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AIRPOWER THEORY AND APPLICATION;
AN HISTORICAL PERSPECTIVE

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degree

MASTER OF MILITARY ART AND SCIENCE

by

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AIRPOWER THEORY AND APPLICATION: AN HISTORICAL PERSPECTIVE, by Major Donald A. Streater, USAF, 106 pages.

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TITLE: AIRPOWER THEORY AND APPLICATION: AN HISTORICAL PERSPECTIVE

AUTHOR: MAJOR DONALD A. STREATER

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I. Purpose: To examine the development of US airpower theory to determine whether it has been matched by effective application of airpower as an instrument of national policy.

II. Problem: The US needs to employ its offensive airpower according to the most well-developed principles in order to attain national objectives as rapidly and efficiently as possible in wartime.

III. Data: The period between the two World Wars, World War II, the Korean War, and Vietnam provide a rich volume of information about theory and application of US offensive airpower. Pre-World War II airpower theory was largely unsubstantiated. World War II provided a large amount of data on offensive applications of airpower. Korea added lessons about a deliberately limited war, and Vietnam confirmed the dangers of piecemeal employment and lack of clear objectives.

IV. Conclusions: The study reveals that a mature airpower theory has not been matched by a commensurate effective application of airpower. In World War II, the theory already existed, but the capability had to be built before significant application was possible. In Korea, airpower was politically limited to avoid expansion of the war in what was perceived as an enemy strategic ploy. In Vietnam,

policy-makers deliberately limited airpower to a gradual application which proved far less effective than its potential.

V. Recommendations: US policy-makers should heed the counsel of professional airmen in order to use the instrument of airpower effectively.

CHAPTER I

INTRODUCTION

The US military acquired a revolutionary new capability in the Twentieth Century: airpower. This new capability proved to be revolutionary in its technology, in its applications, and in its effects.

This thesis deals primarily with examples of airpower application and effect. Together, these have repeatedly become the center of controversy in the brief, dramatic history of US airpower and US airpower theory.

Regarding its applications and effects, an enemy general once said the following of a major US air effort:

...the US Air Force is compelled to escalate step by step, and cannot attack...massively and swiftly in strategic, large-scale, surprise bombings...

...(we) can gain the time and circumstances necessary to gradually transform the country to a war footing, to further develop its forces, and to gain experience...¹

On the other hand, a US general stated the following:

Strategic air assault is wasted if it is dissipated piecemeal in sporadic attacks between which the enemy has an opportunity to readjust defenses or to recuperate.

After a soundly conceived and carefully prepared strategic campaign has been launched, carry it through inexorably and without interruption. Diversion of effort to purposes of momentary importance will endanger the success of a whole air campaign.²

These two assertions contrast sharply with one another. An irony that accentuates the contrast is the fact that they are presented above in reverse chronological order. The latter statement is drawn from the final war report of General of the Army Henry H. "Hap" Arnold, Commanding General of the Army Air Forces, to the Secretary of War, 12 November 1945. General Van Tien Dung, appointed North Vietnamese Defense Minister in February 1980, made the former statement in June 1967 after his country had sustained more than two years of US air attacks.

What happened to create such a disparity between US airpower application as it was conceived by the USAAF Commanding General at the end of the Second World War and as it was experienced and perceived by an enemy general in a war 22 years later? This thesis will examine US airpower theory as it has matured in an effort to determine whether it has been matched by effective application of airpower as an instrument of national policy.

The method used here will contrast theory with historically documented application of airpower. Since theory, doctrine, and strategy all bear on a discussion of this nature it is useful to define these terms at the outset. The American College Dictionary provides the following definition:

Theory: a coherent group of general propositions used as principles of explanation for a class of phenomena; a particular conception or view of something to be done or of the method of doing it; a system of rules or principles.

JCS Pub 1 defines the remaining terms as follows:

Doctrine: Fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives.

Strategy: The art and science of developing and using political, economic, psychological, and military forces as necessary during peace and war, to afford the maximum support to policies, in order to increase the probabilities and favorable consequences of victory and to lessen the chances of defeat.

The focus of this thesis is on applications of offensive airpower, which are generally recognized as promising the greatest results and at the same time require the most serious political decisions for use. What follows is a discussion and evaluation of the development of airpower theory before World War II, and theory and application in World War II, Korea, and Southeast Asia.

This study has been made within several limitations. First, it does not address all airpower missions. Close air support, for example, has been omitted because its results are more immediately discernible and generally less controversial than those of strategic bombardment or interdiction. Second, it does not address various other applications of airpower as a policy instrument, such as the Berlin Airlift. The study is also primarily limited to discussing conventional applications of offensive airpower, since only two highly specific instances of atomic offensive operations have occurred in history.

CHAPTER II

BIRTH AND EARLY DEVELOPMENT OF AIRPOWER THEORY

Three airmen are considered to have provided the primary influencing factors on US airpower theory and USAF basic doctrine: Air Chief Marshall Sir Hugh Trenchard of Great Britain, Brigadier General William "Billy" Mitchell of the United States, and General Giulio Douhet of Italy. All witnessed the carnage of the stalemated ground situation in World War I, and all perceived airpower as a revolutionary military force that could prevent future stalemated wars by carrying warfare directly to an enemy nation.

TRENCHARD

Trenchard pioneered two concepts, the offensive use of airpower and the independent air arm. He firmly established the offensive concept by advocating and then establishing the Independent Bombing Force in the latter stages of World War I. Although this force had but little impact because it was overcome by events which ended the war, it set the precedent for future independent air operations. Trenchard's thinking, however, surpassed the limited bombing operations of World War I. Ten years after the Armistice, he authored a memorandum entitled "War Object of an Air Force." In this document he discussed the

legality, morality, and desirability of bombing civilian populations. He concluded that bombing civilian populations was acceptable and legal in conjunction with "military targets," an ambiguous target designation that is argued to this day. He further considered civilian morale the most vulnerable target in Germany.¹ Trenchard's thoughts on the objective of bombing were to impact Royal Air Force strategy through World War II.

Trenchard so strongly advocated an independent air arm that the Royal Air Force (RAF) was established as a separate military service before the Armistice. The implications of an independent RAF were not lost on American airpower advocates.

Both the precedent of independent bombing operations and an independent air arm directly and powerfully influenced a brash American officer, Mitchell, who gleaned everything he could from Trenchard on RAF operations, organization, and supply. Trenchard's main influence on US airpower theory appears to be through his wartime contact with Mitchell and the mutual respect in which they held each other.

MITCHELL

Following his contact with Trenchard in World War I Mitchell became a recognized technical and tactical expert on aviation in the US military. During the early 1920's his theories were so well based on this technical and tactical expertise that, despite their disfavor with the

military hierarchy, they took hold among a growing number of Army aviation officers.

Mitchell, like Trenchard, strongly advocated developing the offensive capabilities of airpower. He demonstrated his claims for the potency of the air arm in the face of official disfavor, particularly by his bombing experiments against captured German battleships. Although he successfully proved that ships could be sunk by aircraft, the Navy and Air Corps differed for years over the Air Corps role in coastal defense and maritime operations. As late as 1938 the Navy succeeded in obtaining a War Department agreement to limit Air Corps operations to 100 miles offshore.² Billy Mitchell had significant influence on the Air Service Field Officers' School, forerunner of the Air Corps Tactical School (ACTS) where doctrine was primarily developed before World War II. The fact that the school was effectively shut down in the spring of 1921 while faculty and students were absorbed into Mitchell's First Provisional Air Brigade for bombing experiments against German battleships testifies to his direct influence on doctrine development.³

Though he stressed offensive airpower, Mitchell did not slight the defense. He believed a strong force of pursuit aircraft supported by patrolling reconnaissance aircraft might successfully defend against a bomber attack.⁴ This was strong faith in pursuit capability in an era before radar could provide warning. He did, however, discount the

effectiveness of ground defenses, using such words as "fallacious" and "money wasted" in referring to antiaircraft artillery. He cited wartime experience as follows:

During the war antiaircraft artillery brought down about one-tenth of one percent of our airplanes that were fired at.⁵

Mitchell cited the altitude and speed advantages of aircraft and contrasted these with the relatively unsophisticated attempts at antiaircraft artillery in World War I. He correctly identified antiaircraft aiming and fusing problems and considered aerial barrage fire impractical because of the scale of effort required for only a small return. In this, he did not adequately consider the potential for improved antiaircraft technology.

Following his court-martial in 1925 for stubborn proponency of what were then considered extreme ideas, Mitchell became a proponent of attacking an enemy nation's vital centers directly by aerial bombardment. This was the period when his claims emphasized swift, surgical bombing operations to end a war as cleanly and humanely as possible by striking an enemy's population and industrial centers. Herein lies a paradox: that war could be made more humane by carrying it beyond the classical "front" of ground forces directly to an enemy's population. Although this seemed to run counter to previous international law on attacking non-combatant populations in unfortified places, it was more easily accepted by defining "vital centers" as "military targets" and comparing the

promised swift decision by air attack with the inhumanity of the World War I stalemate. As an outspoken advocate of attacking enemy vital centers, Mitchell prophesied a capability far beyond that of the air forces of the 1920's. He could not prove this hypothesis, since breaking an enemy's will and capability to wage war had not been demonstrated in the previous war, nor could it be tested in military exercises. Mitchell thus came to make far wider claims for the future of airpower than his wartime experience might have suggested. He was extreme in his ideas, yet admired for his stubbornness, audacity, and vision. As General "Hap" Arnold commented:

There were three Billy Mitchells; there was the man they court-martialed, not personally known to the public, who wouldn't rest until he became a martyr; there was Mitchell the air prophet, not in the sense of popular but of highly scientific forecasts. And then there was the third Mitchell, who included the first two, but added something. This was the Billy the public loved, and whom the Air Corps loved. the dashing, colourful doer-of-deeds who cut red tape, defied the stuffy boss, snapped his fingers in the face of authority, cried "What, I can't sink your ships?" and sent them to the bottom...⁶

One finds occasional controversy about whose ideas really were the primary influence behind early US air doctrine. This controversy arises because of the similarities between Mitchell's thought and that of the Italian General Douhet. Mitchell could well have been exposed to Douhet's ideas through his correspondence with the Italian bomber designer Gianni Caproni, although any Douhet influence on Mitchell or very early Air Corps thinking is uncertain.⁷

DOUHET

The third primary early airpower theorist, General Giulio Douhet, like Mitchell was court-martialled for speaking out in opposition to his government's air policies. Unlike Mitchell, Douhet was reinstated and his court-martial record expunged in his lifetime. Douhet is best known for his comprehensive work on airpower theory, The Command of the Air, published as early as 1921. Following his retirement, and free of the necessity to conform to government policy, he produced an expanded, more candid version in 1927, which will be addressed below. Douhet's work provided a strong theoretical base for airpower advocates. Bernard Brodie, among others, considered him the greatest of the airpower theorists:

Airpower is too young to have among the theorists of its strategy more than one distinguished name, and he has carried all before him.⁸

The central tenet of Douhet's theory is the concept of "command of the air." Douhet defined achieving "command of the air" as destruction of an enemy's air capability. He emphasized that destruction of enemy air capability must include both existing enemy air forces and the industrial base for building and supporting these forces. Douhet perceived achieving "command of the air" as the strategic key to success. He reasoned that, because of the inevitable offensive actions made possible to the nation possessing "command of the air," it could be equated with victory.

Like both Trenchard and Mitchell, Douhet heavily stressed the offensive use of airpower. He proposed two conditions an air force had to meet to achieve victory in a war. First, it must "conquer command of the air." Then it must maintain its position of strength and exploit it by crushing enemy "material and moral resistance."⁹ The term "material and moral resistance" compares with Mitchell's "vital centers" and reflects the same thought process which envisioned that an air attack would quickly destroy an enemy's capability and will to continue a war.

Douhet's employment principles were to have far-reaching effects and to gain considerable support among growing numbers of airpower advocates. He strongly advocated using bomber forces in mass area attacks. He emphasized the need to concentrate enough bombers on a target to destroy it in one attack and eliminate the need to return. In this, however, he did not foresee the rapidity with which some targets, notably railheads, could be restored to operation. Along with mass, Douhet stressed the need to inflict the greatest damage in the shortest period of time to provide both shock effect and efficiency.

In his early emphasis on bombardment, Douhet anticipated the technological developments in the bomber that occurred in the late 1920's and early 1930's. He stated that an armored, armed bomber could prevail over pursuit aircraft, an early articulation of the "flying fortress" concept embraced by the Army Air Corps (AAC) in the 1930's.

