in fact more nearly unanimous than that gathered by intelligence reports of individual difficulties in moving through bombed towns. A study in the latter connection relating to the ARDENNES and EIFEL area presents sufficient evidence to permit the formation of two views which are consistent with those of German field commanders: one that the bombing of communication centers is not especially effective; the other that it is effective given defiladed towns hit with only moderate effort, or very heavy effort on towns located at the hub of ridge roads.

Von RUNDSTEDT and BAYERLEIN, however, are by no means as discriminating as the intelligence analysis had been. The former calls the D-day

EFFECTS ON SUPPLY AND COMMUNICATION

and D plus 1 attacks on the communication centers of NORMANDY effective in reducing road capacity leading to the beachhead, and considers the attacks in the ARDENNES and EIFEL similarly important. WESTPHAL, JOHN and ZIMMERMANN agree that the level bombing attacks on the NORMANDY communications centers reduced the road capacity to the beachhead, slowing down German troop movements from one to five days. They add further that the air attacks on centers, such as ST VITH, HOUFFALIZE, PRUM, STADTKYLL, BITBURG, DAUN, GEMUND, KALL and SCHLEIDEN reduced required road capacity by 30%. BAYERLEIN says that he was fully conscious of the fact that bridges to his rear or flank had been destroyed (as on the SEINE River) and that road communication centers in NORMANDY, the ARDENNES, the COLOGNE Plain and around the REMAGEN bridgehead had been attacked. His particular concern appears not to have been the effect of divisional movement but that on supply traffic for he recalls vividly the effect on supply of a long list of attacks in NORMANDY and the EIFEL.

Von RUNDSTEDT alone states that similar delays on the forward movement of troops and supplies was achieved by the heavy raids on large German cities such as COLOGNE, MAINZ, FREIBURG, WURZBURG and NURNBURG but gives no particulars.

ATTACK ON FORWARD DUMPS

German opinion is definite in stating that attack on forward dumps is an integral part of a well-rounded bombing program and played a role in lessening front-line ammunition and mobility. Fuel dumps were the greatest concern of the German commanders, with ammunition in second place and general ordnance third. Position of the dump with respect to the front line seems often to have been a more important factor in considering its value than size. Von RUNDSTEDT, in response to a direct question, estimated that the loss of supplies through fighter bomber attacks on trucks in and rear dumps at the divisional and corps levels had been a greater factor of loss than the level bombing attacks on army dumps further to the rear. Members of his staff admit that destruction of fuel was painful; but feel that the loss of ammunition and general ordnance was less serious, attributing this to the fact that with few exceptions the stocks had been properly decentralized. They are agreed that bombing of large fuel, ammunition, and ordnance dumps did not contrib-

ute much to the loss of supplies and mobility. They further state that this effort would have struck more deeply if it had been directed against the railroad system and the road communications. BAYERLEIN believes that ammunition dumps are more difficult to destroy than fuel dumps; and require a very heavy weight of attack if more than a few stocks are to be demolished.

CLOSE SUPPORT OPERATIONS

Von RUNDSTEDT feels that "carpet" bombing in the main line of resistance is the type of air action most detrimental to German ability to defend a position. He rates the efficacy of the bombing on a par with the strength of the defenders and the initiative of the ground attackers, in listing the factors which produce, or fail to produce, a breakthrough in close support operations. This is his view on the CAEN and ST LO operations, and conforms with intelligence reports on operation QUEEN at ESCHWEILER in November 1944. WESTPHAL, JOHN and ZIMMERMANN agree in stating that the effectiveness of laying bomb carpets is beyond doubt. They did not result in the loss of personnel so much as in a terrifying immobility on the battlefield. The troops could not move and were demoralized; the communication system broke down; artillery and anti-tank pieces were knocked out; and tanks were immobilized in craters or beneath heaps of dirt and debris. BAYERLEIN, in common with the units which bore the brunt of the bombs in Operation QUEEN, takes a more respectful view of the bombing by itself. His division lay in the sector which suffered the most heavily under Operation COBRA at ST LO, and he ascribes the loss, at least temporarily, of the 70% of his combat personnel, and thirty to forty of some forty-five tanks to the bombing on 25 July alone. A regimental CP was destroyed, and the whole sector was turned into "a landscape on the surface of the moon, all craters and death". This operation all but completed the destruction of Panzer Lehr which had lost a considerable portion of its strength at TILLY in earlier fighting. BAYERLEIN's respect for the figther bomber, in general and in relation to subsequent developments, is considerable, but it seems likely that he would concur in von RUNDSTEDT's opinion that Allied air power was most effectively brought to bear against the German armies in the West in the attacks on front-line positions as at CAEN and ST LO. It is agreed that this type of air support, at the time of any attempted breakthrough on the ground, is the most successful use of air power.

"CARPET" BOMBING

FIGHTER BOMBER ATTACKS

Fighter bomber work in the MLR fails to draw the same approbation from German commanders as does that of heavy bombers. In the main, it is felt that fighters are more effective in the zone of communication, because the German soldiers and weapons in forward positions are protected and camouflaged. The psychological effect of the fighter bombers on troops is considerable for they must remain under cover, move little if at all, and attack for the most part at night. But losses are smaller, unless ground action makes displacement necessary, and frequently in this case, Allied and German lines are so closely interconnected that fighter bombers cannot work effectively.

ATTACK ON FIXED DEFENSES

No German opinions have been collected on the efficacy of bombing attacks on fortifications, fixed positions and strong points, except that of von RUNDSTEDT who found the operations of the heavy and medium bombers against the batteries of the ATLANTIC WALL decidedly disagreeable, but not critical. His staff concurs in stating that the attacks of medium and heavy bombers on the ATLANTIC WALL had no critical effect.

ATTACK ON DEFENDED VILLAGES

Bombing of defended villages immediately to the rear of the MLR is again rated by C in C West as decidedly unpleasant. The principal difficulty arose out of the widespread destruction of lines of communication, however, and not so far as is known, from the effect on troops installed in such villages. It is not clear whether lines of communication in this instance refers to signals communication, or rail and road. If the latter, the effects are probably similar to those described in Attack on Communication Centers above. The C of S of the Seventh German Army stated that medium attacks of one or two groups on villages and small towns in the German MLR had little military result. "These attacks mainly had a morale effect and certainly a distinct effect on the civilian population. They certainly caused military damage, but it is believed that this damage does not compare with the effort and cost put into these operations".

GENERAL ANALYSIS

From the High Command to the soldier in the field, German opinion has been agreed that air power was the most striking aspect of Allied superiority. In no other arm or branch of military strength were the Germans at all times as completely outclassed and outnumbered. The question properly posed to the German commanders was then whether air power had been used against them as effectively as it might have been, not simply whether it had been im-

CONCLUSIO

THE VALUI CARPET BOMBING

THE OIL PROGRAN

pressive and disturbing. The senior officers were apparently too impressed with the inexhaustibility of our resources to give much thought to overall questions on the composition of our forces. They expressed no views on whether we had put too little, or too much, of our manpower and material into air power; nor did they comment on whether they thought we had made the right proportions in alloting our strength among heavies, mediums and fighters. Their only suggestion relating to the planned establishment of the air forces was that they mightily enjoyed the freedom for movement after dark permitted them by our lack of night fighters. Their contribution consists almost entirely in filling in gaps in our intelligence on the effectiveness of particular types of attacks, and in providing some general impression of German command opinion as to which of our target systems or types of attack produced the largest dividends.

CONCLUSIONS

THE VALUE OF CARPET BOMBING

While aware that close support operations like COBRA and QUEEN were appropriate only at the time of a jump-off against static enemy positions, they felt that these operations were our greatest success. Commanders differed as to why these were so successful, with reasons ranging from disruption of morale to destruction of tanks, signals, and artillery positions. But, with the exception of the beachhead bombings on D-day, there was unanimity in regarding this type of close support as our most effective use of the air. Exploitation was ultimately dependent on the initiative of the ground commander, in which the Germans saw some variation in Allied performance, but the immediate effect of the air attack was always great.

THE OIL PROGRAM

German opinion generally confirms the choices made during the intervening periods, when such mass operations were not in order. For heavies, the early program against ball bearings and aircraft had limited effect, felt in some measure in first line strength of aircraft on D-day, but in no lasting effect on tank and vehicle production. The oil program, begun in May, should have been started earlier if air strength would have permitted. Since adequate strength was not available until the time of the effective attacks on aircraft production in February 1944 and since, presumably, effort could not have been diverted from Operation CROSSBOW and the softening-up of the PAS DE CALAIS, the first real choice arose in March. The question would be, then, whether attacks on oil production should have begun in March in place of the concentration of 40,000 tons on railroad marshalling yards in Northern France and Belgium in March, April and May. German opinion suggests that most of the effectiveness of these early rail attacks was absorbed by the civilian economy, and

that transport could have been handled with nearly as much effectiveness by a thoroughgoing attack on bridges and railheads, carried out for the most part later, and at any rate principally by the mediums.

Apart from recommending earlier commencement of the oil program, implicitly at the expense of the attacks on rail yards, the Germans also suggest that attack against propellants manufacture was greatly feared during the spring, summer and autumn of 1944. Any later, such attacks would have exerted too delayed an effect to influence front line ammunition supplies during the hostilities. They would not have placed such attacks ahead of oil, however, nor would they have considered these more effective than systematic attacks on tank production, especially tank engines. The fault they found, then, was that propellants were not attacked at all, and that tank engines were attacked halfheartedly without concentration or continuity. The only effort which could have been drawn on for these purposes was that devoted during the period to area attacks on cities, and miscellaneous attacks on rail facilities deep in Germany. In both cases, German opinion, (including that of production control figures), records little concern over these attacks during 1944. Area attacks on cities were at no time sufficiently fruitful to warrant diversion from attack on pin-point targets, assuming that the forces making these attacks could have been so used. Rail attacks were dangerously effective when concentrated in time and space, and, after the turn of the year, exerted a great effect in limiting industrial production. However, the Germans feel that the earlier attacks were neither very effective nor necessary as a prelude to aid the success of the later concentrated raids. Comment was fragmentary on attacks against oil storage and ordnance depots by the heavies during March and April 1945. In both cases it is clear that organization was crumbling too rapidly for these to have increased the difficulites of many field units, already staggering because of inability to distribute stocks. The effect was serious for those units which fell back upon the bombed depots, expecting to replace some of their abandoned equipment. Heavy skirmishes by troops drawing on these bombed arsenals may have been avoided; but there was no outstanding effect on the course of military operations.

OTHER STRATEGIC ATTACKS

One other major use of the heavies, supplementing the mediums in the concerted effort to cut off the bulge, was unanimously praised at all levels, from OKH to divisional commanders. The use of the mediums and heavies against railheads, in driving back railheads through attack on rail bridges, and in blocking roads to reduce their capacity below the requirements for forward

INTERDICTION OF THE BATTLE AREA

truck lift, were considered extremely effective. The same pattern, as followed in the SEINE-LOIRE area, found similar genuine admiration, except in von RUNDSTEDTS's wavering views which were not always consistent.

The role of the mediums, as the long heavy arm of the tactical air force, against the communications, dumps and depots in the enemy's L of C, was rated very high by the Germans. Isolation of the enemy's rear, where permitted by the terrain, was considered more effective than attempts to destroy stocks within the isolated zone. Attack on tactical dumps was usually a poorly paying proposition because of the dispersal and camouflage which the Germans developed. Ordnance depots further to the rear were considered useful, provided the attacks were timed to coincide with a heavy use of the depot, when the effect could not be absorbed at an alternate installation. Ammunition filling depots were somewhat similar in presenting a juicy bit to the mediums when frontline dependence on specific stations was large. As in the attacks on rail and road communications, with their incidental effect in the interruption of land-line signals services, attacks on other tactical installations depended for success on their timing. The Germans point out that we had to know about the day-to-day operation of their supply and replacement system much more to make the mediums effective than was necessary for the larger strategic systems further removed in time and distance from the battle. In general, their views may be summarized by saying that the great contribution of the mediums lay in causing such temporary blocks to movement, or short-run shortages of those supplies which had to be immediately available, as to tie the hands of the field commanders, preventing them from acting or reacting quickly, in mass and strength. The fighter bombers struck in this same way, with the effect of a hammer, while the mediums were wielding the sledge. While our ground controlled front-line cover missions were well carried out, most German commanders considered them more significant in weakening their troops' morale than in actual destruction of guns or in killing men. All of these effects were nonetheless important. The Germans interrogated did feel, however, that the fighters were most crucially effective in operating against forward supply lanes. Time after time, when supplies or replacements were badly needed, no movement at all could be risked during daylight. Maneuver into the MLR, as well as within it, was almost prohibitively costly. When in desperation such moves were made, the losses in men and materiel were tremendous.

OTHER MEDIUM BOMBER AND FIGHTER BOMBER ATTACKS

In measuring the broad effect of our air power, German opinon is unanimous. The founders of the Luftwaffe, and of modern blitz warfare, were least

prepared against the very weapons they had newly forged. For the first time in history it had become possible for an army to reach far beyond the enemy's front line, into the furnaces and rooms where the stuff and plans of war were being brewed. In the German view, our air forces found those places. By destroying critical pieces of the war machine supporting the front, by preventing the arrival of the things produced by this machine at the time and place where they were needed, and by destroying even more of these things when they were already in place at the front, the air forces gave the innovators of total war a full measure of poetic justice. All Germans would agree that lives, resources, and time, in uncountable number, were saved by the air force achievement in greatly weakening the ability and will of the German army to resist the advance of our own troops across Europe.

PART FOUR

CONCLUSIONS

CHAPTER XIX

CONCLUSIONS

In following the phases and actions of the campaign in Western Europe, this report has set forth a series of conclusions on just how air effort affected the ground battle. These conclusions are opinions, it is true, but they are based upon factual accomplishment and were formed by the commanders and staffs who directed the operations and who later gave careful consideration to reviewing them in the light of air effects.

It is important to emphasize that a general analysis of the effects and manner of employment of air power must avoid a mental tendency to separate the campaign into air warfare and ground warfare. The most important overall conclusion of this report is the firm verification of the interdependence of our land, sea, and air forces, each upon the other. This interdependence is tactical as well as strategic and any arrangement of our armed forces which prejudices it will likewise prejudice our success in war. To say that invasion would have been unsuccessful without air superiority is as obvious and pedantic as to mention that the ultimate objective of all operations was the seizure and occupation of German territory by our ground forces. It is believed that unusual progress was made in this campaign to draw the services together and to allow an appreciation of the capabilities and limitations of each by the other.

The use of air power is governed by the two common requisites to victory in battle, fire and movement. In this campaign, strategically, air power moved into and seized control of the air above the enemy and then commenced the strategic delivery of firepower against objectives, the destruction of which would lessen the power of all his armed forces to resist. Thus, both in the air and on the ground the application of fire and movement was accelerated and directed against the enemy in the shortest possible time. Tactically, air power, by maintaining control of the element in which it moves, permitted fire and movement in the joint battle (again both in the air and on the ground) to far greater depth and with more flexibility than has ever been known before. In point of time, and due to its high mobility, air power was, and should be, applied first. Later, as the firepower and movement of the land armies is brought into play, the air effort must be correlated therewith, and strategically the two seek a single purpose under single direction.

Based upon this over-riding principle, the following specific conclusions which have been evolved and which are fully covered in the text are repeated for emphasis and summation.

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A proper conception of air superiority regards it as the securing of control of the air in order to deny its use to the enemy to such an extent as will insure our unrestricted use of that element in carrying out offensive operations not only in the air but on land and sea.

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Air superiority attained before invasion was essential not only because it furnished local protection to our forces and installations in the UK, but because it permitted the timely assembly, massing, and movement of a tremendous striking force.

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After invasion, air superiority insured the uninterrupted use of the air as an element from which to strike at the power to resist of the enemy armed forces. The most important effect was the resultant ability to employ the bulk of our air forces offensively in both strategic and tactical roles against the enemy and to permit full exploitation by our ground forces.

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The most important effect of our air superiority during the mounting and launching of invasion was the freedom from air attack on ports and marshalling areas during the week before invasion and during the initial move across the channel.

