What Do We Do Now? Air Power Use After Gaining Air Superiority

A Monograph
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ABSTRACT

WHAT DO WE DO NOW? Air Power use after gaining Air Superiority by MAJ Richard H. Lang II, USAF, 54 pages.

This monograph discusses potential missions for air power once air superiority has been gained in a theater of operations. Options for this usage include interdiction and close air support. These options are analyzed with respect to three types of theaters of operations, mature, immature and primitive.

The monograph uses historical examples from each type of theater in which one side enjoyed air superiority. The paper then analyzes whether air power was used for interdiction or close air support. The interdiction option is further subdivided into target systems that were attacked in each theater. A comparison is then made between actual and desired results and the costs involved in choosing that option.

Finally, a hypothetical "best" use of air power in each theater is determined. Additionally, the target system with the highest payoff within that theater is also noted.

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Chapter 1: Introduction

The employment of land, sea, and air forces in time of war should be directed towards one single aim: VICTORY.
General Guilio Douhet, 1921[1]

Colonel John Warden, author of The Air Campaign: Planning for Combat has issued a challenge to develop air power theory at the operational level of war.[2] In thinking about existing air power theory, it becomes obvious why he issued that challenge. Traditional air power theorists have focused at the strategic level of war. Current air power doctrine focuses primarily on the tactical level of war. Col Warden's book focuses only on one aspect of air power at the operational level, air superiority. Air power theory, then, has a gap at the operational level of war.

The gap is this, a commander has theoretical guidance to gain air superiority as a pre-condition for success in subsequent operations. However, he has no corresponding theory to guide him in applying air power operationally in subsequent operations. This paper presents a solution to the problem this absence of theory presents to a joint planner. The key concept in this paper is the premise that, much like air superiority, interdiction of the enemy's military potential is an essential pre-condition for success in a campaign.

In the past, the lack of operational theory has been less a dilemma since the quantity of available air power in the U.S. inventory allowed for a brute force approach. Effectiveness was the issue, not necessarily efficiency. As the U.S. military draws down, air power will be expected to be as effective as before but with less assets. This will force planners to make the efficient use of air power assets an operational imperative. Consequently, this efficiency imperative is why operational air power theory must be expanded.

This paper will use historical situations in which a participant enjoyed air superiority in war. It will analyze the subsequent use of that participant's air power with respect to the level of war in which air power was applied, operational or tactical. The moral, physical, or cybernetic domain of battle against which air power was applied and the success air power had in those domains will also be analyzed. The paper will analyze the historical situations using three scenarios based on the type of theater in which the air power was used.

The three scenarios a commander could face once he gains air superiority are: 1) He could be facing an opponent in a mature theater. 2) He could be facing an opponent in an immature theater. 3) The commander could be facing an opponent in a primitive theater.[3] The

analysis of each scenario will provide a theoretical best operational use of air power in that type theater.

Chapter 2: Definitions

"I hate definitions."

Disraeli[4]

The Department of Defense dictionary, Joint Pub 1-02, defines theater of operations as "that portion of an area of war necessary for military operations and for the administration of such operations."[5] Mature is defined as "to come to full development."[6] A mature theater of operations, then, is one in which both sides have completed deployment of troops and supplies. They have established bases and have sufficient supply depots to conduct operations. The mature theater has redundant lines of communications in being to support continual operations. Central Europe and the Republic of Korea today are examples of a mature theater of operations.

Conversely, immature is defined as "not mature, ripe, developed, perfected" also "youthful."[7] The implication here is that the theater has begun to develop and has characteristics of that development. However, it is not completely developed. In this paper, an immature theater of operations is one in which either or both sides have begun deployment of troops and supplies but the deployment is ongoing. In addition, logistic distribution networks are limited in their redundancy and

capacity to support operations. North Africa in 1942 and Saudi Arabia during Desert Shield are examples of an immature theater of operations.

Primitive is defined as "simple, unsophisticated, crude."[8] A primitive theater then would be one in which logistic systems are rudimentary and may rely heavily on animal or human transportation. In addition, military operations in the theater, either by choice or as a result of terrain, are more constrained. Freedom to conduct large force operations is limited which means that small unit actions and guerrilla war are more prevalent. Vietnam, from the North Vietnamese and Viet Cong perspective, and Burma during World War II are examples of primitive theaters of operation.

