(2)

Strategic Airpower as Operational Fires: Integrating Long-Range Bombers into Campaign Design

A Monograph
by

Major Jerry D. Garrett
United States Air Force

School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas

Second Term 90-91

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188
Exp. Date Jun 30, 1986

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for Public release; Distribution is unlimited
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION School of Advanced Military Studies 6b. OFFICE SYMBOL (If applicable) ATZL-SWV	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) Fort Leavenworth, KS 66027-6900 COM (913) 684-3437 AUTOVON 552-3437	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification)
Strategic Airpower as Operational Fires: Integrating Long-Range Bombers into Campaign Design (U)

12. PERSONAL AUTHOR(S)
Garrett, Jerry D. , Major

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Monograph	FROM _____ TO _____	91-5-29	72

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	AIR POWER AIR LAND BATTLES STRATEGIC BOMBING

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This monograph seeks to determine under what conditions an operational commander might employ strategic airpower in his campaign design. This journey begins first by exploring the linkage between strategy, operations, and tactics. Next, U.S. Army and Air Force doctrines are compared for terminology and conceptual similarities, with particular emphasis on indivisible airpower and long-range bombers in the role of operational fires. Finally, four historical case studies are analyzed for conditions in which previous commanders have used bombers to facilitate operational maneuver or set battlefield conditions favorable for campaign success.

After a careful review of concepts, doctrine, and history, this monograph concludes with six conditions which have fostered integrating bombers into compaign design. These include: 1) A commander's awareness of bomber strengths and weaknesses; 2) A blending of surprise and overwhelming firepower within minimum time and space; 3) Little reaction or response time; 4) Economy of force conditions; 5) Numerical superiority favors the enemy; and 6) bomber impunity to enemy threat.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE (Include Area Code) / 22c. OFFICE SYMBOL

DD FORM 1473, 84 MAR — 83 APR edition may be used until exhausted. All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Major Jerry D. Garrett

Title of Monograph: Strategic Airpower as Operational Fires: Integrating Long-Range Bombers into Campaign Design

Approved by:

COL James L. Moody — Monograph Director

COL James R McDonough — Director, School of Advanced Military Studies

Philip J. Brookes, Ph.D. — Director, Graduate Degree Program

Accepted this 29th day of May 1991

ABSTRACT

STRATEGIC AIRPOWER AS OPERATIONAL FIRES: INTEGRATING LONG-RANGE BOMBERS INTO CAMPAIGN DESIGN by Major Jerry D. Garrett, USAF, 69 pages.

This monograph seeks to determine under what conditions an operational commander might employ strategic airpower in his campaign design. This journey begins first by exploring the linkage between strategy, operations, and tactics. Next, U.S. Army and Air Force doctrines are compared for terminology and conceptual similarities, with particular emphasis on indivisible airpower and long-range bombers in the role of operational fires. Finally, four historical case studies - Operations Overlord, Cobra, Niagara (Khe Sanh), and Desert Storm - are analyzed for conditions in which previous commanders have used bombers to facilitate operational maneuver or set battlefield conditions favorable for campaign success.

After a careful review of concepts, doctrine, and history, this monograph concludes with six conditions which have fostered integrating bombers into campaign design. These include: 1) A commander's awareness of bomber strengths and weaknesses; 2) A blending of surprise and overwhelming firepower within minimum time and space; 3) Little reaction or response time; 4) Economy of force conditions; 5) Numerical superiority favors the enemy; and 6) bomber impunity to enemy threat.

Consequently, this monograph concludes that educating both current and future military leaders is a key element of integrating bombers into campaign design. The most fertile ground for planting this seed of knowledge rests within senior and intermediate service schools, only to be nourished to full growth during joint training exercises. Furthermore, as the U.S. military force structure continues to shrink, and our national military strategy shifts from forward deployed to a forward presence, the challenge of being able to respond in a timely manner with sufficient firepower to deter a potential adversary is certain to increase. Such a future clearly suggests a greater role for the bomber.

TABLE OF CONTENTS

Section I

INTRODUCTION

> It is firepower, and firepower that arrives at the right time and place, that counts in modern war.
> Liddell Hart, 1944[1]

Success in battle, as Liddell Hart clearly implied nearly half a century earlier, is the result of effectively synchronizing and applying overwhelming combat power at the decisive point and time. U.S. Army Field Manual (FM) 100-5 claims superior combat power is the product of four dynamic elements - leadership, maneuver, protection, and firepower. While clearly recognizing the importance of the first three elements, it is the fourth element of this equation - firepower - that is the focus of this research effort.

Firepower, whether of surface or aerial origins, provides today's operational commander the means to destroy, neutralize, or suppress an adversary and his ability for conducting battle. In particular, operational fires via long-range bomber aircraft provides today's operational commander with a singularly unique, highly flexible, and extremely lethal means of conventional firepower. The purpose of this monograph is to identify under what conditions an operational commander might employ bombers in his campaign design and execution.

On 16 January, 1991, the world watched in awe as American and allied coalition aircraft began launching from airfields in Saudi Arabia and heading for "targets east." Over the next 30 days, the Kuwait Theater of War felt the brunt of a thoroughly integrated and highly synchronized aerial campaign aimed at neutralizing, destroying, and suppressing the true potential of Iraqi combat

forces. Not since the December, 1972, "Christmas Bombings" of Hanoi had the world witnessed such an intense and massive display of aerial and operational firepower.

Among the aircraft comprising this plethora of operational firepower was the B-52 strategic bomber. From the first days of this air war, B-52s were assigned the primary task of immobilizing, isolating, and attriting Iraqi Republican Guard units located in southern Iraq.[2] However, the mere notion of using an aircraft almost twenty years senior to the more modern and plentiful F-15E, F-16, and F-111 fighter-bombers apparently caught several air warfare experts off-guard.[3] Other defense analysts such as Robert Pape, were surprised only by the fact the B-52s "were used the first night."[4]

Yet in retrospect, the willingness of U.S. commanders to employ B-52 bombers should not have come as a surprise to anyone. Since late 1986, the Strategic Air Command (SAC) has maintained an elite contingent of B-52 aircraft and aircrews groomed for such a role.[5] Divorced from their traditional SIOP-based (Single Integrated Operating Plan) nuclear deterrence mission, this small but unique bomber force has been the recipient of a highly concentrated training program aimed at increasing and refining their conventional warfare skills. Furthermore, recent upgrades in aircraft communications, navigation, and targeting equipment, as well as new inventory of area denial, anti-armor, and stand-off munitions[6] has equipped this contingent of conventionally-dedicated bombers with an unprecedented firepower capability, ... readily available to any theater commander.

Therefore, it hardly seems appropriate to question if long range bombers will be employed. Rather, a better question would be under what conditions might an operational commander employ the long range bomber in his campaign design and execution?

To answer this question, Section Two of this study ventures to arrive at a common understanding of the theory and concepts of operational fires, effects, and indivisible airpower. This discussion is designed to familiarize the reader with these concepts and their role in establishing favorable conditions for future battles and engagements.

With this foundation established, Section Three then seeks to gain a historical perspective as to when and under what conditions previous commanders have employed the long range bomber to achieve operational effects. Section Three begins by first examining the role of the bomber during the 1944 Normandy campaign, followed by a review of similar contributions during selected operations in the Vietnamese War, and the recent Gulf War with Iraq.

Drawing from this examination, Section Four offers an analysis of these historical examples. The criteria for analyzing the bomber in terms of operational fires and effects centers upon the ability of long-range bombers to:

a) facilitate maneuver to operational depth by creating an exploitable gap in the tactical defense.

b) set favorable battlefield conditions by destroying, disrupting, neutralizing, shaping, fixing, or interdicting an enemy's ability to command and control, sustain, or mass his combat power.

Finally, Section Five concludes this monograph and provides a series of implications necessary to institutionalize the use of strategic bombers in generating timely and appropriate operational effects.

This mongraph is not a definitive study on employing long-range bombers. This study resides primarily in the ability of the bomber to provide conventional fires as opposed to nuclear. Furthermore, this monograph clearly recognizes the ability and importance of bomber maritime and emerging defense suppression missions, yet for purpose of brevity, has choosen not to discuss them. Moreover, to circumvent an ever-increasing obstacle course regarding the use of classified materials and historical documents, this author has elected to confine research materials to unclassified studies and open source publications.

Section Two

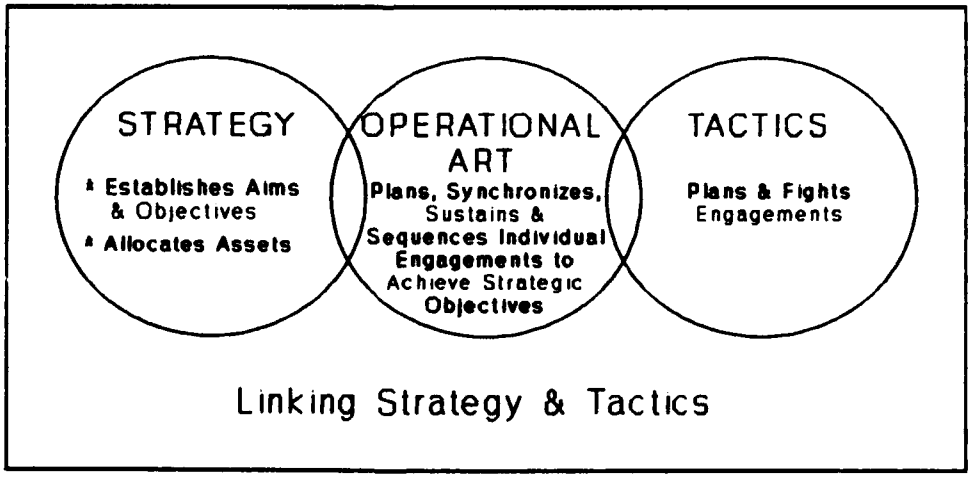
Terms, Concepts and Doctrine

> At the very heart of warfare lies doctrine. It represents the central beliefs for waging war in order to achieve victory. . . a network of faith and knowledge reinforced by experience which lays the pattern for the utilization of men, equipment, and tactics.
>
> Curtis E. Lemay[1]

In 1982, the concept of an operational activity or level of war occupying a position between strategy and tactics was formally introduced to the U.S. Army. Within the covers of a new FM 100-5, Army doctrine described the operational level of war as those operations concerned with employing military resources to attain strategic goals within a theater of war. It spoke of "campaigns" as a commander's tool for the marshalling of forces, logistics, and

fires; selecting objectives and actions to create and set favorable terms for future battles; and defeating an enemy through simultaneous and sequential battles and engagements.[8] Furthermore, FM 100-5 claimed that "operational" simply equated to a "theory of larger unit operations."[9]

Since that time, the range, accuracy, and lethality of military weapon systems have significantly increased, the authoritative relationship of "operational" and "larger unit operations" has been dismissed, and a new FM 100-5 has emerged.[10] In fact, many of the more substantive changes incorporated into the 1986 edition of FM 100-5 addresses the mystique of operational art and its lineage with strategy and tactics. In broad terms, this linkage begins with strategy at one end of the spectrum and the tactical battlefield at the other. Strategy establishes the political aims and objectives, assigns forces and assets, imposes conditions on the use of force, and ties military action to the political aims of war. Tactics, on the other hand, is primarily



Linking Strategy & Tactics

concerned with the planning, preparation and actual employment of fighting forces during individual engagements.[11] The critical bridge linking these two elements is operational art.

While many of the joint and sister service doctrinal publications are practically void of the phase "operational art," U.S. Army doctrine describes it as "the employment of military forces to attain strategic goals or operational objectives in a theater of war through the design, organization, and conduct of campaigns and major operations.[12] Several of the key concepts associated with operational art include centers of gravity, decisive points, culmination points, sequential operations, lines of operations, and ends-ways-means relationships. In the broad scheme of events, operational art is concerned with creating conditions and effects favorable to tactical success and translating this success into strategic victories.

Within the context of effects and conditions, the 1986 version of FM 100-5 also introduced the concept of "operational fires" or firepower at the operational level. FM 100-5 states that fires can "support" operational maneuver by destroying key enemy forces or facilities, disrupt enemy movement schedules, complicate an adversary's command and control of combat forces, and degrade his air defense, artillery, and air capabilities.[13]

Large Unit Operations (Draft), FM 100-6 further expands upon the concept of operational fires. This manual identifies five functions that permit an operational commander to directly influence the outcome of an operation (i.e. intelligence, sustainment, deception, maneuver, and fires).[14] FM 100-6 also describes

operational fires as those lethal and non-lethal fires that constitute a decisive impact in the conduct of a campaign or major operation. The manual further associates operational fires with deep operations, implying that depth, precision, and weapon effectiveness are the critical qualifiers for operational fires. Given this description and the boundaries of today's weapon technology, FM 100-6 claims that operational fires are largely the product of air power.[15]

The Army's Training and Doctrine Command (TRADOC) also recognizes the relationship of operational fires and air power. TRADOC Pamphlet 11-9, Blueprint of The Battlefield, claims that by their very nature, operational fires are joint and/or combined activities and are provided largely by theater air forces.[16] Both FM 100-6 and TRADOC Pamphlet 11-9 further predict that as the range, accuracy, and lethality of surface-based delivery systems continue to improve, they too will assume a greater role as operational fires. Certainly the Army's ATACMS (Army Tactical Missile System) and Navy TOMAHAWK surface-to-surface missiles give weight to this prediction. Furthermore, aside from predicting tomorrow's source for operational fires, both publications form a consensus upon the combat roles and tasks for operational fires.

The first of these roles clearly accredits the ability of fires to concentrate large volumes of destructive firepower within an extremely short period of time. Given this attribute, operational fires enables an operational commander to facilitate maneuver of either ground or air forces to operational depth by creating an exploitable gap in an enemy's tactical defense.[17] In

his discussion on indirect warfare, historian and theorist H.B. Liddell Hart, underscores fires as a means of facilitating maneuver, claiming:

> No attack in modern war is feasible or likely to succeed against an enemy in position, unless his resisting power has already been paralyzed either by some form of surprise or preponderating fire.[14]

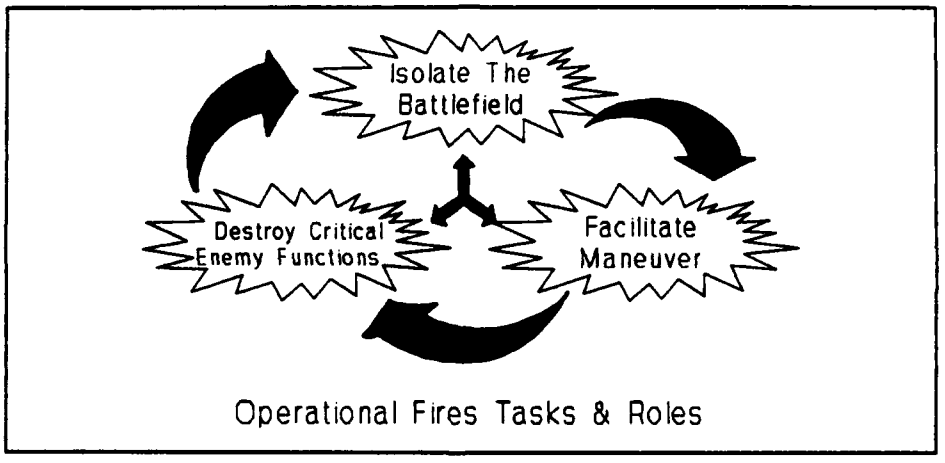
Perhaps narrow-mindedly, "facilitating maneuver" can be perceived as a one-sided show where airpower create gaps for ground forces to maneuver. World War II provides several examples of this traditional perspective, a classic example being Operation Overlord and the carpet bombing of the Normandy beachheads.

However, employing surfaced or air delivery systems, or both, for the purpose of creating a breach in an adversary's air defenses to facilitate "air maneuver" is certainly another perspective of operational fires. Joint Suppression of Enemy Air Defense (JSEAD) by means of both lethal (e.g., artillery fires, Ground Launch Tacit Rainbow) and non-lethal (e.g., electronic warfare) fires is a prime example of creating conditions for operational success.

Interdiction as a means of isolating, fixing, or shaping the battlefield is another important role of operational fires. The primary objective of this role is to deny, disrupt, or delay the enemy's ability to introduce uncommitted forces into an area of operations or sustain those forces already in place. Historically, an adversary's road and rail networks have ranked high upon the list of interdiction targets, and airpower the chief means of attack. In particular, major road and rail junctions, bridges, transload points, and other chokepoints within an enemy's line of operations have made for lucrative air interdiction targets.