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The decision of AAF to use air power as a prelude to and preparation for ground operations has been completely justified.

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The principal effect on later operations obtained by Strategic Air Forces was the supremacy gained by the several types of counter air force action.

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Of all strategic attacks, that against oil was most beneficial to ground force operations. It constituted the most successful air program of that type because it was directed by a well planned, high priority target system against a vital military objective.

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Important indirect effects of strategic air action are,
(a) Diversion and tie-up of manpower.
(b) Dispersal of industrial and supply installations.
(c) Weakening of morale of the enemy armed forces.

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The method of obtaining employment of strategic air forces in a tactical role was too ponderous and difficult. The Supreme Headquarters must have an integrated air and ground operations center which can act on these occasional requests. Control at the top must be under a single commander, assisted by a single integrated staff.

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Saturation bombing of an area by heavy and medium bombers did not produce excessive enemy casualties, but did have a specific shock effect and destructive effect on material and communications when applied in sufficient quantities. In the assault preceding a breakthrough, a pattern bombing of enemy defenses by heavies and mediums was effective when close enough for exploitation by the ground forces. Armored column cover produced the outstanding supporting effect after the initial penetration.

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The greatest contribution of the medium bombers was precision bombing of well defined targets, a capability most effectively applied in interdiction. Experience has shown the need for aircraft, available to the tactical air commands, capable of producing the results achieved by the mediums.

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The outstanding contribution of the fighter bombers, aside from helping to attain and maintain air superiority, was their continuous armed reconnaissance missions to isolate the battlefield to the front and flanks of the ground forces. The full effect of air effort suffered due to lack of night reconnaissance and night bombing.

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Armored column cover solved the inherent difficulties of close air cooperation during phases of mobile warfare, and is recognized as a sound employment of tactical aviation.

The profitable employment of fighter bombers on targets in close cooperation was found to be dependent upon the nature of the largest, availability and location of artillery, and other tactical considerations, rather than the range of artillery.

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Reconnaissance aircraft, in spite of their technical limitations, were a valuable source of information through photography and visual observation of enemy movement, installations, and bomb damage in rear areas, and through provision of basic photographic cover of the battlefield. They increased the effectiveness of artillery by aerial adjustment.

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Aerial reconnaissance did not produce as timely or complete intelligence in the forward areas as it might have because:

(a) It took too long to get information to lower units.
(b) It did not cover night operations.
(c) Limitations of the aircraft curtailed observations.

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The only effective air cooperation given airborne operations was in the air preparation: counter flak, escort, airfield bombing, and isolation to slow down the enemy's reaction to the landing, and insure successful delivery. Inadequate provisions were made for close cooperation from aircraft on an air alert, in the air above, available at any time to comply in first priority with ground requests or direction.

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This campaign proved that ground direction of aircraft to targets was extremely effective and did not cause loss of flexibility of air force control.

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The best effect in attack on both priority II and priority III missions was obtained when the objectives were jointly selected by air and ground staffs and formed part of a joint plan. Selection of these objectives, or programs relating thereto, cannot be made the sole responsibility of either air or ground commanders.

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The organization for air-ground cooperation which permitted coordination in combined operations and joint planning at all levels up to and including Army Group was highly satisfactory and enabled the fullest use to be made of air power available to the ground forces.

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The bombing of the enemy transportation and signal communications system did not seriously interfere with our own military use of the systems except in the immediate area of a breakthrough. The enemy's destruction of his own facilities as he withdrew created the principle damage. Closer coordination and better logistical planning of interdiction programs would have in most cases, saved a certain amount of useless destruction of transportation facilities which would have later been helpful to our own forces.

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Air supply and evacuation is the logistical corollary to exploitation of a breakthrough.

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Air lift assumed an importance far beyond the relatively small proportion of tonnage moved because it delivered critical items at the critical time and place, and assured rapid evacuation of casualties.

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Air lift was not used in the campaign to its ultimate capabilities due to:
(a) Involved channels through which the bids therefor were made.
(b) The diversion of the lift to other purposes at critical times.
(c) Lack of fully developed joint planning in this respect.

PART FIVE

ANNEXES

ANNEX 1

EXTRACTS FROM OPINIONS OF KEY COMMANDERS

INTRODUCTION

The personal opinions of key commanders on the effects and what they consider to be the over-all results of air power on their own operations were submitted by these officers in response to a questionnaire prepared and sent by the office of the Commanding General, 12th Army Group, to Army, Corps, and Division Commanders. Extracts of these opinions are included in this report. Their arrangement and presentation conform to the topical outline of the report itself, thus providing a grouping of opinions under the subjects to which they pertain.

Although in some instances the answers of the commanders present conflicting statements, such differences arise from varied and dissimilar experiences, and the conclusions generally are in accord, reflecting a common experience in the effectiveness of air power.

PART ONE

TYPES, APPLICATION, AND EFFECTS OF AIR ACTION

STRATEGIC ATTACKS

VII CORPS - *Lieutenant General J. Lawton Collins:*

"The effect of strategic bombing of enemy airfields, aircraft production and gasoline supply became apparent months before D-day, when the enemy failed to bomb the concentration of troops and landing craft in the southern ports of ENGLAND. Such attacks would have had serious results had they been made during the last couple of weeks prior to the invasion. The effect of this bombing on the enemy's transportation system was evident at once after the landing was made, and continued until the conclusion of the war. This effect was most marked during the exploitation of the ST LO breakthrough about August 1, 1944, when German troops were obviously unable to move with sufficient speed

to meet our attacks. In the final phases, many airfields were captured by this corps and were found littered with aircraft destroyed on the ground by the Germans because of lack of fuel."

2D INFANTRY DIVISION - *Major General W. M. Robertson:*

"Medium and heavy bombers were valuable in general destruction of large targets, such as communication centers, heavy caliber gun positions and other enemy installations. Fighter bombers afforded the finest air support experienced by this Division in the entire war by striking designated targets from 'air alert'. The Division Commander was able, by virtue of almost continuous daily support, to strike all known or suspected enemy positions accurately with demoralizing and devastating effect on enemy personnel and material. The advance of infantry elements in numerous instances was materially aided."

35TH INFANTRY DIVISION - *Brigadier General T. L. Futch:*

"Effectiveness of strategic bombing of oil production first became apparent to this Division in September 1944 when new German tanks entered combat near NANCY with practically no mileage on them, a number of which were later found stranded for lack of gasoline. No specific time can be given for a noticeable decline in ordnance production due to strategic bombing. A shortage of transportation on the part of the enemy has been evident ever since this Division entered combat in July 1944."

AIR SUPERIORITY

NINTH ARMY - *Lieutenant General William H. Simpson:*

"The air superiority enjoyed during operations by the Ninth U.S. Army enabled traffic to move more densely than would have been the case had such air superiority not existed. Traffic could move twenty-four hours per day, using lights during hours of darkness, except in the most forward areas, where lights, if used, could have been observed by enemy ground forces."

XIII CORPS - *Major General A. C. Gillem, jr.:*

"It is considered vital that there be night intruder and patrol missions. During the long nights of the winter 1944—45, GAF operated with impunity night after night over our area on visual and photo reconnaissance missions, bombing and strafing attacks, dropping

parachutists and agents. At the same time, German troops were able to move freely at night. Thay were able to mass for their ARDENNES counter-offensive undetected and umhampered at night. Night intruder, night tactical reconnaissance and night photographic reconnaissance missions in adequate numbers would have provided:

(a) Decrease in GAF night acitivity.
(b) Vital information of German night movement.
(c) More complete information of German intentions — build-ups, withdrawals, etc."

XIX CORPS - *Major General Raymond S. McLain:*

"That it [air effort] cannot win a war without major efforts of ground troops is perfectly apparent, since, in spite of our vast air superiority, the enemy was able to move a sizable force and launch and support a serious counter-offensive well towards the end of the war."

10TH ARMORED DIVISION - *Major General Fay B. Prickett:*

"Friendly air superiority permitted on all occasions:

(a) Freedom of maneuver day and night.
(b) Relaxation of passive air defence.
(c) The effect of air superiority was of immeasurable value in the movement of supplies. It permitted the maximum movement of supplies during daylight hours and, during the hours of darkness, it permitted the light line to be kept well forward. It also resulted in an efficient and smoothly operating supply system, due to the fact that plans rarely had to be changed or altered because of enemy air activity.
(d) No reduction of the normal attached AAA."

5TH INFANTRY DIVISION - *Major General Albert E. Brown.*

"At dawn and dusk, there was an interim when our night support planes and day support planes were on the ground, whereas the German planes were usually in the air during these periods. It is not understood why the German air force found it possible to operate during these periods between daylight and darkness while our fighter bombers generally did not. It is believed therefore that considerable value could be obtained by increasing our air activity during these periods — in fact over this Division's lines our air activity was generally nil during these periods. This was particularly noticeable at the iime of the MOSELLE River crossing."

THE AIR FORCES IN A TACTICAL ROLE

VII CORPS - *Lieutenant General J. Lawton Collins:*

"We could not possibly have gotten as far as we did, as fast as we did, and with as few casualties, without the wonderful air support that we have consistently had."

XIX CORPS - *Major General Raymond S. McLain:*

"The destruction of cities, marshalling yards, and airports, has certainly been of great consequence in this war. The question of to what extent the economy of a country can support the vast cost of such a program is one that is very pertinent. In the conduct of a war, the length of time that such an expenditure of fuel, craft, and explosives can be maintained, must be a matter of fluctuating limits. The use of strategic bombing on a large scale appears to be a means for offensive action to a much greater extent than its application to a long defensive situation. It is doubtful if a power without the vast resources we have possessed at this time could sustain as overwhelming a program as has been to our advantage in this war."

VII CORPS - *Lieutenant General J. Lawton Collins:*

"As a general proposition, heavy bombers are not desirable for close support except in special cases such as at the ST LO — MARIGNY breakthrough. The bomb pattern cannot be placed as close as desired to our own front lines and the requirement that there be a ceiling of at least 7,500 feet greatly restricts the opportunities for using heavies in direct support. Not the least part of this latter difficulty is the fact that a definite date and time of attack cannot be fixed because of the uncertainty as to weather. Another undesirable feature in using heavy bombardment is the fact that it takes several days to arrange all of the necessary details, during which time the tactical situation may change. However, the shattering morale effect and devastation caused by heavy pattern bombing makes it highly desirable in cases where a well organized enemy position must be penetrated."

1ST INFANTRY DIVISION - *Major General Clift Andrus:*

"In the employment of heavy bombers from the standpoint of the Division Commander no more could be asked, and it is not considered advantageous or feasible to draw heavy bombers away from strategic missions to take on tactical missions except in rare cases, such as the ST LO breakthrough."

35TH INFANTRY DIVISION - *Brigadier General T. L. Futch:*

"It was apparent that bombing by heavies of vital German lines of communication during the ARDENNES battle completely choked off the supplies needed badly by the Nazi spearheads, with the result that German prisoners weret aken who had had practically nothing to eat for several days and who were inadequately supplied with clothing and ammunition. This was probably one of the most effective missions accomplished by the heavies at any time."

THIRD U. S. ARMY - *General George S. Patton jr.:*

"It takes too long to get medium bombers when needed. Suggest attaching a wing of 3 groups of medium bombers to tactical air commands to make them more readily available."

NINTH U. S, ARMY - *Lieutenant General William H. Simpson:*

"The use of mediums has been sufficiently flexible for us to consider them in all of our major operations when the planning was done days in advance; but we have felt that their use ordinarily was not flexible enough to warrant considering them in planning our day-to-day operations. The strike on MAGDEBURG was executed on short notice and was an exception to the above."

VII CORPS - *Lieutenant General J. Lawton Collins:*

"The most valuable contribution of the medium bombers was in isolating the battlefield by the destruction of rail lines and the cutting of bridges."

5TH ARMORED DIVISION - *Brigadier General Morrill Ross:*

"It is believed that greater advantage could be taken by ground forces of the medium air strikes delivered in close cooperation with attacking troops. However, in all planned medium bomber missions with the target area close to the ground troops a radio connection from the most forward ground troops to the air should be made available for positive target direction and safety check."

11TH ARMORED DIVISION - *Major General H. E. Dager:*

"It would have been of value to have had medium bombers available on short notice especially when an armored division was operating in an exploitation role far ahead of supporting infantry. The well-timed shock effect of mediums operating in a close support role would have facilitated the rapid capture of large metropolitan areas and communication centers."

1 ST INFANTRY DIVISION - *Major General Clift Andrus:*

"The main improvements suggested from Division level are a better system of communications between medium bombers and Division G-3 Air, affording better employment of the medium bombers for close support."

30TH INFANTRY DIVISION - *Major General Leland S. Hobbs:*

"Medium bombers are desirable if the weight of the effort is needed and good targets easily identified are available with a good means of marking front line positions The probability of having to postpone an attack because of weather conditions and the late time of attack makes them less desirable in close support roles."

80TH INFANTRY DIVISION - *Major General H. L. McBride*

"The employment of medium bombers in close support was not sufficiently flexible to permit their employment, and missions could not be prearranged by 36 to 48 hours. For example, in the attack on ERFURT, Germany, a medium bomber mission was desired when negotiations for surrender failed, but the ground attack could not be delayed long enough to permit the utilization of medium bombers. Other instances where reserves were known to be concentrated in wooded areas of such size that attacks by fighter bombers were ineffective and medium missions were desirable. Again the notice necessary to set up this medium bomber attack precluded their use."

3D ARMORED DIVISION:

"Fighter bombers furnishing continuous column cover in an operation of this kind [limited objective attack] are the most beneficial to an armored division. With continuous column cover working with forward controllers in each column we are able to perform our immediate close-in reconnaissance to the front and flanks as well as having available at all times for quick employment a strong air strike. In an operation of this kind where divisions are operating in numerous armored columns, artillery support is seldom immediately available and, therefore, column cover is depended upon to bridge this gap."

4TH INFANTRY DIVISION:

"The sometimes expressed criterion that if artillery can reach it, the Air Corps should not be used to bomb it is believed to be invalid. The morale effect of bombing is far greater in an equal period of attack and technically the 500-lb bomb accomplishes destruction the artillery does not."

79TH INFANTRY DIVISION - *Colonel Kramer Thomas:*

"In the selection of targets for fighter bombers, the full capabilities of artillery have always been considered, but it must be understood that many times the full capabilities of the artillery could not be developed because of lack of ammunition. It is believed that the blanket denial of air missions within artillery range is unsound. Often the artillery is unable to obtain adequate information as to targets within range where the air can fly over the area and see the target to be neutralized."

THIRD U. S. ARMY - *General George S. Patton, jr.:*

"The importance of photographs to the artillery cannot be overstressed. Approximately 50 percent of the hostile battery locations are obtained by photo interpretation. Adequate and fresh photo cover means that artillery can knock out or neutralize hostile artillery and thus permit our troops to move forward, cross a stream or build a bridge. Some Corps Commanders would like to set date of attack on availability of recent photo cover."

4TH ARMORED DIVISION - *Major General W. M. Hoge:*

"Reconnaissance aircraft have not satisfied our needs. It was necessary for information obtained to pass through too many echelons, therefore, time lag was too great."

82D AIRBORNE DIVISON - *Major General James M. Gavin:*

"Day visual reconnaissance has been extremely effective and very valuable. It is believed that its value would be enormously increased by improving communications and liaison to the point where it is certain that Division headquarters can receive and interpret the reports of the aircraft in their area while the reconnaissance is actually being performed.

"Night photography has been the weakest part of air reconnaissance results received at Division level. The obliteration by our air superiority of German daytime movement, made the need during operations for night photographs of key communication routes and centers very pressing for the determination of traffic trends. It is not believed that this Division has ever had such a mission successfully accomplished for it."

80TH INFANTRY DIVISION - *Major General H. L. McBride:*

"Visual reconnaissance was of little value from a Division point of view. Artillery liaison planes were able to provide the bulk of the visual reconnaissance necessary."