In addition to the theater definitions, some air power terms require defining. AFM 1-1 Basic Aerospace Doctrine defines interdiction:

> "to delay, disrupt, divert, or destroy an enemy's military potential before it can be brought to bear effectively against friendly forces. These combat operations are performed at such distances from friendly surface forces that detailed integration of specific actions with the fire and movement of friendly forces is normally not required.[9]"

As such it "directly supports the campaign or major operation plan and as such, does not normally require detailed integration and coordination with the surface scheme of maneuver."[10]

Interdiction, since it is designed to "delay, disrupt, divert, or destroy an enemy's military potential" is more operational in its orientation. Its task is more aligned with supporting the campaign plan than supporting the immediate battle. Interdiction is normally oriented against the enemy's infrastructure as opposed to his military forces. Exceptions to these situations can certainly be found, however, for this paper, interdiction missions are conducted in the operational level of war.

While the word interdict implies total prohibition, it should be understood that complete interdiction is an ideal, much like air supremacy. Attrition, versus absolute interdiction, of the enemy's military potential is a much more realistic and achievable goal.[11] With an understanding of the use of air power at the operational level of war, it is important to also understand air power terminology as it relates to the tactical level of war, specifically joint fire support.

Joint Pub 3-09, Joint Fire Support defines Joint fire support as fires done in "... support of a particular force and, therefore, require detailed integration and coordination with the scheme of maneuver of the supported force."[12] Since it is performed in support of a particular force, close air support (CAS) falls under the category of joint fire support.

AFM 1-1 defines CAS as support of surface operations in such close proximity to friendly forces as to require detailed coordination and integration with the plans of the friendly surface forces.[13]

Since joint fire support, manifested as CAS, is defined as directly supporting a unit, it is more tactical in its orientation. Joint fire support is oriented against enemy forces with the intent of winning the immediate battle rather than directly supporting the campaign.

In analyzing air power theory, this paper will rely heavily on the concept of Jomini's "decisive strategic point." Jomini defined this as "all those [points] which are capable of exercising a marked influence either upon the result of the campaign or upon a single enterprise."[14] Jomini called the point "strategic" which in his day, it was. However, in modern day usage, since it deals with campaigns or single enterprises, a decisive strategic point is more applicable to the operational level of war. To minimize confusion, decisive strategic points will be referred to as decisive points throughout the remainder of the paper. Examples of decisive points used in this paper are transportation systems, petroleum systems and command and control systems.

Chapter 3: Theoretical Background

"If we should have to fight, we should be prepared to do so from the neck up instead of from the neck down."

Jimmy Doolittle[15]

Before getting into detailed analysis of the three scenarios, one must first discuss the options a commander has for using air power after air superiority has been gained. These options are strategic bombardment, interdiction and joint fire support.

Guilio Douhet and Billy Mitchell were two of the earliest air power theorists. Douhet espoused breaking an enemy's will by strategic bombardment of cities. Mitchell built on Douhet's theory and advocated a separate air arm as a means of strategic defense.[16] Thus their effort was centered on the strategic level of war. Key to their theories was the concept of "command of the air."

"Command of the air" provided the framework from which Colonel Warden refined his operational theory of air superiority. He believes that air superiority is a pre-condition for success.[17] His book, Air Campaign: Planning for Combat prescribes a campaign to gain it.

It is at this point that theory ends. Doctrine, in the form of Air Force AFM 1-1, provides some general guidelines concerning the use of air power in an interdiction role.[18] Nonetheless, the majority of doctrine as provided in this publication, as well as Army

FM 100-5 and other warfighting manuals, is concerned with air power at the tactical level of war, specifically CAS.

With a solid theoretical background at the strategic level, tested doctrine at the tactical level and a departure point, air superiority, at the operational level, how is air power used in operational art and what should be expected from it?

Operational art is:

> "the employment of military forces to attain strategic goals in a theater of war or theater of operations through the design, organization, and conduct of **campaigns and major operations**"[19][Emphasis my own]

Air power has a key role to play in operational art. In determining that role, FM 100-5 requires the operational artist to answer several questions. Among the questions is this one which relates directly to air power. "What military condition must be produced in the theater of war or operations to achieve the strategic goal?"[20] One of the answers to that question has been provided by Colonel Warden, air superiority. Another answer is interdiction, as the study of history conducted in this paper will show. What, however, should be expected from interdiction and how should interdiction be accomplished?

The result of successful interdiction is a disorganized enemy. Continued friendly attacks push him closer toward disintegration as a fighting force.[21] This desirable goal, the disintegration of the enemy force,

takes place in three domains of battle: physical, cybernetic and moral. Attacking targets in the physical and cybernetic domains affects the moral domain by raising fear in the enemy and demoralizing its army, thus reducing the will to resist.

In the physical domain of battle, two decisive points, petroleum and transportation systems, have consistently been attacked by air. Within the petroleum decisive point, the targets that have been attacked are refineries, pump stations, storage facilities and petroleum transports. This decisive point was chosen for attack because denial of petroleum would limit an enemy's mobility and limit his ability to resupply. Ultimately, successful attacks on this decisive point would deny the enemy freedom of action.