Operational fires aimed at delaying, disrupting, or attriting follow-on or reserve forces also falls within the scheme of fixing or shaping the battlefield. Ferdinand Miksche, a more contemporary air prophet of note, underscores shaping the battlefield with airpower by silencing the enemy's artillery, halting his reinforcements, and severing supply lines via operational fires.[19]

Yet, aside from upsetting an opponent's flow of combat power to the battle through physical damage and destruction, interdicting



Operational Fires Tasks & Roles

operational fires can have a tremendous impact in the moral domain of battle. In his analysis of 1940 German blitzkrieg tactics, Len Deighton discusses how German interdiction efforts not only isolated the battlefield, but subverted their enemy's will to fight. During these airstrikes, Deighton notes:

> . . .such attacks made the defenders run for cover. Men taking cover do not observe, train guns, or shoot. If they take cover often enough for the process to become continuous, they lose the will to fight altogether.[20]

In either case, operational fires in an interdiction role serves to create favorable conditions for future battles by denying an enemy

the ability to concentrate combat power (Mass) within a given area (Space) in a timely manner (Time).

Finally, operational fires play a significant role in shaping battlefield conditions, destroying critical enemy functions, and facilities of operational significance. An opponent's command and control system, air defense network, logistical infrastructure, and offensive air power are but a few of the most likely targets for this role. By employing lethal fires, an operational commander denies his foe the opportunity to synchronize, direct, or mass his combat forces in any coherent fashion. Frequently, the use of non-lethal fires such as electronic warfare and psychological operations can achieve similar results. In either case, once having denied one's enemy the benefits of adequate command and control, sustainment, and protection of his forces, the friendly commander now has within his grasp two of the most important prerequisites for operational success - the initiative and freedom of action to prosecute his campaign to the fullest.

Yet, what distinguishes operational fires from tactical fires? Much of today's Army doctrine centers upon the "top-down" verses "bottom-up" planning process and desired effects as the principal discriminating factors.

In the case of tactical fires, a "bottom-up" request process for fire support prevails. Within this system, fire requests originate from the lower echelons of commands and are elevated through each successive echelon for reconsideration. If at any point during this process a particular fire support officer determines he has the assets and capabilities to accommodate the

request, he then acts accordingly and fires are delivered. Otherwise, the "upward" review process continues until either the request is honored or denied due to higher fire priorities.[11]

Operational fires, on the other hand, assumes a "top-down" approach in the planning process. At this level, the operational commander establishes fire objectives, designates targets, and integrates them into his overall plan.[12] Once accomplished, the plan is then assigned to subordinate levels for execution.

Another important discriminator separating operational and tactical fires is the relationship between fire and maneuver. At the tactical level, fires tend to support maneuver, and while they are indeed important, they are not critical to the success of operational maneuver. Yet, unlike tactical fires, operational fires are seen as a coequal to operational maneuver, requires a higher level of integration and synchronization, and has profound impact upon the success of operational maneuver or major operations.[13]

Thus far, a summary of our discussion reflects operational art as being concerned with the planning, integrating, and sequencing of major operations which translate tactical successes into strategic victories. Our discussion also leads us to the conclusion that top-down planning and operational effects (i.e., facilitating maneuver, shaping or isolating the battlefield, and destroying critical enemy functional capabilities and facilities of operational significance) are the focus of operational fires. However, these discussions have also focussed primarily upon U.S. Army doctrinal literature. As we now turn our attention to examine what Air Force doctrine offers, we find perhaps a notable absence of common terms, but a commonality of

thought and basic concepts.

For instance, while Air Force Manual (AFM) 1-1, Basic Aerospace Doctrine, makes no mention of the term "operational art," the concept of linking strategic aims with tactical operations predominates the manual. AFM 1-1 begins by asserting war is a means of achieving a political objective, and that political objectives shape and define military objectives. This discussion continues, assigning the commander the primary responsibility of developing a broad strategy which encompasses capabilities of friendly and enemy forces, the environment, and sound military doctrine. From this strategy emerges objectives, which then guide the commander in the proper employment of his forces.[24] Air Force doctrine further explains that strategic and tactical actions are not mutually exclusive, and "to consider either of the two in isolation ... disregards their interdependence and synergistic influence in warfare."[25]

Another example of disparity in terms but unity in thought is the concept of operational fires and indivisible airpower. A chief concern of operational fires is effect. Regardless of the weapon system employed, facilitating maneuver, shaping the battlefield, or destroying critical enemy functions and facilities of operational significance are the primary effects operational fires aspires to accomplish.

Likewise, the idea of indivisible airpower advances this same concept as it seeks to downplay the alignment of certain airframes with specific missions. AFM 1-1 states that for the commander, "his guiding principle is to employ aerospace power as an indivisible

entity based upon objectives, threat, and opportunity."[26] Therefore, not only does the concept of indivisible airpower provide the commander with the latitude of designating the number of aircraft needed to produce the "integrated strategic and tactical effects to support the overall objective," but the aircraft type as well.[27]

Former Air Force Chief of Staff, General Hoyt S. Vandenberg, expounds upon this novel approach to applying airpower, stating "the overriding purpose of every plane, whether bomber or fighter, is to win the battle."[28] General Bennie L. Davis, a previous SAC Commander-in-Chief, continues this line of thought claiming, "In combat, the need to get the most from each airpower asset has regularly forced us to set aside artificial restrictions on how we employ our weapons."[29] The artificial restrictions General Davis speaks of refers to an inherent misunderstanding or perception among military officers that only certain weapon systems can qualify or achieve tactical, operational, or strategic effect. However, he also provides us a warning that in peacetime, "We have tended to disregard valuable wartime lessons about the optimum application of airpower."[30] As we seek to recapture these lessons and assess conditions for employing the bomber as operational fires, let us now turn our attention to examining the role of bombers in the Normandy campaign, Vietnam conflict, and the 1991 Gulf War.

Section Three

A Historical Perspective

In his theoretical, political, and historical examination of the act of war, Karl Von Clausewitz explains that the critical analysis of historical examples can serve several purposes. Historical examples can help explain or show application of an idea or concept, support or validate the possibility of such an idea or concept, or in combination with similar events, be employed to distill the essential truths of the matter and then arrive upon a consensus of thinking or doctrine.[1] The purpose of this section is to gain a historical insight as to how past commanders have employed bomber aircraft in creating conditions for operational success. The first of the three historical vignettes presented in this monograph examines the 1944 Normandy Campaign.

1944 Normandy Campaign

In the predawn twilight of 6 June, 1944, General Omar Bradley, Commander of the First U.S. Army, watched from the bridge of the AUGUSTA as the first of almost 5,000 allied medium and heavy bombers swarmed over the German coastal defenses standing guard at the Normandy beachheads. For the allied ground forces preparing for this amphibious assault, this massive aerial bombardment signaled the beginning of Operation Overlord - the long-awaited invasion of the European continent. Yet, for the bomber aircrews, the Normandy missions marked the culmination of eighteen months of intensive planning and preparation.

A brief chronology of the more important events in the design of the Normandy campaign begins with the January, 1943, Casablanca

Conference of the Combined Chiefs of Staff. From the onset, allied leadership recognized that prior to an assault upon the European mainland, they must first gain the winning hand in terms of time, space, and mass. To achieve this dominance, the Casablanca Conference produced an agenda calling for a combined American and Royal Air Force (RAF) bomber offensive aimed at creating a series of preconditions favorable to a successful invasion.

Achieving allied air superiority was the first of these preconditions.[32] Offensively, allied air superiority was essential to allow the full weight of American and British airpower to be applied against the enemy defending the beaches. Defensively, the German Air Force had to be deprived of the means and ability to threaten either the unloading or inward movement of allied troops, equipment, or supplies at the beachhead. Consequently, phased attacks against German airfields, aircraft factories, and aviation POL production facilities became [illegible] priority for the bomber offensive.[33] Through airfield attacks, German regional air strength could be significantly reduced. However, raids upon aircraft factories and fuel facilities were designed to both strangle the enemy's aerial sustainment base and ultimately divert coastal-based fighter units to defend the homeland. Either by attrition or diversion, air superiority over the beachheads would be achieved.

Aside from isolating German air power from the beachhead, denying her the ability to mass or sustain ground combat forces within the coastal regions was also deemed an essential precondition for operational success. By allied estimates, the rail road infrastructure spanning western Germany, France, and the Low

Countries could enable the Germans to mass almost 28 combat divisions - nine more than the allies - by as early as D+14. By D+20, German/Allied combat ratios could rise to 30:25, and continue increasing to 33:28 by D+30.[14]

To preclude such a massing of enemy forces, the bomber plan directed attacks against the enemy's rail net; first striking at the marshalling yards and maintenance facilities, and then rail lines, locomotives, and rolling stock (See Appendix, Figure A-1).[15] By denying their enemy use of the rail system, the allies could also augment their gains by forcing an increase in German POL consumption and wheeled vehicle usage at a time when neither were in plentiful supply.[16]

Other preconditions set forth during the Casablanca Conference included neutralizing enemy surface and submarine threat and thus foiling any opportunity for enemy naval intervention during allied cross-channel operations. Reducing Germany's ability to sustain combat operations also ranked high among the list of Casablanca objectives. Consequently, Germany's submarine bases and construction facilities, as well as her industrial and economic system, became equally important targets of the bomber offensive.[17]

By early February, 1943, the Casablanca objectives were published and both U.S. and British air commanders were busy planning and executing their own version of how best to achieve the stated objectives. Of the two bomber forces, the British, under the command of Sir Arthur Harris was the first to strike. A firm believer that "A bomb not dropped on Germany was a bomb wasted,"[18] Harris chose to apply the weight of his bomber force against a wide

variety of industrial targets well within the German Reich. Munich, Stuttgart, and Berlin were among the first of the German cities to feel the sting of the combined bomber offensive.[39]

In contrast to their British counterparts, the Americans pursued a different strategy. Rather than piecemealing their attacks and gaining perhaps only a small amount of destruction over many targets, U.S. planners elected to mass their efforts to gain a high degree of damage on a few critical targets. Accordingly, U.S. bombers concentrated their initial attacks against the German submarine bases and construction facilities before shifting the weight of their effort to the German aircraft industry.

From the early summer months of 1943 to the Spring of 1944, aircrews of the U.S. Eighth Air Force (8AF) and RAF Bomber Commands continued the relentless prosecution of the targets outlined for the Combined Bomber Offensive. With the intensity of Allied attacks on German aircraft factories and industry steadily increasing, the German Air Force soon began withdrawing their fighter aircraft for defense of the Reich. By early 1944, 75% of enemy fighter assets had been deployed to Germany,[40] and by March, only 85 of the entire German fleet of 1,650 single-engine fighters remained based within range of Normandy landing sites (See Appendix, Figure A-2).[41]

On 14 April, Allied supreme Commander, General Dwight Eisenhower, took control of both RAF and U.S. bomber forces. Content with the withdrawal of the German fighters, yet concerned over their possible return, Eisenhower ordered a continuation of the bomber strikes on German aircraft factories and industrial targets. Simultaneously, he directed additional attacks against all German

operational airfields within 350 miles of Normandy. To preclude possibly identifying the planned amphibious assault area, this 350-mile radius remained until D-minus 30 days, when it was reduced to a 130-mile circle around Caen.[12]

In the weeks short of D-Day, RAF and U.S. bomber forces began increasing their strikes against the rail and road system. Between 1 March and 6 June, 36 marshalling yards in Belgium and Northern France were attacked 139 times.[13] By Mid-May, railway traffic in France had dropped over 30% from January's index, and by early June would plunge another 30% (See Appendix, Figure A-3).[14]

Along with shaping the battlefield through disruption and destruction of the enemy's road nets, bomber attacks were equally successful at fixing German ground forces outside the Normandy area. Throughout the aerial campaign, "Ultra" intercepts had steadily indicated the Germans expected the Allied invasion to occur at Pas de Calais.[15] To reinforce German expectations and convince enemy leadership to retain a sizable portion of their combat forces near Pas de Calais, 40% of the bomber missions flown on D-3 and D-2 struck road, rail, and coastal defenses in the vicinity of Pas de Calais.[16] On D-1, bomber actions continued to bolster this deception as 25% of the total bomber missions pounded the city's coastal defenses.

With a significant portion of German combat forces and reserves commited outside the Normandy area, the ground transportation system slowed to a near trickle, and German air power subdued, air and ground isolation of the Normandy beachheads had been achieved. However, even as Allied ground forces prepared to

take to the beaches on D-Day, the bomber's role in Operation Overlord was far from complete.

Eisenhower's concept for the final assault envisioned a massive barrage of fires blanketing the beachheads within minutes of initial landings. The goal was to both physically and psychologically immobilize the coastal defenses - the bombers being the primary tool of execution. Extensive route planning to ensure airspace deconfliction, reduced bomber exposure to enemy air defenses, and massed fires in minimum time and space were the key elements in successfully breaching beachhead fortifications (See Appendix, Figure A-4).[47]

Under the cover of darkness, 1,300 RAF bombers led the assault. An additional four waves of 2,700 U.S. bombers continued the attack at first light. While the first wave converged upon coastal defenses along the six-mile wide landing zone, the remaining three focussed on disrupting communications and transportation between the frontline defenders and reserve elements positioned inland.[48]

However, despite this overwhelming concentration of firepower, low cloud ceilings would deny the full potential of the aerial attack from being achieved. Unable to see the target area, aircrews in the first wave were obliged to apply a timing correction factor to preclude dropping bombs on friendly troops.[49] Consequently, less than 45% of the bombs hit within 300 feet of their planned target, and the remaining 55% fell as far as three mile away.[50] In his personal memoirs, General Bradley portrays the saturation bombing of the Normandy beaches as "completely ineffective."[51] Nevertheless,

in as little as eight weeks, Bradley would once again call upon the bombers to create conditions favorable for operational maneuver.

OPERATION COBRA

By mid-July, the situation in Normandy was far from satisfactory. Aside from poor weather, neither Bradley nor his staff had fully anticipated the impact of the bocage country upon their operational tempo. The small open fields, bordered by an extensive patchwork of entangling hedgerows, narrow roads, and deep drainage ditches severely hampered mobility. Making the most of this terrain, enemy troops burrowed into the hedgerows, creating a well organized network of highly defensible positions and firesacks. By 24 July, the U.S. First Army was advancing at a mere snail's pace while casualties were soon to exceed 120,000.[52] From Bradley's perspective, the situation was beginning to show signs of an impending stalemate - the very situation he had planned so hard to avoid.[53]

To jump-start the advance, Bradley conceived an idea of massing both fires and troops along a narrow front and forcing a rupture within the enemy's defensive belt. Once the rupture was achieved, infantry units would quickly widen and secure the flanks, creating a gap for mechanized forces to bolt through and drive deep into enemy territory (See Appendix, Figure A-4). Thus, firepower would set the initial conditions for operational success. However, for the plan to succeed, concentrating fires in both time and space were essential.

As part of this concentration, Bradley had access to over 600 artillery pieces.[54] Although General Charles E. Hart, VII Corps

Artillery Commander, professed this to be sufficient for creating a gap within the enemy's lines, Bradley disagreed:

> Had he had ten times the number of guns - maybe. But it would have been impossible for Hart to saturate the carpet with the intensity that I wanted, for there were neither the guns nor ammo for the task.[55]

On 19 July, Bradley met with air commanders Carl Spaatz, Arthur Tedder, and Trafford Leigh-Mallory to explain his request. His ultimate objective for using the bombers was to create the "blast effect" typical of artillery prep-fires, only in a more concentrated form. Disrupting German communications, neutralizing enemy front-line and reserve forces, and reducing the enemy's will to fight were the desired side effects.[56]

Weapons effect and troop safety were among the many issues dominating the planning conference. Borrowing from Montgomery's experience with bombers at Caen, Bradley requested fragmentation bombs be used exclusively to avoid cratering the very roads he depended upon to expedite his advance.[57] To minimize the chance of friendly bombs on friendly troops, Bradley strongly suggested the road between Periers and St. Lo serve as a "no bomb line." As long as the bombers flew parallel, but south of the road, Bradley contended his troops north of the road would be safe. Where the aviators advocated a 3,000 yard buffer zone was needed to ensure troop safety, Bradley argued 800 yards was more appropriate. Bradley's point was that the farther away his troops were from the enemy, the more time the enemy would have to recover from the chaos and confusion of the bombing.[58] By the end of the conference, a 1,200 yard buffer zone and a start date of 21 July was agreed upon by all. However, where Bradley thought the bomber's approach axis

had been resolved, later events would prove different.[59]

After several weather delays, a green light was finally given for Operation Cobra to begin on 24 July. Yet, the attack was not to fully materialize. Once again poor weather prevailed, forcing Air Marshal Leigh-Mallory to cancel the strikes. Nevertheless, nearly 200 fighter-bombers and 335 bombers never received the recall orders and continued with their attack, with many of their bombs impacting among friendly troops.[60]

Early reports of the assault centered on allied casualties and the bomber's axis of attack. From Bradley's perspective, not only had the air commanders deceived him on the bomber's approach, but the abortive assault had also cost him the element of surprise and 146 casualties.[61] However, unknown to Bradley, the raid had been of some merit. Convinced they had succeeded at repelling a major allied attack and likewise convinced another attempt was forthcoming, the Germans repositioned a majority of their troops directly into the area scheduled for the saturation bombing.[62] Nonetheless, while the Germans had correctly anticipated a re-attack, they failed to realize the magnitude of the firepower they would face.