83D INFANTRY DIVISION - *Major General Robert C. Macon:*

"Information obtained at Division level by reconnaissance aircraft has not been adequate. This may be due to lack of facilities for the dissemination of the information obtained by the observers to the front line units. This fault could be eliminated if reconnaissance squadrons operated under corps control. Definitely the briefing and interrogation of the observers should be done by Corps personnel. Frequent visits by the observers to the WAR ROOM at corps and division headquarters would show them the need for certain information desired by the commanders.

"Air photographs, when provided, have usually reached this level too late for intelligence purposes."

3D ARMORED DIVISION:

"It would be very desirable in an armored division to have four L-4 or L-5 planes available in which VHF radios could be installed. These planes should be under the control of division headquarters, separate from division artillery planes, and would be allocated to the combat commands for fighter bomber control in accordance with the tactical situation . . . . . .

"Unless additional liaison planes are furnished the division it is impossible to have planes available for this purpose. Artillery planes are kept fully occupied on fire adjustment and even if they had time to do fighter control, it would involve complete change over of radio equipment and a change over to air corps personnel as observers. The L-4 is not capable of carrying two radio sets and two people due to the weight limitations, thus making it impossible to use an L-4 as a dual purpose plane."

5TH INFANTRY DIVISION - *Major General Albert E. Brown:*

"It is recommended that four additional liaison type aircraft be provided for use other than artillery missions. These four planes to be used for reconnaissance by Division staff officers; for allotment to regiments for performance of reconnaissance missions; for mission with the Reconnaissance Troop; for use by G-3 (Air) in guiding fighter bombers to targets; for liaison with armored units operating within Division zone; and for liaison with higher headquarters when distance involved is beyond the efficiency of vehicle travel. These four additional ships, for economy of personnel in repair and maintenance, to be part of organic equipment of Headquarters Division Artillery, but under control of Division."

83D INFANTRY DIVISION - *Major General Robert C. Macon:*

"Their [liaison aircraft] use has greatly improved the teamwork and coordination of the Division in combat. It is recommended that three L-5s be made organic or attached to the Division for this purpose."

INTERDICTION

NINTH U. S. ARMY - *Lieutenant General William H. Simpson:*

"Based largely on statements made by prisoners of war, it is believed that the interdiction programs did have the desired effects of crippling key communications centers and of causing confusion and losses among both combat and supply troops. The bombing of LINNICH and ALDENHOVEN during Operation QUEEN, serve as good examples."

29TH INFANTRY DIVISION - *Major General C. H. Gerhardt:*

"The interdiction programs were established where they could be most effective. This was particularly true in NORMANDY and in the static phase prior to the crossing of the ROER River."

SYSTEM OF AIR-GROUND COOPERATION

NINTH U. S. ARMY - *Lieutenant General William H. Simpson:*

"There is no doubt but that joint planning has made the efforts of ground and air more effective. At the Army-TAC level, at least, insofar as it applied to Ninth U. S. Army and XXIX Tactical Air Command, it is felt that the joint planning was entirely satisfactory. Little was left to be desired. This statement does not mean that perfection has been reached. It is expected that improvement can and will be made during future operations."

XIII CORPS - *Major General A. C. Gillem, jr.*

"Joint planning is essential for success. It has been effective as far as it has gone. In the attack the air plan is too often limited to the first twenty-four hours. This applies particularly to medium bombers. Protracted planning and closer liaison to assure flexibility are required."

2D ARMORED DIVISION - *Major General I. D. White:*

"Joint planning is the most effective means of deriving results most beneficial to both air and ground forces."

6TH ARMORED DIVISION - *Major General R. W. Grow:*

"The air-ground cooperation has been excellent in this Division; G-3 (Air) and the Air Support Officers and their parties have always worked closely together. One officer with his party has always operated right with the G-3 (Air) and the G-3 Section. All planning and operations were conducted with the Air Support Officer's full knowledge and support. The results have more than justified this party becoming an integral part of the Division Headquarters and similar parties with the combat commands."

35TH INFANTRY DIVISION - *Brigadier General T. L. Futch:*

"Within the division the air-ground cooperation system has functioned very efficiently with respect to fighter bomber missions. It is felt that a system of closer contact and control of tactical reconnaissance aircraft, in a manner similar to that used with fighter bombers, could be very beneficial to the division. Contact with tactical reconnaissance planes usually appeared to be too complicated because of Corps or higher headquarters systems of communication and control."

90TH INFANTRY DIVISION: *Major General Herbert L. Earnest:*

"Joint planning has definitely made the effort of the ground and air more effective. During the SAAR River operation the CG, C/S, G-3, G-2, and G-3 (Air) were in constant touch with the air plans and accomplishments of the air. A separate operational map containing only air information (targets hit, targets requested, etc.) has been used by this Division on major operations.

"TALOs should be more carefully selected. The best TALOs that worked with this Division were not pilots but ground air officers who gave considerable time and energy to fill the ground controller's role. Fighter pilots as a rule knew little about the extensive possibilities of Tac/R, and Tac/R pilots knew little about fighter bomber technique and capabilities. TALOs have been exchanged too often."

SUPPLY AND EVACUATION BY AIR

XVIII CORPS (AIRBORNE) - *Brigadier General L. Mathewson:*

"Since it was employed only in a critical situation where all else had failed, air supply and evacuation made the operation possible. The air evacuation saved many lives and contributed to a higher morale. Air supply was a tremendous factor in many a rapid advance, and often the controlling factor".

VIII CORPS - *Lieutenant General Troy H. Middleton:*

"Without air resupply, BASTOGNE could not have been successfully defended. Air resupply facilitated the rapid advance east of the RHINE".

101ST AIRBORNE DIVISION - *Major General Maxwell D. Taylor:*

"Air supply performed an important role in support of the Division in HOLLAND and BASTOGNE. It was established conclusively that supplies dropped by parachute from C-47's were put down in a much better pattern than those from bombers. Also the glider is definitely a better way of landing Airborne supplies than parachute. The procedure for marking fields and homing aircraft bringing in supplies would be the same as the procedure for putting down Airborne troops."

CHIEF SURGEON, EUROPEAN THEATER OF OPERATIONS -
Major General Paul R. Hawley:

"Air evacuation has played a major role in evacuation of patients. Approximately 56% of all patients evacuated to the UK from the Continent were evacuated by air. During several phases of the operation, evacuation was entirely dependent upon air evacuation, particularly during the drive across FRANCE and the drive east of the RHINE. It would have been impossible to evacuate all of the casualties from the Armies without air evacuation.

"Total overall medical tonnage flown from D-day to VE-day was 20,206,496 pounds.

"Immediately before and during an airborne operation there were almost no transport aircraft available for supply. This situation was alleviated somewhat when B-24 bombers were made available. Each actual and projected airborne operation except the RHINE crossing operation seriously interfered with air evacuation as planes would not be available for air evacuation for a period of two (2) to five (5) days. This resulted in an accumulation of patients awaiting evacuation in forward areas. Upon one occasion approxi-

mately 4,000 patients were awaiting evacuation; upon another occasion, 1,800 were awaiting evacuation at one field.

"The largest single improvement [suggested for air supply and evacuation] would be the assigning of an especially trained Transportation or QM unit, with personnel and trucks, to act as a receiving depot on forward fields, to off load and store supplies and notify units to call for same. This was done on A-22-C in NORMANDY but was not followed up later in the campaign to any great extent."

EFFECTS OF AIR ACTION
ON OUR OWN MAINTENANCE AND SUPPLY

V CORPS - *Major General C. R. Huebner:*

"Bombing of road communications has not materially affected supply problems. Roads and bridges essential for troop movement have been adequate for supply of the troops. There is no doubt that road damage by aerial bombardment has had its effect on vehicular maintenance, but is believed to be relatively negligible".

VII CORPS - *Lieutenant General J. Lawton Collins:*

"I believe disruption of enemy signal communications is of such great importance to us that it should be done irrespective of any delay that might be caused in our subsequent use of this system".

XVI CORPS - *Major General John B. Anderson:*

"It is believed that the bombing of enemy signal communications so as to deny him the use of them was of far greater importance than attempting to preserve a system for our own use when captured".

XIX CORPS - *Major General Raymond S. McLain:*

"It is not believed that bombing efforts should be restricted because of prospective use of billeting areas, marshalling yards, road centers, bridges, shop facilities, etc. It may be expected that the enemy will destroy these himself when he is threatened with their loss".

5TH ARMORED DIVISION - *Brigadier General Morrill Ross:*

"The use of GP bombs on motor convoys on roads has caused craters which present a problem particularly in wet weather. If rockets and machine guns were used for purpose of destruction, particularly on main roads and critical road junctions, it is believed that the same effects could be obtained without as much damage to the roads. Craters result in serious bottlenecks particularly where road net is restricted and as a consequence, it is very difficult to get supply vehicles to the rear to reconstitute basic loads".

11TH ARMORED DIVISION - *Major General H. E. Dager:*

"Our strategic and tactical bombing of railroads, rail bridges and marshalling yards delayed our supplies very little. It did lengthen our supply lines due to the time that was required for the Engineers to repair rail lines.

"The tactical bombing of road communication necessitated the use of secondary roads for MSR's which caused some delay and damage to our trucks. It also delayed vehicle replacements coming forward due to the fact that temporary bridges would not support the loaded tank transporter. One-way bridges (Bailey and Treadway) caused traffic problems and resulted in some delay".

2D INFANTRY DIVISION - *Major General W. M. Robertson:*

"The division advance was never retarded more than two hours by any known result of friendly bombing".

5TH INFANTRY DIVISION - *Major General Albert E. Brown:*

"Enemy shop and housing facilities have frequently been destroyed by our air. This effect upon the enemy is believed to have been of infinitely greater value to us than would be the convenience and utility to us of these facilities if they had been protected from our bombing and taken by our ground action alone. It was the loss of these shop facilities that made the enemy unable to fight as a highly organized combat force".

9TH INFANTRY DIVISION - *Brigadier General Jesse A. Ladd:*

"Where we have been delayed by bomb damage we felt that the enemy would have used prepared demolitions to accomplish the same effect if it had not been done by our aircraft. The damage done by our air to enemy communication and morale and transportation more than offset any slight delay which we may have experienced".

83D INFANTRY DIVISION - *Major General Robert C. Macon:*

"At division level the amount of additional effort diverted from actual supply and maintenance is insignificant compared to the value of bombing in overcoming enemy resistance".

PART TWO

COMBINED EFFECTS OF TACTICAL AIR EFFORT ON VARIOUS TYPES OF MILITARY OPERATIONS

LANDING OPERATION

XVIII CORPS (AIRBORNE) - *Brigadier General L. Mathewson:*

"Heavy bombardment provided the most beneficial results to the successful beach landing on NORMANDY by: the semi-isolation of the battle area due to the destruction of roads, railroads and bridges; the neutralizing of enemy airdromes within effective range of the beaches; and by the destruction of fortified hostile installations".

101ST AIRBORNE DIVISION - *Major General Maxwell D. Taylor:*

"The best results of the heavy and medium bombers in the landing in NORMANDY were the neutralization of coastal batteries and the interruption of ground communications. The latter prevented the movement of strategic reserves and allowed the establishment of a firm bridgehead before the enemy could react in strength. Fighter bombers contributed most by the neutralization of the air and protection of the beaches from air attack. Reconnaissance aircraft contributed vital air photography to assist the preliminary planning but was of little assistance in tactical reconnaissance after the landing".

1ST INFANTRY DIVISION - *Major General Clift Andrus:*

"Landing was definitely the most difficult of .... operations. Heavy and medium missions were flown prior to the actual landing and continual air cover was maintained throughout the critical stages. More assistance could have been given by having communications available and observers in high performance planes able to adjust both naval and field artillery fire on all types of targets. Prearranged high performance planes are not satisfactory due

to complicated communications and lack of availability for targets of opportunity. All reconnaissance planes should be able to communicate direct with the Division Artillery F. D. C. Reports made by reconnaissance planes are cold and usually worthless by the time the artillery gets them".

LIMITED OBJECTIVE ATTACKS

XII CORPS - *Major General S. Le Roy Irwin:*

"Heavy and medium bombers are most effective in isolating the objective area, preventing reinforcement and effective counter-attack. Usually our troops are too close to permit bombing of the position proper. Fighter bombers are most effective in close support on enemy tanks, reserves, and artillery. Reconnaissance aircraft, in all categories, observe for our artillery and pay close attention to movement of enemy forces, and to location of enemy artillery".

XX CORPS - *Major General Louis A. Craig:*

"Heavy and medium bombers were not used by this Corps on limited objective attacks. Fighter bombers were most effective in neutralizing enemy positions and destroying enemy artillery. Photos furnished by reconnaissance aircraft were particularly beneficial, and the artillery observation furnished by liaison type aircraft was most effective".

82D AIRBORNE DIVISION - *Major General James M. Gavin:*

"Heavy and medium bombers were most helpful by isolating the battlefield from the rest of the front besides attacking main supply centers which supplied the enemy in the sector to our immediate front. Fighter bombers were most effective in furnishing close-in support to our attacking echelons as directed by the Air-Ground Cooperation Party. Secondly, by flying armed reconnaissance in our immediate front they were able to harass enemy reinforcements, and to bomb located enemy vehicles or installations. Reconnaissance planes provided tactical information of the enemy's movements and accurate photo maps of the area to be attacked. Liaison type planes were valuable in directing and adjusting the artillery fire prior to and during the attack".

3RD ARMORED DIVISION:

"Fighter bombers can best be used in a mission of this type [limited objective attack] by striking certain pin-point targets in the objective target area in conjunction with preparatory fires laid down by the artillery prior to H-hour. After H-hour, fighter bombers should be in the vicinity of the target area performing armed reconnaissance ahead of the bomb line, thus preventing enemy movement of reserves in the direction of the objective.

The fighter bombers performing armed reconnaissance are subject to call during the attack by forward air-ground controllers working with the assault troops. After assault troops have reached the objective area it sometimes becomes necessary to request fighter bombers to search out heavy enemy artillery firing on objectives which cannot be neutralized or destroyed by our supporting artillery.

"Reconnaissance aircraft are most beneficially used in conjunction with a limited objective attack by getting up-to-date photographic coverage of the target area just prior to D-day. Also a continuous Tac/R coverage before and on D-day to spot any movement of reserves in the direction of the objective.

"It is felt that the medium and heavies operate more to the advantage of the ground forces by continuing their long range interdiction and attrition program".

35TH INFANTRY DIVISION - *Brigadier General T. L. Futch:*

"In the experience of this Division, heavy bombers have played no role in limited objective attacks ..... Medium bombers lend themselves to efficient use in the 'softening-up' process incident to a limited objective attack. This support can be particularly effective in woods of limited size known to contain considerable number of enemy troops. Fighter bombers are particularly well adapted for use in limited objective attacks, where the objective can be studied thoroughly and targets pin-pointed. Under these circumstances, fighter bombers can attack artillery, dug-in tanks and SP guns, and even enemy individual emplacements, with great effect. Reconnaissance aircraft can furnish photos of enemy positions and thus allow pin-pointing. They can also detect and report the approach of any reserve troops moving forward to counter-attack. Liaison type aircraft are of inestimable value in this type operation, as in all, because of their observation of artillery fire, detection of enemy tanks, reporting on positions of friendly front lines, and their observation of enemy troop movements near the front lines".

83 D INFANTRY DIVISION - *Major General Robert C. Macon:*

"In a limited objective attack it is possible to focus the efforts of the aircraft upon a comparatively small area. The heavy and medium bombers generally have made their attacks well ahead of the attack by ground troops, upon area targets rather than upon pin-point targets. Effects of these earlier strikes are difficult to determine except in a general way. Undoubtedly the attacks by heavy and medium bombers had a 'softening-up' effect in addition to the disruption of supply and communication facilities. Fighter bombers, when made available, obtain the most readily discernible effects. By attacking troops, armored vehicles and tanks, and gun psoitions, they disperse the enemy's forces, cause him many casualties and lower the general morale of his forces, thus making the task of the attacker easier".