His belief that an attacking bomber force would always get through was based on his European war experience and the technological level of the time.¹⁰ His requisites for bomber capabilities were similarly limited: a 200-300 kilometer radius of operation ("European" thinking on distances, perhaps) and a 3,000-4,000 meter ceiling, which appears to assume the same static antiaircraft artillery technology as Mitchell.

Douhet claimed that offensive operations provided the best defense for a nation and, in fact, the only effective defense. He deemphasized the worth of defensive efforts. Like Mitchell, he discounted the value of antiaircraft artillery. Unlike Mitchell, he also discounted the value of pursuit aviation, relegating it to the primary function of bomber escort and, at the same time, minimizing its usefulness in this role. Douhet carried this overall deemphasis of defense to the point of advocating the acceptance of enemy attacks on one's own nation, while attempting to inflict heavier damage on the enemy, until "command of the air" is achieved.¹¹

Douhet's thinking led him to foresee the need for an independent air arm as a separate, equal military force with a value far greater than an army or navy. He recognized the competition for resources that a political system must manage and, in doing so, championed airpower as the best military use of a nation's limited resources. He defined air forces operating in support of army and navy

operations as "auxiliary aviation." In his more candid comments which appeared in his 1927 version of Command of the Air, he bluntly termed these auxiliary uses of aviation as "worthless, superfluous, and harmful" because they sapped resources from the main air effort, which detracted from achieving "command of the air" and thereby directly defeating an enemy.¹² The common thread in Douhet's thought is the advocacy of the strategy that the air arm of a nation's military - operating independently - could bring about an enemy's defeat. Douhet thus strongly advocated an independent air force.

THE AIR CORPS TACTICAL SCHOOL

While Trenchard, Mitchell, and Douhet provided a basis for the development of US airpower theory and basic doctrine, there was a need to institutionalize this body of ideas in a school. The Air Corps Tactical School, (ACTS), established at Langley Field and later moved to Maxwell Field, became the center of AAC doctrinal expertise and the forum for doctrinal debates in the 1920's and 1930's. As previously noted, Mitchell's influence was strong when the school was established and continued to be strong throughout its development. In 1942, General Laurence S. Kuter commented on Mitchell's influence on the school as follows:

In 1932, the then Lieutenant K.M. Walker, who was one of General Mitchell's several very capable aides, became instructor in bombardment aviation at the Air Corps Tactical School.... Captain Robert Olds, another of Mitchell's aides, became responsible for extensive courses of

bomber instruction. Between the two, Mitchell's work has continued, expanded, augmented, and separated into its several components, including tactics and techniques of attack aviation, tactics and techniques of bombardment aviation, and the employment of air forces.¹³

Douhet's influence, on the other hand, appears to have been as a reinforcing authority to be cited as needed, but also to be modified as considered practical. General Ira Eaker observed that Douhet's theory was considered somewhat extreme and more future - oriented, useful for publicity value as the thoughts of a foreign expert. Major General Benjamin Foulois, Chief of the Air Corps, in 1933 did indeed use Douhet in this manner by providing thirty mimeographed copies of a translation of Douhet's work to a Congressional committee as a supplement to his testimony.¹⁴ General "Hap" Arnold noted the practical modifications of Douhet's theory that were taking place in the Air Corps as follows:

As regards strategic bombardment, the doctrines were still Douhet's ideas modified by our own thinking in regard to pure defense ... A different attitude from Douhet's toward bomber escort and a very different view of precision bombing resulted. we became convinced ... that long-range heavy bombers must have not only increased fire power and mutual support, but also a fast, maneuverable fighter escort...¹⁵

It is now useful to examine the historical trends in doctrine development in the Air Corps Tactical School. In doing so, it is necessary to keep in mind for clarity the fact that the Air Service Field Officers School (1920-1922) and the Air Service Tactical School (1922-1926) were for all practical purposes the same evolving school as ACTS

under different names. The doctrine developed there defined three branches of aviation: pursuit, attack, and bombardment. It further defined "command of the air" in terms similar to Douhet's, but posed a seeming contradiction: "command of the air" was a necessary condition, but at the same time an ideal condition that could only be achieved temporarily and locally before an enemy's defeat.¹⁶ The temporary and local nature of achieving "command of the air" stemmed from the inherent mobility of aircraft and their ability to mass rapidly on an objective.

Between 1920 and 1926 school doctrine was closely tied to the surface strategy, with the air arm considered vital to achieving the ground objective. There was greater stress on pursuit aviation because of the necessity to achieve "command of the air," or air superiority as it came to be called. Air forces were envisioned supporting the infantry similar to the Army's concept of the role of naval forces assisting ground forces. In this context two types of bombardment were conceived, tactical and strategic, both tied to supporting the overall ground objective. Targeting concepts for both were vaguely defined as "communications" and "troop concentrations."¹⁷ ACTS theorists began to deemphasize the ground support role of aviation in the late 1920's. By the mid-1930's the extreme position of first defeating hostile air forces and then providing support to ground operations held considerable sway.¹⁸ Parallel to this was a strong advocacy of theater-level

control of air forces rather than the then-current assignment to ground units. Control measures used by the Army hierarchy to restrict depths of air operations in field exercises undoubtedly contributed to this by frustrating the air planners and participating Air Corps officers. For example, between 1928 and 1931 the ACTS participated in an annual maneuver with the Army War College (AWC). In the 1928 exercise, AWC planners largely ignored the impact of air operations on the field problem while ACTS planners proceeded according to school doctrine and exploited the inherent flexibility of aircraft. The result was a ground situation that could not develop until air operations were arbitrarily restricted. Again in 1931 air operations were restricted to activity at the front, and attacks on logistics targets in the rear were prohibited.¹⁹ Many Air Corps officers experienced first hand ground commanders' and staffs' ignorance of effective air employment, disregard of aviation in planning, and a tendency to assume away the air problem by applying arbitrary restrictions on employment. Small wonder joint air-ground doctrine did not develop as did strategic bombing doctrine before World War II!

Assertions that air forces could strike directly at an enemy nation's vital centers began to appear in school texts as early as 1926. By 1930 the bomber had come into its own as the primary branch of aviation in ACTS doctrinal thought, although strong debate continued. Then Colonel

"Hap" Arnold wrote in 1933 that the bomber was basic and that other aviation missions should be tailored around it.²⁰ The emphasis grew in the mid-1930's on daylight precision bombing. Targeting concepts were aimed at critical areas that would disrupt a nation's entire economy. Major General Haywood S. Hansell, a former ACTS instructor and bomber commander in World War II, had pointed out that the thinking was in terms of identifying "items of similar criticality" in industry and singling out production of these items for attacks to cripple an economy.²¹ A significant contrast exists between this line of thinking and Douhet's, and even Mitchell's latter-day assertions. Air Corps personnel thought in terms of bringing about enemy surrender through daylight precision bombing of pinpoint targets whose loss would rapidly cause enemy collapse by neutralizing his capability to sustain a war. Douhet's emphasis on mass area attacks and Mitchell's predictions of the total collapse of a nation were more oriented toward breaking an enemy's will to resist.

The early 1930 bomber-pursuit controversy on-going at the ACTS merits further consideration because of its significance to events that followed in World War II. In the early 1930's theory favorable to pursuit aviation was downgraded in the ACTS. Only a few voices, notably Major Claire Chennault's, were raised to support the effectiveness of pursuit aviation.

The impact of the B-17 on airpower theory being

developed in the ACTS was profound. Even before it appeared in prototype, the capabilities desired and expected for this aircraft foreshadowed a bomber technology in advance of US pursuit technology. The B-10 had previously demonstrated the potential for superior speed, endurance, and firepower in a bomber. Then came the B-17, on the crest of a trend strongly supporting bombardment in US doctrine and around the time Douhet's theories on the primacy of the offensive appeared in English translation.

General Arnold pointed out that early fighter exercises against the B-10 and B-12 initially produced deceptive results, in particular a suggestion that unescorted bombers could outrun fighters. This concept was supported by the planned 250 mile-per-hour capability of the B-17.²² Although the bomber advocates held sway over pursuit advocates through the mid-1930's, by 1939 General Arnold and other Air Corps leaders recognized that bombers making unescorted daylight attacks ran the risk of severe losses. Arnold bears this out as follows:

Those who thought it was a miracle that long-range fighter escort for our bombers appeared over Germany at just the critical moment in the autumn of 1943 apparently do not realize that, like the Super Fortress, this was something we started developing before the war. I should have preferred never to send any unescorted bombers over Germany.²³

Major General Hansell provides a striking additional insight on the emphasis on bombing theory, pointing out the defense's weakness of poor warning in the era before radar as follows:

If our air theorists had had knowledge of radar in 1935, the American doctrine of strategic bombing in deep daylight penetrations would surely not have evolved.²⁴

Despite the apparent risk of precision daylight bombing attacks, the Air Corps leadership remained solidly behind the concept. Their action underscores the momentum of the doctrine and its vital role in the future of the Air Corps.

THE B-17 AND THE INDEPENDENT AIR FORCE

The Air Corps leaders between 1935 and World War II began to regard strategic bombardment, and the B-17 in particular, as the essence of real airpower. The B-17 was "... the focus of our air planning ... of the Air Corps' fight to get an air plan... accepted by the Army."²⁵ Arnold himself minimized the value of previous theory and organization in establishing credible US airpower and placed the focus of power in the four-engine bomber. He observed that, as of 1941:

...our whole fight for an Air Force had come to center more and more around bombardment, precision bombardment by daylight, all the things summed up by the great word Flying Fortress.²⁶

Despite this impetus toward an independent Air Force, General Arnold and General George Marshall agreed in the immediate pre-war years to hold back on actions toward actually separating the Air Corps from the Army. The difficulties and possible dangers from a period of inefficiency during reorganization of logistics and other support as the nation approached the crisis evidently helped

bring about this agreement. Furthermore, Arnold's staff and forces were given greater autonomy from Army Staff supervision as General Headquarters Air Forces was established in 1940 and Arnold himself subsequently functioned as a member of the newly-formed Joint Chiefs of Staff.²⁷ He had nearly de facto independence if not officially and organizationally.

Although trends were increasingly supporting the independence from the Army of air forces, both official doctrine and war planning continued to be completely oriented to the surface forces right up through US entry into World War II. The doctrine developed in the ACTS had not been accepted by the Army General Staff. As late as 1940 Field Manual 1-5, Employment of Aviation in the Army, insured that air operations would be planned and executed in accordance with the overall plan for the surface campaign.²⁸ The existing war plans generally ignored actual strategic employment of the B-17 in favor of what were actually tactical operations.²⁹ The Army Air Forces thus entered World War II with a relatively well-developed theory of strategic operations for application of airpower in the conflict, but this theory had not been accepted as doctrine by the Army.

CHAPTER III

AIRPOWER THEORY APPLIED: WORLD WAR II

At the outset of the Second World War, US Army Air Forces were primarily engaged in joint tactical operations while experiencing a slow but steady increase in strategic operations. This chapter will discuss joint operations and the growing importance of interdiction. Early expectations of strategic bombing, planned bombing of Germany and Japan, and its effects on both the Army Air Forces and on the enemy nations will also be addressed.

JOINT OPERATIONS

Both the AAF and ground Army units were relatively inexperienced in effective air-ground coordination and operations at the US entry into World War II. The arbitrary restrictions placed on air operations in past maneuvers and lack of sufficient resources devoted to developing joint air-ground operations now placed both the Army and AAF at a disadvantage. Generals Arnold and Eaker recognized this and commented in 1941 as follows:

Lack of sufficient co-operative aviation in the past, as well as the shortage of motorized, mechanized forces in the ground branches, has led to insufficient co-operation between aviation and the motorized forces to insure the degree of training and efficiency indicated as necessary by the campaign in Poland.¹

The Germans had developed air-ground coordination to a relatively high degree of efficiency. They also adhered closely to Douhet's dictum of achieving "command of the air" by attacking and neutralizing enemy air forces first in their initial conquests. Another airpower advocate, Alexander DeSeversky, the Russian-born aircraft designer and airpower advocate, observed the immediate need for "cooperative aviation." He proposed that tactical air forces be attached to support land and sea forces in temporary, flexible arrangements and operate primarily in coordination with surface forces.²

Conflicting doctrine led to near disaster in initial American operations in North Africa. Despite years of Air Corps Tactical School efforts to establish centralized control of air assets as an official military doctrinal position, War Department Field Manual 31-35, Aviation of Ground Forces, provided for piecemeal employment of air units. German fighters, meanwhile, operated under centralized control and used their ability to mass quickly over great distances with devastating results. After the Army defeat at the Kasserine Pass in February 1943, theater air assets were placed under a central theater air commander. Centralized control of theater airpower and improved coordination between air and ground units turned the tide in North Africa and led to a statement of equality between air and ground forces in a new Field Manual 100-20, Command and Employment of Air Power,

in July 1943. This manual further stated that establishing air superiority had first priority to insure success of operations. It emphasized the necessity to conduct offensive operations against enemy air forces to achieve air superiority. The manual adapted existing prewar theory to theater-level joint operations. Doctrine long advocated by Air Corps Tactical School theorists thus was finally accepted by the Army.