At nine-thirty the very next day, U.S. ground forces began withdrawing from forward positions in preparation for the aerial bombardment. In less than two and one-half hours over 2,200 bombers and 350 fighters drenched the 7,000 by 2,500 yard target box with nearly 5,000 tons of high explosive and napalm.[63] The effect of this massive aerial assault upon the enemy was without precedent. In his accounting of Operation Cobra, Army Historian Martin

Blumenson writes:

> Bombs buried men and equipment, overturned tanks, ... communications with forward echelons were completely disrupted ... No less than a thousand men must have perished ... about one-third of the total number of combat effectives ... were probably killed or wounded, the survivors dazed ... Only local and feeble resistance was possible.[64]

Adding to Blumenson's description, General Fritz Bayerlein, the receipent of the main weight of the Cobra bombing claims:

> The first line has [sic] been annihilated by the bombing ... dugouts and foxholes smashed, men buried ... the same happened to guns and tanks. Long duration bombing, without any possibility for opposition, created depressions and a feeling of helpness, weakness, and inferiority. The shock effect was nearly as strong as the physical... For me, who during this war was in every theater committed at the points of the main efforts, this was the worst I ever saw.[65]

By July 27, elements of the 1st, 4th, and 30th Infantry Divisions and 2nd and 3rd Armor Divisions had moved through the rupture and were well on there way toward achieving their objectives. Although plagued once more by problems of fratricide, Operation Cobra proved a resounding success. The massive bomber attacks stunned and demoralized the German defenders, severely disrupted their communications and defenses, and created conditions facilitating operational maneuver. As Bradley would later record, "Slowly it came to me that Cobra had not failed. It had succeeded; we had broken through."[66]

Operation Niagara

Leaping forward nearly two decades, the next vignette examines yet another conflict bombers were employed not so much as to create conditions for tactical or operational success, but instead deny those conditions from the enemy. In the interim between WWII and

Vietnam, U.S. military force structure became a victim of a diminishing military budget and an increasing reliance upon nuclear weapons. During post-WWII and Korean eras, America had chosen to maintain neither a large conventional army nor tactical air force, but a sizeable nuclear bomber force instead.[7] Consequently, the phrase "strategic bomber" soon became synonymous with "nuclear," a concept that frequently prevails even today.[8]

On 17 February 1965, two squadrons of B-52s were released from their nuclear mission for use in conventional operations in Southeast Asia. Their mission was to disrupt the enemy's flow of logistics, deny him the ability to mass his combat power, and give him no relief from attack even in his jungle enclaves. Yet, the main value of the B-52 was its psychological effect; the enemy lived in constant fear that a B-52 strike could come at any time and with little or no warning.[9] By early February, 1968, B-52 sortie rates had climbed from an initial 300 to 1,200 sorties per month, and surged another 600 per month by mid-February. Yet, as events would later illustrate, bomber sortie rates were not the only thing on the rise.

Within the last few months of 1967, intelligence reports began showing a dramatic increase in the volume of troops and supplies coming into the Khe Sanh area. In contrast to a January-September monthly average of 480 trucks, 1,116 trucks were observed in October, followed by 3,823 in November, and 6,315 in December.[10] Similar reports revealed that between four to five North Vietnamese infantry divisions had also moved into the terrain surrounding the 6,000-man U.S. Marine camp at Khe Sanh.

While theories as to the North Vietnamese intent varied, the most publicized version portrayed Khe Sanh as an impending Dien Bien Phu.[12] This was particularly alarming for President Lyndon Johnson, who as senior member of the Senate Armed Services Committee in 1954 had opposed sending U.S. aid to the French at Dien Bien Phu. Now with American blood at stake, Johnson became obsessed with preventing such a recurrence.[13]

In accordance with his commander's wishes, General William Westmoreland, Commander of U.S. Forces in Vietnam, developed a two-phased campaign - code name Operation Niagara[13] - for the defense of Khe Sanh. The first phase was primarily an intelligence collection effort aimed at gathering as much information on enemy strengths, unit size, and location as possible. Every and all resources were employed and their data funneled into MACV J-2 (Military Assistance Command, Vietnam: Intelligence Branch) for analysis. From this data, MACV J-2 analysts were able to approximate their foe's level of echeloned combat power, doctrinally template his positions relative to the terrain surrounding Khe Sanh, and then transform the area into a series of B-52 target boxes.[14]

Phase two operations called for carefully synchronizing artillery, Navy, Air Force, and Marine tactical aircraft, and an "unquestionable priority on B-52 strikes."[15] Westmoreland was a firm believer in the unleashed, combat potential of the B-52. In a memorandum to Admiral U.S.G. Sharp, Pacific Command Commander-in-Chief (CINCPAC), Westmoreland demanded more than tactical air support to fight his elusive, jungle-based enemy. "Magnificent, but limited" is how Westmoreland described the effects of tactical air

(Tacair) during Operation Black Virgin One (15 April, 1965).

> Ordnance could be delivered only in a spotty, irregular, inconsistent fashion. Moreover, it took 443 sorties to deliver 900 tons of ordnance over the 12-square kilometer area. If an attack could have been launched in which the bombs were evenly distributed, the results would have been far more effective.[16]

Aside from the advantage of the "evenly distributed" bombing pattern typical of the bomber, Westmoreland also recognized the inherent capability of the B-52 to "marry surprise with devastating firepower."[17] Soon, his faith in this marriage of surprise and firepower would be put to the test.

The North Vietnamese offensive at Khe Sanh began in January, 1968, as the first of several hundred artillery rounds began impacting the marine camp. By the end of the first night's activities, the camp's entire ammunition stocks and a majority of the fuel storage facilities were virtually destroyed.[18] In response, Westmoreland ordered Phase Two of Operation Niagara to begin the next day. Seeking to deny the enemy his ability to mass, command, control, or sustain his combat forces, B-52s flying from Anderson AFB, Guam targeted enemy command and control facilities, logistical routes, and troop assembly and staging areas. Barely two weeks into the operation, 463 bomber sorties had already demolished 65 key targets threatening Khe Sanh's survival.[19] Yet, within the same time span, the North Vietnamese had severed Highway 9 - Khe Sanh's link to the east - and overrun the Special Forces camp at Lang Vei (See Appendix: Figure A-6).

On 23 February, the North Vietnamese assault peaked as over 1,300 artillery rounds rocked the U.S. compound. Soon thereafter, aerial reconnaissance and ground observers began to take note of

extensive enemy trench-works and bunker systems within 350 feet of the camp's perimeter.[6] At Westmoreland's request, the 3,000 meter safety zone was cut to 1,000 meters and the bombers were directed to conduct "close-in" attacks. Describing the first of the "close-in" attacks, Marine Captain Moyers S. Shore II reports:

> ... the NVA had taken advantage of the buffer zone by moving troops and supplies in as close to the marine base as possible to avoid the bomber raids. ... When American airborne observers noted enemy bunker complexes cropping up ... the no-bomb line was moved in to about half the original distance. At first, the regimental commander was afraid that the resulting [bomb] concussion would collapse his own bunkers and trenches; as it turned out, the enemy fortifications were the only ones to suffer.
>
> The first few B-52 raids inside the old line touched off scores of secondary explosions and undoubtedly snapped the North Vietnamese out of their sense of security. The closer strikes also served as a morale booster for the defenders who flocked from their bunkers to watch what the Marines called, "Number One on the hit parade."[7]

Over the next thirty-seven days, an integrated bomber/Tacair campaign continually pounded the numerically superior communist combat forces as they attempted to capture the isolated U.S. outpost. On 22 March, the North Vietnamese conducted yet another massive artillery assault, as if preparing for a major attack. Within the next 48 hours, over 135 B-52 sorties drenched suspected enemy staging areas, denying the enemy the opportunity to mass his forces, and ultimately quelled any remaining plans for attacking Khe Sanh.[8]

By the end of March, the communist offensive had tapered off and by mid-April ceased to present a major threat. Although periodic mortar attacks continued to plague the camp until its closure in June, the integrated bomber/Tacair effort had denied the

North Vietnamese conditions for tactical, operational, and possibly, strategic success. During a stop-over trip at the B-52 base on Guam, General Westmoreland praised B-52 effectiveness during the Khe Sanh seige.

> The thing that broke their back basically was the fire of the B-52s. Yes, we did have additional firepower. . . around 100 TAC air sorties a day [and] sixteen 175-mm guns of the U.S. Army . . . and they did an excellent job but the big gun, the heavy weight of our firepower, was the tremendous tonnage of bombs dropped by our B-52s.[43]

Yet, rhetoric aside, the most accurate assessment of bomber effectiveness is found in the enemy's response and actions. For example, several ground reconnaissance reports attributed the enemy's abandoning large arms caches to his fear of B-52 strikes.[44] North Vietnamese and Viet Cong prisoners and detectors supported this assessment, listing their fears as "B-52s, tac[ical] air, artillery, and armor, in that order."[45] Captured NVA documents underscore the impact of the bombers on troop morale. One such document indicated that almost 300 soldiers belonging to a NVA unit enroute to Khe Sanh deserted for fear of B-52 raids.[46] A concerted propaganda effort to convince NVA troops not to fear B-52 strikes "because bombs had to fall within three meters to cause a casualty" also indirectly reflect B-52 effectiveness.[47]

In essence, Khe Sanh reflects a time where a commander chose to use bombers both for physical and psychological effect. As we step yet another two decades foward, we find another commander with similiar ideas.

OPERATION DESERT STORM

On August 2, 1990, the world took note as Iraqi military

forces crossed over its southernmost border and invaded the small gulf emirate of Kuwait. In less than twelve hours, Iraqi forces not only overpowered local defense forces and seized the capital city of Kuwait, but also triggered a series of political and military events that would ultimately lead into a regional war between Iraq and a coalition of Allied forces.

In response to Iraq's failure to withdraw forces as prescribed in United Nations (U.N.) Resolution 678,[11] Allied forces took to the air on 15 January, 1991. Under the cover of darkness, U.S. Navy Tomahawk cruise missiles led the attack, striking at the enemy's command and control and paralyzing his air defense systems. F-111, F-15E, and F-117 stealth fighter-bombers continued the attacks against similar facilities as B-52s targeted known enemy ground positions in less-defended areas of Kuwait and Iraq.[12]

Describing the design and execution of this awesome, well-coordinated aerial assault, Former Air Force Chief of Staff, General Michael Dugan, outlines a four-phased operation. Phase one began with attacks upon Iraq's nuclear, chemical, and biological facilities, industry, and command and control network; Two takes out her offensive and defensive counter air capabilities; Three isolates the battlefield; and Four supports ground forces by reducing enemy troops, tanks, and artillery.[13]

Nevertheless, in terms of basic campaign design, there appears little disparity between yesterday's Operation Overlord and today's Desert Storm. In both cases, achieving air superiority was first and foremost. Both campaigns identified the enemy's web of command and control, logistics, and road/rail net as the critical or

"decisive" points for isolating the battlefield. Moreover, Generals Dwight Eisenhower and Norman Schwarzkopf each saw his opponent's operational reserve as the enemy's center of gravity and took the appropriate measures to prevent its use. Yet last, but not least, both Eisenhower and Schwarzkopf embraced the use of long-range bombers as an integral element in the design and execution of their plan.

For example, early bomber missions targeted Iraqi power plants, SCUD missile assembly facilities, and chemical munitions sites.[31] Although strategic in nature, these missions gained operational significance by strangling Iraq's weapons production and restricting Hussein's combat power to on hand systems and equipment.

Enemy airfields and major road and rail arteries were also prime bomber targets in isolating the battlefield and creating opportunity for allied operational maneuver. While bomber attacks neutered Iraqi airpower, the B-52/FASCAM combination virtually severed Hussein's life-line to his forces in southern Iraq and northern Kuwait.[32] Isolated from supplies and leadership, Hussein's front-line troops soon fell victim to an arsenal of B-52 delivered bombs, cluster munitions, fuel-area-explosives (FAE), and a variety of "Chieu-Hoi" or psychological warfare leaflets (See Appendix, Figure A-8).[33] An excess of 50,000 Iraqi deserters within the first two days of the coalition ground assault speaks well of the bomber's unique ability to physically and psychologically undermine an adversary's combat forces.[34]

Yet aside from isolating and attriting Hussein's front-line forces, the bomber was also charged with fixing and emasculating the

enemy's operational reserve - the elite Republican Guard. Not only was this 110,000-man, battle-hardened unit the best equipped and trained force Iraq had to offer, but its mobility and geographic position threatened any future coalition assault into Kuwait (See Appendix, Figure A-9). By reducing the combat integrity of this organization and isolating its ability to influence future battles, the cohesiveness of the entire Iraqi military could be unhinged."[11]

As in previous examples, the marriage of surprise and devastating firepower through saturation bombing once more proved instrumental in immobilizing a highly dispersed, well dug-in enemy force. Although attrition of Republican Guard units was not as high as earlier estimated, the repetitive and unyielding saturation raids prevented the enemy opportunity to mass his combat power, denied him the initiative, and facilitated allied operational maneuver by creating conditions favorable for tactical success. Summarizing the U.S. strategy, General Colin Powell, Chairman of the Joint Chiefs of Staff, announced, "First we're going to cut it [the Iraqi Army] off, and then we're going to kill it." On both tasks, the bomber was key to campaign success.

In conclusion, this section has examined four major operations where operational commanders have integrated bombers as a key element of campaign design and execution. Except for Operation Niagara, each case provides a clear example of how bombers contributed to creating conditions favorable for campaign success. Niagara, on the other hand, reflects a war of negative aims, where simply denying the enemy tactical, operational, or even strategic success was the primary objective. Hence, each of the examples, in

its own right, achieved its primary aim. With our historical canvassing complete, this monograph now turns to analyze the conditions prompting Generals Eisenhower, Bradley, Westmoreland, and Schwarzkopf to seek out the use of bombers.

Section IV

Historical Analysis

> The practical value of history is to throw the film of the past through the material projector of the present onto the screen of the future.
>
> Liddell Hart[6]

A cursory review of the Overlord, Cobra, Niagara, and Desert Storm vignettes underscores how in both past and recent conflicts, integrating long-range bombers have been central to the success of major operations and theater-level campaigns. As operational fires, the bomber's flexibility, range, and massive firepower have enabled commanders to shape the battlefield and facilitate operational maneuver. These feats have been achieved by: 1) disrupting his enemy's command and control; 2) upsetting his enemy's flow of battlefield logistics; 3) rupturing and exploiting his opponent's defenses; and 4) immobilizing an adversary's reserve strengths. Each and every of these achievements contributes to creating conditions for tactical victories and campaign success. Yet, a more in depth synthesis of the four case studies also reveals several key conditions which have prompted previous commanders to integrate strategic airpower into campaign design and execution. Given that operational fires function on a "top-down" planning and execution process, it seems only natural the first condition should focus upon the operational commander.

In each of our historical examples, the commander was keenly

aware of how bombers could sway the balance of victory in his favor. To guarantee success at Normandy, General Eisenhower first began shaping the battlefield by matching bomber capabilities with pre-campaign objectives. From this process emerged bomber target priorities for the Combined Bomber Offensive. Later, Eisenhower took control of bomber assets to ensure final preparations for the amphibious assault were complete. Likewise, Bradley's efforts to secure and integrate the bombers for Operation Cobra also reflect his awareness of bomber capabilities. While Bradley never gained control of the bomber fleet, his efforts in the planning and sequencing of the bomber strikes were instrumental in setting battlefield conditions supporting operational maneuver. Westmoreland's efforts during the design and execution of Operation Niagara reflect an equal level of insight and awareness.[31]

A second condition favoring bomber integration in campaign design revolves around a need for blending surprise with devastating firepower. During Overlord and Cobra breaching operations, overwhelming an unprepared enemy with a single dose of fires was essential to campaign success.

For instance, Overlord planners estimated almost 7,800 tons of explosives delivered within thirty minutes of the initial landings were necessary to adequately suppress enemy coastal defenses.[11] For Cobra to succeed, Bradley judged slightly more than 4,300 tons delivered in less than an hour was necessary to disrupt and demoralize enemy defenses opposing his route of advance.[11] Yet, in both cases, surprise and deception were equally important; Any large scale repositioning of naval fires or artillery pieces could have

compromised both.[100] Under these circumstances, the bomber became the favored choice.