BREAKTHROUGH OPERATION

VII CORPS - *Lieutenant General J. Lawton Collins:*

"The pattern bombing by the heavies, particularly on the front of this Corps along the ST. LO — PERIERS road, had a devastating effect. Enemy communications were completely disrupted resulting, in some areas, to an almost total lack of coordinated resistance following the bombing. Most prisoners taken by our troops were stunned and bewildered by the bombing. The morale factor was truly shattering. There can be no question that the bombing was a decisive factor in the initial success of the breakthrough .....

"Armed reconnaissance was invaluable. In a breakthrough the situation frequently changes too fast for the distribution of up-to-date aerial photographs. Armed reconnaissance out ahead of our columns gave timely information of the enemy and frequently gave the earliest reports of our own frontline locations".

XIX CORPS - *Major General Raymond S. McLain:*

"..... the use of heavy and medium bombers in close support is believed to have more disadvantages than advantages. However, with the development of close support bombing techniques the effect of a tremendous air strike followed by an artillery preparation may have its advantages, principally against the enemy morale. However, it should never be considered as a substitute for adequate artillery preparation. Once the breakthrough has been effected, the use of fighter bombers for mobile column cover is tremendously beneficial. In such a situation, fighter bomber support is usually more effective than artillery. Accurate aerial road reconnaissance is extremely important in such a situation. Early in the operations of this Corps, combat commanders expected that aerial reconnaissance would be able to report demolished bridges, road blocks, etc., which would hinder their progress. Such information did not materialize. The beneficial effect of such reports is believed to be evident. The liaison type aircraft is invaluable for control during a breakthrough. By means of such aircraft, commanders and key staff officers are able to visit quickly both lower and higher headquarters which results in closer understanding and a more closely coordinated effort. They furnish a sure swift courier service".

2D ARMORED DIVISION - *Major General I. D. White:*

"The results of the ST. LO bombing were devastating, but certain shortcomings reduced its effectiveness considerably. The necessity to withdraw our troops from the front line caused the initial loss of 1500 yards which had to be regained by fighting because the enemy followed our retrograde movement closely. This also created the effect of making his forward elements no more vulnerable than our own since this shift of the front lines of both

sides placed the target area in the enemy's rear. Short bombing caused heavy casualties among our own assault troops and seriously disrupted coordination of the ground attack. Enemy PWs taken subsequently never admitted to excessively heavy casualties from bombing .....

"The ST. LO bombing did retard the advance of the ground forces. Only one paved road ran through the saturation area and it was badly cratered. Much engineering work was necessary before this road was made capable of bearing the traffic which had to flow over it ..... Delayed H-hours do retard us as they limit the daylight fighting hours available.....

"Fighter bombers were employed on precision targets with excellent accuracy. During the subsequent days of the breakthrough and continuing through the pursuit into Northern FRANCE and BELGIUM, the work of the fighter bombers was superb. Clear weather and the fact that the enemy was on the move combined to make target spotting easy. Our ground controllers were able to designate most targets without resorting to smoke markers. When we had no specific targets, flights released on armed reconnaissance found good hunting on the roads ahead of our advance. It was this period that endeared the fighter bombers to the hearts of our tankers forever. Many veteran tankers refer to the P—47 as the best and only effective AT weapon we had at that time".

6TH ARMORED DIVISION - *Major General R. W. Grow:*

"Breakthrough: Air cooperation was most valuable in this type of operation; enemy lines of communication were disrupted and retreating enemy columns were bombed, strafed and disorganized. Fighter bombers controlled from near the heads of columns were largely responsible for successful breakthroughs ..... Fighter bombers are perfect support for armored units. Best targets are enemy armored vehicles and artillery".

83D INFANTRY DIVISION - *Major General Robert C. Macon:*

"In a breakthrough, heavy and medium concentrated bombing in a small area is very effective in destroying personnel and equipment as well as demoralizing the personnel surviving the bombing. Fighter bombers following the heavy and medium bombers to knock out pin-point targets not hit by the heavy and medium bombing is very effective in destroying the installations which could hold up the advance. In such operations, the use of fighter bombers was found especially effective in two roles; first, to reinforce or replace artillery fire when the mass of supporting artillery fire was out of range due to rapid advance of leading elements; second, for employment against hostile flank attacks made against our elements in rear of, or abreast of, the artillery positions".

ASSAULT OF A DEFENDED RIVER LINE

VII CORPS - *Lieutenant General J. Lawton Collins:*

"Landing on a hostile shore is the most difficult of all military operations .... The next most difficult operation is the crossing of a defended river line. Here again air superiority is mandatory. The air forces provided their greatest assistance in these operations by protecting our troops from enemy aerial attack and by disrupting his communications and by limiting the movement of enemy reserves. These three factors are essential for success."

XX CORPS - *Major General Louis A. Craig*

"Heavy bombers were not used by this Corps on the assault of a defended river line. Medium bombers were used by this Corps to soften the enemy's defenses and in the case of the SAARLAUTERN bridgehead operation probably enabled the assaulting infantry to capture intact a bridge over the river by disrupting the demolition control wires. Fighter bombers were most effective in maintaining air superiority, in reducing hostile artillery fire, and in attacking enemy counter-attacks."

35TH INFANTRY DIVISION - *Brigadier General T. L. Futch:*

"The fighter bomber is particularly well suited for close support in the assault of a defended river line. Targets at the river's edge, once they are pin-pointed, can be attacked effectively and with more than the usual factor of safety for friendly troops in that the river serves as a well-defined bomb line. Furthermore, since the general doctrine on river-line defense calls for the movement of mobile reserves to the particular point or points at which the crossing is being forced, fighter bombers can almost always find profitable targets in the form of enemy foot and motor columns moving toward the crossing points....

"It is believed that the most effective role of the heavy and medium bombers in this type of operation (assault of defended river line) does not differ from their principal mission in other situations. That is, their bombing of rail and road facilities behind the front hinders the movement of enemy troops and supplies and prevents the reinforcing by the defender of critical points. In the many river-crossing operations made by this Division there was never any close support by heavy and medium bombers. It is believed that missions farther to the rear, for the purpose of 'isolating the battlefield', were more efficient and more economical than an attempt at close support would have been."

ASSAULT OF A LINE OF PERMANENT FORTIFICATIONS

VII CORPS - *Lieutenant General J. Lawton Collins:*

"Medium and fighter bombers were used in preparation for the attack on the outer defenses of CHERBOURG in the first large scale pattern bombing in Europe. Many

mistakes were made particularly in orientation. Some fighter bombers attacked friendly troops well within our own lines. Much of the medium bombardment was widely scattered. Nevertheless, the overall effect on enemy morale and the destruction of communications was worthwhile. Fighter bombers were highly effective in attacking specific strong points on the periphery of CHERBOURG. These could be accurately designated because of the splendid photographic reconnaissance that had been made prior to D-day. I visited more than one of these key strong points which had been utterly destroyed by remarkably accurate fighter bomber attacks ..... Fighter bombers were of great help in reducing key areas of resistance (in the SIEGFRIED LINE), but were not employed against individual bunkers or pill-boxes which can be much better taken on by SP artillery or tanks."

XX CORPS - *Major General Louis A. Craig:*

"Heavy and medium bombers were used in the assault of a line of permanent fortifications in the vicinity of METZ. Enemy communications were disrupted but little material damage was achieved. Fighter bombers were ineffective. Reconnaissance and liaison type aircraft were particularly valuable in their roles of furnishing photographic cover and artillery observation."

4th INFANTRY DIVISION:

"There has been no experience with heavy bombers in the assault of a line of permanent fortifications. However, the medium bomber attack on the BRANDSCHEID fortifications in the SIEGFRIED LINE completely reduced all defensive installations above ground but no material damage to the bunkers was accomplished. Communications were not disrupted as telephone communications between pill-boxes were intact after capture. Field fortifications around the permanent type fortifications have been reduced by use of medium bombers and the casualty effect of this type of bombing has proven very effective. Fighter bomber attacks against permanent type fortifications are generally not effective. However, they have proven very effective against the field fortifications which are normally in the vicinity."

9TH INFANTRY DIVISION - *Brigadier General Jesse A. Ladd:*

"We found the use of fighter bombers extremely valuable on the assault of the SIEGFRIED LINE. However, we have had some difficulty in getting our AGLOs to request air on pill-box areas because they have been briefed that fighter bombers could not damage pill-boxes. While the SIEGFRIED LINE is a line of pill-boxes in depth behind dragons teeth we found that the enemy fought from trenches on the outside and retired to the pill-boxes, only when the final assault was being made. Fighter bombers were very effective in producing enemy casualties and lowering enemy morale even though they were unable to damage pill-boxes themselves."

30TH INFANTRY DIVISION - *Major General Leland S. Hobbs:*

"The assault of the SIEGFRIED LINE was the most difficult of ..... operations. The air forces assisted in this operation by a saturation bombing and close fighter bomber support. However, due to the inaccuracy of medium bombers the bombing of front line positions was ineffective and of little assistance. Additional assistance could have been given through accuracy in bombing and column cover and by heavy bombing on artillery positions, troop concentrations, and centers of communication, further to the rear."

ASSAULT OF A FORTRESS CITY

XII CORPS - *Major General S. Le Roy Irwin:*

"Heavy and medium bombing does little to permanent forts, but does destroy communications, barracks and depots and has morale effect. Reconnaissance and fighter bombers can locate and destroy mobile batteries, AA installations, and limit movement of troops and supplies. Field fortifications are vulnerable to all types of bombing, but the use of heavy and medium types is usually hampered by proximity of our troops."

XIX CORPS - *Major General Raymond S. McLain:*

"In the assault of a fortified city, or fortified area, bombing is essential and must be of the largest possible tonnage and concentration in order to shake the underground caverns and passages....."

XX CORPS - *Major General Louis A. Craig:*

"Medium bombers were used in the assault of the fortress city of SAARLAUTERN. Communications and demolition control wires were destroyed and morale of the enemy's troops lowered, but little physical damage to enemy defenses was achieved."

83D INFANTRY DIVISION - *Major General Robert C. Macon:*

"In the attack on the CITADEL of ST. SERVAN at ST. MALO, medium bombers thoroughly bombed the fortress before the infantry assault. The effects of their attack, however, were negligible due to the amount of overhead cover, in this case natural rock, possessed by the defenders. It is doubtful whether or not, in this particular case, an attack by heavy bombers would have had any positive results."

104TH INFANTRY DIVISION - *Major General Terry de la M. Allen:*

"The results of the combination of artillery and air were so effective that enemy troops were unable to hold any part of the city (fortress city LUCHERBURG) despite desperate counter-attacks which they launched on two successive days. It is our opinion that this operation is a classic example of the destructive power of close fighter bomber cooperation."

ASSAULT OF A FORTIFIED AREA

NINTH U. S. ARMY - *Lieutenant General William H. SIMPSON:*

"I believe that in the attack of a fortified area, such as this was, the nature of construction of the pill-boxes is such that the damage done to the pill-boxes by bombing is not commensurate with the expenditure of means. Such bombardment is of value however, for several reasons. First, we have encountered few German pill-boxes large enough to accommodate a major calibre anti-tank gun or artillery piece. Air attack against these weapons in the open can most certainly be effective. Second, the cratering effect produced by an aerial bombardment of a fortified area serves to disrupt prepared fields of fire and provides cover for the assaulting troops. Third, a certain number of underground communications cables will be destroyed thus creating confusion in a highly organized defensive set up."

4TH INFANTRY DIVISION:

"The 4th Infantry Division has had air support in conjunction with the attack of the fortified areas of ST. MARCOUF, OZEVILLE, QUINNEVILLE, HAMBERG Battery and CHERBOURG. Heavy bombers were not used on any of these targets. Medium bombers were used on OZEVILLE, QUINNEVILLE and ST. MARCOUF. The medium bombing on these targets did not destroy the permanent fortifications; however, communications outside the fortifications were disrupted and personnel within the blockhouses were destroyed. The disruption of communications and personnel losses caused by the bombing is considered to be the most beneficial effects of this type bombing."

AIRBORNE OPERATIONS

XVIII CORPS (AIRBORNE) - *Brigadier General L. Mathewson:*

"The Airborne Operation: The air force assisted in the delivery of airborne troops by attempting to eliminate enemy antiaircraft, and then cooperated in a normal manner.

Not enough fighter bombers were available to airborne troops in NORMANDY and in the HOLLAND airborne operation."

82D AIRBORNE DIVISION - *Major General James M. Gavin:*

"We found the airborne operation most difficult particularly at night. The air forces assisted by neutralizing known flak positions, flying fighter cover for our formations to our destinations, in addition to keeping up supplies by air and evacuating our wounded until the ground forces were able to reach us."

101ST AIRBORNE DIVISION - *Major General Maxwell D. Taylor:*

"Airborne: Fighter bombers again were the most effective type of aircraft, attacking flak installations, escorting troop carriers and making fighter sweeps in the battle area. Reconnaissance aviation provided air photographs essential for planning."

DEFENSIVE OPERATIONS

XII CORPS - *Major General S. Le Roy Irwin:*

"Heavies and mediums are effective against depots, roads and bridges, troop concentrations in rear areas, and command posts. Bombing near the front is best handled by fighter bombers, attacking assaulting units, tanks, enemy artillery and reserves."

XIX CORPS - *Major General Raymond S. McLain:*

"Heavy and medium bombers must be used to prevent build up of reserves in rear areas. The presence of fighter bombers materially decreases enemy artillery. If fighter bombers are active, very little enemy movement is made in large convoys during daylight hours. As a result, night reconnaissance becomes extremely important. Photo reconnaissance must be constant in order to detect movements of enemy troops."

82D AIRBORNE DIVISION - *Major General James M. Gavin:*

"In this type of operation heavy bombers were considered most valuable in long range strategic bombing of airfields, oil and gasoline refineries, marshalling yards, supply depots and transportation centers. Medium bombers were of the greatest value in destroying communication centers and disrupting the transportation system of the enemy units in direct

contact with our forces. Fighter bombers were widely used by the Division in this type of operation in the following ways: Close support in event of an enemy attack; armed reconnaissance; and the destroying of centers of resistance, artillery, and pill-boxes that our own artillery were unable to reach or neutralize. Reconnaissance planes proved themselves invaluable in keeping us informed of enemy troop movements, status of transportation networks, enemy fortifications, and extent of damage suffered by the civilian population to our immediate front. Liaison planes besides serving as spotters for artillery, flew patrol leaders over the area of their proposed patrols, furnished information to unit commanders of enemy locations to their immediate front and acted as liaison planes to rear areas."

10TH ARMORED DIVISION - *Major General Fay B. Prickett:*

"Defensive — Fighter bombers are excellent in the defense against an attacking enemy. By locating the attacking troops and hitting them with all air available, many of what might have been strong attacks have been broken or so completely disorganized that when they aid come they were not in great strength. Best examples of the use of fighters defensively in the history of this Division are the BASTOGNE and CRAILSHEIM incidents. The Commander of CC 'B' at BASTOGNE made the statement that the fighter bombers did work equivalent to the employment of two U. S. Infantry Divisions."