The second decisive point, the transportation systems, has been attacked for the same reason, to deny enemy freedom of action. Transportation systems were targeted at railyards, bridges, tunnels, and ports. In addition, individual trucks, trains, or ships were attacked.

In the cybernetic domain of battle, decisive points that air power has historically attacked include command and control systems as well as operational reserves. Targets within the command and control decisive point include headquarters, communications systems, electrical

production and centralized control facilities. Targeting operational reserves is accomplished directly by attacking assembly areas. Air power also targets this decisive point by attacking bridges, railyards, tunnels etc. along the lines of operation of the enemy force.

The moral domain of battle is intangible. It involves the will of the enemy to continue to fight. At the strategic level, this involves national will. At the operational level of war, it involves the will of the enemy military to fight. Air power's role is the acceleration in the widespread moral collapse of enemy formations and commanders at all levels. Operationally, air power helps the commander to establish moral ascendancy over the enemy by "convincing the enemy that he's whipped."[22]

The difficult part of attacking decisive points in the moral domain is that they cannot be attacked directly. The effect in the moral domain occurs by limiting mobility and generally reducing logistics in the physical domain. The effect is further enhanced by encouraging confusion and slowing decision making by attacking command and control systems in the cybernetic domain. By attacking targets in the physical and cybernetic domains, air power has an effect in the moral domain and helps the commander achieve moral ascendancy. Enemy ground forces who surrendered immediately after

heavy air strikes are an excellent example of this phenomenon.[23]

As the reader may have noticed, the same individual targets appear when attacking different decisive points. The distinction between the decisive points occurs in the targets themselves and the systematic nature in which they are attacked. For instance, enemy shipping regularly passes through a commander's area of responsibility. If he focusses his attacks on all tankers that pass by, he is attacking the petroleum decisive point. If, on the other hand, he attacks any ship regardless of type, he is attacking the transportation decisive point. This systematic targeting of all particular targets in a particular decisive point is the fundamental distinction between decisive points.

With an understanding of air power theory, decisive points and domains of battle, analysis of air power usage in history can begin.

Chapter 4: Historical Case Studies

Scenario 1: An Enemy in a mature theater

> *"... In the night an uninterrupted trail of burning vehicles extended like a torchlight procession from Bastogne to as far back as the West Wall."*
>
> *Ludwig Heilmann, Cdr 5th Paratroop Div.* [24]

The first scenario to be discussed will be the situation in which a commander has gained air superiority

against an opponent who still has significant technological sophistication and is operating in a mature theater. The commander is now faced with the decision whether he should use his air power in an interdiction mission, in a joint fire support mission or in some combination of the two. Decisive points to be studied in Scenario 1 are transportation systems and petroleum systems. Also studied will be fire support.

The first option to examine will be the interdiction mission. During World War II, the Allies continually evolved their theories about interdiction. In North Africa, the Americans used their air primarily as CAS while the British used their air power against shipping. During the Italian Campaign, air power was used against the German transportation system to deny them petroleum and other logistics.[25] During Overlord, air power was directed against transportation to hinder enemy mobility.[26] After the invasion, air power was redirected against German petroleum production.

Air power usage in North Africa will be discussed in the section dealing with immature theaters. This section focuses on air power in Italy and Operation Overlord.

In an effort to break the ground stalemate in effect after the Anzio invasion, the Allies conducted Operation Strangle. This two month interdiction effort was conducted with the intent to cut the German's supply

system.[27] The Allies targeted the German transportation system as the decisive point during the Italian campaign in World War II. In Italy, the specific targets the Allies attacked were defiles, road junctions, bridges and towns.[28]

The success of the effort can be measured in the inability of the German Tenth Army to move its Divisions to counter threats and, in fact, its inability to conduct a retreat until 16 June 1944 when fuel supplies improved.[29]

This effect was not instantaneous, as the Overlord planners later recognized. In fact, the initial effect of the attacks against traffic targets was minimal to the German troops on the front.

> "This situation changed in late summer 1944 when air attacks, the precise date of which cannot be established, suddenly destroyed all Po River bridges. Only one of the railway bridges was capable of only temporary repair, and from then on all rail traffic across the Po River, in both North-South and South-North directions ceased. All supply and personnel traffic had to be adjusted to motor vehicle transportation which meant that large quantities of motor fuel had to be made available for the purpose at the expense of units in combat at the front.[30]

The success that the Allied interdiction effort against transportation systems in Italy enjoyed had a large impact on planning for the Overlord invasion.