Similar to Overlord and Cobra, combining bomber surprise and massive firepower also contributed to Niagara and Desert Storm success. Where Westmoreland employed the bombers to prevent a massing of enemy combat power, Schwarzkopf wielded the bomber's surprise and firepower to disrupt enemy logistics, dissolve Iraqi linear defenses, and immobilize Hussein's operational reserves. Robert Kritt's accounting of Operation Niagara offers evidence of where a single B-52 strike devastated 75 percent of an 1,800-man North Vietnamese regiment.[101] Warren Trest's study of Khe Sanh presents similar testimony.[102] Although Desert Storm figures have yet to be finalized, there is little doubt that the saturation bombing of Hussein's "Maginot Line," elite Republican Guard units, and Iraqi supply routes set conditions favorable for coalition campaign success during the ground phase of operations.[103]

Yet, neither an operational commander's insight nor his ability to blend surprise and firepower is of much consequence if he cannot respond in a timely manner. Both Niagara and Desert Storm highlight that in the initial hours of a crisis, the ability to project power into a threatened region may be the decisive factor in stalemating an adversary's advance or turning the tide of battle. During Niagara operations, Westmoreland's ability to quickly secure and employ B-52 firepower was key to thwarting a communist take-over of the Khe Sanh basecamp. Likewise, Desert Storm clearly illustrates how a quick military response with airpower can both stem an enemy's plans for attack and buy time to mobilize additional

combat power.[104]

Furthermore, each of the four examples clearly outlines a situation where limited fire assets and economy of force measures may necessitate incorporating strategic bombers into campaign design and execution. For example, to achieve the 7,800 ton ordnance goal at Normandy, over 20 battleships and 100 destroyers would have been required - neither of which where available.[105] Likewise, while Bradley readily admits that his 600 piece artillery force was inadequate for Cobra objectives, he further questions if a ten-fold increase would have been sufficient.[106] In these two cases, employing long-range bombers as operational fires not only rectified land and sea-based firepower shortfalls, but precluded operational delays and a need to divert firepower assets from other commanders.

An analysis of Niagara and Desert Storm operations further depicts how bombers can maximize a commander's firepower and still permit him to husband critical resources for higher priority tasks. For instance, during the defense of Khe Sanh, B-52s only accounted for less than 11% of the total strike aircraft sorties. However, this small percentage of sorties dropped almost 61% of the total ordnance expended during Niagara (See Appendix, Figure A-10).[107] In this case, B-52 fires enabled Westmoreland to shower his enemy at Khe Sanh with overwhelming fires and still have his fighter aircraft to use against higher priority targets throughout his theater of operations.[108]

A comparison of Desert Storm sortie rates reveals a similar situation. While the USAF flew 59% of all Desert Storm combat sorties, less than 3% of these sorties were B-52 missions. Yet,

like Operation Niagara, this 3% carried almost 40% of all USAF bombs and 30% of all U.S. (e.g. Air Force, Navy, and Marine) bombs during this 100-day war.[109] Unquestionably, a majority of this ordnance was directed against Hussein's well-dispersed and dug-in Iraqi defensive positions and Republican Guard units. Thus, by utilizing B-52 saturation raids to reduce enemy defensive fortifications and immobilize Iraqi operational reserves, remaining firepower assets could be better utilized against other and perhaps higher priority targets.

Furthermore, an analysis of both Niagara and Desert Storm suggests that the use of bombers as operational fires may be appropriate in situations where friendly forces are outnumbered. For example, at the start of the 1968 Khe Sanh offensive, allied combat forces consisted of one South Vietnamese and four U.S. Marine battalions. Fire support for the 6,000 defenders was limited to less than fifty-five pieces of mixed artillery and mortar equipment (See Appendix, Figure A-11).[110]

Communist forces attacking Khe Sanh included four to five infantry divisions - almost 40,000 North Vietnamese regulars - and two artillery regiments. In rough terms, the North Vietnamese had almost a seven-fold superiority in troops and fire support numbers alone.

At the start of the Desert Storm air war, combat ratios between coalition and Iraqi forces were listed at 0.7:1.0 for troops, 0.74:1.0 for tanks, and 0.54:1.0 for artillery - all favoring the Iraqi forces. Nonetheless, despite these significant shortfalls, allied/ coalition forces prevailed. While much of the

success at Khe Sanh has been attributed to strategic airpower, it seems unlikely the same level of recognition will emerge from Desert Storm.

Finally, a synthesis of three of the four case studies reflects allied air superiority, or at least air parity, significantly enhanced bomber operations. Looking back at the Combined Bomber Offensive, neither U.S. nor RAF bombers were able to strike deep into the Reich without incurring significant losses.[11] With the skies belonging to the allies during Overlord and Cobra, allied bombers were able to mass into large formation and lay a concentrated blanket of bombs without serious consideration of enemy threats.[12]

The uncontested skies of South Vietnam, Laos, and Cambodia certainly enhanced B-52 operations during Niagara. For instance, it is doubtful the accuracy needed to accomplish the "Close-In" 1,000 meter bombings could have been achieved if aircrews would have had to react to enemy air or ground threats. At this time, the particulars of B-52 tactics and bombing procedures, enemy air defense capabilities, and allied threat suppression measures still remain closely-guarded. Consequently, it is uncertain just how much a lack of allied air superiority could have influenced B-52 operations during Desert Storm. Furthermore, the promise of stealth technology suggests perhaps the skies over enemy terrain need not be under control of allied forces. However, for the time being, one could suppose bomber impunity of enemy threat permitted the Desert Storm bomber crews, like their predecessors at Normandy, Cobra, and Niagara, to concentrate on weapon delivery and not enemy threat.

Section V

Conclusions and Implications

> Weapons, when correctly handled, seldom fail to gain victory.
>
> J.F.C. Fuller[113]

This monograph has explored the question: " Under what conditions might an operational commander employ strategic airpower in his campaign design?" This exploration began with discussing the linkage between strategy, operations, and tactics. Next, U.S. Army and Air Force doctrine were compared to assess terminology and conceptual similarities regarding strategic bombers as a form of operational fires. Finally, four historical case studies were selected to determine under what conditions previous commanders have employed long-range bombers to facilitate operational maneuver and set battlefield conditions favorable for campaign success. After a careful review and analysis of concepts, doctrine, and history, this monograph concludes that integrating strategic bombers in campaign design and execution is warranted when:

- The commander possesses an awareness of strategic airpower capabilities.
- The situation requires a blending of surprise and overwhelming firepower, concentrated in minimum time and space, as a prerequisite for operational success.
- Limited reaction or response time.
- Limited firepower assets or economy of force conditions prevail.
- Numerical superiority favors the enemy.
- The allied possess or can achieve localized air superiority.

Of these five conditions, a commander's awareness of bomber capabilities and how they can assist him in setting conditions for

tactical victories, operational achievement, and campaign success receives top priority. A lack of awareness or misunderstanding of such capabilities may not only result in an omission of bomber employment as operational fires, but could conceivably lead to misapplication or loss of these extremely limited firepower assets. This inherently implies that educating current and future operational commanders and their planning staffs is of immense importance. It seems only natural that the most fertile ground for planting this seed of knowledge rests within the senior and intermediate service schools, only to be nourished to full growth during joint training exercises.

The ability to blend surprise and overwhelming firepower when both response time and additional fire assets are limited merely underscores conditions of how bombers can best serve an operational commander. As our military continues to shrink in size, the probability of our resources become fewer, and our national military strategy reverts from forward deployed to a forward presence, the challenge of being able to respond in a timely manner with sufficient firepower to deter an enemy is certain to increase. Such a future clearly suggests a greater role for the bomber. Therefore, it only seems logical that both today's and tomorrow's military leadership understand when and how the long-range bomber can best assist in maintaining the peace - or ensuring victory.

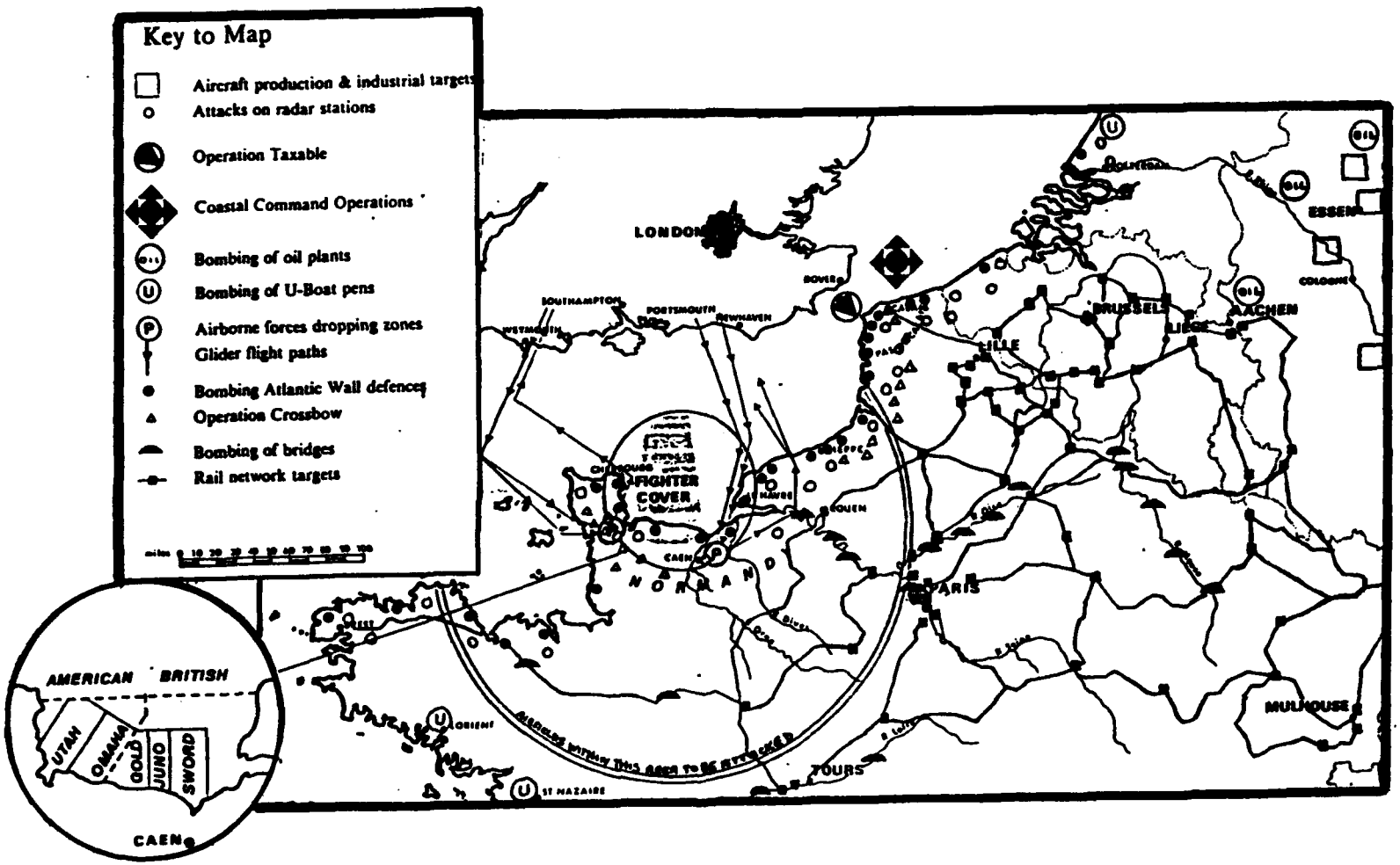


FIGURE A-1

Operation Overlord Bomber Targets

Source: Prelude to Overlord

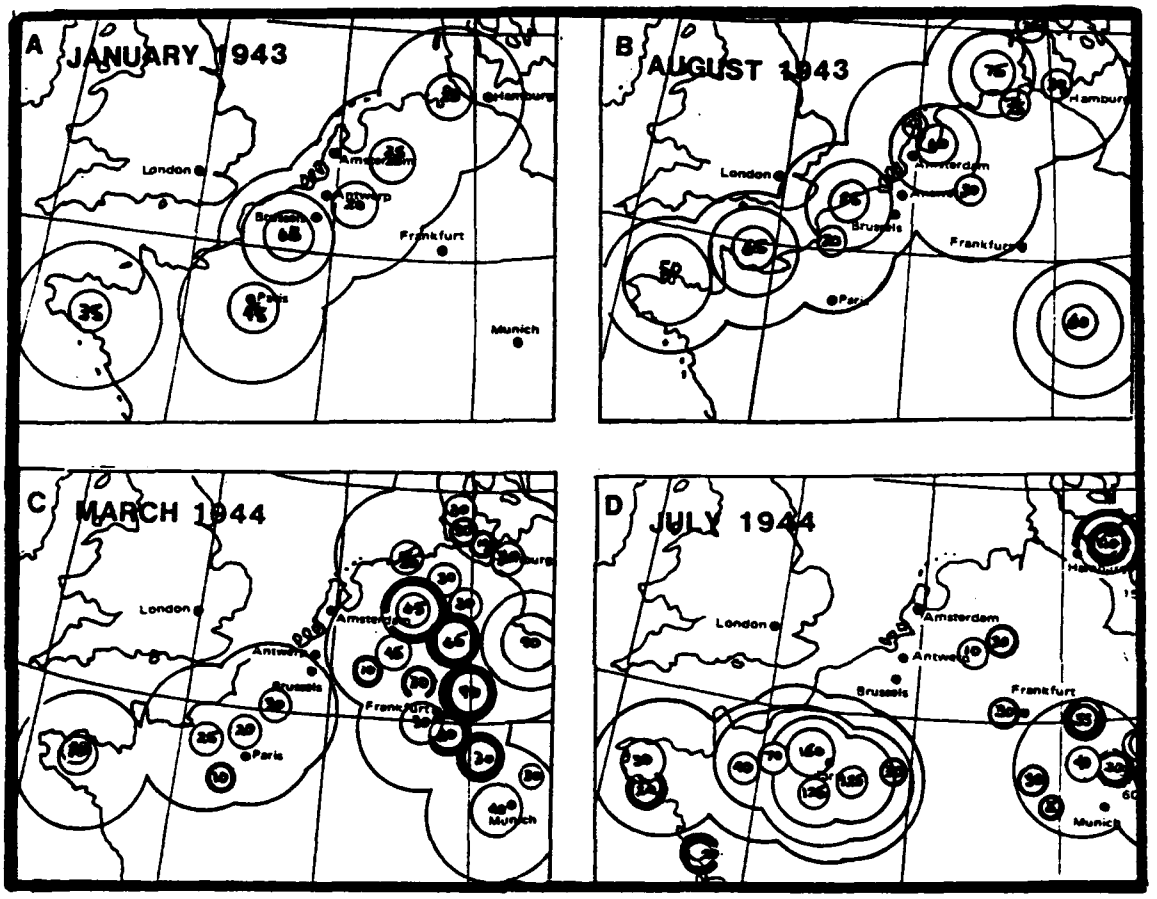


FIGURE A-2

German Fighter Dispositions

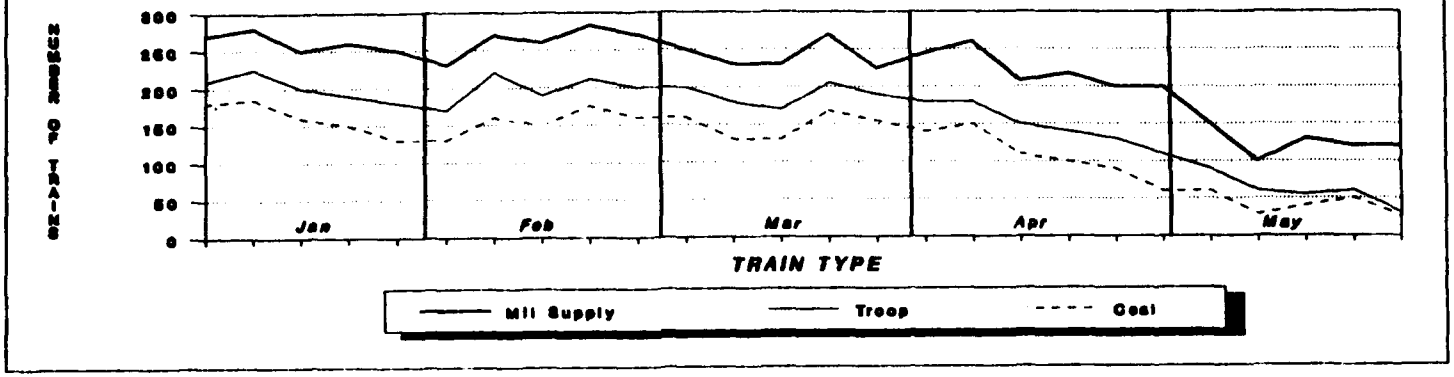
Large circles represent 100-mole radius. Values at center of circle(s) indicates total number of enemy fighters within that region. March 1944 basing reflects German response ot Allied bombings of industrial districts.