RETROGRADE MOVEMENT

XIX CORPS - *Major General Raymond S. McLain:*

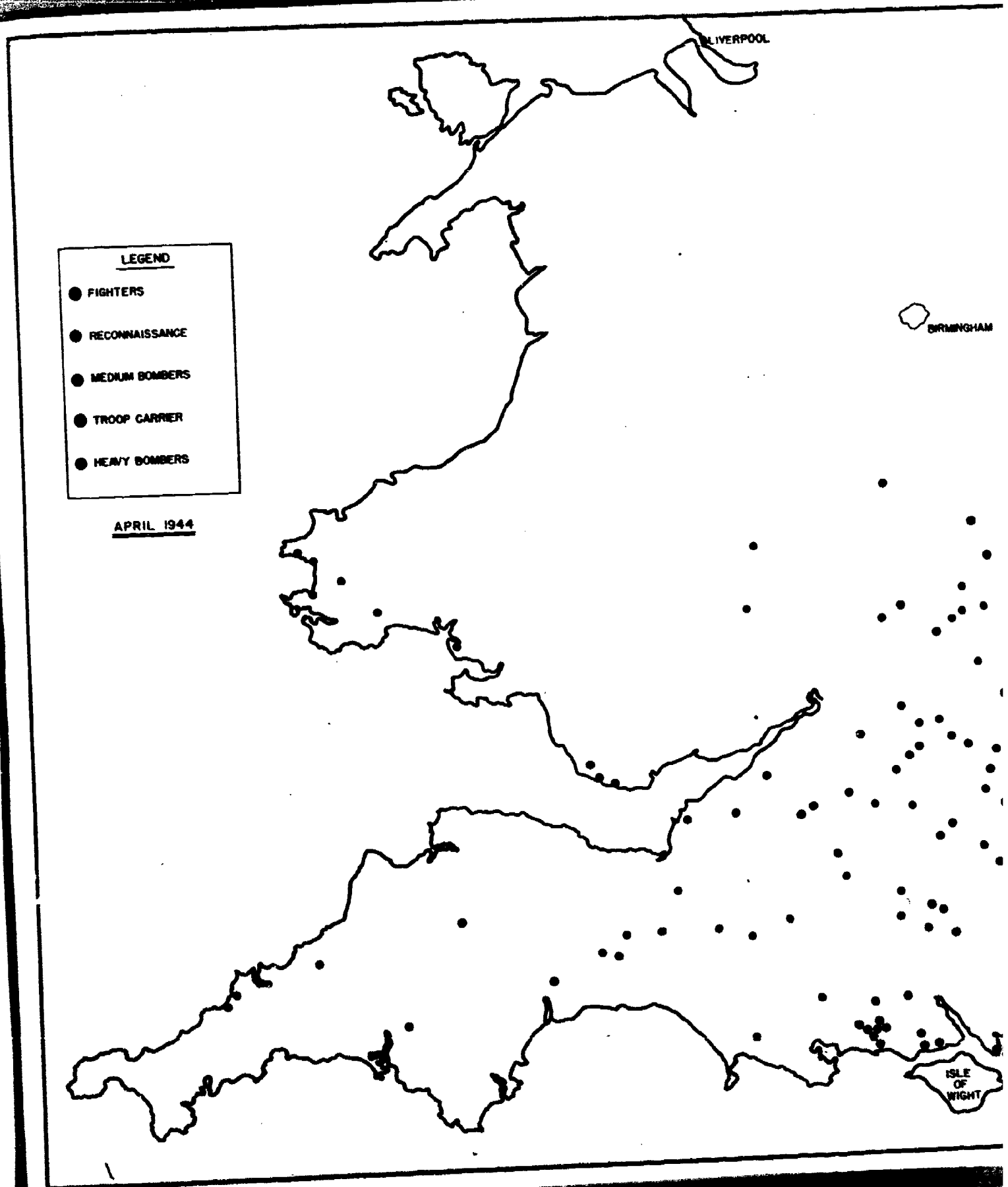
"In retrograde movement, heavy and medium bombers have a very vital role in destroying bridges and other means of communication."

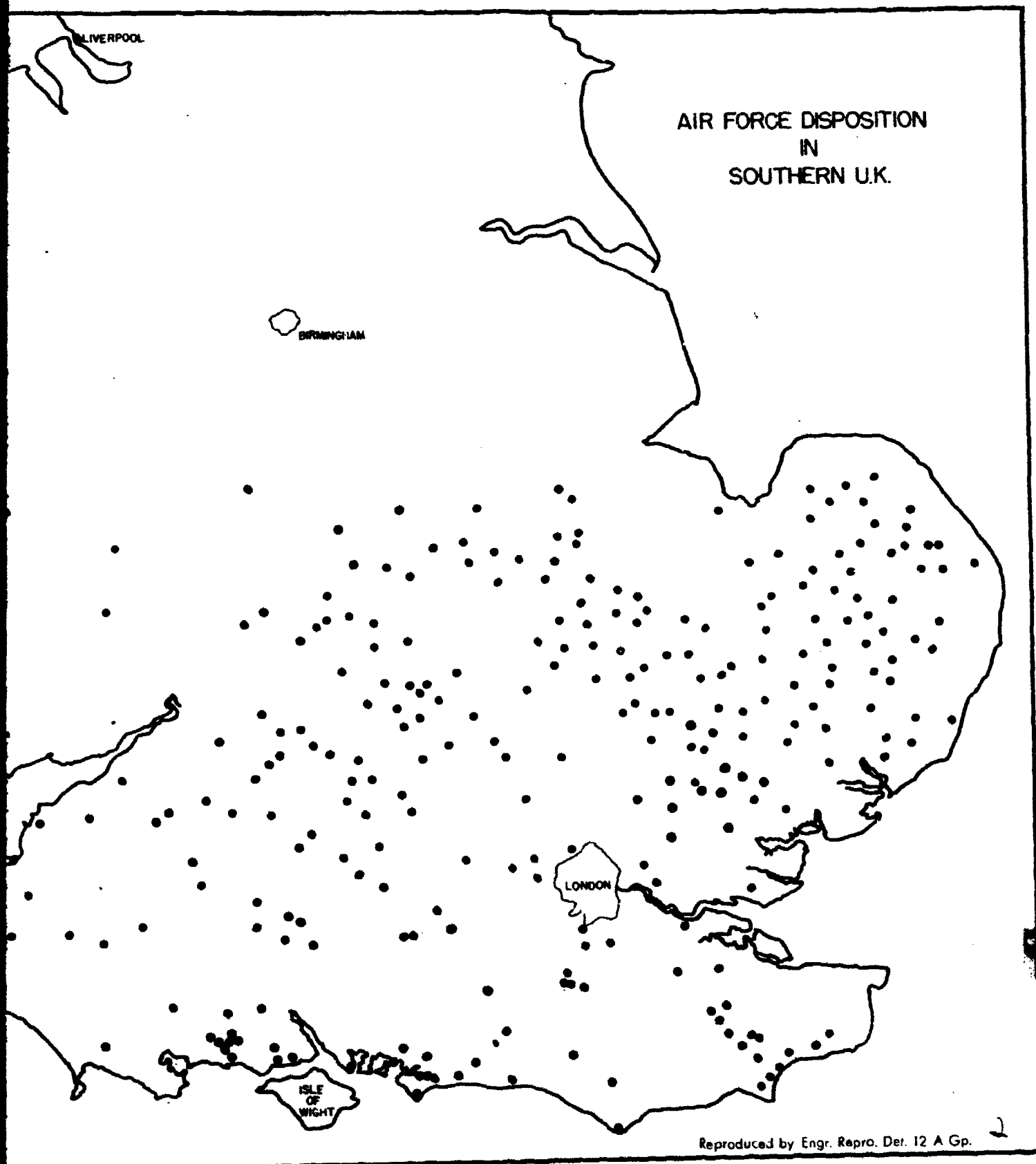
2D ARMORED DIVISION - *Major General I. D. White:*

"Retrograde movement has been engaged in only once by this division. This was occasioned when heavy and accurate artillery fire knocked out sections of our ELBE River bridge faster than our engineers could construct it. Our infantry, attacked by armor and without any heavy aramament to combat it, was forced to withdraw from the east bank bridgehead which they had established earlier. Fighter bombers became available during the final phase of this withdrawal and assisted in covering our infantrymen as they returned to the river by bombing and strafing villages known to contain enemy tanks and troops. It is believed that the presence of our planes reduced the enemy's employment of his tanks and enabled most of our men to return safely to the western bank of the river."

ANNEX II

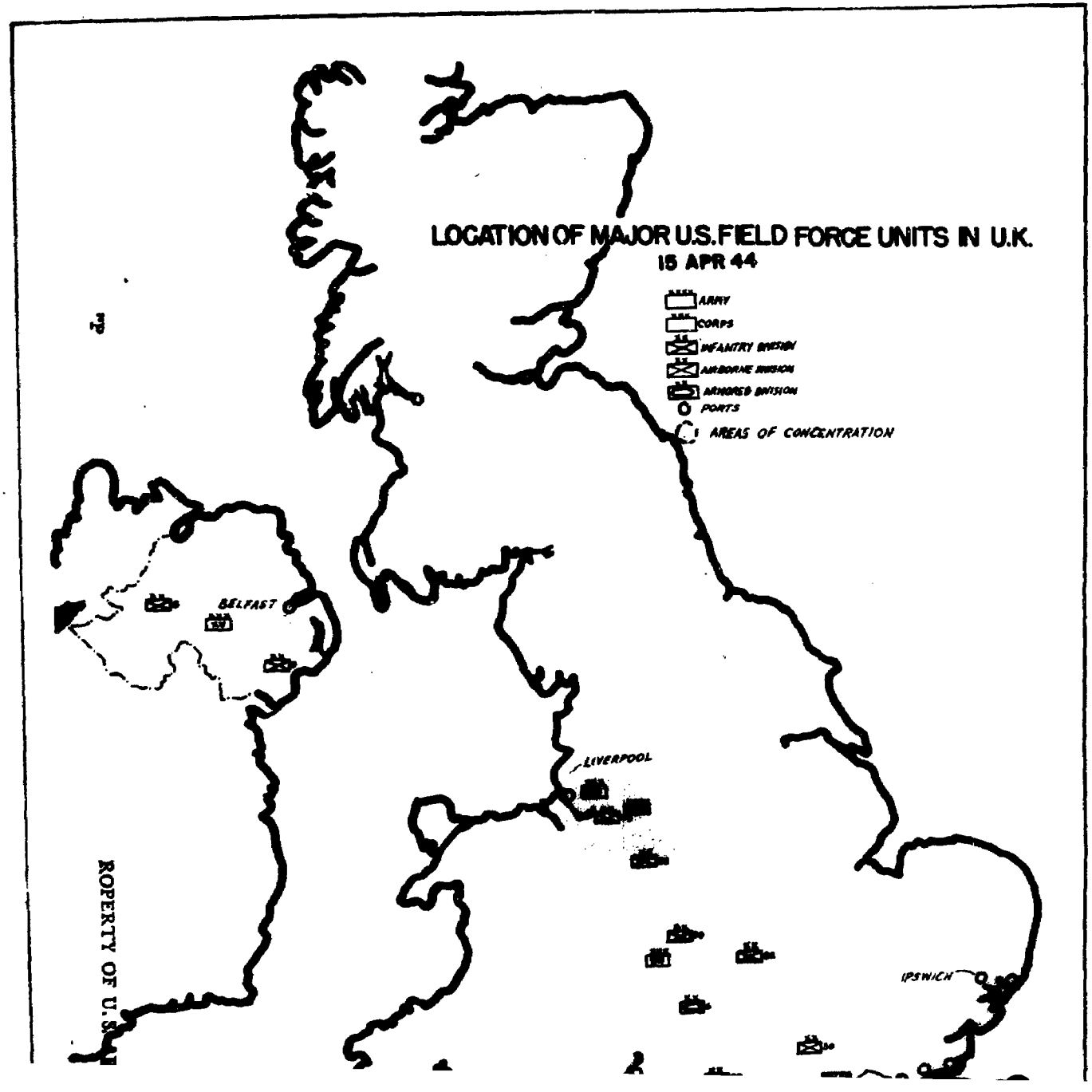
AIR FORCE DISPOSITION
IN
SOUTHERN U. K.

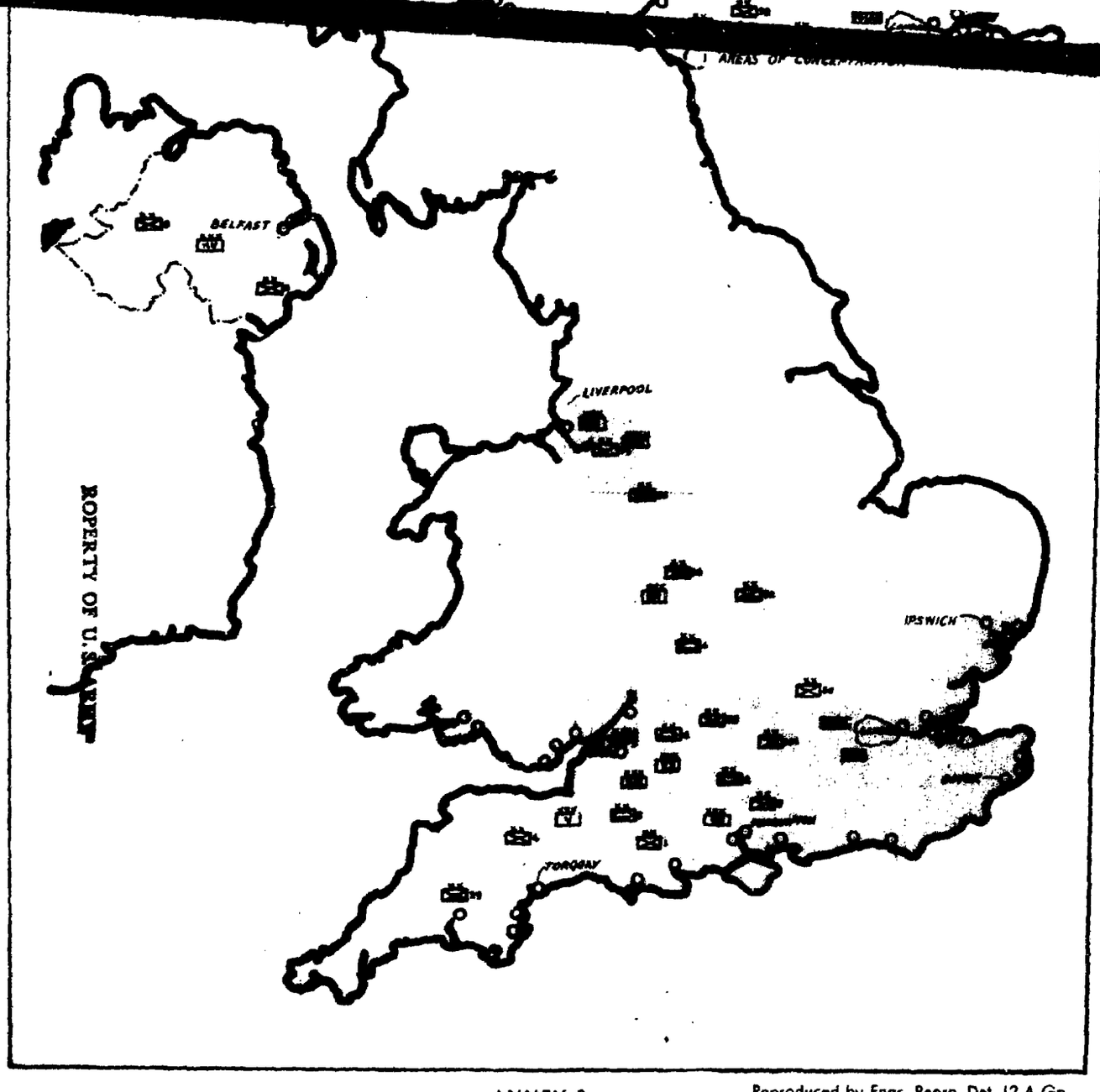

LIVERPOOL
BIRMINGHAM
LEGEND
FIGHTERS
RECONNAISSANCE
MEDIUM BOMBERS
TROOP CARRIER
HEAVY BOMBERS
APRIL 1944
ISLE OF WIGHT


LIVERPOOL
AIR FORCE DISPOSITION
IN
SOUTHERN U.K.
BIRMINGHAM
LONDON
ISLE
OF
WIGHT
Reproduced by Engr. Repro. Det. 12 A Gp.

ANNEX III

LOCATION OF MAJOR U. S. FIELD FORCE UNITS IN U. K.