Operationally, the tactical air force effectiveness improved through the efforts of unit commanders and their staffs. They implemented field improvements that drove doctrine changes which have carried through to today's tactical air forces: collocating tactical air headquarters with Army headquarters, developing and implementing the concept of the Air Liaison Officer (ALO), and providing ALO's with radio equipment capable of air-ground communications.

By March 1944, tactical air forces in Italy demonstrated a sophisticated joint air-ground capability and carried out a highly effective interdiction campaign, OPERATION STRANGLE. Although this campaign did not completely dry up the flow of enemy supplies it did lower enemy supplies below a critical level needed to allow the enemy freedom of action.³ It thus greatly inhibited tactical movement of enemy forces. Hap Arnold, the AAF Commanding General, cited the accomplishments of OPERATION STRANGLE as follows:

It made it impossible for one of the best organized, best disciplined armies in the world to offer prolonged resistance to determined offensive on the ground -- even in country as naturally suited for defense as German-held Italy was.⁴

Subsequent joint operations in the Pacific and European theaters enjoyed similar success. In the Pacific island campaigns, geography forced a high degree of joint coordination and cooperation. General George Kenney, MacArthur's air commander, enjoyed close rapport with MacArthur and was able to implement the ideas he had advocated years earlier as an ACTS instructor. Interdiction and joint air-ground operations in general were critical to the Normandy Invasion, as General Eisenhower so aptly noted: "...Without that Air Force, without the aid of its power...that invasion...would have been criminal."⁵ Tactical air demonstrated such excellence by 1944 that in August of that year General Patton in one action left the responsibility for his entire southern flank to Major General E.R. "Pete" Quesada's 19th Tactical Air Force.

A final comment on interdiction efforts in World War II is in order. The most dramatic successes occurred when interdiction was complemented by aggressive ground action which caused the enemy great need for the supplies they were being denied.⁶ This observation will be relevant to subsequent discussion of interdiction.

STRATEGIC BOMBING

Strategic bombing became one of the most controversial aspects of World War II. Some, like Bernard Brodie, regard its effectiveness as limited in a "pure" air campaign undertaken without supporting surface operations, as the following statement illustrates:

...the gigantic land and naval operations taking place in other parts of the world, especially Eastern Europe, enormously assisted the effectiveness of the Allied strategic bombing in at least two ways. First, that fighting absorbed huge German resources which might otherwise have gone into the defense against our strategic bombing. Secondly, it put an enormous strain upon the German military economy, thereby making the German military posture far more sensitive to the effects of destruction from the air than it might otherwise have been.⁷

This viewpoint seems to regard strategic bombing as something more akin to interdiction on a grand scale.

The AAF leadership recognized that World War II did not allow a demonstration of strategic bombing totally in and of itself, as the following statement by General Carl Spaatz shows:

Because the last war saw the weapons of all services employed in profusion, one may argue the exact degree of contribution made by strategic bombing to the final decision...the war against Germany was fundamentally an infantry war, supported by airpower, much as the war against Japan was fundamentally a naval war supported by air.⁸

Although Brodie and others have taken issue with the effectiveness of strategic bombing in World War II, they have done so largely by comparing its results with the early expectations of its advocates. This comparison

is far more complex than the manner in which it has been generally treated by both advocates and critics of the theory, as the following discussion shows.

Early expectations were based on unsubstantiated theory before World War II and on very limited, unique experience during the early stages of World War II. A 1942 British assessment of the results of German bombing of British cities found that one ton of bombs made 100-200 people homeless. This assessment then extrapolated that 10,000 bombers dropping 15,000 tons of bombs on 58 German cities would leave one-third of the German population homeless and thus cause a devastating impact on enemy morale.⁹

The German Luftwaffe's strategic bombing operations ultimately were unsuccessful in achieving war objectives. As early as 1942, DeSeversky recognized the Luftwaffe's limited effectiveness and German mistakes. He claimed the Luftwaffe suffered from inadequate bombing power, in terms of payloads, number of bombers, and range; a lack of continuity of action; and bad targeting policy, in particular, by failing to eliminate or neutralize the Royal Air Force.¹⁰

DeSeversky also was an airpower advocate who in 1942 postulated a scenario in which bombers accompanied by fighters converged on the US from all directions to wreak havoc. He predicted that the Atlantic's value as a barrier would be cancelled within two years, the Pacific's within

three, and that bombers would have around-the-world range within five years.¹¹ These were high expectations for the time in regard to aircraft range, the effects of conventional bombs, and the scale of operation required to seriously damage a country as large as the US.

Serious AAF thinkers were also forward-looking, but of necessity more concentrated on the present reality of existing technology and the need to identify critical targets on which to concentrate bomber assets. Generals Arnold and Eaker reflected this targeting concern as follows:

The priority of targets for an air force is determined by answering this question: The destruction of which target will cause the most damage to the enemy and have the most effect upon his continued ability to wage war?

...it will always be those things which to him are most vital and most essential to the further conduct of the war.¹²

The immediate problem, then, was determining what to destroy and how to use bombers to do it.

THE PLANNED BOMBING OF GERMANY

AAF planners began attempting to determine appropriate strategic targets in Germany in conjunction with the forces expansion in 1941. Air War Plans Division -1 (AWPD-1) identified 154 targets as vital: the electric power system, the transportation system, petroleum, aircraft assembly plants, and aluminum and magnesium factories. The primary targets were the electric power system, transportation, and petroleum.¹³ AWPD-42 appeared in late 1942

and identified a new set of target systems, in order of priority: pursuit aircraft assembly plants, bomber assembly plants, aircraft engine plants, submarine yards, transportation, electric power, petroleum, aluminum, and rubber.¹⁴

These plans were followed in early 1943 by the Casablanca Directive, which provided approval of the air strategy by the Combined Chiefs of Staff and top British and American political leadership. The strategy they approved was one of both strategic air attack and land invasion to defeat Germany. This directive set the following target priority: submarine construction yards, aircraft industry, transportation, petroleum production, and other armaments industry. A civilian and military Committee of Operational Analysts was set up to define specific objectives in the German economy from this broad guidance. By June 1943 the ultimate target priority became concentrated on the Luftwaffe's lifeline industries: fighter production, ball bearings, and petroleum, oil, and lubricants (POL). The shift toward the aircraft industry reflected greater strategic importance placed on the Luftwaffe's capability. Ultimately, the Combined Bomber Offensive Plan established four phases: the buildup in early 1943; increased operations from July to October 1943 with concentration on fighter targets; a major effort from October 1943 to January 1944 attacking all primary objectives to include fighter factories, ball bearing plants,

submarine yards, and POL; and sustained major operations from January to April 1944 leading up to land invasion of the Continent.¹⁵

During the months of target system planning, the Army Air Forces faced an equally imposing problem of resource management as force structure was expanded at as fast a rate as possible, yet at a rate far short of demand. Although the European Theater had official priority, it was impossible to ignore the Pacific Theater. General Arnold referred to the problem of disposition of new bomber assets by stating, "...Everyone wanted them."¹⁶ Basically, there was a "stopgap" deployment of all US forces in 1942 to supplement weak Allied defenses throughout the world. The AAF felt the greatest impact because its forces could be rapidly deployed and its power be of immediate use. Coupled with this problem were production lags caused by bottlenecks in the rapidly expanding wartime economy which delayed aircraft deliveries. The "stopgap" deployment and dependence on an economy shifting to war production caused a rather gradual buildup of US strategic bombing capability in Europe. Employment of early deployed bomber assets created a further problem. Because of the initial Allied strategy that directed use of airpower against submarine yards, in anti-submarine operations, and in support of Allied forces in the Mediterranean area, the direct attack on the German economy desired by AAF strategists was considerably delayed.

Robert Futrell sums up the overall impact of these problems the AAF faced as follows:

Buildup of B-17's and B-24's in Europe was slow, and the strategic air campaign was not begun intensively until January 1944.¹⁷

EFFECTS ON THE AAF OF BOMBING OPERATIONS AGAINST GERMANY

As the AAF became engaged in Europe in World War II, its primary strategy of precision daylight bombing confronted a technological gap created by prewar emphasis on bombers and less emphasis on pursuit aviation. The events of 1943 bore out the AAF leadership's earlier recognition of the need for fighter escorts for bomber forces as they were confronted with a sophisticated German air defense system. As soon as AAF bomber formations began deep daylight raids into Germany, their losses increased sharply. Better warning, fighter technology, and antiaircraft artillery enabled the defense to inflict significant losses on AAF formations. Tactical innovations, such as General Curtis Lemay's famous "combat box," which positioned bomber units in formation to maximize their overlapping defensive fields of fire, were helpful but far from a solution.

High bomber losses necessitated limiting the scope of AAF bombing operations. As Liddell Hart notes, the winter of 1943-44 saw 8th USAAF restricted to short-range operations.¹⁸ The second Schweinfurt raid, 14 October 1943, in particular demonstrated that the German defense could inflict unacceptable losses on AAF daylight formations.

However, the AAF leadership remained committed to daylight precision bombing, rather than adopt the RAF strategy of night area bombing. They accepted a period of restricted operations while waiting for the necessary escort fighter capability.

EFFECTS OF BOMBING GERMANY

The actual effects of bombing Germany varied considerably with the target systems selected. Target systems, such as particular industries, varied in vulnerability as well as in the impact of their losses on the German war economy.

The initial precision bombing strategy directed against the Luftwaffe by attacking its industrial base failed to a large extent. Despite sustained efforts which eventually led to 90 percent of the airframe plants being bombed, German fighter production increased steadily until September 1944.¹⁹ This can be attributed to the dispersed nature of the German aircraft industry, many plants of which were located on the periphery of urban areas. Production of components in various sub-assembly plants further blunted the effect of bombing attacks.

The Luftwaffe did suffer indirect strategic impacts as a result of the bombing, however. First, the bombing placed the Luftwaffe on the defensive. The Germans concentrated war production on fighter aircraft at the expense of heavy, long-range bombers which could have struck back at the attacking air forces.²⁰ Second, the

bombing caused a defensive change in the deployment of fighter assets to protect the homeland. In January 1943 the disposition of the German Fighter Arm was as follows: 42 per cent in Western Europe, 33 per cent in the Soviet Union, and 25 per cent in the Mediterranean area. By October 1943, the disposition had changed to 60 per cent in Western Europe with resulting decreases in the other sub-theaters.²¹ Strategic bombing thus contributed to successes in the East and Mediterranean by absorbing the brunt of fighter capability.

The precision bombing attacks on the German ball bearing plants were directly related to incapacitating the Luftwaffe as well as all mechanized aspects of the German war machine. These attacks were part of the continuing search for a vital target system that would immobilize the German war economy. The attacks on the ball bearing industry are widely cited as a failure because of German stockpiling, substitution of components, dispersal of production, and imports. It is true that the raids on ball bearing production failed to cause the German war economy to grind to a halt; however, closer scrutiny of their immediate and potential effect tends to support this targeting initiative. Observations by Albert Speer, Hitler's Minister of Armaments and War Production, appeared in English translation in 1970 and shed considerable light on the criticality of ball bearing production. Speer reports having warned Hitler as early as 20 September 1942

that the Schweinfurt ball bearing facilities were crucial to the war effort and admits that ball bearings were a bottleneck in the effort to increase war production.²²

Commenting on the Schweinfurt-Regensburg double strike of 17 August 1943, Speer says:

...in this very first attack the other side committed a crucial mistake. Instead of concentrating on the ball-bearing plants, the sizable force of three hundred seventy-six Flying Fortresses divided up. One hundred and forty-six of the planes successfully attacked an airplane assembly plant in Regensburg, but with only minor consequences.