LEGEND

Single-Engine Day Fighter Single-Engine Night Fighter
Twin-Engine Day Fighter

Source: Strategic Air Warfare

Source: *Airpower in War*



Source: *Strategy For Defeat*

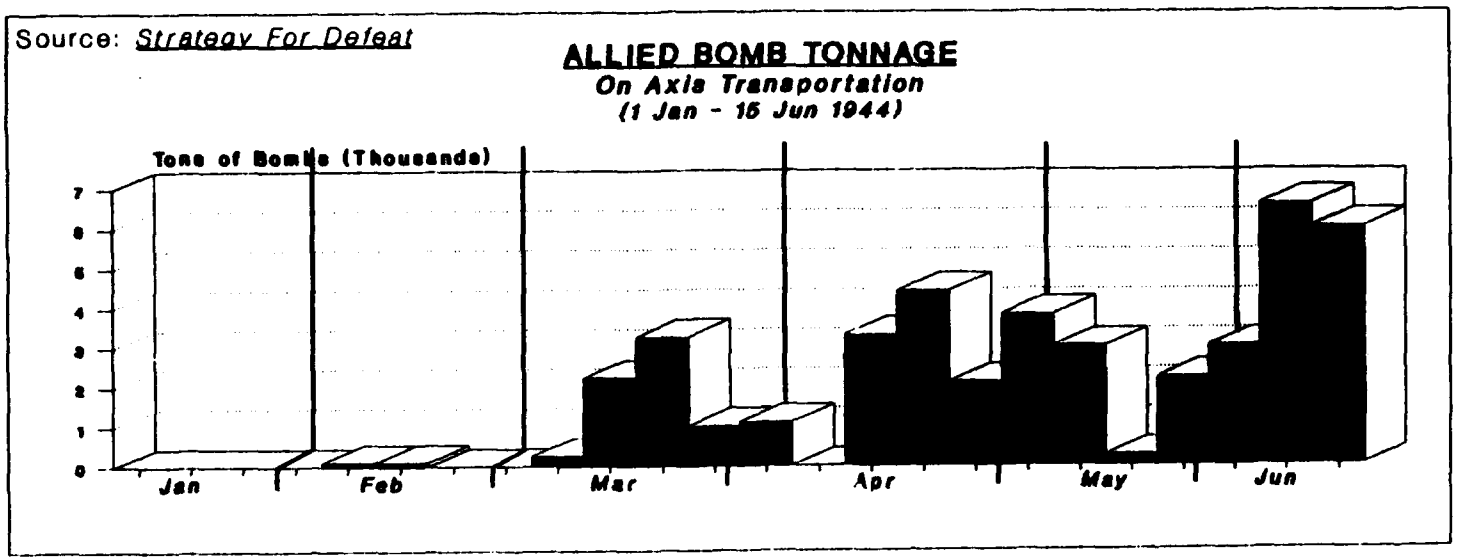


FIGURE A-3
Effects of Bomber Offensive on Axis Transportation

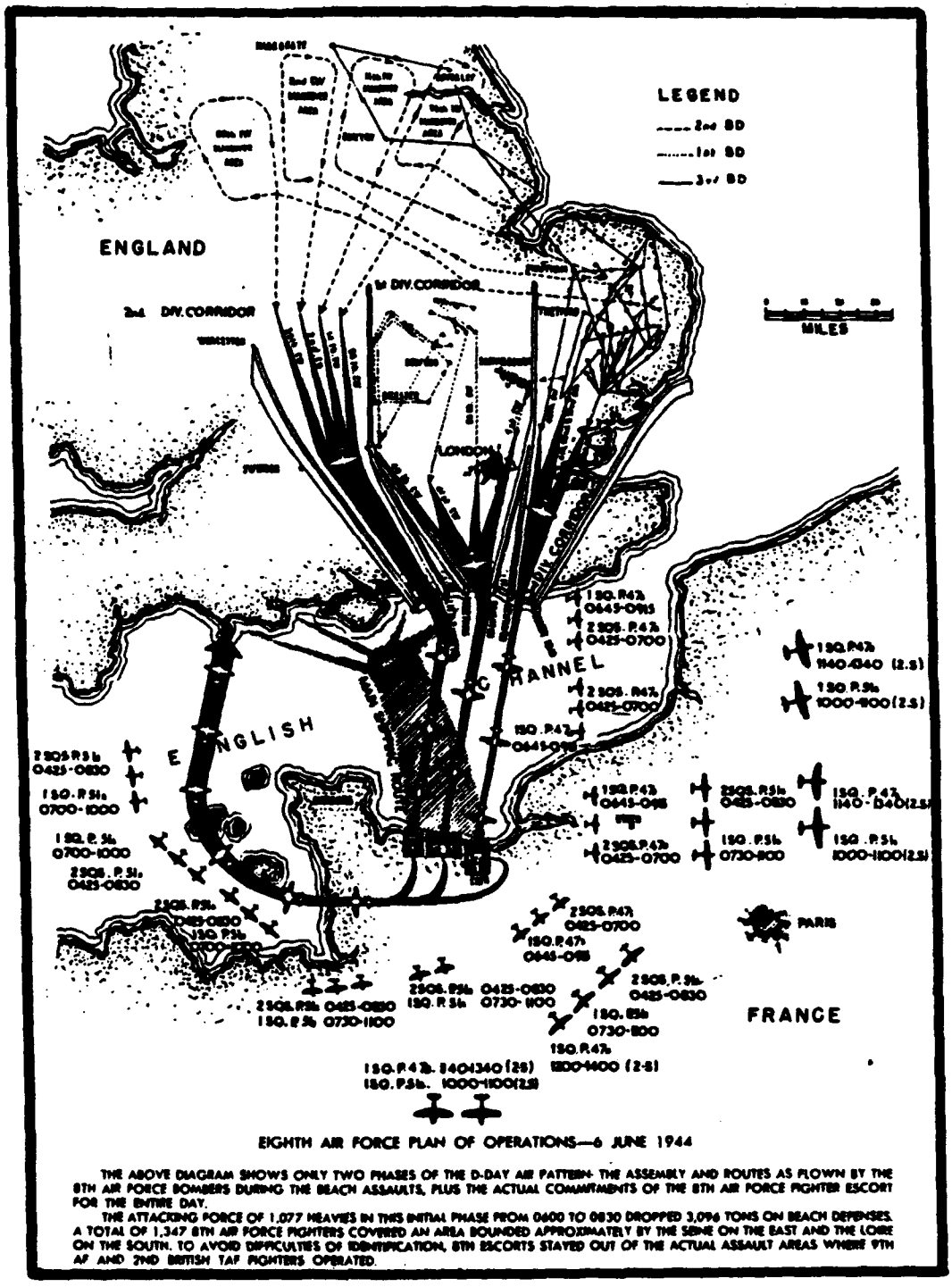


FIGURE A-4

Eighth Air Force Overlord Bomber Routing

Source: Effects of Airpower on Military Operations in Western Europe

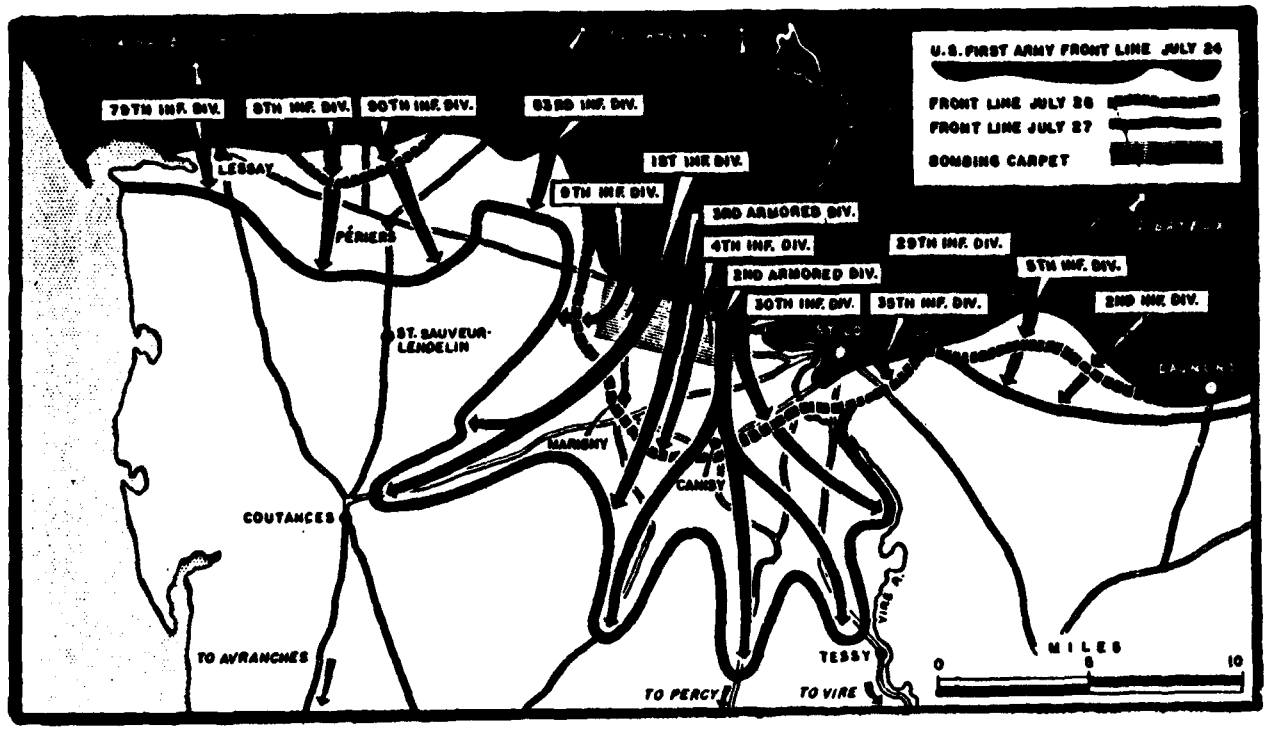


FIGURE A-5

Operation Cobra
(24 - 27 July, 1944)

Source: A Soldier's Story

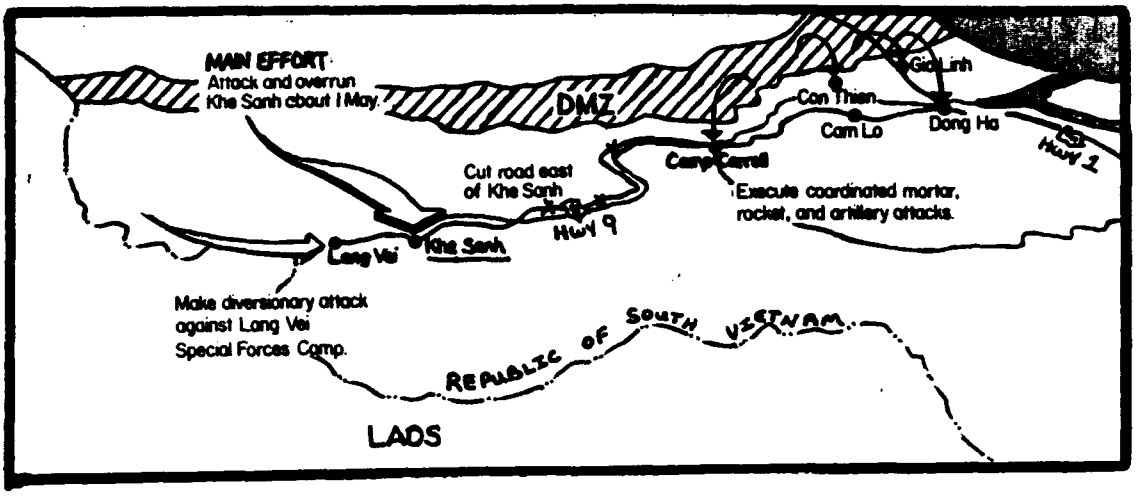


FIGURE A-6

North Vietnamese Battle Plan at Khe Sanh
(January - April, 1968)

Source: The Battle for Khe Sanh

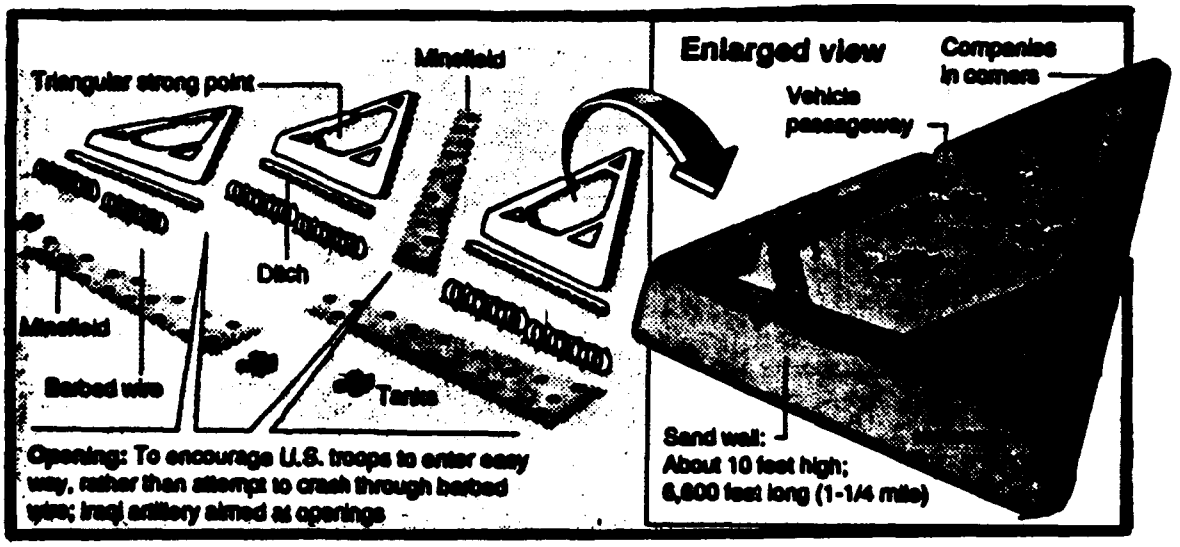


FIGURE A-7

Iraqi Linear Defense Profile
(Battalion-Size)