On 25 March, 1944, during the pre-invasion planning for Overlord, General Eisenhower made the decision to

isolate the Normandy beachhead. The Allied air commanders decided that the transportation system the Germans were using would be attacked. Decisive points to attack in that system were the railyards, bridges and locomotives. Although Eisenhower's specific decision was to attack railyards, Air Marshall Tedder and his adviser Solly Zuckerman were able to include the attacks on bridges and locomotives.[31]

Eisenhower made the decision because he believed the best use of air forces would be to "hinder enemy movement" during and immediately after the Overlord invasion.[32]

Some difference of opinion exists about the success of the attack on the transportation system. Field Marshal Von Rundstedt, the commander in chief, Army Group West, told interrogators that "strategic bombing had little or no effect on the French railway systems until late in July 1944."[33] Evidence suggests otherwise. Between 11 June, 1944 and 11 July, 1944, the Allies estimated the German tactical sustainment requirement at twenty four trains per day crossing the Seine-Loire bridges. The actual number the Germans were able to get into the region was less than one per day.[34] After the war, the 12th Army Group Air Effects Committee, chaired by General Omar Bradley had the following to say:

> "The enemy was unable to use the rail system inside the SEINE-LOIRE area for any large scale movement of troops and the most significant delays were those imposed by detrainment at the rim of the arc. Rail movement within the area was principally devoted to the carrying of supplies. The continued attacks by patrolling aircraft caused virtually all movements to take place at night, with resultant disorganization and loss of time. Attacks on marshalling yards required the enemy to disperse his locomotives. They decreased his coal supplies, and made rail transportation more difficult to arrange. They frequently denied the capacity to route his movements by the shortest direct route, and forced him to submit to the disadvantage of delays and detrainings.
>
> Half of the troops detrained at the LOIRE marched six to twelve days into battle, and those who crossed on bridges temporarily operative did not advance more than fifty miles before detraining."[35]

Clearly, Eisenhower's objective of "hindering enemy movement" was met.

Some members of Eisenhower's staff had argued for targeting the oil system prior to Overlord. The plan was rejected primarily because the time required for completing the attack would have moved the Overlord invasion much later in the year when the weather in the English Channel would have been unfavorable.[36]

Nevertheless, the attack on the German petroleum production system began shortly after the Overlord invasion and continued through the remainder of the war. Figure 1 shows the total German production and import capacity of oil products in 1944. Table 1 gives expanded monthly figures for all petroleum production. The figure

shows the precipitous decline in production which occurred once the system as a whole was targeted.

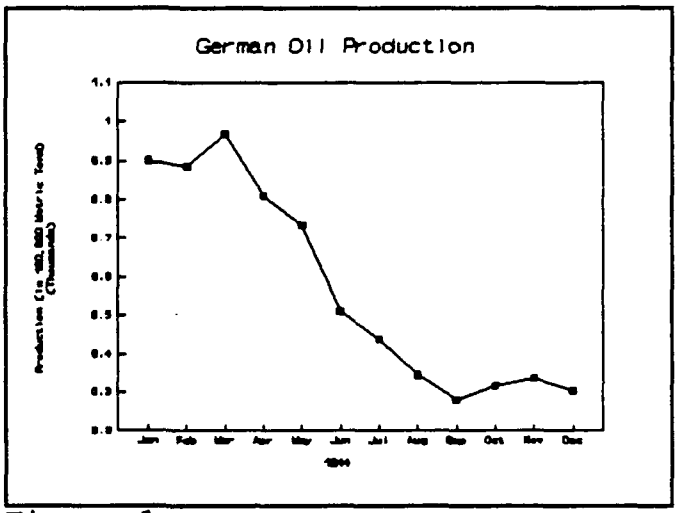

Figure 1 Webster and Frankland, Strategic Air Offensive against Germany, IV, 516-517

This six month attack on the petroleum decisive point also had the desired effect of "hindering enemy movement." This fact is supported by a report by General Hasso Manteuffel which stated that the 2nd Panzer Division was "immobilized" *from* lack of fuel during the Battle of the Bulge.[37] As the German offensive ground to a halt on Christmas Eve, it was apparent the German lack of fuel and, by extension, the Allied attack on its production system, was a significant factor in the Allied success.[38]

In addition to operational use of air power, the commander may choose use it tactically. CAS was an important role for air power in World War II in Europe.

General Bradley, in his Effect of Airpower on Military Operations, praises the 9th Tactical Air Command and its operations in support of 12th Army Group in Europe during World War II. This is quite understandable

since they were highly successful and had demonstrable results. After ordering a CAS strike, a commander could usually see the results directly. The results of an interdiction mission are not so readily observable.