...After this attack the production of ball-bearings dropped by 38 per cent. Despite the peril to Schweinfurt, we had to patch up our facilities there, for to attempt to relocate our ball-bearing industry would have held up production entirely for three or four months.²³

It is particularly interesting to note Speer's statement that it was not feasible to relocate production. Although ball bearing plants existed in Schweinfurt, Berlin-Erkner, Steyr, and Cannstadt, Speer relates that as late as August 1944 they had not been dispersed for protection against bombing attacks.²⁴ In regard to the use of stockpiled ball bearings, Speer indicates Germany continued armaments production on a slim margin:

After this first blow we were forced back on the ball-bearing stocks stored by the armed forces for use as repair parts. We soon consumed these, as well as whatever had been accumulated in the factories for current production. After these reserves were used up -- they lasted for six to eight weeks -- the sparse production was carried daily from the factories to the assembly plants.²⁵

The second major blow struck on Schweinfurt, 14 October

1943, caused even more serious damage to machine shops from fires set in oil baths used in the production process. This time production was reduced by 67 per cent. Speer claims that concentrated attacks on the entire ball bearing industry at once would have had the effect of crucially weakening armaments production within two months and bringing production to a standstill within four months.²⁶ However, these raids occurred at the precise time the AAF was suffering high attrition on these and other deep penetration missions. Thus the raids were sporadic, giving the Germans time to restore damaged production facilities after each attack. The ball bearing raids continued into 1944, causing successively greater destruction. Then, suddenly, targeting priority shifted from ball bearings to POL and transportation. Speer adds a final irony to the ball bearing campaign as follows:

At the beginning of April 1944...the attacks on the ball bearing industry ceased abruptly. Thus, the Allies threw away success when it was already within their hands. Had they continued the attacks of March and April with the same energy, we would quickly have been at our last gasp.²⁷

The targeting shift to the synthetic oil industry and transportation system came at a time when the Nazi regime was under maximum pressure from a two-front war. Ultimately, the Allies brought about Germany's final defeat with a combined arms effort of land, sea, and air forces, culminating a ground invasion. However, the strategic bombing effort against oil and

transportation in 1944-1945 would have rendered effective German war effort impotent within a short time had Germany not been invaded.²⁸ The oil shortage was especially felt by the Luftwaffe, which had increased in numbers to defend the Reich and required more fuel to train additional pilots. Hermann Goering commented to General Carl Spaatz on the impact of the oil campaign on the Luftwaffe as follows: "...our pilots could not get sufficient training, (they were) no match for yours..."²⁹ The oil shortage similarly impacted ground operations, as illustrated in the following statement:

Both Speer and Field Marshall Jodl referred to the fact that in February, after the Russians had forced the crossing of the Vistula at Baranow, the Wehrmacht massed 1,200 to 1,500 tanks to stem the drive into Upper Silesia, but was unable to make proper tactical use of them for lack of fuel.³⁰

The scale of bombing effort required to achieve the dramatic results on the oil targets was not proportionately large for the results it achieved. The US Strategic Bombing Survey compares it with the total Combined Bomber Offensive effort as follows:

The force required to knock out this target was within the power of Allied air forces and was not large in relation to the consequences of the oil loss on the German war effort. The more than 200,000 tons of bombs dropped on oil targets represented only about 15 per cent of all Allied strategic bombing in Europe.³¹

The synthetic oil industry in the case of Germany thus demonstrated the "vital target" characteristics air-power theorists had foreseen. The key characteristic was

the enemy's inability to substitute other resources for those destroyed by bombing, as the following observation of the synthetic oil campaign illustrates:

Substituting for a missing source of supply is one thing, but substituting for an industry that is already a substitute for a missing source of supply is something else -- especially when the industry is such an important one, and the nation under attack is near defeat...³²

The Allied bombing effort directed against the German population's morale deserves comment because of its relevance to earlier airpower theory. Although mass night area bombing of urban areas was primarily an RAF role, AAF precision missions often meshed with RAF efforts against a target as in the case of Dresden.³³ Survey results show that the bombing did lower morale and undermine faith in the regime, but these effects were not nearly as pronounced as Douhet or Mitchell had predicted. Notably, the mass area attacks did not cause morale to decrease further in proportion to the greatly increased scale of attack. The ultimate small effect of bombing on morale is illustrated by Speer's attribution of the "armament miracle" of increasing German war production to the steady reliability of the German worker despite his exposure to bombing.³⁴

The overall effects of the AAF strategic bombing effort against Germany must be assessed in the complex context of the Combined Bomber Offensive and continuing German economic mobilization. German armament production

increased during the first half of 1943, remained steady during the last half of 1943, rose significantly during the first half of 1944, and began a steady, sharp decline after July 1944 as German transportation faltered and Allied ground forces arrived.³⁵ While the results of the oil and transportation precision bombing campaign demonstrated the potential of a strategic bomber force to have a paralyzing effect on a belligerent industrial state, the overall bombing effort did not produce paralysis quickly. This can be attributed to the slow buildup of AAF precision bombing capability, Allied inability to identify and concentrate sufficient force on a "vital" target system earlier in the war, and the resiliency of the German war economy.

When all the factors affecting the AAF strategic bombing effort against Germany are weighed, it appears that the AAF approach of precision attacks against critical enemy target systems was borne out. The ultimate effectiveness was less than it could have been largely because of factors the AAF leadership had recognized and unsuccessfully attempted to change before the war. Albert Speer lends support to AAF doctrine, as opposed to that of the RAF, as follows:

...the war could largely have been decided in 1943 if instead of vast but pointless area bombing the planes had concentrated on the centers of armaments production.³⁶

THE PLANNED BOMBING OF JAPAN

The Allied emphasis on defeating Germany first delayed a serious bomber offensive against Japan until 1945.

AAF target planning for Japan began, however, early in the war, shortly after the planning of German target systems. The Committee of Operations Analysts in November 1943 agreed on merchant shipping, steel production, urban industrial areas, aircraft plants, antifriction bearings, and electronics production as target systems. The Committee did not rank their selections in order of importance.³⁷ In 1944 General Arnold requested the Committee provide recommendations based on two different sets of assumptions. The first proposed a strategy of defeating Japan by a blockade using naval ships and aerial mining combined with strategic air attack. For this strategy the Committee recommended merchant shipping, aircraft production, and urban industrial area target systems, in this priority. The second set of assumptions was a strategy to blockade and carry out strategic air attack followed by invasion. For this strategy the Committee recommended targeting aircraft production, urban areas, and merchant shipping, in this priority.³⁸ By the time a large-scale strategic bombing effort could be mounted the US naval advantage largely eliminated merchant shipping as a target system.

By late 1944 when the AAF began to mass a significant strategic bombing capability, there was mounting

pressure from the political leadership through the Joint Chiefs of Staff to bring the war in the Pacific to a rapid conclusion. The JCS wanted the strategic bomber forces to do the following:

...achieve earliest possible progressive dislocation of the Japanese military, industrial, and economic systems and to undermine the morale of the Japanese people to a point where their capacity and will to wage war were decisively weakened.³⁹

This shaped the strategic bombing campaign against Japan quite differently from AAF efforts against Germany.

EFFECTS ON THE AAF OF BOMBING OPERATIONS AGAINST JAPAN

The actual bombing campaign against Japan caused a doctrinal shift in the AAF method of employment. The AAF made this shift by embracing mass night area bombing of Japanese urban areas. This was more in line with RAF doctrine and contrasted sharply with the AAF doctrine of precision bombing in the European Theater. As shown below, this shift was primarily for expediency and was an adaptation to the particular set of circumstances the AAF bomber forces faced. It was not a permanent change in doctrine. Rather, the shift was actually a theater adaptation and represented flexibility on the part of General LeMay to get the job done.

There are three main reasons for this doctrinal shift. First, three months of precision attacks, from November 1944 to February 1945, had failed to achieve desirable results. High altitude precision attacks by the

new B-29's had encountered hitherto unsuspected wind velocities of up to several hundred miles per hour -- the jet stream phenomenon. The climb to the 30,000 foot bombing altitude also greatly lowered aircraft fuel efficiency. This required larger fuel loads and correspondingly lower payloads. The B-29's at 30,000 feet could only deliver half their 10,000 foot payload. Further complications were icing, cloud cover in target areas, and a relatively good Japanese day fighter capability.

The second reason for shifting to area bombing stemmed from the Committee of Operational Analysts' assessment that it would have a high probability of success in the relatively vulnerable Japanese urban areas. Subsequent B-29 test missions proved the validity of this prediction. A low-altitude incendiary raid on Japanese-held Hankow, China, in December 1944 and a similar attack on Tokyo in February 1945 demonstrated the extreme vulnerability of oriental urban areas to area incendiary raids.⁴⁰

A third reason for the shift was the Japanese application of small, decentralized production methods typical of their economy. Large economic effects could be more readily achieved by widespread urban destruction.

The AAF made a further innovation in the offensive against Japan by supplementing the naval action against the Japanese home islands with aerial minelaying operations. These operations began in March 1945 and effectively tightened the blockade of the home islands

while greatly restricting food supplies to the outer islands. Admiral Nimitz described the results of the aerial minelaying operations as "phenomenal."⁴¹

EFFECTS OF BOMBING JAPAN

Japan's economy was effectively destroyed "twice over" because of the effects of the naval and air action to cut off imports and the direct strategic bombing of urban areas.⁴² The area bombing effort began in earnest on 9 March 1945 with massive fire raids. Between 9-19 March 1945 Tokyo and three other cities were gutted by 10,000 tons of incendiaries destroying a total of 32 square miles. The incendiary supply was exhausted by the intensity of operations, causing a lull of approximately one month. As soon as attacks were resumed, they were diverted. A second lull in urban area attacks thus occurred from 17 April-11 May 1945 while the bomber force attacked Kyushu airfields in support of the Okinawa invasion. The attacks resumed in mid-May and continued through the atomic bombings in mid-August. Including the two atomic strikes, 66 urban centers were attacked, 178 square miles of urban area were destroyed, and approximately 806,000 civilian casualties were inflicted.⁴³

It is extremely difficult to isolate the strategic bombing effects on Japan in any effort to determine a primary cause for Japan's defeat. It must suffice to observe that Japan also was defeated by a combined arms effort,

which was largely a naval campaign. The campaign culminated in an intensive strategic bombing offensive designed to paralyze and shock Japan out of the war. The shock effect of two atomic strikes did just that, providing, as General Arnold observed, a way out for the Japanese government.⁴⁴ In spite of the intensive effort, a lucrative target system remained, the largely unaffected internal transportation system. The US Strategic Bombing Survey observed in retrospect that an attack on this target system could have effectively stopped coal movement and "...would have completed strangulation of Japan's economy."⁴⁵ It appears that even without the atomic bombings airpower, in conjunction with the effective naval effort, could have made an invasion of the Japanese home islands unnecessary.

A QUALITATIVE CHANGE IN BOMBING

The atomic strikes themselves symbolize the great qualitative change that occurred when atomic weapons were combined with airpower. The enormous magnification of the capability of a single bomber caused a permanent change in the political sensitivity of strategic bombardment. The rapid, massive impact of a bombing offensive predicted by Douhet was now possible, saving Douhet from oblivion in Brodie's opinion.⁴⁶

CHAPTER IV

AIRPOWER THEORY APPLIED: KOREA

The air effort in Korea was far smaller in scale than World War II operations; yet, it had a disproportionate impact on the future of airpower theory and subsequent US air operations. For the first time air planners had to deal with significant restrictions: politically imposed geographic limitations, weapons limitations, and some target limitations. Offensive operations centered on an early, small strategic bombing campaign, a continuing interdiction effort, and a newly-conceived "pressure" campaign.

STRATEGIC BOMBING IN KOREA

Early in the Korean effort, the newly-formed Strategic Air Command identified five major industrial areas in North Korea as strategic targets: Wonsan, a major seaport, railway center, and petroleum refining city; Pyongyang, an armaments production center; Hungnam, a chemical-producing city; Chongjin, a port, railway center, and ironworks area; and Rashin, a port with significant naval oil storage facilities and railyards.

The actual strategic bombing campaign lasted a scant eight weeks. By October 1950, concentrated B-29

attacks had effectively neutralized four of the five major targets and removed their war-supporting industry. Only Rashin was spared because of its proximity to the Soviet border and the resulting State Department concern for its political sensitivity. Despite the rapid, effective strategic effort, it had little impact on the outcome of the war. The Air Force leadership recognized that strategic air attack on the North Korean industrial base would not be decisive; however, they felt that North Korea must be denied its industrial capability to assist the war effort.¹ North Korean industry ultimately contributed little to their total war effort since Communist forces were supplied almost completely from the Soviet Union and China.