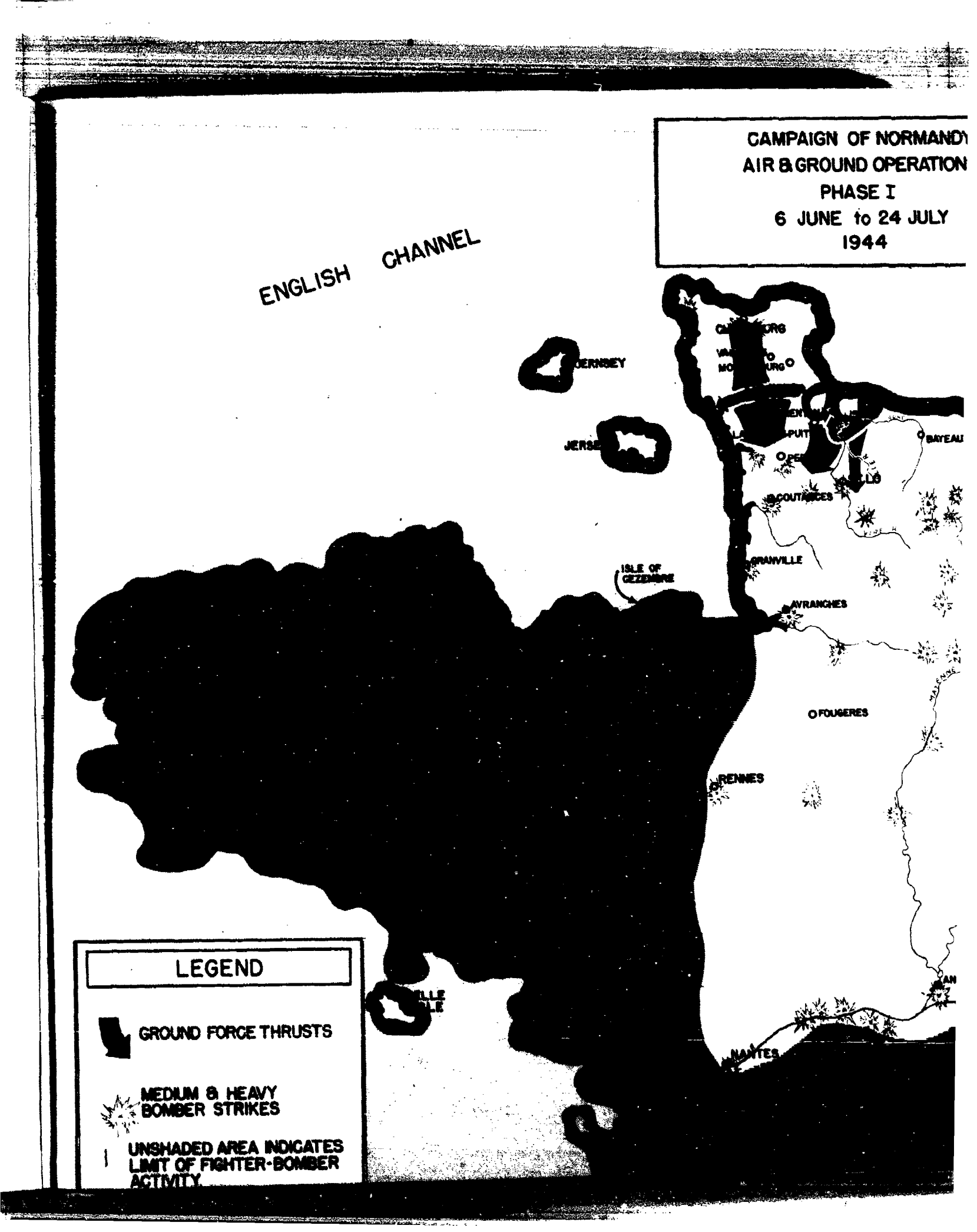


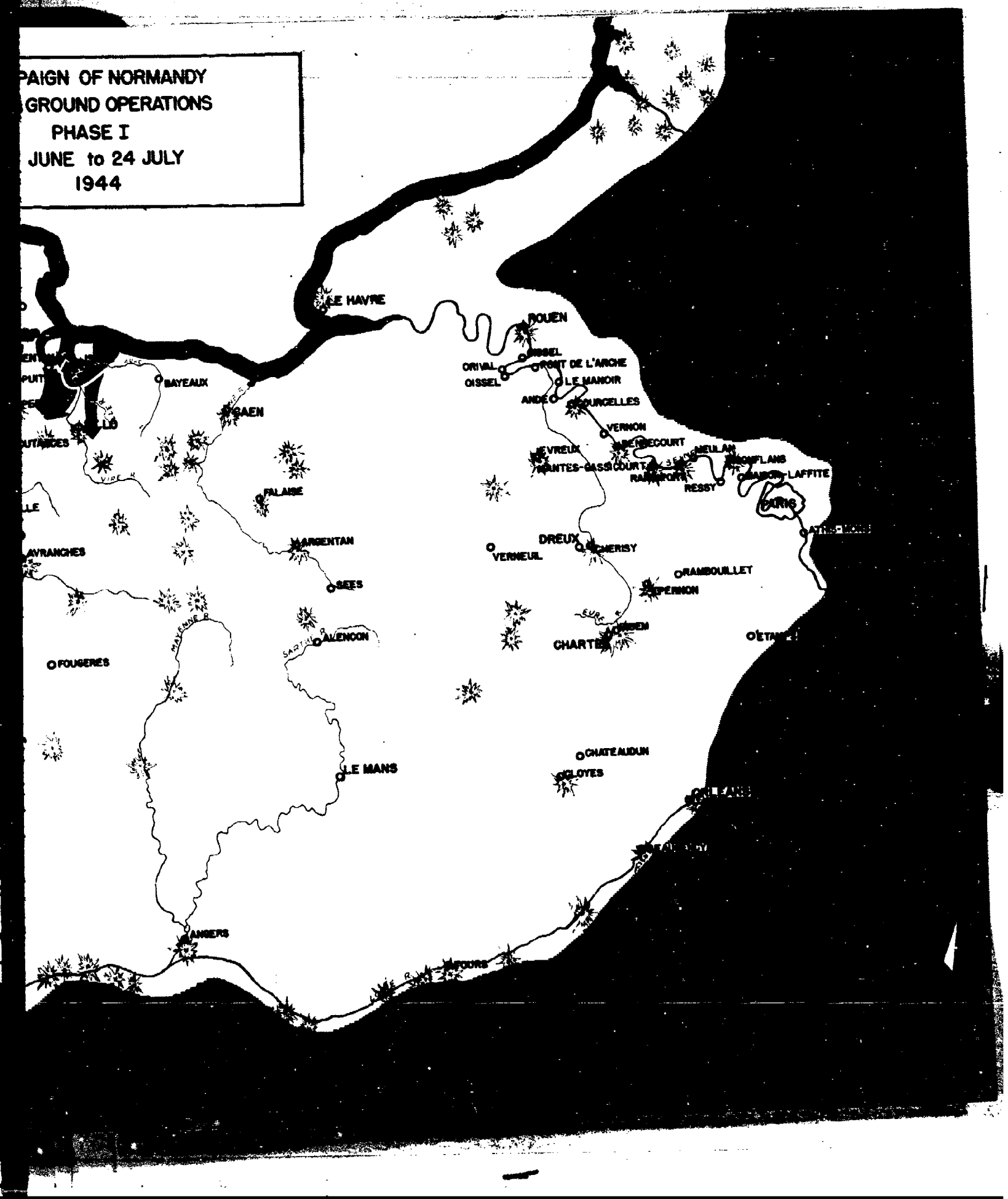
ANNEX 3

Reproduced by Engr. Repro. Det. 12 A Gp.

ANNEX IV

CAMPAIGN OF NORMANDY
AIR & GROUND OPERATIONS
PHASE I

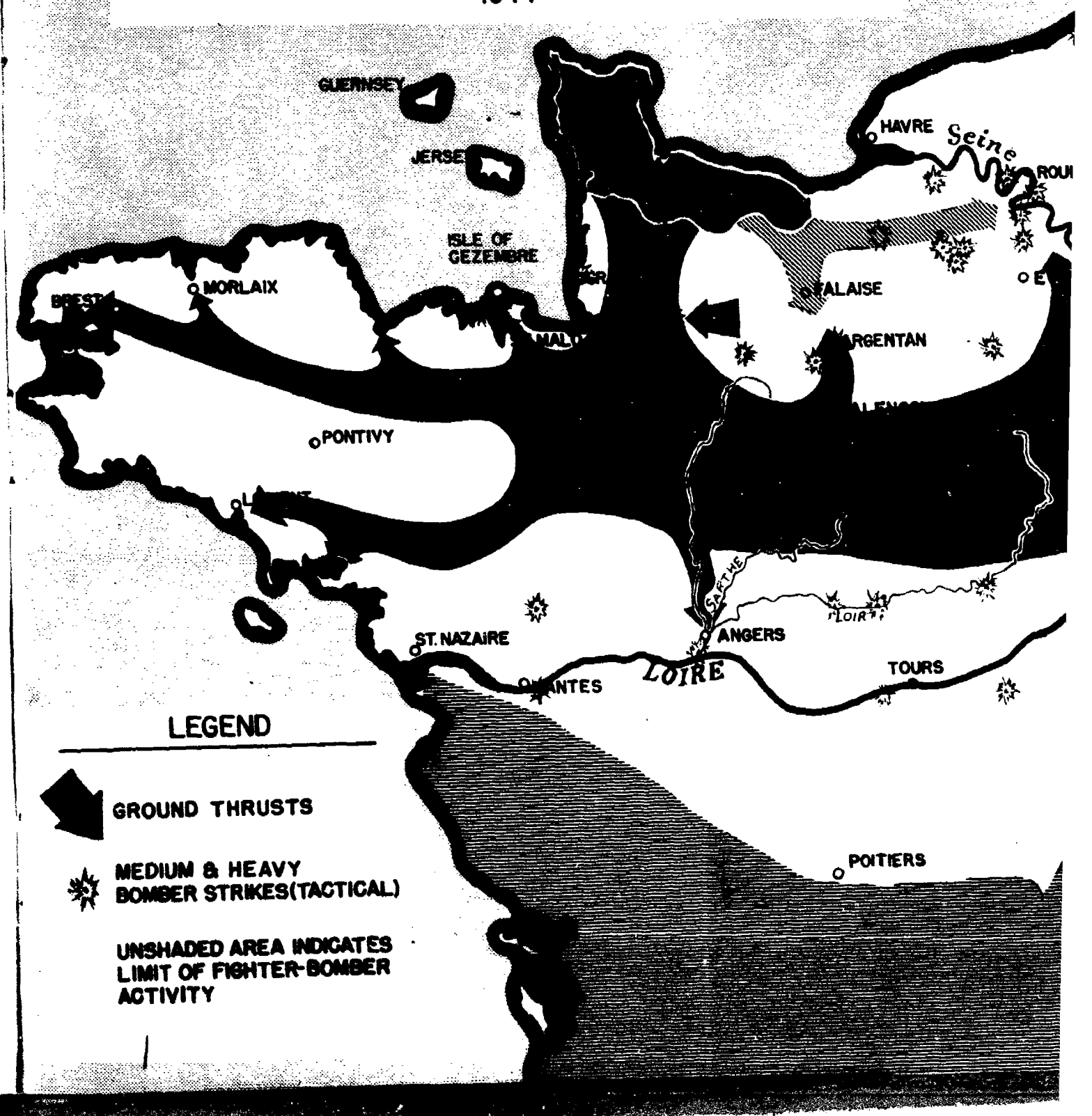

CAMPAIGN OF NORMANDY
AIR & GROUND OPERATION
PHASE I
6 JUNE to 24 JULY
1944
ENGLISH CHANNEL
JERSEY
BAYEAUX
COUTANCES
GRANVILLE
ISLE OF GEZEMBRE
AVRANCHES
FOUGERES
RENNES
NANTES
LEGEND
GROUND FORCE THRUSTS
MEDIUM & HEAVY BOMBER STRIKES
UNSHADED AREA INDICATES LIMIT OF FIGHTER-BOMBER ACTIVITY

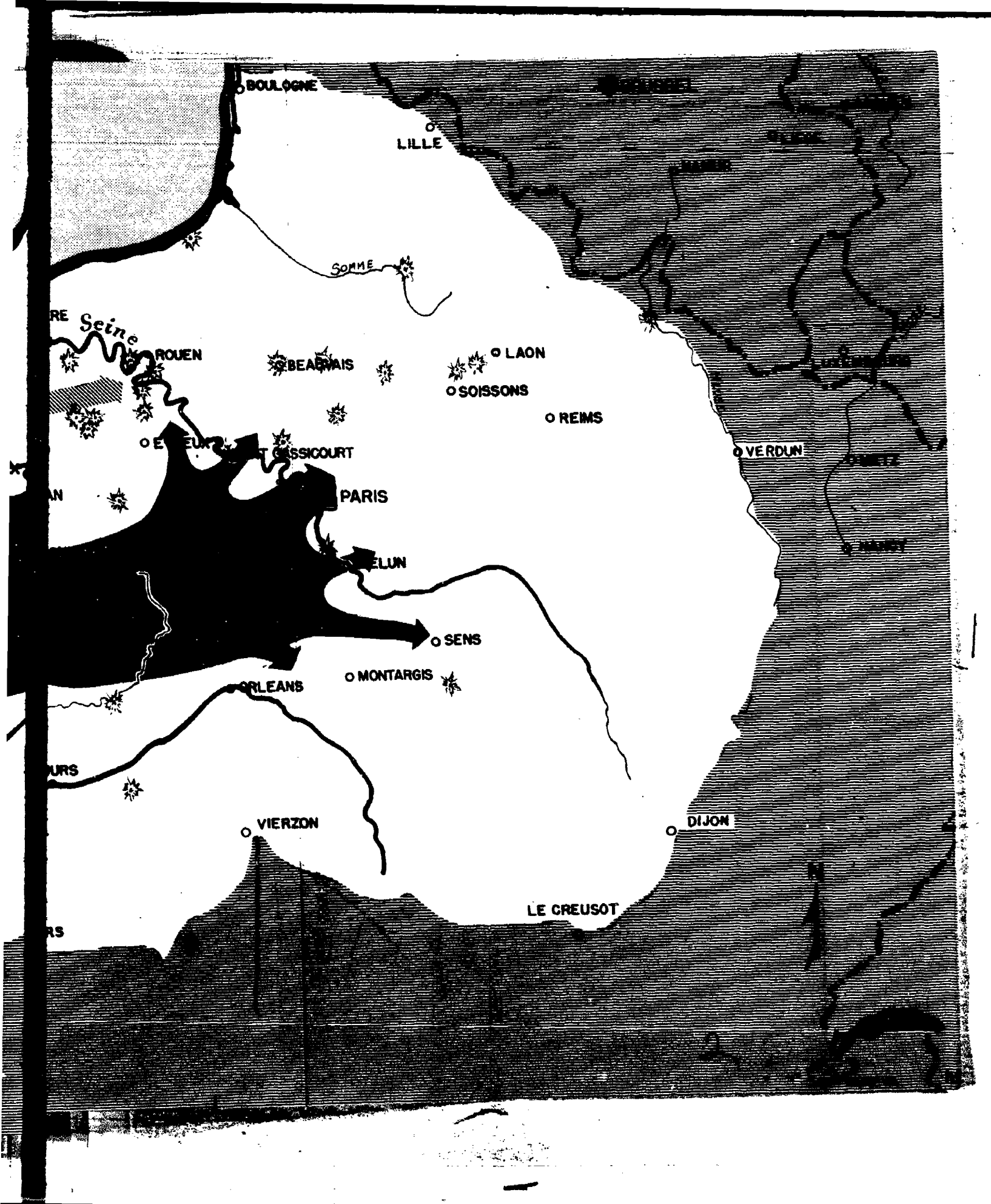

PAIGN OF NORMANDY
GROUND OPERATIONS
PHASE I
JUNE to 24 JULY
1944
LE HAVRE
ROUEN
ORIVAL
OISSEL
PONT DE L'ARCHE
LE MANOIR
ANDE
COURCELLES
VERNON
BERNECOURT
NEULAN
CONFLANS
CHARENTON
LAFFITE
PARIS
RAMBOUILLET
PERNON
DREUX
VERNEUIL
MERISY
CHARTRES
ETAMPES
BAYEUX
CAEN
LISIEUX
FALAISE
ARGENTAN
AVRANCHES
SEES
ALENCON
FOUGERES
LE MANS
CHATEAUDUN
GLOYES
ORLEANS
ANGERS
TOURS