Source: Desert Warrior

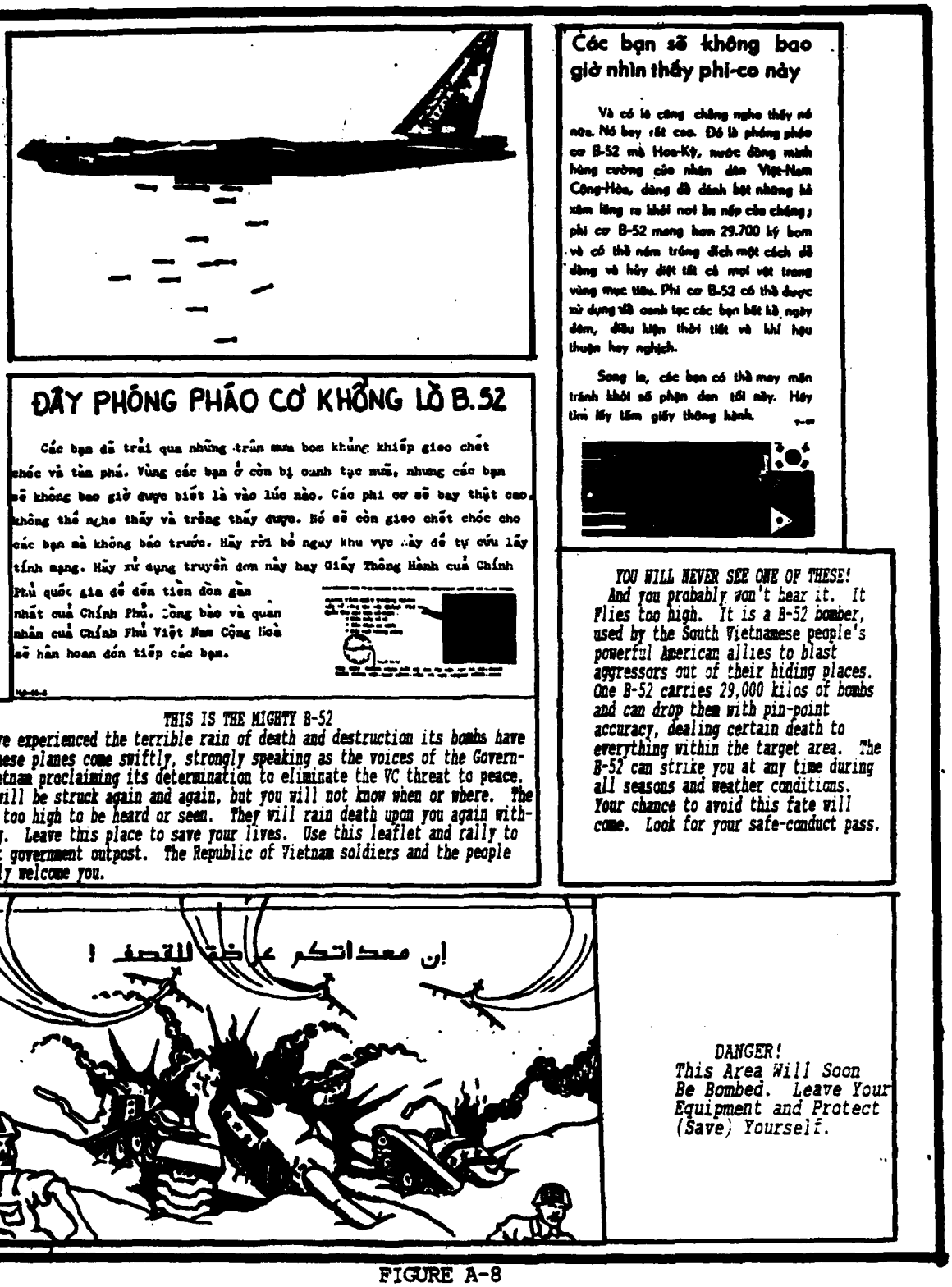


FIGURE A-8
B-52 Psychological Warfare Leaflets

Source: Arc Light Effectiveness

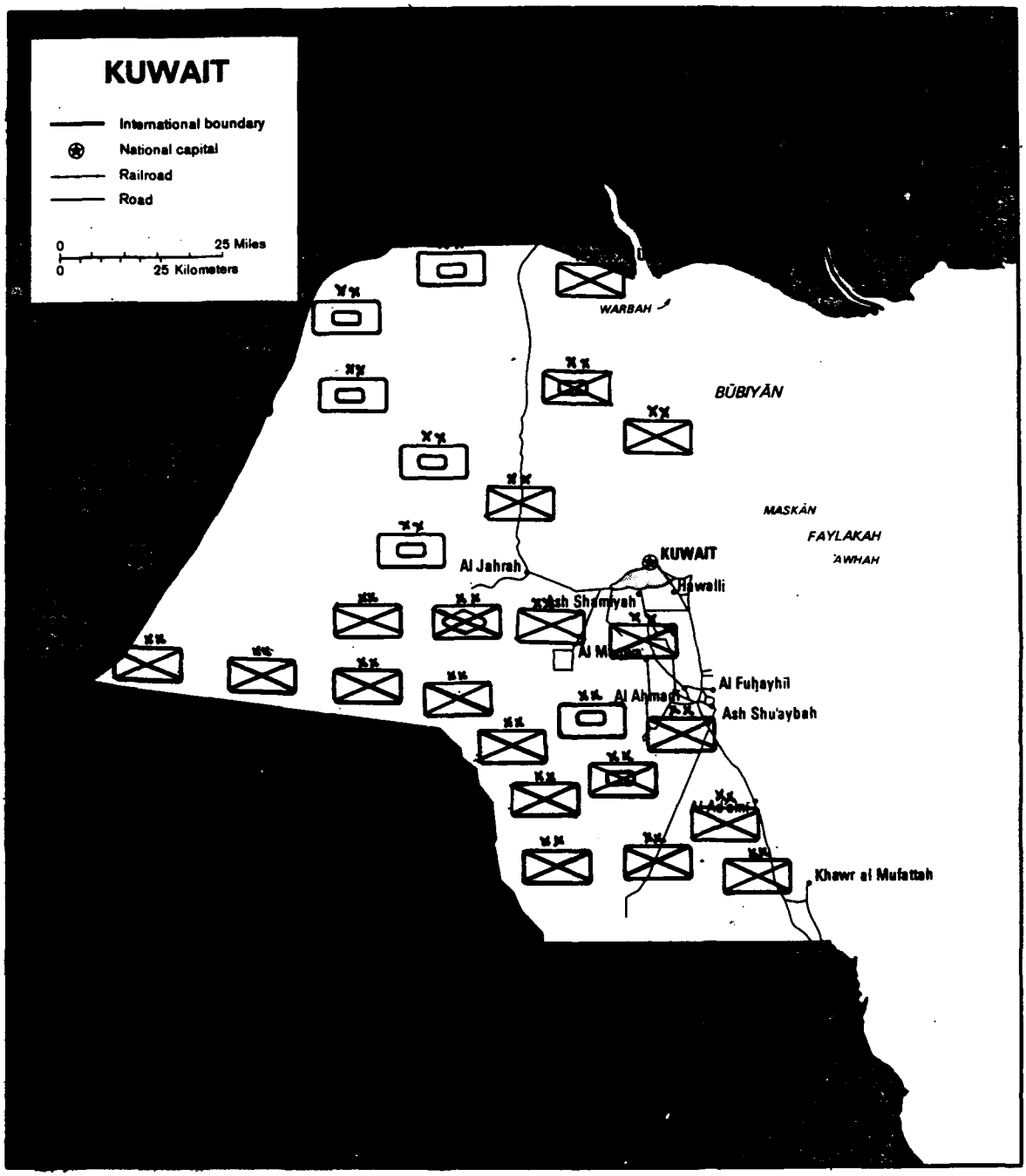
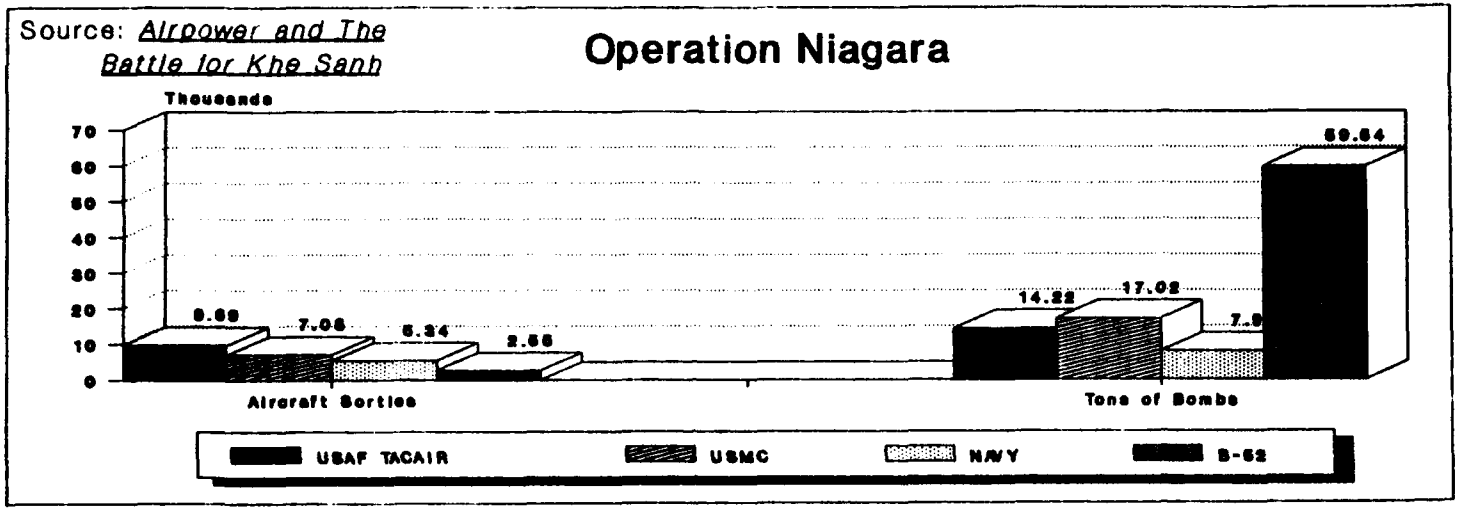


FIGURE A-9

Iraqi Troop Dispositions
(As of "Day One" - 16 January, 1991)



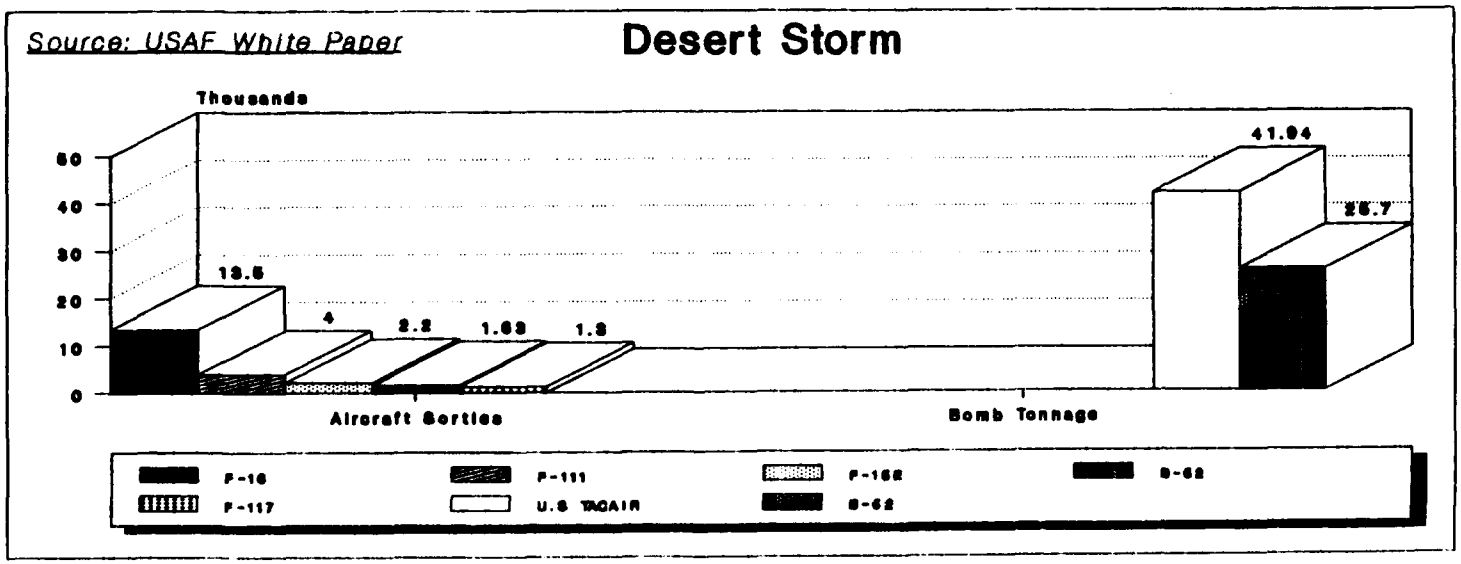


FIGURE A-10

Niagara and Desert Storm Aircraft Sortie to Bomb Ratios

Source: *Airpower & The Fight for Khe Sanh*

U.S. - NVA KHE SANH COMBAT RATIOS
(1 January, 1968)

	NVA	U.S.	RATIOS
Troops	40,000 - 3 Inf Div - 1 Rgt	6,000 - 1 Rgt+	1.0/0.2
Artillery	144 - 48 105mm - 48 122mm - 48 75mm	24 - 18 105mm - 6 155mm	1.0/0.2
Mortars	222 - 78 120mm - 36 82mm - 108 60mm	24 - 6 4.2in - 18 175mm	1.0/0.1

Sources:
* *CENTCOM Brief*
* *How to Defeat Hussein*

IRAQI - COALITION COMBAT RATIOS
(17 January, 1991)

	IRAQI	COALITION	RATIO
Troops	623,000	443,000	1.0/0.71
Tanks	4,700	3,500	1.0/0.74
Artillery	3,200	1,745	1.0/0.55
Combat Aircraft	500	1,930	0.26/1.0
Combat Helio	120	650	0.19/1.0

FIGURE A-11
Niagara and Desert Storm Combat Ratios

ENDNOTES

1. B.H. Liddell Hart, Thoughts on War, (London, 1944), p. xiv.

2. "Strategy", USA Today, (22 January, 1991), p. 7A.

3. Ken Fireman, "The Devil's Freight Train: B-52 Raids Called an Unforgettable Horror", Newsday, (27 January, 1991), p. 6.

4. Juan J. Walte, "B-52s: Quakemakers", USA Today, (18 January, 1991), p. 4A.

5. Casey Anderson, "SAC Dilemma: Smaller Force, Multiple Tasks", Air Force Times, (29 April, 1991), p. 28; Also see Robert R. Ropelewski, "SAC Explores Conventional Role for Older Bombers", Armed Forces Journal International, (September 1989), p. 20.

6. See B-52 Conventional Munitions Fact Book, (HQ SAC/XRTA, Jan 1988) for a listing of various conventional weapon capabilities. For employment concepts, see: Thomas Bradley, The Use of Air Power in Joint Maritime Operations, (Maxwell AFB, 1985), pp. 67-84; Clyde E. Bodenheimer, Impact of New Technology Weapons on SAC Conventional Air Operations, (Maxwell AFB, 1983), pp. 57-78; and Martin T. Daack, "Sowing The Seams: Strategic Bombers Versus Follow-On Forces", Airpower Journal, (Winter 1988), pp. 22-30

7. Department of the Air Force, U.S. Air Force Basic Doctrine (AFM 1-1), (Maxwell AFB: 1984), p. i.

8. Department of The Army, Operations, (FM 100-5), (August, 1982), p. 2-3.

9. Ibid., p. 2-3.

10. Headquarters, Department of The Army, Operations FM 100-5, (Washington D.C.: 1986), p. 10. While FM 100-5 does recognize the planning and directing of campaigns is a theater commander duty, and the design of major ground, sea, and air operations is usually a function of the appropriate component commanders, it also dismisses the idea that operational art is not constrained to any particular echelon of command.

11. FM 100-5 (May 1986), pp. 9-11.

12. Ibid., p. 10.

13. Ibid., p. 13.

14. U.S. Army Command and General Staff College, Large Unit Operations (FM 100-6) (Draft), (Fort Leavenworth: 1987), p. 3-7.

15. Ibid., p. 3-13.

16. Headquarters, U.S. Army Training and Doctrine Command, Blueprint of The Battlefield, Training and Doctrine Command Pamphlet (TRADOC Pam) 11-9, (Fort Monroe, 1990), pp. 12-13. Also see TRADOC publication The Army in Theater Operations, FM 100-7 (Draft) (Fort Monroe:1990), p. 2-40.

17. FM 100-6, p. 3-14; Also see FM 100-7, p. 2-41.

18. Brian Bond, Liddell Hart: A Study of His Military Thought, (London: 1977), p. 58.

19. F.O. Miksche, Attack: A Study of Blitzkrieg Tactics, p. 27-28.

20. Len Deighton, Blitzkrieg: From The Rise of Hitler to The Fall of Dunkirk, (New York: 1979), pp. 220-221.

21. Headquarters, Department of The Army, Fire Support in The Airland Battle FM 6-20, (Washington D.C.: 1988), pp. 2-4 - 2-5, and 3-1 - 3-5.

22. TRADOC Pamphlet 11-9, p. 13.

23. Ibid., p. 13.

24. AFM 1-1, p. 2-5.

25. Ibid., p. 2-11.

26. Ibid., p. 2-10.

27. Ibid., p. 2-11.

28. Hoyt S. Vandenberg and Stanley Frank, "The Truth About Our Airpower," Saturday Evening Post, (17 February, 1951), p.21.

29. Bennie L. Davis, "Indivisible Airpower," Air Force Magazine, (March, 1984), p. 46.

30. Ibid., p. 46.

31. Carl Von Clausewitz, Michael Howard and Peter Paret, eds. On War, (Princetown: 1984), pp. 171.

32. Anthony Verrier, The Bomber Offensive, (London: 1969) p. 332. Also see Lord Tedder, With Prejudice, The War Memoirs of Marshall of The Royal Air Force, (Boston: 1966), p. 546.

33. Verrier, pp. 332-335.

34. Max Hastings, Overlord: D-Day and The Battle for Normandy, (New York: 1984), p. 35.

35. Hastings, p. 334.

36. Matthew Cooper, The German Army: 1933-1945, (Chelsea: 1990), pp. 502-503.

37. Charles Messenger, 'Bomber' Harris and The Strategic Bombing Offensive: 1939-1945, (Harrisburg: 1984), p. 107.

38. Basil Collier, A History of Air Power, (New York: 1974), p. 229.

39. Messenger, pp. 110-113.

40. The Rise and Fall of The German Air Force: 1933-1945, (New York: 1983), p. 324.

41. Richard H. Kohn and Joseph P. Harahan, Strategic Air Warfare, (Washington, D.C.: 1988), p. 46.

42. Humphrey Wynn and Susan Young, Prelude to Overlord, (Novato: 1983). p. 102.

43. Ibid., p. 104.

44. Wesley Craven and James Cates, The U.S. Army Air Force in World War II, Vol III: Argument to V-E Day, (Washington, D.C.: 1983), p. 160.

45. Russell F. Weigley, Eisenhower's Lieutenants: The Campaign of France and Germany (1944-1945), (Bloomington: 1974), p. 73.

46. Craven and Cate, pp. 142-143.

47. Army Air Force Evaluation Board in The European Theater of Operations, The Effectiveness of Third Phase Tactical Air Operations in The European Theater (5 May 1944 - 8 May 1945), p. 69.

48. Headquarters, Eighth Air Force, Daily Operational Activities: 2 June - 17 June 1944, (Operations No. 394, "D-Day Heavy Bomber Activities," Missions 1-4). pp. 1-10. Also see Headquarters, Eighth Air Force, "Report of Operations" - 2 - 17 June, 1944 (Tactical Operations in Support of Allied Landings in Normandy), (6 November, 1944), p. 9; and Craven and Cate, p. 189.

49. HQ, 8AF, Daily Operational Activities, p.5. Delay factors were a function of target time relative to H-Hour and establishing a 1,000 yard safety zone between the forces moving forward and desired point of weapon impact.

Target Time Relative To H-Hour	Bomb Delay Factor
75 - 20 minutes prior	No Delay
20 - 15 minutes	5 Seconds
15 - 10 minutes	10 Seconds
10 - 5 minutes	15 Seconds

50. Craven and Cate, p. 192.

51. Omar N. Bradley and Clay Blair, A General's Life, (New York: 1983), p. 249.

52. Michael E. Barrington, et al., "Operation Cobra and The Mortain Counterattack," Military Review, (July 1988), p. 58.

53. Omar N. Bradley, A Soldier's Story, (New York: 1951), p. 318.

54. Paul Martell, et al., A Study of Breakthrough Operations, (Dunn Loring: 1976), p. 70. Artillery resources included: 258 non-divisional pieces; 312 divisional; and 96 pieces from two divisions in reserve.