Strategic bomber forces were politically limited from striking targets in the Soviet Union and China to get at the roots of the enemy warmaking capability. While cases have been made on purely military grounds for the desirability of attacking the sources of enemy capability, President Truman stated the ultimate rationale of preventing expansion of the war and avoiding entrapment in what was then perceived as a Communist strategic diversion. He commented as follows:

...my decisions had to be made on the basis of not just one theater of operations but of a much more comprehensive picture of our nation's place in the world...

There was no doubt in my mind that we should not allow the action in Korea to extend into a general war. All-out military action against China had to be avoided, if for no other reason than because it was a gigantic booby trap.²

INTERDICTION IN KOREA

Interdiction efforts were similarly restricted to operations within North and South Korea. OPERATION STRANGLE began in late May 1951 with the initial objective of interdicting highway traffic and quickly shifted to an emphasis on rail traffic. At first it showed promising results, but over a period of months turned into a duel between tactical air forces and North Korean antiaircraft and rail repair crews. Although it increased the cost of North Korean operations substantially, by December 1951 Fifth Air Force admitted that the enemy rapid rail repair and antiaircraft capabilities had "...broken our railroad blockade of Pyongyang and...won...the use of all key rail arteries."³ OPERATION STRANGLE's lack of success can be attributed to lessening 8th Army pressure on the enemy, allowing the North Koreans to minimize their supply consumption; widely scattered air attacks that brought small amounts of easily repairable damage to rails; and a necessity to divert an increasing number of missions to the role of suppressing antiaircraft fire.

OPERATION SATURATE followed STRANGLE in March 1952 with a similar objective of preventing the enemy from moving enough supplies to his forces to support a successful static defense and build up for offensive operations. Initially, it also showed promising results, but the continuous increase in antiaircraft capability along enemy supply routes greatly undermined its effectiveness.

Interdiction efforts were confronted by an enemy with considerably lower supply requirements than US forces. While a US division of 16,000 men required approximately 500 tons of supplies per day, the enemy divisions of 10,000 men have been estimated to require only approximately 48 tons per day. The enemy relied on the local population for food and also made good use of captured food, weapons, and equipment.⁴

The North Koreans and Chinese complemented their advantage of low supply requirements with a relatively simple, flexible logistics system and extensive night movement. While rail and truck movement were a primary logistics method, the enemy used every means available, such as human and animal transportation, to insure a continuous flow.

Once the war became stalemated, the enemy acquired an additional advantage. The North Koreans and Chinese could adjust their operations to the supply situation and choose the time and intensity of action. This lessening of pressure gave the enemy the initiative and compounded the problem of achieving decisive results with interdiction.

In summary, interdiction efforts in Korea forced the enemy to move at night and reduced the enemy supply flow. The results of interdiction were considerably less effective than they might have been because the forces employed possessed a poor night capability, enemy antiaircraft countermeasures built up and hampered operations,

supplies flowed from areas of sanctuary, and the stale-mated war gave the enemy the initiative in adapting their operations to the supply availability.⁵

OPERATION PRESSURE

During the Korean truce negotiations, Air Force leaders sought a more decisive role for airpower. In early 1952, Brigadier General Jacob E. Smart, newly-assigned Far East Air Forces (FEAF) Deputy for Operations, initiated a new FEAF operational policy of maintaining effective positive pressure on enemy military forces to enable the United Nations Command to achieve favorable results at the negotiating table. General Smart ordered a study for new ideas on how to implement this policy, and the study was complete in April 1952. It frankly analyzed the shortcomings of previous air campaigns and suggested a new strategy of "...the maximum amount of selected destruction, thus making the Korean conflict as costly as possible to the enemy in terms of equipment, supplies and personnel."⁶ This concept required a flexible, expanded target list and careful evaluation of specific targets for their importance and value to the enemy.⁷

The campaign that resulted from the new strategy was not interdiction per se, but included interdiction and impacted enemy supply movements as lines of communication were flooded by bombing irrigation dams.⁸ Hydroelectric facilities were also effectively attacked, with approximately

90 per cent of North Korea's generating capacity knocked out in a four-day assault in June 1952.⁹

The punishing attacks continued through the conclusion of peace negotiations with a relatively higher measure of success than the previous interdiction campaigns. During OPERATION PRESSURE, many new targets were identified by intelligence. Often, however, it was difficult to predict how important or valuable a selected target was to the enemy.¹⁰ Not all targets represented the obvious value of the hydroelectric plants. For example, B-29 attacks on marshalling yards in July 1952 yielded relatively poor results: 71 B-29 sorties resulted in only 17 railroad cars destroyed or damaged.¹¹

OPERATION PRESSURE represented a doctrinal shift away from the more conventional "tactical" and "strategic" methods of targeting strategy. It pioneered the concept of putting steady bombing pressure on an enemy to achieve desired results during negotiations to end the conflict, rather than the previous focus on destroying enemy capabilities to wage war. It also underscored the fact that targets varied considerably in their punishing potential. This fact would be especially relevant later, in the mid-1960's.

The doctrinal shift was not a permanent major change in Air Force basic doctrine, as subsequent reliance on "massive retaliation" would prove. Rather, like the shift in Pacific air strategy in World War II,

it represented an expedient adaptation to the situation with which Air Force commanders were confronted.

CHAPTER V

AIRPOWER THEORY APPLIED: VIETNAM

US airpower and airpower theory entered an exceptionally difficult era with the Vietnam years. Air capability and the basic premises behind it were questioned as to their relevance in the Southeast Asia war. On the other hand, the civilian policy- and decision-makers have been criticized for blunting the effects of a sharp military instrument.

In order to examine the relationship between airpower theory and airpower application as a policy instrument against North Vietnam, it is necessary to consider the US objectives and strategies in that war, the resulting targeting of North Vietnam, civil-military relations in this context, how actual air operations affected the US military, and the bombing effects on North Vietnam. A brief look at the concluding air campaign is also in order as the US phased out of Southeast Asia.

OBJECTIVES AND STRATEGIES: PRE-BOMBING PROJECTIONS

In the early stages of US involvement in the insurgency in South Vietnam, there was speculation about how to deal with this situation and insurgencies in general. Walt Rostow, Chairman of the State Department Policy Planning Council and former Deputy Special Assistant to the President for National Security Affairs, produced a written

assessment in the months before the Gulf of Tonkin Incident which influenced post-Tonkin strategy discussions. In essence, Rostow proposed that "...insurgency supported by external power must be dealt with through measures to neutralize the sources of support."¹ He postulated that by applying limited, graduated military actions, as well as political and economic pressures, the US could cause the supporting nation to reduce or eliminate its support. Rostow's theory was based on influencing the supporting nation to reevaluate its own interests in terms of actual losses and fear of further losses of military and economic facilities, fear of being involved in an expanded conflict, fear of becoming subservient to one of the major Communist powers, and fear of internal political weakening.² This theory of influence set the stage for a "diplomacy of violence."³

In March 1964, the State Department Policy Planning Council had produced a prophetic study that asserted bombing North Vietnam would fail to achieve the desired results of stopping their support of the insurgency. The Council reasoned that bombing would fail because the North Vietnamese leaders were motivated primarily by the desire to extend their regime's control to all of Vietnam and not by economic growth and industrialization. Thirty-year revolutionary nationalists were likely to continue with what they regarded as their unfinished business. The study further predicted that, given their present standard of living and leaders' determination, bombing would not seriously affect North Vietnam other than to strengthen the

regime's control. The study also saw the North Vietnamese regime as less likely to negotiate as the result of bombing because the very purpose of bombing implied loss of control to the US and direct pressure on negotiations; hence, they would be reluctant to make a first concession as a result of bombing because further escalation implied more concessions.⁴ The study suggested the US was actually dealing from a position of weakness in the area and could not control the rate, scale, or intensity of such a war.⁵ Robert Johnson, Deputy Chairman of the Policy Planning Committee and author of the study warned, Undersecretary of State George Ball in October 1964 as follows:

It is the nature of escalation that each move passes the option to the other side, while at the same time the party which seems to be losing will be tempted to keep raising the ante.⁶

A high-level war gaming exercise that supported the Policy Planning Council study results took place in 1964. Some of the top people in government participated in this exercise: Air Force Chief of Staff General Curtis Lemay, Chairman of the Joint Chiefs of Staff General Earle Wheeler, Presidential Assistant McGeorge Bundy and Assistant Secretary of Defense for International Security Affairs John McNaughton, among others. The exercise simulated moves and countermoves in escalation involving bombing, troop level increases, and logistics buildups. The results of this exercise suggested that North Vietnam could meet US escalation at a surprisingly low cost. The exercise was, however, tied to an escalation scenario

that by its nature of allowing time for enemy responses, caused a less-than-optimum use of airpower.⁷

OBJECTIVES AND STRATEGIES: REPRISALS

McGeorge Bundy, Special Assistant to the President for Foreign Relations, originated the initial objective of bombing as a reprisal policy. Bombing had been used as a quite effective reprisal in the Tonkin Incident. Following a Viet Cong attack on a US barracks at Pleiku, Bundy recommended a policy of "sustained reprisal." He proposed initially to relate reprisal bombing attacks to high visibility Viet Cong attacks in the South, with subsequent reprisals related to smaller attacks. This implied direct control between the North Vietnamese government and Viet Cong operations as well as a subjective threshold for the US to launch reprisals. One might consider this a proposal based on a questionable assumption and a potentially unpredictable US reactive posture, respectively. Nevertheless, the "carrot and stick" approach to influence activity in the South prevailed, with the object not to "win" an air war against Hanoi, but to influence day-to-day Viet Cong activities in South Vietnam. Bundy did not show great confidence in his proposed policy, as he predicted it could be from 25 to 75 per cent successful. He further admitted that it might lead to an expanded air war. However, Bundy insisted that it was necessary to go ahead with it to show that the US had done all it could to assist South Vietnam.⁸

As the sustained reprisal policy surfaced, Maxwell Taylor, Ambassador to South Vietnam, differed with Bundy's proposal slightly, suggesting "graduated reprisals" to bring pressure on North Vietnam to desist in supporting the Viet Cong.⁹ Admiral U. S. Grant Sharp, Commander-in-Chief, Pacific, however, commented that "graduated reprisals" should be a public figure of speech, while the US should think and act in terms of "graduated pressures." This latter concept implied steady, relentless attacks on North Vietnam to make support of the insurgency prohibitive.¹⁰

The Bundy position prevailed, leading to a slowly ascending tempo of initial bombing reprisals in response to Viet Cong activity. Bundy's recommendations were incorporated virtually verbatim in a National Security Action Memorandum issued 6 April 1965.

The actual objectives of reprisal bombing attacks were vague, and the results certainly not readily measurable in objective terms. They have been variously described as forcing Hanoi to cease supporting the insurgency, boosting the South Vietnamese government's morale, demonstrating potential for inflicting pain on North Vietnam, and showing the firmness of US resolve. Secretary of Defense Robert McNamara confirmed the objective of demonstrating US resolve in a press conference following some of the early 1965 bombings as follows:

I think it is quite clear that this was a test of will, a clear challenge of the political

purpose of both the US and South Vietnamese governments.¹¹

He also stated to the Joint Chiefs of Staff following the first ROLLING THUNDER bombing strikes in 1965 that the primary objective was to communicate US political resolve.¹²

OBJECTIVES AND STRATEGIES: INTERDICTION

The seeds of a shift to an interdiction rationale, rather than reprisals, were sown when Secretary McNamara noted the relatively poor results of the First ROLLING THUNDER in relation to effort, and the Chairman of the Joint Chiefs of Staff replied by recommending operational commanders be given latitude for selecting the ordnance to be used and the timing of strikes.¹³

From McNamara's viewpoint, shifting the emphasis of bombing to interdiction brought several advantages to his personal control of rapidly escalating events. It provided a rationale to restrict targets to those with direct military importance, thereby helping him to resist pressures to escalate. It also was easier to defend an interdiction rationale publicly.¹⁴

Public explanations, while conceding total interdiction impossible, began stressing that bombing "disrupted" enemy supply flow and made it "more difficult" and "costly" to North Vietnam. McNamara himself, in Congressional testimony in August 1965, emphasized attacking ammunition depots, supplies, barracks, and lines of

communication and at the same time defended not attacking power plants and major POL storage sites because of their "irrelevance" to interdicting the infiltration and the risk of widening the war.¹⁵

The JCS embraced the shift of emphasis to interdiction, although they wanted it on a larger scale. Pacific Command (PACOM) proposed a line-of-communications (LOC)-cut program in March 1965 which was a more comprehensive concept of air operations than any employed up until that time. It was designed to attrite, harass, and interdict North Vietnam south of the established 20° North latitude restriction line through attacks on four main "entry funnels" into Laos and South Vietnam. General John P. McConnell, Air Force Chief of Staff, dissented, proposing instead an intensive 28-day program hitting all previous JCS-proposed targets beginning in southern North Vietnam and moving relentlessly north to Hanoi in two- to six-day intervals to "eliminate the source of the insurgency." However, he deferred to the majority JCS support of the PACOM interdiction program and withdrew his proposal.¹⁶

OBJECTIVES AND STRATEGIES: PRESSURE

Although interdiction was a convenient rationale and a useful one for public statements, significant evidence exists that a "pressure" rationale was the real purpose of the bombing by spring and early summer of 1965. This was more akin to the original reprisal thinking than traditional military interdiction operations.