ANNEX V

CAMPAIGN OF WESTERN FRANCE & BRITTANY
AIR & GROUND OPERATIONS
PHASE II

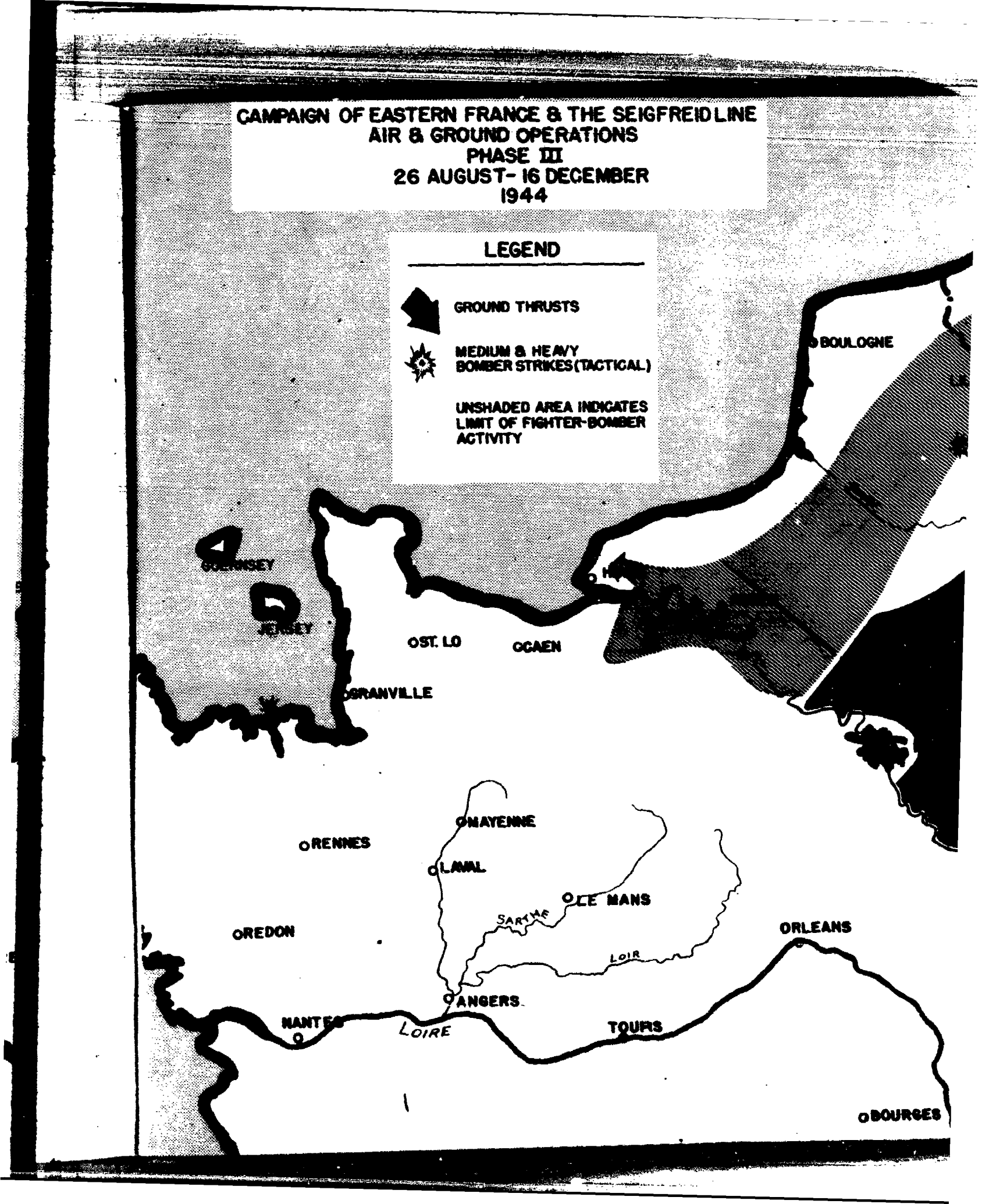
CAMPAIGN OF WESTERN FRANCE & BRITTANY
AIR & GROUND OPERATIONS
PHASE II
25 JULY — 26 AUGUST
1944




BOULOGNE
LILLE
Somme
Seine
ROUEN
BEAUVAIS
LAON
SOISSONS
REIMS
VERDUN
PARIS
SENS
MONTARGIS
ORLEANS
VIERZON
DIJON
LE CREUSOT

ANNEX VI

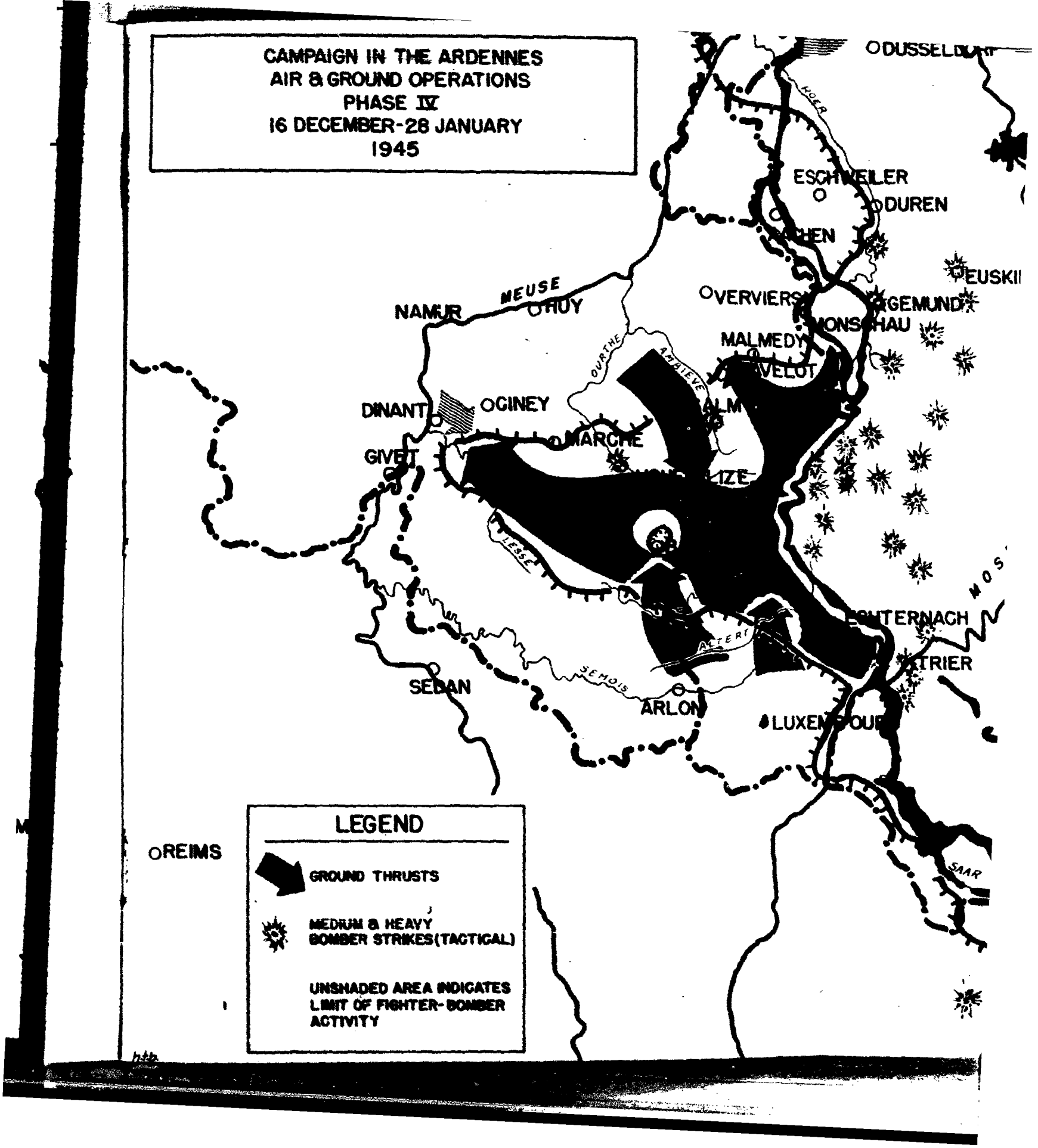
CAMPAIGN OF EASTERN FRANCE & THE SIEGFRIED LINE AIR & GROUND OPERATIONS PHASE III

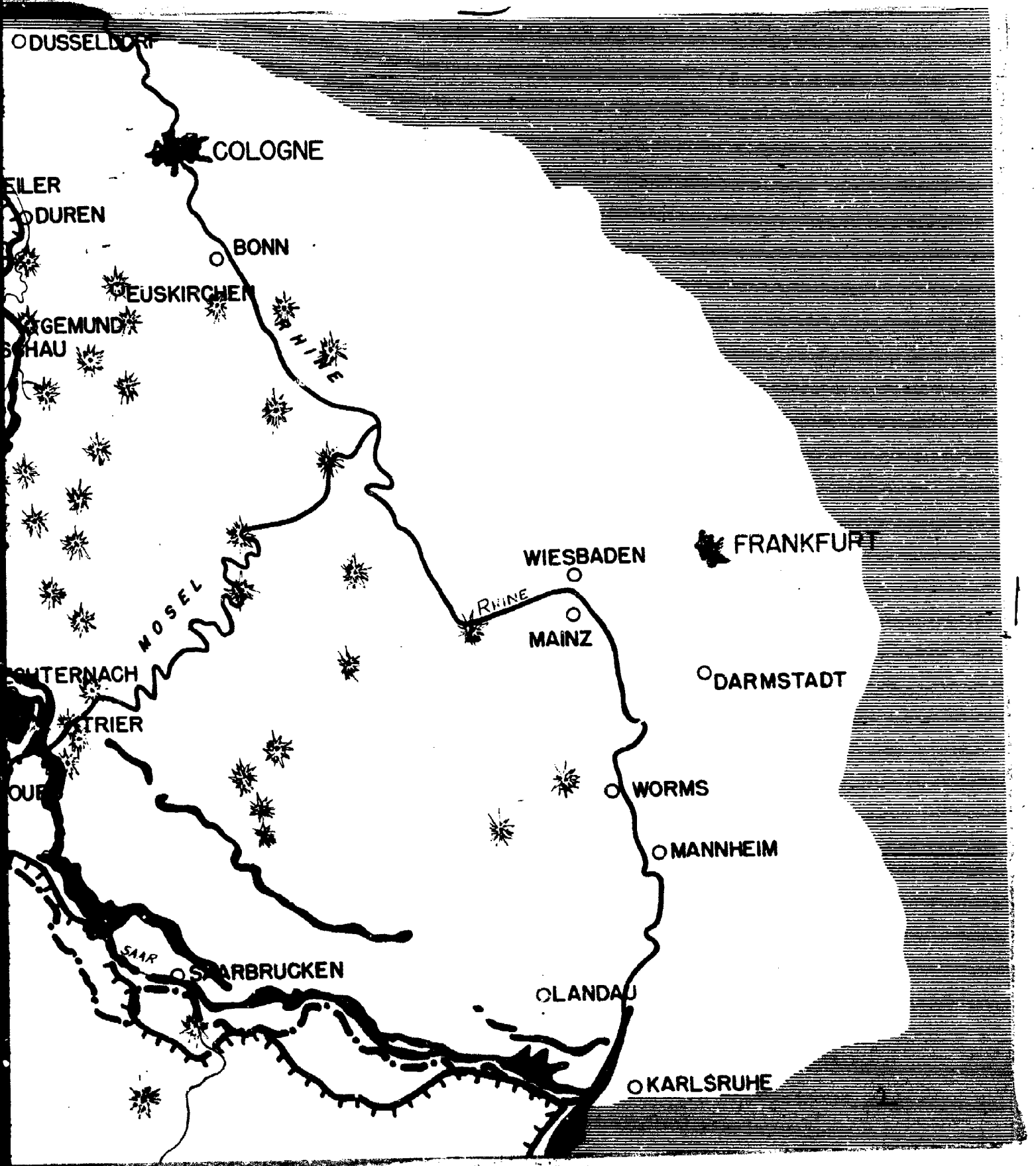

CAMPAIGN OF EASTERN FRANCE & THE SEIGFREID LINE
AIR & GROUND OPERATIONS
PHASE III
26 AUGUST- 16 DECEMBER
1944
LEGEND
GROUND THRUSTS
MEDIUM & HEAVY BOMBER STRIKES (TACTICAL)
UNSHADED AREA INDICATES LIMIT OF FIGHTER-BOMBER ACTIVITY
BOULOGNE
GUERNSEY
JERSEY
ST. LO
CAEN
GRANVILLE
MAYENNE
RENNES
LAVAL
LE MANS
SARTHE
REDON
ORLEANS
LOIR
ANGERS
NANTES
LOIRE
TOURS
BOURGES


ROTTERDAM
ARNHEM
DUISBURG
ESSEN
DUSSELDORF
COLOGNE
BONN
RHINE
BRUSSELS
VALENCIENNES
CAMBRAI
COBLENZ
FRANKFURT
MAINZ
MOSEL
SEDAN
MEUSE
NANCY
BADEN
SEINE
BOURGES

ANNEX VII

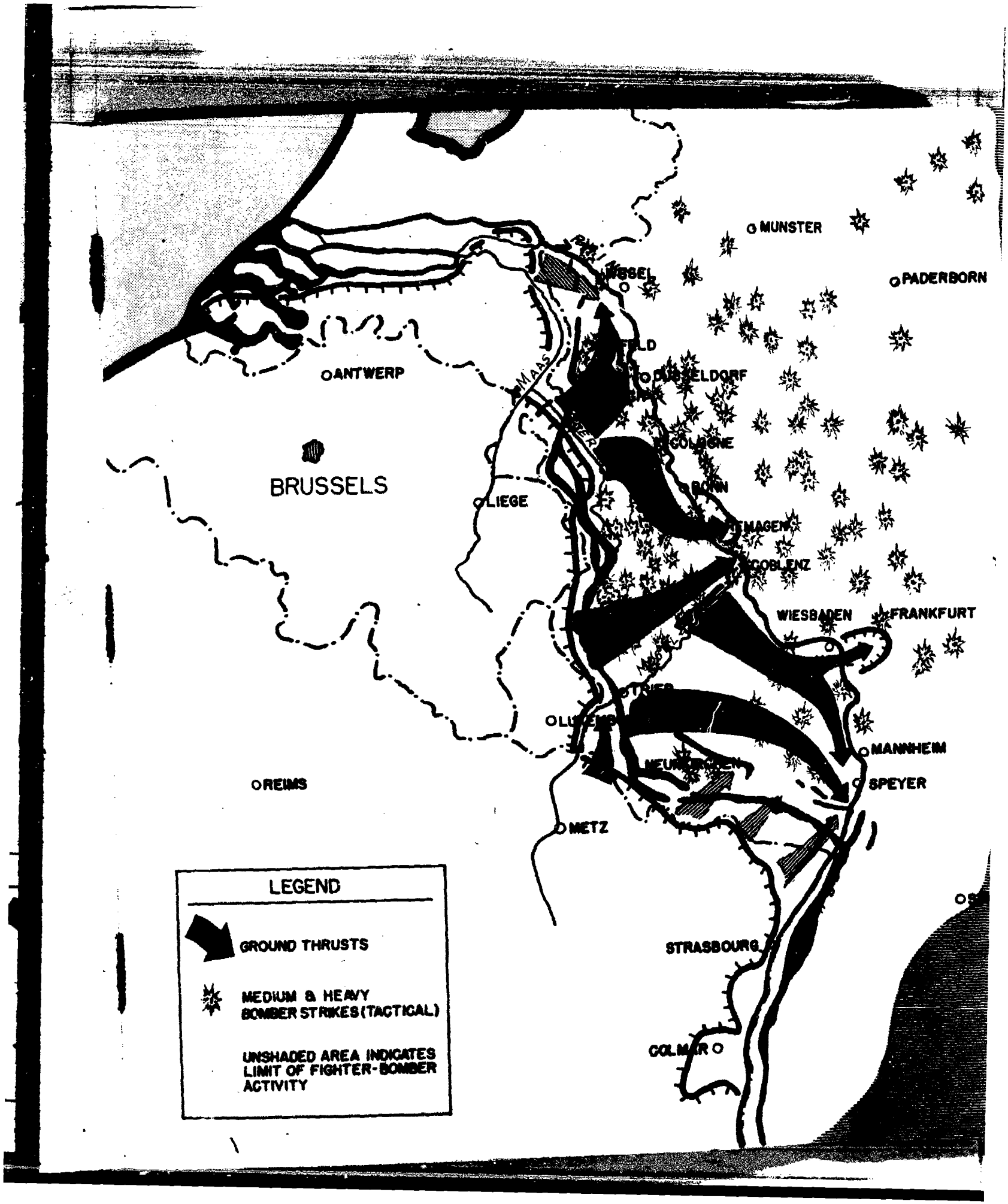
CAMPAIGN IN THE ARDENNES
AIR & GROUND OPERATIONS
PHASE IV