55. Bradley, A Soldier's Story, p. 338.

56. Martin Blumenson, United States Army in World War II: Breakout and Pursuit, (Washington, D.C.: 1984), p. 220.

57. Ibid., pp. 188-193. Reference is made to Operation Goodwood in which Montgomery requested RAF bomber to open a gap in the German defenses on the outskirts of Caen. Per his request, Montgomery received over 1,700 bombers and 8,000 tons of bombs. While the bombs eliminated much of the German resistance, it also severely cratered and obstructed the roads, requiring a tremendous engineer effort before Montgomery could proceed.

58. Weigley, p. 151.

59. David R. Mets, Master of Airpower: General Carl A. Spaatz, (Presidio: 1988), pp. 222-223. Mets outlines both sides of the argument for a parallel verse perpendicular bombing axis. Where Bradley thought an axis in which the sun could blind the sight of enemy anti-aircraft defense might appeal to the aviators, Spaatz and Tedder saw the argument more of a case of achieving mass, minimizing risks, and improving bombing accuracy. In any case, Bradley came away from the conference confident he had won the argument whereas the Spaatz and Tedder insist they never would have accepted the plan if required to execute such an attack. Also see, Weigley, p. 151.

60. Blumenson, pp. 228-229. Allied casualties were listed at 25 U.S. soldiers killed, 131 wounded.

61. Bradley and Blair, p. 279.

62. Blumenson, pp. 238-239.

63. Ibid., pp. 221-222. The assault came in four waves. The first wave consisted of 350 fighter-bombers conducting low-level strafing runs against enemy defenses and anti-aircraft positions. Next came

1,800 B-17 and B-24 bombers in an hour-long attack, followed by another 350 fighter-bomber attack to support the start of the actual ground assault. Finally, 396 bombers hit targets in the far southern edge of the target box, pinning down remaining German resistance as U.S. troops moved forward.

64. Ibid., p. 240.

65. Richard P. Hallion, Strike From the Sky, (Washington, D.C.: 1989), pp. 212-213. Also see "Bombing and Operation Cobra: Interview with General Von Luettwitz", (Department of The Army: 12 July 1949), p. 3.

66. Bradley and Blair, p. 281.

67. John E. Frisby and Grover E. Myers, "Strategic Forces in Transition: A Doctrine for Indivisible Aerospace Application," (Maxwell AFB: 1985), pp. 15-17. In October, 1948, General Curtis LeMay, SAC Commander-in-Chief, announced "The fundamental goal of the Air Force should be creation of a strategic atomic striking force capable of attacking any target in Eurasia from bases within the United States." Later that same year, Air Force Chief of Staff, General Hoyt Vandenberg, reduced the Air Defense Command and Tactical Air Command to a status of operational headquarters without assigned units. Also, General William Moymer, Commander of Seventh Air Force and General Westmoreland's Deputy Air Commander in Southeast Asia, states that in the late 1940s, "The Air Force was shrinking and funds were short. . . it wasn't easy to find money for conventional tactical weapon systems... most of the Air Force budget was earmarked for that part of the force which would have to deter or win a general nuclear war."

68. One contemporary example perpetuating the "bomber = nuclear" myth can be found in the annual budgetary reports submitted to congress. In a play for greater funds, the bomber has typically been listed as a "Nuclear Forces and Strategic Defense" asset, claiming "Strategic bombers can carry nuclear gravity bombs, short-range attack missiles, or air-launched cruise missiles." Today, this same relationship persists as funds for B-2 Stealth Bomber, B-1, and B-52 continue to become more difficult to obtain. Only with the greatest of scrutiny can the reader find any reference in these reports to bombers in a conventional role. See Annual Report to The Congress: FY 1990, (Washington, D.C.: 1989), pp. 155-156, 181-190, & 231-232 and Annual Report to The President and The Congress: FY 1991, pp. 30-32 & 75-76.

69. Truong Nhu Tang, A Vietcong Memoir, (New York: 1985), p. 167. Also see: Thomas C. Thayer, A Systems Analysis View of The Vietnam War: 1965-1972, (Washington, D.C.: 1975), 111; and "SAC in SEA - And After." Supplement to the Air Force Policy Letters for Commanders, No. 11-1968, United States Air Force, (November, 1968), p. 9.

70. Warren A. Trest, Project CHECO Report: Khe Sanh (Operation Niagara), (Headquarters, Pacific Air Force: 1968), p. 3.

71. Lyndon B. Johnson, The Vantage Point: Perspectives of The Presidency (1963-1969), (New York: 1971), p. 381. General Westmoreland suspected that North Vietnam's Defense Minister, General Vo. Nguyen Giap, was planning a major assault against the Khe Sanh base in hopes of achieving "a climatic victory" similar to Dien Bien Phu and thus gain "exploitable victories for political purposes." However, General S.L.A. Marshall saw the massing of forces at Khe Sanh to be "just a feint," with the ultimate purpose of drawing U.S. combat power out of the populated areas to reinforce Khe Sanh, and leaving the major cites in South Vietnam vulnerable to attack. Also see Stanley Karnow, Vietnam: A History, (New York: 1983), p. 542.

72. Karnow, p. 541. Johnson's obsession over the possibility of Khe Sanh becoming another Dien Bien Phu grew to the point where he demanded a written promise from each of the Joint Chiefs of Staff stating no such reoccurrence would take place.

73. Willam Pearson, The War in The Northern Provinces: 1966-1968, (Washington, D.C.: 1975), p. 49.

74. Trest, p. 4.

75. William C. Westmoreland, A Soldier Reports, (Garden City: 1976), p. 339.

76. U.S. Grant Sharp, Strategy For Defeat: Vietnam in Retrospect, (San Rafael: 1978), pp. 87-88. By contrast, a single B-52 mission, consisting of 6 aircraft, could deliver almost 150 tons of bombs on a 2-KM area, all in less than 15 minutes.

77. David J. Mrozek, Air Power and The Ground War in Vietnam, (Maxwell AFB: 1988), p. 140.

78. Willard Pearson, p. 33.

79. Bernard C. Nalty, Air Power and The Fight for Khe Sanh, (Washington, D.C.: 1986), p. 82.

80. Ibid., p. 38.

81. Moyers S. Shore, The Battle For Khe Sanh, (Washington, D.C.: 1969), p. 102.

82. Trest, p. 89.

83. Carl Berger, ed., The United States Air Force in Southeast Asia: 1961-1973. (Washington, D.C.: 1984), p. 157.

84. Michael Herr, Dispatches, (New York: 1978), pp. 166-167.

85. U.S. News and World Report, (28 November, 1966), p. 49.

86. Trest, p. 92.

87. Ibid., p. 93.

88. "U.N. Resolutions on Iraq", The New York Times International, (16 February, 1991). p. A2.

United Nations Resolution 660 (2 August, 1990):
1) Condemned the Iraqi invasion of Kuwait.
2) Demanded the immediate and unconditional withdrawal of all forces to positions occupied on 1 August.
3) Called for immediate negotiation between the two countries.
4) Created provisions to ensure compliance.

United Nations Resolution 678 (29 November, 1990) granted a "pause of goodwill' to permit Iraq a final opportunity to withdraw from Kuwait, but authorized member states to "use all necessary means" to implement U.N. Resolution 660 if Iraq failed to comply with the 15 January, 1991 deadline.

89. Marty Baumann, "How Baghdad Was Hit", USA Today, (17 January, 1991), p. 3A; Also see Marty Baumann, et al., "Operation Desert Storm: The First Day", USA Today, (18 January, 1991), p. 5A.

90. Michael Dugan, "The Air War", U.S. News and World Report, (11 February, 1991), p. 26.

91. Craig R. Whitney, "B-52 Crews in England Tell of High Altitude Strikes on Iraqi Targets," New York Times, (8 March, 1991), p. A9. Also see "Baghdad Jolted by Waves of B-52 Attacks," The New York Times, (5 February, 1991), p. A14.

92. Headquarters, Strategic Air Command, Bomber Conventional Operations Directorate. Unclassified Talking Paper: "Mobility Area Denial Delay of Ground Forces." (14 November, 1989). p. 3. Paper cites B-52/FASCAM merger enables a single bomber to seed 30 separate minefields, five minefields 800 feet by one mile long, or a number of combinations in between.

93. Jared Schneidman, "Discount A-Bomb," Newsweek, (25 February, 1991), pp. 26-27. Also see "Updating the 'Big Ugly Fellow," Newsweek, (18 February, 1991), p. 47.

94. General Norman Schwarzkopf, Central Command (CENTCOM) Desert Storm Briefing, (27 February, 1991).

95. Jeffrey Smith, "U.S. Aims to Destroy Core of Iraq's Military," Washington Post, (25 February, 1991), p. A1.

96. Hart, Thoughts on War, p. i.

97. Westmoreland was instrumental in forging a single air commander concept to integrate and maximize both Tacair and B-52 firepower over Khe Sanh. Also, Westmoreland's efforts and insight were equally critical in devising B-52 Bugle Note operations, which further enhanced bomber responsiveness and lethality. See: Trest, pp. 6-12 and 66-71; and Westmoreland, A Soldier Reports, p. 339.

98. Weigley, p. 72.

99. Ibid., p. 172.

100. Ibid., pp. 72-73. Weigley states that to achieve the Overlord 7,800 tonnage requirement, over 20 battleships and 100 destroyers would have been necessary. He further states that total naval support at Normandy consisted of: 3 battleships; 3 heavy and 6 light cruisers; 20 destroyers; and a single Dutch gunboat, equating to a fires capacity of 2,500 tons of ordnance. Bradley, on the other hand, readily admits that even if he had all the artillery he needed to achieve his Cobra breakout, they would have been incapable of "saturating the carpet with the intensity required." (Bradley, A Soldier's Story, p. 338.)

101. Berger, p. 157.

102. Trest, p. 70-71.

103. Schwarzkopf Desert Storm Briefing, (27 February, 1991): Also see: "B-52 Fears Echo from the Past," Los Angeles Times, (16 February, 1991), p. A1; Tom Morganthau, "The Troops March On," Newsweek, (25 February, 1991), pp. 27-28; and Charles Lane, "Wearing Down the Enemy," Newsweek, (4 March, 1991), p. 41.

104. Office of Public Affairs, Headquarters Strategic Air Command. "SAC Bomber and Tanker Crews Respond to Desert Shield," SAC News Service, (5 September, 1990), pp. 8-9. Article reports that twenty-four B-52s deployed from CONUS to assume conventional alert status at Diego Garcia, a small island located in the Indian Ocean.

105. Weigley, pp. 72-73. Also see endnote #100.

106. Bradley, A Soldier's Story, p. 338.

107. Nalty, p. 105. Also see Trest, pp. 112-114.

108. Note: The term "his" in reference to Westmoreland owning any fighters is used quite loosely. Seventh Air Force, commanded by General William Momyer, actually "owned" the fighter assets. For additional information regarding command responsibilities, see Airpower in Three Wars, "Command and Control of Airpower in the Vietnam War" (Chapter III), (Washington, D.C.: 1978), pp. 65-108.

109. Department of the Air Force, "White Paper: Air Force Performance in Desert Storm," (April 1991).

110. Nalty, p. 14.

111. William R. Emerson, Operation Pointblank: A Tale of Bombers and Fighters, (Colorado Springs: 1962), p. 5. Also see Messenger, pp. 228-230.

During the first Schweinfurt mission (17 August, 1943), Eighth Air Force lost 60 of its 376 bombers, yielding almost a 16% loss rate. On its follow-up mission in October, 291 bombers were dispatched. On those: 229 reached Schweinfurt; 197 returned to England; 5 crashed while attempting to land; and 17 where too badly damaged to fly again. Total loss rate: 28%

RAF losses were never that severe. Typical attrition rates ran between three and six percent. On 24 March, 1944, the Berlin raids cost the RAF 456 of its 5,000 bombers (9%) and a subsequent Nuremberg mission on 25 March resulted in the loss of 96 of the 795 aircraft flown (12%).

112. Weigley, p. 94. Captured enemy records indicate that during the allied landings at Normandy, the German tactical air force (Jagdkorps II) was able to muster up between 50 and 121 aircraft. This equated to approximately 250 sorties, none with substantial effect. Furthermore, Operation Cobra was practically void of German air threat and those allied bombers that failed to return fell victim to German ground defenses. (See Craven and Cates, p. 233.)

113. J.F.C. Fuller, Memoirs of an Unconventional Soldier, (London: 1936), p. 26.

BIBLIOGRAPHY

Books

Berger, Carl, ed., The United States Air Force in Southeast Asia: 1961-1973. Washington, D.C.: Office of Air Force History, 1984.

Blumenson, Martin. The U.S. Army in World War II: Breakout and Pursuit. Washington, D.C.: Center of Military History, 1984.

Bond, Brian. Liddell Hart: A Study of His Military Thought. London: Cassell, 1977.

Bradley, Omar N. A Soldier's Story. New York: Henry Holt and Company, 1951.

_____ and Clay Blair. A General's Life. New York: Simon and Schuster, 1983.

Chadwick, Frank. Desert Shield Fact Book. Bloomington: Game Designers' Workshop. 1991.

Clausewitz, Carl Von. On War. Translated and edited by Michael Howard and Peter Paret. Princeton: Princeton University Press, 1976.

Collier, Basil. A History of Airpower. New York: MacMilliam Publishing Company, Inc., 1974.

Cooper, Matthew. The German Army: 1933-1945. Chesea: Scarborough House Publishers, 1990.

Craven, Wesley and James L. Cates. The Army Air Force in World War II, Vol III: Argument to V-E Day. Washington, D.C.: Office of Air Force History, 1983.

Davis, Jacquelyn K. and Robert L. Pfaltzgraff Jr. Power Projection and The Long-Range Combat Aircraft. Washington, D.C.: Institute for Foreign Policy Analysis, Inc., 1981.

Davis, Richard G. The Bomber Baron: Carl Andrew Spaatz and The Army Air Forces in Europe, 1942-1945. Ann Arbor: University Microfilms International, 1986.

Deighton, Len. Blitzkrieg: From The Rise of Hitler to The Fall of Dunkirk, New York: Ballantine Books, 1979.

D'Este, Carlo. Decision in Normandy. New York: E.P. Dutton, Inc., 1983.

Doubler, Michael D. Busting The Bocage: American Combined Arms Operations in France: 6 June - 31 July, 1944. Ft.

Leavenworth: U.S. Army Command and General Staff College, 1988.

Dupuy, Trevor N., et al. How To Defeat Saddam Hussein: Scenarios and Strategies for the Gulf War. New York: Warner Books, 1991.

Emerson, William R. Operation Pointblank: A Tale of Bombers and Fighters. Colorado Springs: USAF Academy, 1962.

Fuller, J.F.C. Memoirs of An Unconventional Soldier. London: Ivor Nicholson and Watson Limited, 1936.

Hallion, Richard P. Strike From the Sky. Washington, D.C.: Smithsonian Institution Press, 1989.

Harris, Arthur. Bomber Offensive. London: Collins Books, 1947.

Hart, B.H. Liddell, Thoughts on War. London: Faber and Faber, Ltd., 1944.

Hastings, Max. Bomber Command. New York: The Dial Press, 1979.

_____. Das Reich. New York: Holt, Rinehart, and Winston, 1981.

_____. Overlord: D-Day and The Battle For Normandy. New York: Simon and Schuster, 1984.

Herr, Michael. Dispatches. New York: Avon Books, 1978.

Hurley, Alfred F. and Robert C. Ehrhart, eds. Airpower and Warfare. Washington, D.C.: Office of Air Force History, 1979.

Irving, David. The War Between The Generals. New York: Congdon and Lattes, Inc., 1981.

Johnson, Lyndon B. The Vantage Point: Perspectives of The Presidency (1963-1969). New York: Holt, Rinehart, and Winston, 1971.

Karnow, Stanley. Vietnam: A History. New York: Penguin Books, 1983.

Kennett, Lee. A History of Strategic Bombing. New York: Charles Scribner's Sons, 1982.

Kohn, Richard H. and Joseph P. Haraham. Strategic Air Warfare. Washington, D.C.: Office of Air Force History, 1988.

Messenger, Charles. 'Bomber' Harris and The Strategic Bombing Offensive. Harrisburg: Arms and Armour Press, 1984.

Mets, David R. Master of Airpower: General Carl A. Spaatz. Presidio: Air Force Historical Foundation, 1988.

Miksche, F.O. Attack: A Study of Blitzkrieg Tactics, New York: Random House, 1942.

_____. Is Bombing Decisive: A Study in The Organization and Tactical Employment of Modern Air Fleets. London: George Allen, Ltd., 1943.

Moymer, William W. Airpower in Three Wars. Washington, D.C.: Office of Air Force History, 1978.

Mrozek, David J. Airpower and The Ground War in Vietnam. Maxwell AFB: Air University Press, 1988.

Murray, Williamson. Strategy For Defeat: The Luftwaffe (1933-1945). Maxwell AFB: Air University Press, 1983.