McNamara appears to confirm this in his memorandum to the President of 20 July 1965. In it he stressed emphasizing the threat of future bombing as follows:

At any time, "pressure" on the DRV depends not upon the current level of bombing but rather upon the credible threat of future destruction which can be avoided by agreeing to negotiate or agreeing to some settlement in negotiations.¹⁷

By stressing the importance of future bombing levels over present levels, McNamara led into the rationale for bombing halts. That is, if the future threat is more important than the present pain, the present pain can easily be removed while one relies primarily on the future threat to coerce enemy actions. This point of view appears to have been in intellectual favor at the time, as Thomas Schelling asserted the following:

Military strategy can no longer be thought of...as the science of military victory. It is now equally if not more, the art of coercion, of intimidation and deterrence. The instruments of war are more punitive than acquisitive. Military strategy, whether we like it, or not, has become the diplomacy of violence.¹⁸

Despite adhering to the "pressure" viewpoint of using military force, McNamara appeared uncertain of any specific gains he could achieve other than to have some vague influence on the North Vietnamese to negotiate. He further stated the following in the 20 July 1965 memorandum:

So long as full victory in the South appears likely, the effect of the bombing program in promoting negotiations or a settlement will probably be small. The bombing program now and later should be designed for its influence on the DRV at that unknown time when the DRV becomes more optimistic about what they can

achieve in a settlement acceptable to us than about what they can achieve by continuation of the war.¹⁹

One is led to believe that, because of its inherent flexibility, airpower was considered an instrument of convenience by men who defined no intermediate objectives in getting to the negotiating table. Secretary of the Air Force Harold Brown later commented, "...airpower was one of our principal bargaining counters; it can quickly be turned up, down, or off."²⁰

General McConnell, in a speech before the Dallas Council on World Affairs in September 1965, defined two types of bombing, "interdiction" and "strategic persuasion." The latter indicated the Administration's underlying purpose and meant using measured amounts of airpower applied to "persuade the North Vietnamese leaders to cease their aggressive actions and accede to President Johnson's offer of negotiating a peaceful settlement of the conflict."²¹

Another aspect of the "pressure" and "persuasion" rationale was tied closely to McNamara's focus on the value of the future threat and on the rapid, flexible capability of airpower. This aspect was Assistant Secretary of Defense John McNaughton's concept of "hard line" versus "soft line" bombing halts. He envisioned a "hard line" halt in which the US would automatically resume bombing at the end of the halt unless specific diplomatic objectives were achieved. The "soft line" halt left open-ended the question of resumption, leaving the Administration free to define diplomatic progress as it chose. These

catchword concepts caught on in high policy circles, but their subtlety seems to have escaped the recipients of the punishment.

Thus interdiction appears to have been used as a rationale toward those outside the real decision process, while the actual decision-makers' thinking was in terms of applying punishing force in hopes of achieving negotiations. McNamara subsequently testified to the Stennis Subcommittee that he was aware that complete interdiction was impractical, but he "could not or would not" state an exact objective for the bombing. Rather he talked in terms of tonnage dropped and general economic impacts, such as North Vietnamese labor force shifts.²²

OBJECTIVES AND STRATEGIES: OTHER CIVILIAN VIEWS

Airpower as an instrument of flexibility and convenience permitted civilian strategists to think in terms of quick, clean operations, a mental way of not going to war, "use of power to prevent using power."²³

Walt Rostow's "victory" thesis, proposed in May 1965, is a good example of this thinking. He proposed that the US would "win" by blocking North Vietnam's routes to victory. A primary way of doing this, as he saw it, was punishing North Vietnam by paralyzing its modern industrial sector. Rostow was convinced that Hanoi valued its industrial establishment highly and would respond favorably to its paralysis. He therefore advocated destroying North Vietnamese electric power generating capability to cause an "...immediate, desperate economic, social, and political

problem."²⁴ His proposal thus went far beyond interdiction into a more classical strategic air action of attacking vital centers, although he phrased it more in terms of punishment rather than in terms of destroying total war-making capability.

John McNaughton originated the term "ratcheting" to describe the policy-makers' approach to an escalated bombing campaign to higher and higher punishing levels. McNaughton, who had considerable influence with McNamara, perceived the primary US objective in Vietnam to be the avoidance of a humiliating defeat. His perceptions of US strategy appear to have been focused primarily on demonstrating US commitment while merely avoiding defeat, and are summed up by his statement, "We are in an escalating military stalemate."²⁵

Undersecretary of State George Ball, a supporter of negotiation without bombing, warned the President in January 1966 that "...a sustained bombing program acquires a life and dynamism of its own" and would inevitably escalate.²⁶ He concisely summed up the vagueness and confusion that plagued policy-makers by further stating the following:

...we have never had a generally agreed rationale for bombing North Vietnam. But the inarticulate major premise has always been that bombing will somehow, someday, and in some manner create pressure on Hanoi to stop the war... it is also widely accepted that for bombing to have this desired effect, we must gradually extend our attack to increasingly vital targets.²⁷

McGeorge Bundy, having resigned from government, wrote President Johnson a year later that the US had prevented defeat for two years and managed to make this prevention sound like a victory.²⁸ He also claimed that getting the North Vietnamese leaders to give in to the bombing had never been a US position. Bundy implied that the bombing should continue, nevertheless, to avoid giving the North Vietnamese "something for nothing" and warned that they would hold out for a US policy shift after the next election.²⁹ Johnson, addressing the Tennessee Legislature in March 1967, stated reasons that largely followed the various vague rationales that had previously been put forward. He put the pressure and psychological roles of bombing ahead of any interdiction objectives.³⁰

In May 1967, Walt Rostow, now Special Assistant to the President, produced a strategy paper that outlined three broad bombing strategies: closing the top of the "supply funnel" which North Vietnam was supposed to represent, attacking what was inside the "funnel," and concentrating bombing on the southern panhandle of North Vietnam. He associated high risks and low return with the first option, cautiously recommended keeping the second option open, and recommended concentrating bombing on the southern panhandle. With this recommendation, he admitted not expecting dramatic results, but pointed out that it would involve losing fewer pilots, a growing government concern. Rostow in 1967 appeared generally far less

optimistic in his predictions of bombing results, as the following statement to Secretary of State Rusk indicates:

We have never held the view that bombing could stop infiltration...We have held the view that the degree of military and civilian costs felt in the North and the diversion of resources to deal with our bombing could contribute marginally -- and perhaps significantly -- to the timing of a decision to end the war.³¹

OBJECTIVES AND STRATEGIES: CONGRESSIONAL FINDINGS

Congress became attuned to the lack of readily identifiable objectives for the bombing at the highest levels of government. The Stennis Subcommittee in 1967 was critical of the way airpower had been used below its potential. The Senate Foreign Relations Committee in 1972 further found that, while the Administration's public rationale in 1965 had been to reduce the flow of men and equipment south, its private rationale was "a mixture of complex and often conflicting objectives."³² The Committee identified six general objectives, paraphrased below in no priority:

- 1) to reduce infiltration of men and supplies into South Vietnam,
- 2) to make North Vietnam pay a high cost for supporting the war in the South,
- 3) to break the will of North Vietnam,
- 4) to affect negotiations for an end to the war,
- 5) to raise US and South Vietnamese morale, and
- 6) to show US determination.³³

TARGETING NORTH VIETNAM

As early as November 1964, after introduction of US security forces and dependent evacuation from South Vietnam, the JCS proposed a comprehensive bombing program.

It included B-52 strikes against major North Vietnamese airfields and fuel facilities in the Hanoi-Haiphong areas, follow-on strikes against infiltration routes and transportation-related targets, and progressive strikes by B-52's and tactical aircraft against military and industrial targets in North Vietnam. Admiral Sharp has speculated that this proposal, if followed, would have had major effects on North Vietnam for only minimal US losses. Admiral Sharp cites the availability of the essential element of surprise at that time and the minimal North Vietnamese air defenses then existing as contributing greatly to the proposed effort.³⁴

At Secretary McNamara's request in early February 1965, the JCS prepared an eight-week bombing program. McNamara placed constraints on JCS planning by requiring that the program be generally limited to targets along Route 7 and south of the 19th parallel. He also required that South Vietnamese air forces also participate in strikes.³⁵

The JCS program called for deployment of 30 B-52's to Guam, nine tactical fighter squadrons to Southeast Asia, and a fourth aircraft carrier to the area. McNamara ultimately approved some of the force deployments, including the B-52's, but did not implement the comprehensive eight-week air strike program he had asked to be planned. Instead, he and the President preferred approving targets on a carefully controlled, case-by-case basis or at the most in weekly target packages.³⁶

The JCS also provided McNamara what proved to be an accurate risk assessment of the proposed program. They predicted that Soviet and Chinese support would be primarily in the form of antiaircraft artillery and surface-to-air missiles (SAMS), with personnel assistance under the guise of technicians so that any casualties might be ignored. The JCS further predicted that a US bombing policy as planned under the given constraints would not pressure Hanoi into restraining Viet Cong operations in the South. Rather, they advised that a significant increase in the damage level would be required to achieve the desired result.³⁷ General McConnell himself considered the eight-week program proposed as far too mild. Instead, he favored the more extensive strike proposals offered by the JCS the previous November.³⁸

Ultimately, the JCS eight-week program was never adopted as proposed. However, the target proposals included in it were considered in high-level reprisal strike planning in early 1965. No long-term comprehensive target plan was adopted.

It is useful at this point to examine briefly the target selection process. Unlike in any previous war in which US airpower was employed, specific targets were not chosen by military staffs acting on broad campaign guidance approved at the national level. What occurred in Southeast Asia appears to be virtually the reverse of the

process that was used in the Combined Bomber Offensive and interdiction campaigns of World War II.

In the actual process, subordinate commands submitted target recommendations up the chain of command to CINCPAC, where they were consolidated and evaluated to provide a PACOM recommendation to JCS. JCS then further evaluated this proposal and forwarded the recommendations through several levels of civilians in the Office of the Secretary of Defense and the State Department to the Secretary of Defense.³⁹ Admiral Sharp has commented on the results of this process as follows:

By the time the Secretary of Defense considered these JCS proposals, they were accompanied by many comments and suggestions for change.⁴⁰

The actual final targeting decision on a specific strike or weekly target package was made at the President's "Target Tuesday" luncheon. In addition to the President, the principals at this meeting were the Secretary of Defense, Secretary of State, Presidential Advisor Rostow, and Presidential Press Secretary Bill Moyers (later George Christian). Significantly, no professional military officer was included at these decision meetings until late 1967, more than two and a half years after the bombing began. Admiral Sharp considers this omission "...a grave and flagrant example of his (McNamara's) persistent refusal to accept the civil-military partnership in the conduct of our military operations."⁴¹

The actual targeting of North Vietnam was the subject of continuing debate between military and civilian officials in the government. Initial targeting was, as the Senate Foreign Relations Committee found in 1972:

...completely dominated by political and psychological considerations....Relatively little weight was given to the purely physical or more directly military and economic implications of whatever target destruction might be achieved.⁴²

However, as early as March 1965, the government gradually began to accept "...a militarily more significant, sustained bombing program" and paid more attention to target systems with more tangible military effects as McNamee began to adopt the interdiction rationale.⁴³ McNamee's gradual shift to the interdiction rationale led to a focus on the rail system in southern North Vietnam. The JCS advocated simultaneous strikes on this entire target system. McNamee instead requested a detailed plan for attacking the rail system south of the 20th parallel with the option of striking in increments or individual targets rather than striking the entire system at once. As a result, the JCS submitted a twelve-week bombing plan at the end of March 1965, and targets continued to be struck on a piecemeal basis.⁴⁴

The JCS in 1965 recommended a list of 94 targets they considered significant and vital to achieving the desired results on North Vietnam. In 1966, this list had expanded to 242 targets. The Stennis Subcommittee in 1967 found that only 22 targets on the list had been struck

and less than one per cent of the total air effort had been directed against targets on the list. The Subcommittee further found that vital targets in the northeast quadrant of North Vietnam, where the bulk of war-supporting resources were concentrated, were largely left unharmed.⁴⁵

During 1965 and early 1966, the JCS strongly supported attacking North Vietnamese POL facilities for both strategic and interdiction impact on North Vietnam. The debate dragged on, with McNamara and the President resisting this proposal. Meanwhile, a subtle change was occurring in this target system, as Admiral Sharp observes:

In the meantime, however, there had been enough publicity in the press about hitting the POL facilities that the Communists were sparing no effort to disperse their fuel supplies. The Hanoi/Haiphong POL storage complexes were still lucrative targets, but by now the North Vietnamese were storing fuel in barrels in caves and along the streets of villages in order to make such supplies immune from air attack...⁴⁶

The JCS ROLLING THUNDER Study Group Report, 14 April 1966, recommended expanding the bombing to include the Haiphong POL facility, as well as mining the entrances to the port of Haiphong and attacking major airfields. This produced no immediate positive response from McNamara or the President.⁴⁷ Shortly thereafter, however, Walt Rostow pressed an argument to attack POL based on the results achieved against Germany in World War II.⁴⁸ General Westmoreland and Admiral Sharp by early June 1966 were

strongly urging POL strikes, with Admiral Sharp stressing the POL dispersal going on in North Vietnam.