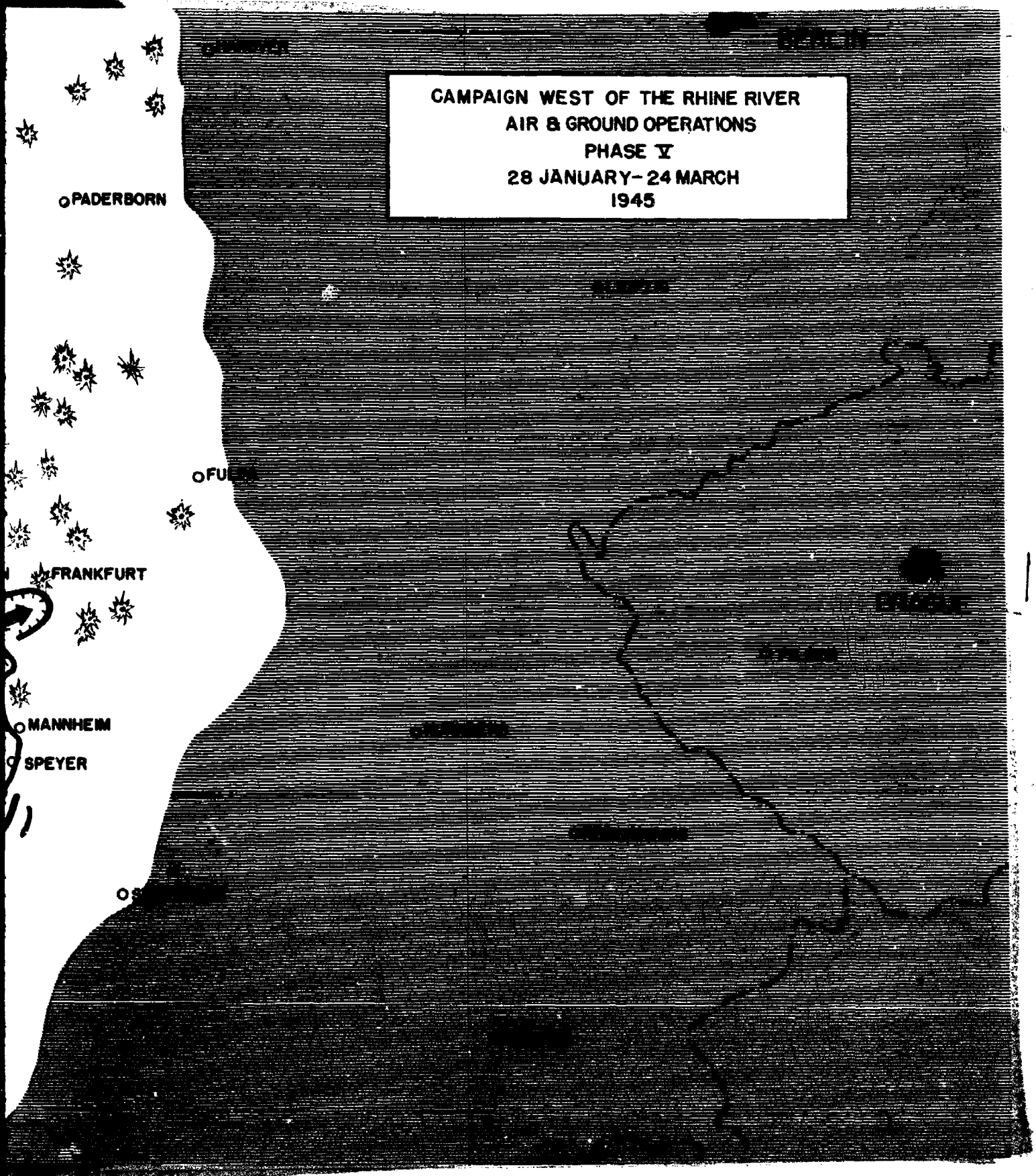

CAMPAIGN IN THE ARDENNES
AIR & GROUND OPERATIONS
PHASE IV
16 DECEMBER-28 JANUARY
1945
DUSSELDORF
ESCHWEILER
DUREN
EUSKIR
VERVIERS
GEMUND
MONSCHAU
MALMEDY
VELOT
NAMUR
MEUSE
HUY
DINANT
CINEY
MARCHE
GIVET
IZE
LESSE
OURTHE
ARTAIVE
ALM
ACTERT
SEMOIS
SEDAN
ARLON
LUXEMBOURG
ECHTERNACH
TRIER
SAAR
REIMS
LEGEND
GROUND THRUSTS
MEDIUM & HEAVY BOMBER STRIKES (TACTICAL)
UNSHADED AREA INDICATES LIMIT OF FIGHTER-BOMBER ACTIVITY


DUSSELDORF
COLOGNE
EILER
DUREN
BONN
EUSKIRCHEN
GEMUND
HAU
RHINE
WIESBADEN
FRANKFURT
RHINE
MAINZ
MOSEL
UTERNACH
DARMSTADT
TRIER
WORMS
MANNHEIM
SAAR
SAARBRUCKEN
LANDAU
KARLSRUHE

ANNEX VIII

CAMPAIGN WEST OF THE RHINE RIVER
AIR & GROUND OPERATIONS
PHASE V

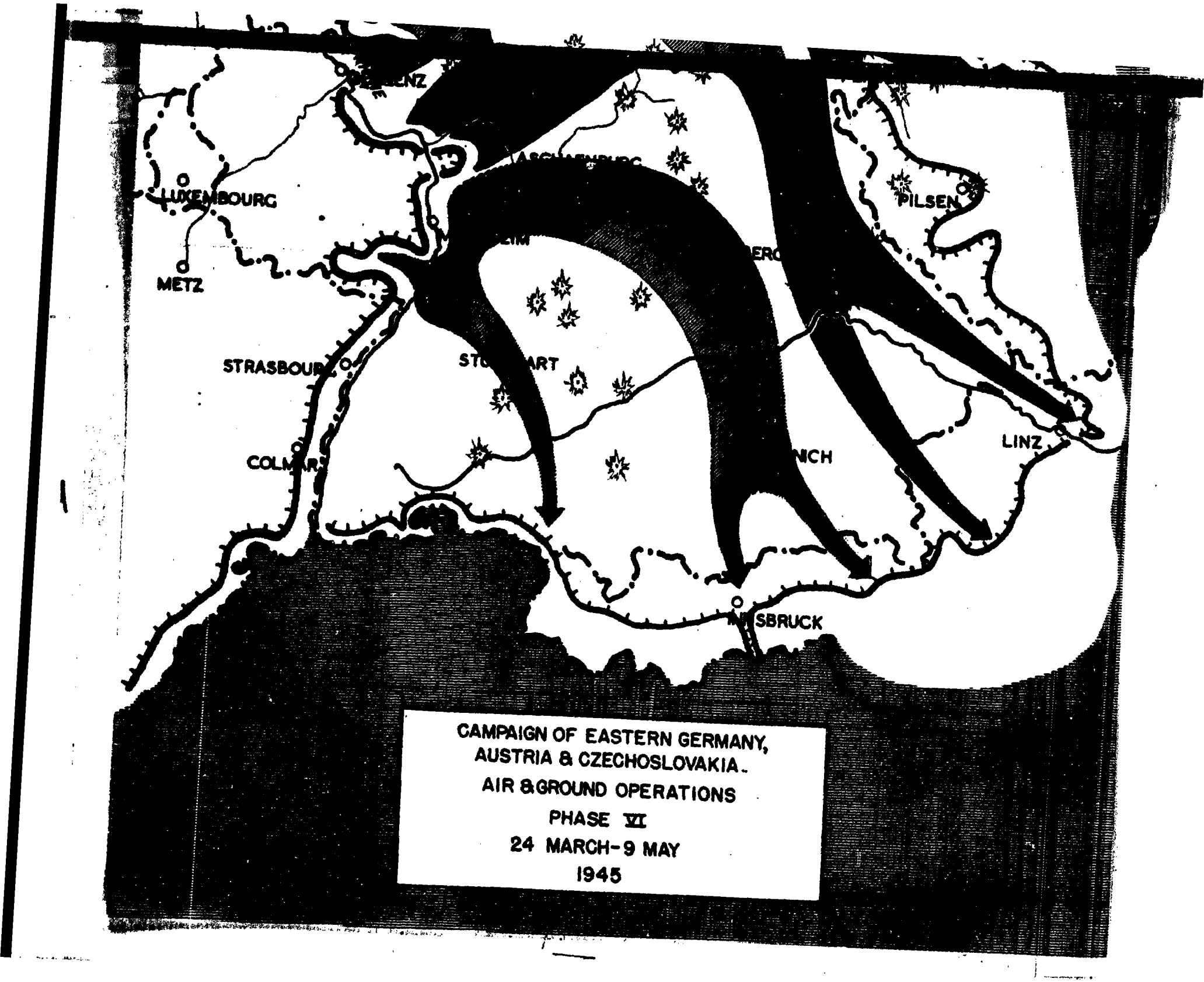

MUNSTER
PADERBORN
ANTWERP
MAAS
BRUSSELS
LIEGE
COLOGNE
BONN
WIESBADEN
FRANKFURT
MANNHEIM
SPEYER
REIMS
METZ
STRASBOURG
COLMAR
LEGEND
GROUND THRUSTS
MEDIUM & HEAVY BOMBER STRIKES (TACTICAL)
UNSHADED AREA INDICATES LIMIT OF FIGHTER-BOMBER ACTIVITY


CAMPAIGN WEST OF THE RHINE RIVER
AIR & GROUND OPERATIONS
PHASE V
28 JANUARY - 24 MARCH
1945
PADERBORN
FRANKFURT
MANNHEIM
SPEYER

ANNEX IX

CAMPAIGN OF EASTERN GERMANY AUSTRIA & CZECHOSLOVAKIA AIR & GROUND OPERATIONS PHASE VI


LEGEND
GROUND THRUSTS
MEDIUM & HEAVY BOMBER STRIKES (TACTICAL)
UNSHADED AREA INDICATES LIMIT OF FIGHTER-BOMBER ACTIVITY
KIEL
HAM
EMDEN
ZOWOLLE
BRUNSWICK
ARNHE
PADERBORN
DUSSELDORF
AACHEN
CHEMNITZ
PILSEN
LUXEMBOURG


LUXEMBOURG
METZ
PILSEN
LINZ
SBRUCK
CAMPAIGN OF EASTERN GERMANY,
AUSTRIA & CZECHOSLOVAKIA.
AIR & GROUND OPERATIONS
PHASE VI
24 MARCH-9 MAY
1945

ANNEX X

SOURCE MATERIAL

This report is based upon (a) interviews with and answers to questionnaires received from the key commanders and staffs of all echelons of command of 12th Army Group, (b) detailed study and research of ground force and air force operational and intelligence reports, and (c) battle experience of the members of the committee in joint air-ground operations. Ninth Air Force (to include its commands and 9th Bombardment Division) and Eighth Air Force afforded the fullest cooperation in making necessary material available. The assistance and records of general and special staff sections of Headquarters 12th Army Group and of First, Third, and Ninth Armies were also placed at the disposal of the committee. Likewise, the various agencies of ETOUSA and Communications Zone were most helpful when consulted. Interrogation reports and data used in concurrent studies of the U. S. Strategic Bombing Survey were freely exchanged with this committee and proved helpful.

The following list comprises the more important reports and reference matter.

1. — "THE EFFECTS OF STRATEGIC AND TACTICAL AIR POWER ON MILITARY OPERATIONS ETO" — File of opinions of key commanders in answer to questionnaire.
2. — G-2 DAILY INTELLIGENCE REPORTS — 12th Army Group.
3. — G-3 DAILY PERIODICS — 12th Army Group.
4. — HISTORY OF OPERATIONS VOLUME I — First U. S. Army.
5. — BRIEF HISTORICAL SUMMARY OF OPERATIONS — Third U. S. Army (1 August 1944 — 8 May 1945).
6. — G-3 AFTER ACTION REPORTS — Ninth U. S. Army.
7. — G-2 AFTER ACTION REPORTS — Ninth U. S. Army.
8. — AFTER ACTION REPORTS — Corps and Divisions, U. S. Army ETO.
9. — WEEKLY INTELLIGENCE SUMMARY OF OPERATIONS — Ninth Air Force.
10. — DAILY SUMMARY OF OPERATIONS — Ninth Air Force.
11. — "12,000 Fighter Bomber Sorties" — XIX TAC.
12. — "MONTHLY HISTORY" — G-3 (Air) XIX TAC.
13. — XXIX TAC DAILY MISSION SUMMARIES.
14. — XXIX TAC — NINTH U. S. ARMY JOINT REPORTS — OPERATIONS "QUEEN", "AIR GRENADE", "FLASHPOINT".
15. — "CLOSE IN AIR COOPERATION BY HEAVY BOMBERS WITH GROUND FORCES" — Eighth Air Force Report.
16. — EIGHTH AIR FORCE TACTICAL MISSION REPORT, OPERATION NO. 715.

17. — SPECIAL REPORT ON OPERATIONS EIGHTH AIR FORCE, 24, 25 JULY 1944.
18. — TACTICAL MISSION REPORT NO. 707 — Eighth Air Force.
19. — DEVELOPMENT OF SAFETY AIDS (BATTLE AREA ATTACKS BY HEAVY BOMBERS) Eighth Air Force.
20. — DAILY MISSION SUMMARIES 9th Bombardment Division.
21. — 9TH BOMBARDMENT DIVISION HISTORY.
22. — WEEKLY INTELLIGENCE REPORTS TO COMBAT CREWS — 9th Bombardment Division.
23. — REPORTS OF INTERROGATION OF GERMAN COMMANDERS — IPW Reports.
24. — REPORT ON SIGNAL OPERATIONS ETO — Signal Section ADSEC.
25. — HISTORICAL SECTION REPORT — Communication Zone.
26. — RAIL PROJECTS REPORTS NOS. 1—327 inclusive. ADSEC.
27. — TRANSPORTATION INTELLIGENCE BULLETINS NOS. 2,3. — ADSEC.
28. — CATOR DAILY REPORTS — September 1944 to May 1945.
29. — REPORTS ON OPERATIONS — "TRANSFIGURE", "LINNET", "COMET", "MARKET".
30. — QUESTIONNAIRE OF OFFICE OF CHIEF SURGEON — "SUPPLY AND EVACUATION OF WOUNDED BY AIR" — 23 June 1945.
31. — AIR EVACUATION DURING CROSSING OF THE RHINE — Third U. S. Army.
32. — IMMEDIATE REPORT NO. 30 (COMBAT OBSERVATIONS) ETO.
33. — AIR SUPPLY AND EVACUATION REPORT — First U. S. Army.
34. — REPORTS OF MINISTRY OF ECONOMIC WARFARE.
35. — COMBINED STRATEGIC TARGET COMMITTEE REPORTS ON OIL PRODUCTION, AFV PRODUCTION, M/T PRODUCTION, TRANSPORTATION, AMMUNITION PRODUCTION.
36. — REPORTS OF OSS.
37. — REPORTS OF ECONOMIC WARFARE DIVISION OF THE AMERICAN EMBASSY — LONDON.