Nalty, Bernard C. Airpower and The Fight for Khe Sanh. Washington, D.C.: Office of Air Force History, 1986.

Nofi, Albert A. The War Against Hitler. New York: Hippocrene Books, Inc., 1982.

Pearson, Willard. The War in The Northern Provinces: 1966-1968. Washington, D.C.:U.S. Government Printing Office, 1975.

Pisor, Robert. The End of The Line: The Siege of Khe Sanh. New York: W.W. Norton and Co., 1982.

Possony, Stefan T. Strategic Airpower: A Pattern of Dynamic Security. Washington, D.C.: Infantry Journal Press, 1949.

Rise and Fall of The German Air Force: 1933-1945. New York: St. Martin's Press, 1983.

Rostow, Walt W. Pre-Invasion Bombing Strategy. Austin: University of Texas Press, 1981.

Schlight, John. The War in South Vietnam: The Years of The Offensive. Washington, D.C.: Office of Air Force History, 1988.

Shandroff, Gary J. The Evolution of Area Bombing in American Doctrine and Practice. Ann Arbor: University Microfilms, 1972.

Sharp, U.S. Grant. Strategy For Defeat - Vietnam in Retrospect. San Rafael: Presidio Press, 1978.

Shore, Moyers S. The Battle for Khe Sanh. Washington, D.C.: Historical Department, United States Marine Corps, 1969.

Tang, Truong Nhu. A Vietcong Memoir. New York: Harcourt Brace Jovanovich, Publishers. 1985.

Tedder, Arthur William. With Prejudice: The War Memoirs of Marshall of The Royal Air Force. Boston, 1966.

_____. Airpower in War. Westport: Greenwood Press Publishers, 1948.

Verrier, Anthony. The Bomber Offensive. London: The MacMillian Co., 1968.

Warden, John A. The Air Campaign. Washington, D.C.: National Defense University Press, 1988.

Weigley, Russell F. Eisenhower's Lieutenants. Bloomington: Indiana University Press, 1981.

Westmoreland, William. A Soldier Reports. Garden City: Doubleday Books, 1976.

_____. Report on The War in Vietnam (As of 30 June, 1968). Washington, D.C.: U.S. Government Printing Office, 1968.

Wynn, Humphrey and Susan Young. Prelude to Overlord. Novato: Presidio Press, 1983.

Articles and Periodicals

Anderson, Casey. "SAC Dilemma: A Smaller Force, Multiple Tasks." Air Force Times, (29 April, 1991), p. 28.

Atkinson, Rick and Dan Belz. "Allied Bombers Strike Shifting Iraqi Troops." Washington Post. (1 February, 1991), p. 1.

"B-52 Fears Echo from the Past." Los Angeles Times. (16 February, 1991), p. A1.

"Baghdad Jolted by Waves of B-52 Attacks." New York Times. (5 February, 1991), p. A14.

Baker, Caleb. "Attack on Iraqi Line on Hold." Army Times. (28 January, 1991), p. 26.

Barrington, Michael E., et al. "Operation Cobra and The Mortain Counterattack." Military Review. (July, 1988), pp. 57-66.

Baumann, Marty. "How Baghdad Was Hit." USA Today. (17 January, 1991), p. 3A.

_____. "Operation Desert Storm: The First Day." USA Today. (18 January, 1991), p. 5A.

Bird, Julie. "Air Force Leaders Foresee Fewer, Costlier Weapons." Air Force Times. (11 March, 1991), p. 26.

Borrows, Stephan D. "Cobra: The Normandy Breakout." Armor. (September - October, 1984), pp. 24-29.

Brownlow, Cecil. "B-52s Prove Tactical Value During Siege of Khe Sanh." Aviation Week and Space Technology. (13 May, 1968), pp. 26-30.

Budiansky, Stephen, et al. "Preparing The Ground." U.S. News and World Report. (4 February, 1991), pp. 32-41.

Carlson, Kenneth G. "Operational Level or Operational Art?" Military Review. (October, 1987), pp. 50-54.

Daak, Martin T. "Sowing The Seams: Strategic Bombers Verses Follow-On Forces." Air University Review. (Winter, 1988), pp. 22-30.

Davis, Bennie L. "Indivisible Airpower." Air Force Magazine. (March, 1984), pp. 46-50.

Dugan, Michael, "The Air War." U.S. News and World Report. (1 February, 1991), pp. 24-31.

Fireman, Ken. "The Devil's Freight Train: B-52 Raids Called an Unforgettable Horror." Newsday. (27 January, 1991), p. 6.

Fulghum, David. "Conventional NATO Mission Sought for B-52Gs." Air Force Times. (5 October, 1987), p. 35.

Galvin, John R. "The Relief of Khe Sanh." Military Review. (January, 1970), pp. 88-94.

Huston, James A. "Tactical Use of Airpower in World War II: The Army Experience." Military Review. (July, 1952), pp. 32-49.

Kipp, Robert M. "Counterinsurgency From 30,000 Feet." Air University Review. (Fall, 1968), pp. 11-18.

Lane, Charles, et al. "The Might and Myth of the B-52." Newsweek. (18 February, 1991), pp. 46-48.

_____. "Airpower Faces Its Biggest Test." Newsweek. (21 January, 1991), pp. 34-35.

_____. "Wearing Down the Enemy." Newsweek. (4 March, 1991), p. 41.

Matthews, Tom. "The Secret History of the War." Newsweek. (18 March, 1991), pp. 28-39.

Matthews, William. "Thunder and Lightning of Desert Storm." Army Times. (28 January, 1991), pp. 12-18.

Morganthau, Tom, et al. "The Troops March On." Newsweek. (25 February, 1991), pp. 26-28.

Record, Jeffrey. "Air Force's Future Bright after Stellar Gulf Showing." Air Force Times. (11 March, 1991), p. 25.

Ropelewski, Robert R. "SAC Explores Conventional Role for Older Bombers." Armed Forces Journal International. (September, 1989), p. 20.

Schreyach, Jon C. "Fire Support for Deep Operations." Military Review. (August, 1989), pp. 30-36.

Schmitt, Eric. "Saudi Base is Springboard for B-52s." New York Times International. (16 February, 1991), p. L9.

Schneidman, Jared. "Discount A-Bomb." Newsweek. (25 February, 1991), pp. 26-27.

Smith, Jeffrey. "B-52s Begin Bombing Elite Units." Washington Post. (23 January, 1991), p. A19.

_____. "U.S. Aims to Destroy Core of Iraq's Military." Washington Post. (25 February, 1991), p. A1.

"Strategy." USA Today. (22 January, 1991), p. 7A.

Turque, Bill. "Breaching the 'Saddam Line'." Newsweek. (11 February, 1991), p. 27.

"U.N. Resolutions on Iraq." New York Times International. (16 February, 1991), p. 1.

"Updating the 'Big Ugly Fellow." Newsweek. (18 February, 1991), p. 47.

Vandenberg, Hoyt S. and Stanley Frank. "The Truth About Our Airpower." Saturday Evening Post. (17 February, 1951), pp. 21-24.

Waller, Douglas. "Architect of the Air War." Newsweek. (28 January, 1991), p. 24.

Walte, Juan J. "B-52s Quakemakers." USA Today. (18 January, 1991). p. 4A.

Warrick, Joby. "Air Force Gives Itself an A-Plus on War Role." Air Force Times. (13 May, 1991), p. 25.

Watson, Russell and Gregg Easterbrook. "A New Kind of Warfare." Newsweek. (28 January, 1991), pp. 15-23.

Wheeler, Edd D. "Prospects for The Manned Bomber," Air University Review. (January-February, 1979), pp. 2-15.

Whitney, Craig R. "B-52 Crews in England Tell of High Altitude Strikes on Iraqi Targets." New York Times. (8 March, 1991), p. A9.

Wilson, George C. "Anytime Anywhere: A New Conventional Role for B-52 Bombers." Washington Post. (31 March, 1981), p. A2.

Government Publications

AFM 1-1, United States Air Force Basic Aerospace Doctrine. Washington, D.C.: HQ Department of the Air Force, March 1984.

Annual Report to The President and the Congress, (FY 91). Washington, D.C.: U.S. Government Printing Office, 1990.

Annual Report to The Congress (FY 90). Washington, D.C.: U.S. Printing Office. 1989.

FM 6-20, Fire Support in The Airland Battle. Washington, D.C.: HQ Department of the Army, 1988.

FM 100-5, Operations. Washington, D.C.: HQ Department of the Army, 1982.

_____. Washington, D.C.: HQ Department of the Army, 1986.

FM 100-6, Large Unit Operations (Coordinating Draft). Ft Leavenworth: Command and General Staff College, 1987.

FM 100-7, The Army in Theater Operations (Coordinating Draft). Ft Monroe: HQ Training and Doctrine Command, 1990.

FM 100-20, Command and Employment of Airpower. Washington, D.C.: HQ, War Department, 1943.

JCS Pub 3-09, Doctrine for Joint Fire Support Operations (Draft). Washington, D.C.: Office of The Chairman, Joint Chiefs of Staff, 1990.

TRADOC Pam 11-9,, Blueprint of The Battlefield. Ft Monroe: HQ Training and Doctrine Command, 1990.

Supplement to the Air Force Policy Letters for Commanders. No. 11-1968, USAF, November, 1968.

How They Fight: Desert Shield Order of Battle Handbook. Washington, D.C.: U.S. Army Intelligence and Threat Analysis Center, September 1990.

Monographs and Unpublished Research Projects

Berlan, Gregory J. "Forward Offense: Preparing the B-52 for Conventional Warfare." Maxwell AFB: Air University, 1989.

Bingham, Price T. "Airpower and the Defeat of a Warsaw Pact Offensive." Maxwell AFB: Air University Press, 1987.

Bodenheimer, Clyde E. "Impact of New Technology Weapons on SAC Conventional Air Operations." Maxwell AFB: Air University Press, 1983.

Bond, John M. "Operation Cobra, Airland Battle Doctrine, and Joint Attack of The Second Echelon." Ft Leavenworth: Command and General Staff College Thesis, 1969.

Bradley, Thomas. "The Use of Airpower in Joint Maritime Operations." Maxwell AFB: Air Command and Staff College Research Project, 1985.

Combat Studies Institute. Operation Cobra Battle Studies. Ft Leavenworth: Command and General Staff College, 1985.

Crow, Charles L. "Tactical and Operational Depth." Ft Leavenworth: School for Advanced Military Studies Monograph, 1986.

Ford, Jerry L. "Long-Range Combat Airpower." Ft Leavenworth: Command and General Staff College Thesis, 1985.

Frisby, John E. and Grover E. Myers. "Strategic Forces in Transition: A Doctrine for Indivisible Aerospace Application." Maxwell AFB: Air University Press, 1985.

Hammond, Charles O. "Operational Fires and Unity of Command." Ft Leavenworth: School for Advanced Military Studies Monograph, 1990.

Harper, Stephen D. "Indivisible Airpower and The Role of Long-Range Combat Aircraft in Conventional NATO Theater-Level Conflict." Maxwell AFB: Air Command and Staff College Research Project, 1985.

Hogue, Robert M. "Strategic Aircraft Utility for the Spectrum of Warfare." Falls Church: Analytic Services Study, 1973.

Hosmer, Stephen and Glenn A. Kent. "The Military and Political Potential of Conventionally Armed Heavy Bombers." Santa Monica: A RAND Corporation Study, 1987.

Jenkins, Frank R. "Development of Interdiction Doctrine and Strategy in the USAF." Maxwell AFB: Air War College Research Project, 1977.

Karle, Donald D. and Julian B. Hall. "Integrating Strategic and Tactical Airpower in Conventional Warfare." Maxwell AFB: Air War College Research Project, 1988.

Keaney, Thomas A. "Strategic Bombers and Conventional Weapons: Airpower Options." Ft J. McNair: National Defense University Thesis, 1984.

Martell, Paul, et al. A Study of Breakthrough Operations." Dunn Loring: Historical Evaluation and Research Organization, 1976.

Monroe, Kent, et al. "Employment of the Manned Strategic Bomber in Nonnuclear War: A Perspective." Maxwell AFB: Air War College Research Project, 1978.

Murawinski, Daniel J. "The Operational Level of Air Warfare." Maxwell AFB: Air War College Research Project, 1989.

Purcell, Roger L. "A Description and Analysis of the Sieges of Dien Bien Phu and Khe Sanh." Maxwell AFB: Air Command and Staff College Research Project, 1986.

Reece, Ralph G. "Operational Fires." Maxwell AFB: Air War College Research Project, 1989.

Rice, William J. "Operational Fires - What's in a Name?" Ft Leavenworth: School for Advanced Military Studies Monograph, 1990.

Sorour, A.H. "Planning for Theater Warfare Using the Concept of Massive Air Strike to Insure Success." Maxwell AFB: Air War College Research Project, 1987.

Stafford, Bruce H. and Robert L. Peterson. "B-52 Area Bombing." Offutt AFB: HQ, Strategic Air Command, 1968.

Streater, Donald A. "Airpower Theory and Application: A Historical Perspective." Ft Leavenworth: Command and General Staff College Thesis, 1980.

Thayer, Thomas C. "A Systems Analysis View of the Vietnam War: 1965-1972." Washington, D.C.: Office of Air Force Studies and Development Research Project, 1975.

Whittemore, Bruce J., et al. "Tactical Application of Strategic Bombers." Arlington: Institute for Defense Analysis Research Project, 1976.

Other Sources

Army Air Forces Evaluation Board in the European Theater of Operations. "The Effectiveness of Third Phase Tactical Air Operations in the European Theater: 5 May 1944-8 May 1945." 1945.

B-52 Conventional Munitions Fact Book. Offutt AFB: HQ SAC/XRTA, January, 1988.

Bombing and Operation Cobra: Interview with General Von Luettwitz. Washington, D.C.: Department of the Army, Historical Section, 12 July, 1949.

Bradley, Omar N. Effect of Airpower on Military Operations: Western Europe. HQ, 12th Army Group, 1945.

Chester B. Hanson Papers: 1 June-31 August, 1944. Carlisle Barracks: U.S. Army Military History Institute.

History of VII Corps, U.S. Army. "Operations in Normandy, France (1-31 July, 1944), 6 August, 1944.

HQ, U.S. Army Combined Arms Command. Desert Warrior: Iraqi Threat. Ft. Leavenworth, (December, 1990).

HQ, Eighth Air Force. "Daily Operational Activities: 2-17 June, 1944."

_____. Special Report: "Eighth Air Force Tactical Operations in Support of Allied Landings in Normandy (2 June-17 June, 1944)." 1944.

HQ, VIII Corps, U.S. Army. "Operations Memo 45: Additional Bombing Details [on] Operation Cobra." 22 July, 1944.

HQ, Strategic Air Command, Bomber Conventional Operations Directorate. Unclassified Talking Paper: "Mobility Area Denial Delay of Ground Forces." (14 November, 1989).

_____. Office of Public Affairs. "SAC Bomber and Tanker Crews Respond to Desert Shield." SAC News Service. (5 September, 1990), pp. 8-9.

HQ, United States Military Assistance Command, Vietnam. Arc Light Effectiveness: Combined Intelligence Center Vietnam (CICV) Study 68-08. (16 March, 1968). Confidential: Only Unclassified portions included in this monograph.

HQ, 4th Infantry Division, U.S. Army. "Operation Cobra After Action Report." 10 August, 1944.

HQ, 1st Infantry Division, U.S. Army. "G-3 Report of Operations; 1-31 July, 1944." no date.

HQ, 9th Infantry Division, U.S. Army. "G-3 Report of Operations, 1-31 July, 1944." no date.

I SS Panzer Corps in the West in 1944: An Interview with General Fritz Kraemer. HQ, U.S. Army, Europe: Foreign Military Studies Branch, 1945.

Joint Fire Support Analysis Report: Joint Universal Lessons Learned (JULLS). Alexandria: Military Professional Resources, Inc., 1990.

Lessons Learned No. 69: "Analysis of Enemy Positions at Khe Sanh and Evaluation of the Effectiveness of Weapons Systems against Enemy Fortifications." HQ, U.S. Military Assistance Command, Vietnam, 1968.

Lessons Learned No. 77: "Fire Support Coordination." HQ, U.S. Military Assistance Command, Vietnam, May, 1970.

Normandy, Cobra, and Mortain: Interview with General Major Freiher V. Gersdorff. Washington, D.C.: Department of Army, Historical Section, 12 July, 1949.

Schwarzkopf, General H. Norman. Central Command (CENTCOM) Desert Storm Brief. (27 February, 1991).

Sunday Punch in Normandy: The Tactical Use of Heavy Bombardment in the Normandy Invasion. Washington, D.C.: HQ, Army Air Forces, 1945.

Theater Lessons: Use of Heavy Bombers in a Tactical Role. HQ, Supreme Allied Expeditionary Force, 1945.

Trest, Warren A. Project CHECO Report: Khe Sanh (Operation Niagara). HQ, Pacific Air Force: Tactical Evaluation Directorate, CHECO Division, 13 September, 1968.

White Paper: "Air Force Performance in Desert Storm." Washington, D.C.: Department of the Air Force, April 1991.