By 22 June 1966 the President ordered POL strikes on Hanoi and Haiphong, but they were delayed while several foreign governments were to be notified. A news leak occurred during this delay, causing further postponement. The strikes actually took place on 29 June, destroying a large Hanoi POL storage facility and 90 per cent of the Haiphong facilities.⁴⁹ These strikes surely were no surprise to the North Vietnamese, nor were other POL strikes that followed.

In addition to POL, the JCS stressed the value of transportation targets at the entry points of the enemy logistics system, since these were infinitely more advantageous to destroy than the diffuse smaller and often more mobile targets in the logistics system further south. Secretary McNamara admitted the greater difficulty in interdiction further south, but stressed the potential political repercussions of attacking the enemy entry points to the President as follows:

Interdiction should be carried out so as to maximize effectiveness and to minimize the political repercussions from the methods used. Physically, it makes no difference whether a rifle is interdicted on its way into North Vietnam, on its way out of North Vietnam, in Laos or in South Vietnam. But different amounts of effort and different political prices may be paid depending on how and where it is done...The program should avoid bombing which runs a high risk of escalation into war with the Soviets or China and which is likely to appall allies and friends.⁵⁰

The value of closing the port of Haiphong remained high on the JCS priority list, as did bridges connecting North Vietnam and China. McNamara conceded that the majority of North Vietnamese imports passed through Haiphong, possibly as much as 4700 of an estimated 5800 tons per day. Still, he steadfastly opposed closing this port because of the potential political dangers of deeper, more direct Soviet and China involvement.⁵¹

By late summer 1967, however, targeting had been expanded to include more transportation, war-supporting industry, electric power facilities, steel production, airfields, and bridges in the North. This greatly increased the effects over those of earlier strikes, but came rather late. The Stennis Subcommittee commented as follows:

...military leaders stated that more had been done in the past three months than was achieved in the previous eighteen months -- all because significant targets were being approved, largely for the first time.⁵²

CIVIL-MILITARY RELATIONS

Because of the continuing differences of opinion between civilian and military officials on the use of airpower through 1968, a brief appraisal of major factors affecting the civil-military relations of the time is helpful at this point. The factors considered here are the new men brought into government with President Kennedy, Secretary McNamara himself, and McNamara's use of new management methods.

President Kennedy brought into the government a new brain trust of well-educated elite men with vigor and high self-image. David Halberstam has described them as self-styled "hard-nosed realists," men who considered themselves to have "borne the brunt" of World War II, who had "lost comrades," who were the "company commanders" rather than the generals or colonels.⁵³ These were men like Walt Rostow, McGeorge Bundy, and John McNaughton. Many tended to have been appointed to staff positions during World War II in contrast to their image.

These men became the civilian strategists who dominated US actions in Southeast Asia through most of the 1960's. As civilians, they had been free in their careers to move back and forth between various academic positions, "think tanks," and government jobs. As civilians, they had also been able to be relatively independent of previous official government policy when this was desirable. They further had been allowed the time and financial support for their research. They were men who had published, who had strong intellectual credentials.⁵⁴

Contrast now the strategists in the modern US military with these civilian strategists. Military professionals were more caught up in time-consuming jobs in force development, force training, and force management. Military officers also found it difficult to disagree publicly with Administration policy. This and security constraints made it much more difficult for them to publish.

Military strategists were further limited by their positions in the hierarchy and the necessity to support strategic planning goals. General McConnell in 1967 pointed out that the military professional's first task is to identify the most likely and serious threats and plan to counter them. He then lamented with irony how the Air Force would have been received by Congress had it in the years preceding Vietnam asked for money to build up a large stockpile of conventional weapons to be prepared for a guerrilla war in Asia.⁵⁶

The results of these elite civilian strategists dominating the warfighting strategy suggests that "...danger stems not so much from the military establishment as from the ways civilians use it."⁵⁷ The way they caused the military instrument to be used and the objectives they attempted to define appear to bear out that "...in many cases...officials reach consensus by designing an ambiguous policy."⁵⁸

McNamara himself had a tremendous impact on civil-military relations and thereby on policy and strategy formulation. He very early established "active management" as his mode of operation. One author comments on the extent of this as follows:

...It puts the Secretary of Defense firmly in control of the overall process of decision-making....a policy framework is set by the Secretary; much of the data base is provided by the Secretary; judgments are invited by the Secretary; decisions are made by the Secretary.⁵⁹

Although he attempted to maintain the appearance of soliciting JCS views, McNamara did not hesitate to overrule them. He differed with General McConnell's testimony to the Sternis Subcommittee in 1967 on the impact of less restricted bombing on US casualties. The Subcommittee found a "...sharp difference of opinion between civilian authority and top-level military witnesses...over how and when our airpower should be employed..."⁶⁰ McNamara previously had defended bombing restrictions with the argument that they lowered the risk of direct Soviet or Chinese intervention. Now, however, he publicly disagreed with his military professionals on the military impact of the restrictions. One officer who served near the top of the military establishment has observed the following:

...they (the military) have never seriously challenged the right or the tradition of civil control. They have recognized that the ultimate decision-maker must balance military recommendations against other considerations. It becomes extremely difficult, however, for him to reconcile himself to an adverse decision by his civilian superior based on military considerations. It challenges his military professionalism.⁶¹

McNamara and the management experts he brought into the Department of Defense dominated the decision-making process with the new technique of systems analysis. While it benefited the services by ultimately improving their programming methods, McNamara appears to have used systems analysis rather than organizational changes to establish his control over the Department. "Control over

the premises of decision" and insistence on "rationality" insured "correct" decisions.⁶² As one author has observed:

The revolutionary manner in which McAmara made his decisions (revolutionary, that is, for the Defense Department), transformed the "expert" career bureaucrat into the "novice" and the "inexperienced" political appointee into the "professional."⁶³

The Systems Analysis Office he established virtually became a "civilian JCS giving independent judgments."⁶⁴ The problem with these judgments was not so much in the method, but in the underlying assumptions. A basic problem was making intangible and unquantifiable objectives, such as deterrence, operational.⁶⁵ Deterrence, for example, exists largely in the mind of the adversary and is therefore quite subjective. Specifics of the damage that is threatened or the forces required to achieve this damage are quite difficult to quantify.

There is evidence that McAmara made small use of the Systems Analysis Office in the early stages of the war, relegating its war-related activities to data collection. By October 1966, as his disaffection with the bombing grew, he used it more and more to undermine the rationale for bombing and confirm his convictions.⁶⁶ Even so, he has been attacked for "...looking for American production indices in an Asian political revolution."⁶⁷

EFFECTS OF BOMBING OPERATIONS ON THE USAF

Bombing operations impacted the Air Force in many ways. Use of assets, "gradualism," target restrictions, and bombing halts are discussed below.

One of the ironies of the early years of the air war is the fact that tactical aircraft were often used in a strategic mission, whereas strategic aircraft were barred from this mission and used in a tactical role. While not specifically precluded in USAF doctrine, the most effective use of air assets, and the one the JCS recommended at the outset, was for strategic bombardment of the North primarily by B-52's with conventional bombs.

There are reasons for and against the way air assets were employed. The Administration primarily feared use of the B-52 would alarm the Soviets and Chinese and lead to an expansion of the war. Based on known Soviet respect for US strategic air forces, this fear seems not without basis. General McConnell in September 1965 gave two operational reasons to support the approved employment: the B-52's provided good area saturation needed for some targets in the South, while the fighters were better suited for the targets in the North.⁶⁸ One might question whether the target selection was being made with this in mind to preclude the necessity for area attacks in the North.

Instead, assets were used in a manner that created an atmosphere of "gradualism" for the bombing campaign. This greatly impacted the Air Force by causing unnecessary losses of pilots and aircraft. The enemy was not only given time to build up his defenses in a long, drawn-out campaign of light bombing effort, he was also trained

by the limited air strikes. The infant North Vietnamese air defense forces grew with external assistance and a far less than full-scale US effort into a formidable problem for the Air Force. General Momyer, former 7th Air Force Commander and former Commander of Tactical Air Command, has observed that "...we had merely alerted them to start work on what would become a superb air defense system..."⁶⁹ A Rand report adds the following:

...the learning process probably was greatly assisted by the specialized and constrained pattern of the US air campaign. It made for repetitiveness and predictability of the tasks and problems imposed and the responses required...The gradual, and initially intermittent, buildup of the air war will have facilitated the learning process.⁷⁰

Besides the active defense measures the Air Force faced, gradualism undermined the effectiveness of bombing by allowing the growth of passive defenses, as will be discussed subsequently. This allowed critics to question the credibility of airpower.

Target restrictions, especially those imposed in the Hanoi-Haiphong areas further undermined the effectiveness of bombing efforts. The JCS had repeatedly advised McNamara of the far greater effectiveness of destroying military supplies while concentrated at the entry points of the logistics system. The restrictions also largely allowed defenses to go unmolested. Again, fears of expanding the war by these actions dominated the decision process.

Bombing halts had the same dual impact on the Air Force. The enemy consistently used them to increase the supply and personnel infiltration south, negating the effects of previous interdiction as well as much forthcoming interdiction. The enemy also used them to improve his air defenses and redeploy them for increased effectiveness.

BOMBING IMPACTS ON NORTH VIETNAM

The gradualism, restrictions, and bombing halts both tangibly and intangibly assisted the North Vietnamese in their war effort. These factors had positive impacts on enemy perception of the war, their defensive effort, their wartime economy, their resistance to interdiction, and their ability to withstand attacks on POL and transportation.

The North Vietnamese leaders perceived the initial bombing efforts against less-than-vital targets correctly as indicating less than total commitment of US decision-makers. They knew well the capabilities of the USAF to strike virtually at will against their relatively poor air defense system in the early stages, and interpreted the restrained US effort as weakness in resolve. At the same time, however, they adopted a "long war" strategy, assuming that the US effort would gradually intensify. Therefore, they never downplayed US capability to their population; instead, they used the building threat to mobilize national will against the common external danger.

After more than two years of the bombing, North Vietnamese General Dung commented as follows:

Never before have our people in the North... been so closely united and so firmly confident as they are today... Never before have our people been so highly enlightened and mobilized, so comprehensively organized, and so effectively trained in combat and production as they are today.⁷¹

The North Vietnamese used this mobilized national will quite well in their active and passive defense efforts. They increased the scale of training while acquiring greater assistance in equipment and technicians from their larger Communist allies. They instituted extensive passive defensive measures where possible by relocating industrial production, POL, and population. These relocations initially used up resources, but were an inexpensive source of defensive strength once accomplished.