During Normandy operations in June and July 1944, 48,242 fighter-bomber and 13,176 medium bomber sorties were specifically devoted to the CAS and BAI missions.[39] The success of those missions can be summed up in the following:

> "Close support attacks by fighter bombers during this battle (the attack on ST. Lo) were made chiefly against strong points, enemy troop formations, gun positions, field fortifications, self-propelled guns, etc. In addition to actual attacks made, and as attested by reports of the commanders concerned, great benefit was derived by the mere presence of fighter bombers in the area. Enemy artillery was noticeably quiet when they were present. Attacks on defended villages consistently made them easier to occupy by our troops, as was also the case in most instances of attacks on field fortifications and key centers of resistance.
>
> During this attack, as was true with similar attacks being made concurrently by other corps of the First Army, the fighter bomber appeared to be one of our most effective weapons."[40]

These examples represent historical use of air power at both the operational and tactical level of war in a mature theater. Historical examples of air power use in an immature theater will be presented next.

Scenario 2: An Enemy in an immature theater

> *What must it be like to be an Iraqi soldier... They don't see the B-52s. They don't hear them [until the bombs start exploding]. All they know is that today the bombs will come. And they do.*
>
> *John Keegan* [41]

When deciding how best to use his air power to attack a enemy in an immature theater, the commander is faced with much the same choices he has in Scenario 1. His targeting options will be discussed in this order: transportation systems, petroleum systems, command and control systems, and using his air power strictly for BAI and CAS.

In an immature theater, the transportation systems are a much more lucrative target than in more developed theaters. By definition, an immature theater has less redundant rail and road networks, they are therefore more vulnerable to interdiction.

In an immature theater, the transportation system and the petroleum systems are also much more closely intertwined. This presents an opportunity for the commander to exploit. For instance, during the North African campaign, the Allies targeted Axis shipping. Although a transportation system, the Axis powers were also receiving their oil by those ships. By denying the Axis powers the oil, the Allies denied the Axis the fuel

to power their transportation system. This virtually shut down the Axis logistic system. Field Marshal Rommel fully understood the serious impact logistics had on a campaign:

> "The first essential condition for an army to be able to stand the strain of battle is an adequate stock of Weapons, Petrol and Ammunition, In fact, the battle is fought and decided by the quartermasters before the shooting begins."[42]

During August 1942, Rommel's Panzerarmee received only 12,800 tons of fuel. This amount was not enough to sustain the force in its positions, much less accumulate the fuel stocks needed for an attack.[43] Allied Air Marshal Tedder confirms this.

> "The battle of El Alamein was lost by the Axis powers before it began, because Rommel suffered primarily under a very serious shortage in fuel and lubricating oils. Sufficient supplies in these commodities were admittedly ready for shipment in Italy, but there was no possibility of shipping them to North Africa."[44]

In more modern times, transportation systems have remained a lucrative interdiction target in immature theaters. During Desert Storm, the Iraqi transportation system was targeted between 26 January and 28 February 1991.[45] Of the official 112,000 sorties flown in the conflict, 22% or 24,640 were flown against the system.[46] During this portion of the campaign the Iraqi army was cut off logistically by the destruction of rail and road

bridges. The effect was to almost entirely isolate the Iraqi army.[47]

Command and control systems were also targeted by commanders in immature theaters. During Desert Storm, the Iraqi command and control system was one of the first targets hit. In the initial phase of the campaign, twenty-eight power plants were attacked, shutting down electrical power, television, telephones and radio communications.[48] Precision guided munitions played a key role in making that operational attack on command and control systems possible.

The commander could also use his air power to attack enemy forces in a BAI or CAS role. During Desert Storm, 29,120 sorties were tasked in this role.[49] Air power was tasked to attrite front line combat units to less than 50% combat strength prior to the beginning of the ground offensive. General H. Norman Schwarzkopf believed "[i]t was necessary to reduce these forces down to a strength that made them weaker, particularly along the front-line barrier that we had to go through."[50] In addition to the attrition of the front-line units, air power was tasked to attrite units in the second defensive belt by twenty five to fifty percent.[51]

The success of air power's role in joint fire support for breaching the Iraqi first line of defense and the subsequent exploitation of the breach played a key

part in what General Schwartzkopf called an "absolutely superb operation."[52]

Scenario 3: An Enemy in a primitive theater

> *"Without the victory of the air forces there could have been no victory for the army, and, when it came, the shares of the soldier and the airman were so intermingled that it was a joint victory."*
>
> *Field Marshal Viscount Slim*[53]

In the past, when confronted with an enemy in a primitive theater, commander's have attacked transportation systems, and command and control systems. They have also relied heavily on air power in a joint fire support role.

Because of the primitive nature of the theater, decisive points are much fewer in number. Petroleum systems have not usually been decisive points. Various petroleum related targets nevertheless were struck. However, the intent was not the systematic denial of all petroleum products as a pre-condition for success in a campaign as it was in Europe in World War II.