Bombing caused three types of resource impact on North Vietnam. There was investment, such as air raid shelters and active air defense infrastructure. There was repair of war damages, and there was operation and maintenance of war-related programs. Hoeffding comments in a Rand report as follows:

Much of Hanoi's 1965 effort to insure against a higher level of attack than initially imposed by the United States was of the investment variety, imposing heavy but largely non-recurrent low-cost and sustained benefits.⁷²

The bombing impact on manpower in particular deserves comment. Although labor had to be diverted from the predominately agricultural activities to war-related

activities, there is evidence that this impact was far from critical. First, there was considerable "slack" in the manpower pool before the bombing, as underemployment is common in Third World economies.⁷³ Next, the population was expanding yearly. Approximately 375,000 males and females were estimated to reach age 18 in 1968, and this figure was projected to increase at the rate of 6,000 to 8,000 per year.⁷⁴ The existing labor force also was called upon to produce more work than before, and women entered the labor pool in increasing numbers.⁷⁵

Another general economic impact was that much of the bomb damage was to installations not necessary to sustain the war effort. The North Vietnamese simply did not attempt to restore many of these. The size of the "modern industrial sector" of the North Vietnamese economy itself was relatively small, constituting approximately 12 per cent of a gross national product of approximately \$1.6 billion.⁷⁶ The country was thus less vulnerable by its underdeveloped state than a modern, highly interdependent economy.

The US interdiction efforts impacted North Vietnam by reducing its capability to sustain operations in the South, but this impact fell within enemy tolerance.⁷⁷ The problem lay largely in the "long term supply denial" nature of the interdiction effort the US had to mount, as opposed to an effort to affect a specific enemy operation.⁷⁸ As Korea had proved, interdiction of an enemy ground effort is exceedingly difficult when the enemy

controls his supply consumption by dictating the time, place, and scale of engagement.

North Vietnam was frequently termed a "supply funnel" in discussions of the interdiction. Unlike the funnel image, however, the supply flow fanned out as supplies moved progressively southward. The Ho Chi Minh Trail itself presented a massive targeting problem for anyone attempting to impede supply flow. The following description serves to illustrate this:

The trail seemed to change character in almost direct proportion to the interdiction efforts. When any well-travelled portion of the network was blocked or damaged, a new segment would appear in the form of a bypass. The enemy was also observed to construct entirely new route structures in anticipation of upcoming offensives.⁷⁹

North Vietnam withstood bombing of its transportation and POL systems quite well through the 1968 bombing halt. The transportation system, while having relatively modern rail and seaport components, largely was simple and flexible, enhancing its resistance to bombing. The US tendency to strike piecemeal rather than in a comprehensive assault on the entire transportation system allowed the North Vietnamese to effect repairs in short order with less than critical impact on their economy.

The POL system benefited from the long delay in US strikes on major POL facilities. The North Vietnamese had considerable time to carry out a dispersal program. Fuel was routinely stored throughout the countryside and in villages in small, concealed caches. Their POL imports

changed from predominately bulk to predominately packaged (drums) during the months of US debate on POL strikes, so that by the June 1966 strikes, crippling impact was averted. One Japanese reporter who witnessed a POL strike noted that the fire was put out the same night and that he was told by North Vietnamese that most of the fuel had been evacuated to other areas.⁸⁰ The US apparently gave North Vietnam more than a year to carry out a POL dispersal plan that allowed it, as a less-developed economy, to carry on a war effort.

CONCLUDING AIR CAMPAIGN

After years of sanctuary north of the 20th parallel. President Nixon ordered an expanded bombing campaign and the mining of North Vietnam's harbors in response to the North Vietnamese spring offensive in 1972. LINEBACKER I, an extensive interdiction campaign was conducted over a period of months. This campaign had more ambitious objectives than the previous ROLLING THUNDER campaigns:

- 1) Restrict resupply of North Vietnam from external sources;
- 2) destroy internal stockpiles of military supplies and equipment;
- 3) restrict flow of forces and supplies to the battlefield.⁸¹

The purpose behind these objectives was to break enemy will and capability to continue the war.⁸² This campaign led to a bombing halt in October 1972 in anticipation of progress in negotiations following the blunting of the North Vietnamese offensive.

LINEBACKER II was initiated in December 1972 as a result of no progress in negotiations. This was an intensive, round-the-clock strategic offensive, using B-52's by night and fighters by day until North Vietnam's air defense system had been saturated and depleted and substantial damage had been done to North Vietnam. In 11 days North Vietnam asked for a cease fire. The air effort had the desired effect, but one should not forget that US objectives were now defined in terms of "Vietnamization" and disengagement in contrast to the earlier war years.

CHAPTER VI

CONCLUSIONS

Airpower theory has matured far beyond what most US applications suggest. The US has repeatedly used airpower in war in ways much less effective than the potential foreseen by pioneer airpower theorists. The preceding analysis has shown that the reasons for the lower levels of effectiveness are specific to the particular war analyzed. Policy-makers may face specific new conditions in a war, but they cannot lightly ignore the lessons of the past and at the same time wield responsibly so powerful a military instrument as airpower.

WORLD WAR II

Two aspects of airpower theory stand out in offensive operations in World War II. Joint air-ground operations, particularly interdiction, had paralyzing effects on enemy operation in 1944 and 1945. Strategic bombardment, even in the conventional mode, demonstrated a devastating capability against an enemy state.

As opposed to strategic theory, joint air-ground operations doctrine was less clearly articulated before the war. Some aspects, such as centralized control of air assets and application of the principle of mass to

achieve local air superiority, were already understood by airmen but not yet accepted by ground commanders.

Joint air-ground doctrine was poorly developed before the war because airmen were not heeded by ground commanders and staffs in peacetime exercises. Vital opportunities to identify problems in equipment and methods were foregone. As a result, the principles of close coordination between air and ground forces had to be forged in combat in World War II.

Combat is an unforgiving school, but the survivors are well-trained. Joint air-ground operations became a highly effective combined arms effort in wartime. Interdiction, as a part of this effort, was extremely effective when complemented by a vigorous ground campaign. This dual pressure on an enemy was one of the chief lessons for future air operations.

Strategic bombing in World War II also provided important lessons in the application of airpower, but the whole discussion of the effectiveness of strategic bombing is often grossly oversimplified. Once an adequate US force had been developed and deployed, strategic bombers inflicted devastating damage on Germany and Japan. They penetrated intense enemy antiaircraft defenses to strike at the enemy heartland; they largely destroyed their targets.

The initial impact of US strategic bombing on Germany was blunted by "gradualism." Only a "gradual"

increase in bombing effectiveness was possible because of the low force level maintained in the prewar years. The USAAF grappled with a monumental task of force development as it entered World War II. Not only did its leaders have to manage a massive organizational expansion as large numbers of people and large amounts of equipment were assimilated, but they also had to insure their forces acquired the latest technology. Even with this herculean effort, a potent bombing force developed only gradually because of the time required for wartime economic expansion. As the force developed, it was initially committed piecemeal to shore up various theater tactical situations. This compounded the effect of "gradualism."

Targeting policy also was affected by "gradualism." This can partly be attributed to the ground campaign orientation of virtually the entire US military hierarchy except the AAF, as well as a similar orientation among the allied military hierarchy that approved the initial bombing strategy. Consequently, bombing effort was dissipated piecemeal on a variety of targets more tactical in nature, and a mass bombing assault on really vital target systems did not occur until later in the war. Thus, the targeting policy itself was weak for much of the war.

Inadequate capability during the early war years and weak targeting policy must be recognized for the telling effect they had on strategic bombing as a military

instrument. The US was still learning how to use the air-power instrument; however, visionaries like Mitchell had foreseen the great power of the air forces of 1944-45.

KOREA

In Korea strategic bombing and interdiction gave way to a pressure campaign because of the unique characteristics of the war.

Strategic bombing in Korea had little impact on the outcome of the war for two main reasons. First, there were few worthwhile targets in North Korea, and none proved critical to the enemy war effort. Second, and more significantly, strategic bomber forces were politically limited from striking true strategic targets in the Soviet Union and China.

Opponents of strategic bombing have decried its use in Korea as proving that it has been overrated, while its proponents have denied this. Any examination of the strategic bombing attacks in Korea yields the fact that the bombing forces demonstrated their capability; they were simply denied authority to engage the true strategic targets of a purposely limited war.

The interdiction campaign in this limited war offered sharp contrast to the very successful interdiction efforts of World War II. It provided important lessons for the future about the difficulty of seriously impairing an

enemy that has comparatively low supply requirements and who can control the time, place, and intensity of his operations.

Out of the ambiguous interdiction situation in Korea grew a new approach, the "pressure" campaign to achieve desired results at the negotiating table. In retrospect, although this campaign was made up in large part of interdiction efforts, this type of campaign appears to be a modified version of a strategic air offensive and should be recognized as such for proper perspective. While it was not aimed at total destruction of enemy war-making potential, it was directed at the will of the enemy to continue hostilities. As such, it took on a strategic nature. This is a lesson that decision-makers in the Vietnam era should have heeded.

VIETNAM

In Vietnam the US had the opportunity to demonstrate once and for all the war-winning capability of airpower as a force in and of itself -- and lost it because it was minutely controlled and employed piecemeal by policy-makers who poorly understood the nature of the instrument.

Airpower applied against North Vietnam suffered from a failure of the decision-makers to acknowledge what was in fact a strategic air offensive, lack of clear objectives, and "gradualism" in its application.

The military at the outset perceived air action against North Vietnam in strategic terms, as evidenced by all early JCS proposals on bombing. Most of the civilian strategy intellectuals advising the President and Secretary of Defense, however, seemed to think that, so long as it did not include the Soviet Union or China, the air effort was not strategic. A theme that frequently appears in their very general objectives is that of breaking North Vietnamese will to continue the war. A campaign of one nation attempting to break another's national will is surely strategic, whatever the scale of effort. The weak, uncertain application of force ultimately served to bolster enemy will.

Secretary McNamara failed to set well-defined objectives because he did not heed his military advisors, nor did he appreciate the strategic nature of operations. Once the reprisal rationale gave way to an interdiction rationale, objectives became even more vague. Perhaps no well-defined objectives were set for the interdiction effort because to do so would be to allow objective evaluation of the effort. This in turn would point out errors and inconsistencies in the methods -- the Secretary of Defense's methods. It is ironic that Secretary McNamara, the personified epitome of efficient management, dominated the strategy decisions of a war with tremendous self-imposed inefficiency.

McNamara's failure to heed military advice raises the question of his own military experience. Why did he discount the opinions of experts in a technical area in which he had no background? His own military experience in World War II consisted of establishing statistical control systems for the USAAF, hardly operational command experience. He exhibited a powerful intellectual arrogance in his dealings with the JCS. This arrogance became a defense mechanism as his weak, ineffectual use of the military instrument yielded only poor results toward resolving the conflict on US terms. Thus, he became increasingly displeased with the military for achieving results that he himself had foreordained. His displeasure and intellectual arrogance caused him to distrust the military and led him to fail to resolve the war on US terms.

McNamara further focused on the need to prevent escalation into global conflict and indicated strong concern for this danger numerous times. In doing so, however, he ignored the advantages of a lightning war confronting the major Communist states with a fait accompli and instead chose the route of "gradualism" and a continuing danger of escalation.

"Gradualism" created a monumental bombing problem in North Vietnam. The enemy was given an excellent opportunity to develop active and passive defenses. Thus, the ultimate lack of desired effects on North Vietnam became a self-fulfilled prophecy. The Administration would

not allow an effort sufficient to achieve its goals. The effort it did order was just enough to magnify the bombing problem over time. North Vietnam's problem was less one of bearing pain than one of making an economic adjustment.

THE FUTURE

Airpower theorists and pioneer airmen helped provide the US with an excellent national defense capability. However, the principles they forged for applying this capability properly stand in danger of being rendered ineffectual if they are ignored in the course of national policy. Airpower has been misused in the past because airpower experts were not heeded. Such misuse in the future will make escalation and global conflict more, rather than less, likely.

The very nature of airpower lends itself to irresponsible use: it is quickly and easily applied and can be put to use without sound appraisal of a war's objectives; it is a dramatic gesture; and it involves few of our own people compared to ground actions, allowing policy-makers to believe they are not really going to war. These characteristics increase policy-makers' responsibilities in applying airpower effectively. However, when an enemy general observes that a basic USAF weakness exists because it cannot freely bring its strength to bear, the conclusion follows that a well-developed theory of airpower has not been matched by effective application.

The early theorists proclaimed that airpower is an instrument for directly defeating an enemy; the Vietnam-era policy-makers used it as an instrument of gradual damage. Those who commit the US airpower instrument in future conflicts without heeding the counsel of professional airmen bear the moral responsibility of increasing the risk of defeat.

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