One of the targets that has been attacked in Scenario 3 situations is Command and Control systems. Slim discusses this aspect:

> "In all these operations, and particularly in those aimed at the disruption of the enemy command, the Allied air forces played a notable part. As soon as a Japanese divisional or army headquarters opened up, our wireless location unit, recognizing their call signs and even the mannerisms of their individual

> operators, quickly pin-pointed their positions. Then American and British light bombers and ground support aircraft were on them like terriers on to rats, while a motorized and armoured column often followed before the dust had settled. The life of a Japanese general and his staff in these days was not a happy one."[54]

The effects of these attacks were attrition of the enemy command system as well as forcing it to use slower, less efficient means to exercise command and control. Slim was using his air power to assist him in "getting inside the enemy's decision cycle."

In a primitive theater, the enemy transportation system may also be a decisive point. However, it is heavily reliant on pack animals or humans capable of traveling along obscure and easily hidden trails. These means make direct interdiction difficult. It is still possible to attrite the enemy's supply lines by air as shown in Burma during World War II. But, as shown in the interdiction effort in South Vietnam, complete interdiction is much more difficult.

Slim, in his Burma campaign, quite clearly attacked the enemy transportation system.

> "... far beyond the range of its [the army's] sight the enemy's line of communication and administrative installations had been kept under almost constant attack by the Allied bombers. The cumulative effect of this was immense; his river craft, his motor transport and railway trains slunk along haltingly only at night. The air forces never stopped him moving his formations, but they slowed them

> up, destroyed their vehicles, and disrupted their communications."[55]

The United States also attempted to interdict the North Vietnamese transportation system during the Vietnam War. Their attempts were met with varied success. The most notable of these attempts was directed against the Paul Doumer and Thanh Hoa railroad bridges. After several attempts and numerous losses, the bridges were destroyed. However, the effectiveness of interdicting these bridges as well as other decisive geographic points along the Ho Chi Minh Trail was questionable.

The elusive nature of this effectiveness, or payoff, is precisely the dilemma the commander faces in a primitive theater. Should he use his air power operationally, against a difficult target to locate and successfully attack, with indefinite assessment of its results? Or, should he use it in a more visible and every bit as important mission, that of joint fire support? A conversation between then Chairman of the Joint Chiefs of Staff, General Earle Wheeler, Lyndon Johnson and Dean Rusk in 1966 sums up this dilemma nicely:

> **Wheeler:** We should decrease by every pound we can to stop the movement of supplies. In interdiction, you start at the beginning and go all the way through to finally stopping it in Country...
> **President:** We really pay a price- if we are not getting a payoff.
> **Rusk:** [Bombing] ought to directly help our troops and break the will of the other fellow.

My own priority would be to concentrate on operational connections in the South."[56]

This brings the discussion to the other mission, joint fire support, specifically CAS. Air power's participation in joint fire support is near and dear to a ground commander's heart, with good reason. It is effective. It is visible, both in the ability to see the support as it is happening and in the ability to view and benefit from the results. Consequently, in a frustratingly primitive theater, such as Burma or South Vietnam, commander's have frequently used air power as joint fire support.

Slim used air power as joint fire support , developing methods of calling air support to augment his scarce artillery. As the proficiency of both soldiers and airman grew, Slim "confidently dovetailed" his fire plans with both the airmen and artillery gunners.[57]

A similar use of air power was applied during the siege of Khe Sanh in 1968. Between January and March of that year, General Westmoreland tasked 22,500 fighter sorties and 2,500 B-52 strikes in a round-the-clock support of the garrison.[58] Air power clearly played an integral part in the joint fire support for the successful defense of Khe Sanh.

A comparable air power effort was used in Vietnam during Operation ATTLEBORO (14 September-26 November

1966) conducted in the vicinity of the Cambodian border northwest of Saigon. 1,600 CAS sorties dropped nearly 12,000 tons of ordnance. The Viet Cong suffered over 1,000 killed to the air attacks including four battalion commanders and five company commanders.[59]

Air power can obviously be used in either the interdiction or joint fire support roles in a primitive theater. In either case, the effectiveness of the effort will be less than it would be in a more developed theater. Determining the effectiveness and efficiency of air power in each theater will be the subject of the next section of this paper.

Chapter 5: Analysis

"Think first, fight afterwards- the soldier's art"

Robert Browning[60]

Before analyzing the use of air power in each of the three scenarios presented, analysis of two aspects of air power germane to any theater must be completed. These aspects are the measurement of the effects of interdiction and the enemy reaction to friendly air power.

The first issue is somewhat ethereal in nature. The concept involves comparing a course of action that never happened, the enemy plan prior to the interdiction

effort, with a course of action that actually took place, the enemy's post interdiction actions.[61]

A successful interdiction effort will cause the enemy to alter his plan. This alteration may be insignificant as in changing the main supply route he uses. But, it may also be very significant such as forcing the enemy to use an infantry unit to hand carry supplies. However, air power has historically been unable to completely interdict the enemy, merely to attrite him. In other words, the battle or campaign the interdiction effort supports must still be fought. Therefore, the problem with determining the effect of interdiction is trying to determine the effect that infantry unit would have had on the battle or campaign if it had been used as infantry instead of as laborers. Since the unit was not used as infantry, the gauging of the effect the interdiction effort had can only be an educated guess.

The second aspect of air power which applies to any theater is the enemy reaction to the friendly air effort. One facet of this is the enemy's reaction to the loss of air superiority. Warden believes that the enemy might attempt to regain it and an effort must be made to continually ensure air superiority.[62] Certainly, this is true. However, even if the enemy recognizes the futility of this attempt, he will most likely react to the loss of air superiority by increasing his ground based air

defense. The Germans did this in World War II.[63] The North Vietnamese did the same in the Vietnam War. They increased their air defenses strategically around Hanoi and Haiphong, operationally around key railroad bridges and tactically to counter U.S. CAS and helicopters.[64] The commander must plan for this reaction, as the enemy is unlikely to surrender solely on the basis of losing air superiority.

In addition to countering air superiority, the enemy will attempt to counter the interdiction effort. Historical means to negate interdiction effects have been to move at night,[65] to disperse the movement of supplies along numerous routes,[66] and to rely more heavily on human effort as exhibited by the Viet Minh efforts at Dien Bien Phu. Reliance on these means, while minimizing air power effects, also has the effect of reducing the enemy's operations tempo. Again the commander must plan for the probable enemy reaction and understand that the interdiction attempt will probably not totally cut off the enemy effort.

With an understanding of 1) the problems of measuring successful interdiction and 2) the enemy's reaction to air power, the discussion can progress to specific analysis about the three theater scenarios.

Scenario 1

Scenario 1, where the commander faces an enemy in a mature theater, is the most familiar to military planners. This has been the traditional way of looking at the world since World War II. U.S. forces have been deployed to the European and Korean theaters for almost fifty years so the logistic system as well as campaign plans are fully mature.

Historically, when faced with a mature theater, commanders have systematically, and thus operationally, targeted two systems, the transportation system as well as the petroleum system. In addition, they have devoted a significant portion of their air power assets to the joint fire support effort. It has already been shown that air power can be and has been successful in accomplishing all three missions. In order to analyze the best use of air power, the operational cost for using air power for one mission at the expense of another must also be analyzed.

The first target system to analyze will be the transportation system. The fact that the attack on the German transportation system, in this case rail, was successful is indisputable. Nevertheless, the destruction of the transportation system used by the Germans meant the system was not available for friendly use. In the fall of 1944, the Allied offensive was halted due to

insufficient logistics. The famous "Red Ball Express" was organized to bring supplies to the front as quickly as possible. Since the Allies were still unable to assemble trains in the bombed railyards and use them to transfer supplies, the truck convoys were used instead. The heavy logistics load necessitated high speeds over the poor roads which increased the wear and tear on the trucks.[67] Had the railyards not been destroyed, the Allies would have been able to assemble trains and use them to reduce the load on the trucks.

It therefore appears that a systematic attack on transportation systems in general, and railyards specifically, in a mature theater, while tactically effective, is operationally costly to follow on operations. This decisive point should not be a commander's first choice for air power to attack.

Petroleum systems have also historically been a decisive point to attack in mature theaters. The attack on German petroleum was shown to be effective in operationally limiting the Germans during the Battle of the Bulge.

The cost the Allies incurred by using air power to attack petroleum was that air power, in attacking petroleum, was unavailable for strategic bombardment or joint fire support. Factions, other than those who favored petroleum attacks, in the Allied staff believed

this was a significant cost. For example, Air Marshal Tedder was still intent on prosecuting his transportation plan while Air Marshal Harris, commander of RAF Bomber Command, intended to go ahead with his plan for strategic bombing of German cities.[68] Both attempted to siphon assets from petroleum attacks to execute their plans while the attack on petroleum was in progress.[69]

Attacking an enemy's petroleum system appears then to have a tactical effect, in that it limits an enemy's objectives, tactics or mobility. It also has an operational effect, in that it limits the objectives a campaign can expect to achieve while also limiting the options a commander has in committing operational reserves.

However, it incurs a cost of excluding the use of air power in a strategic air campaign by tieing up air assets operationally. Therefore, if a commander faces an enemy that is unlikely to capitulate to strategic air bombardment, a systematic attack on the enemy's petroleum distribution system is an effective operational use of air power.

The final historical use of air power in a mature theater is in joint fire support. Was there a cost associated with using air power in support of the ground forces during World War II? There was no demonstrable negative impact of using air power in this role. There

was sufficient quantity of aircraft to handle this mission as well as others. Strategic bombers were being used either to attack petroleum production or other industrial targets. Medium bombers were attacking the transportation targets that were still available. Fighter bombers would have been, due to their limited range, ineffective in either role. Therefore, their use for close support was an effective use of air power.

In any future campaign, the commander will have to assess the quantity of his air power assets in making the determination to assign tasks. Limited air power assets might force the commander to phase his campaign plan to allow the same assets to attack operational level targets and subsequently attack tactical targets in support of surface units. Alternatively, the threat situation might force the commander to use his air power initially against tactical targets in an effort to seize the initiative or stabilize the situation. Once he has the initiative, the commander could then free his air power to attack operational targets.

In a mature theater, the "best" use of air power, given friendly freedom of action, appears to be attacking, on an operational level, the enemy's petroleum system. An alternative, at higher operational cost to subsequent operations, is to attack his transportation system. If a commander must seize the initiative, he

should consider using his air power tactically as joint fire support, then employ it subsequently against one of the above mentioned decisive points.

Scenario 2

A key point in analyzing air power use in an immature theater is recognizing the transient nature of the characteristics of the theater. Unlike the other two scenarios, a theater in Scenario 2 is seldom in stasis. The theater is either becoming more mature or it is becoming more primitive. This occurs because the enemy is attempting to bring more maturity or infrastructure to the theater. Meanwhile, friendly forces are trying to destroy the enemy's infrastructure.

Building infrastructure without air superiority, is,at best, difficult to achieve. The enemy is continually vulnerable to air attack. Not only is it difficult to improve the characteristics of the theater, it is difficult to maintain the characteristics as they are. This is the dilemma the enemy is forced to attempt to deal with. As the infrastructure is continuously attacked, the theater takes on more characteristics of a primitive theater. The enemy will be forced to adapt the methods used in primitive theaters. This will, in itself, support the commander's campaign plan as it slows down

the enemy's reaction time. This, of course, facilitates the commander gaining and maintaining the initiative.

Historically, in an immature theater, commanders have systematically attacked three target systems, transportation systems, petroleum systems and command and control systems. Tactically, as in other theaters, they have used their air power as joint fire support.

As in mature theaters, airpower has met with success in attacking all three target systems. In attacking transportation systems, as in Scenario 1, success denies both sides the use of the system. The difference between the two theaters is in the nature of the immature theater. Since the definition states the theater is developing, assets for the development of that theater are in the planned deployment. Equipment for repair of roads, bridges, and possibly rail lines, should be a priority in the deployment plan.

The enemy will, of course, recognize this vulnerability and deploy the same type equipment. With the pre-condition of air superiority, enemy equipment is continually vulnerable to attack while friendly equipment is at least safe from air attack.

The enemy petroleum system would make an excellent target to attack if one exists in the theater. In the historical examples cited, petroleum systems were not prevalent. Pipelines are difficult to install and require

substantial time to emplace. Without question, if a theater has petroleum pipelines with their attendant vulnerable points, refineries and pumping stations, the system should be attacked. However, the developing nature of this type of theater has historically placed the burden of supply of petroleum on truck and rail transport. Thus an attack on vulnerable points characteristic to petroleum systems in this theater is also an attack on those of transportation systems and vice versa.

Command and control systems are also an excellent target for attack by air assets. If the situation in the campaign is such that ground operations are occurring concurrently with the interdiction effort, this system would be a rewarding target. However, the window of opportunity created to exploit attacks on command and control is small. If command and control systems are hit too early in the campaign, the enemy may be able to react and recover. If the target is hit too late in the campaign, a much more limited effect is achieved. This occurs because the enemy has had time to plan his actions and communicate that plan to subordinates. Attacking a command and control system at this point will only prevent revisions to the basic plan. The commander must, in making the decision of attacking this system,

synchronize this attack closely with the ground forces effort.

The other option a commander has for using his air power is to use it, again, as joint fire support. This has been highly rewarding in the historical examples cited. Under many circumstances, a decision to use air in this manner is appropriate. The primary reason a commander may choose this option is, as in Scenario 1, when seizing the initiative is required. Once the initiative has been gained, the commander should use his air power against an operational level target system. Another instance when a commander might use his air power tactically, is when the characteristics of the theater have been so heavily altered by the effects of the campaign, there are no more viable decisive points for attack. When this happens, tactical use of air power is obviously appropriate.

In an immature theater, the best operational use of air power is against transportation systems. Command and control systems should also be high in the commander's priority.

Scenario 3

Commanders in a primitive theater have the most difficult scenario in which to effectively employ air power. Since the theater, by definition, has no well developed infrastructure, successful interdiction is more

difficult to achieve. Modern conventional armies will seek to develop the infrastructure in order to facilitate combat. The fact the theater remains primitive is usually caused by terrain characteristics. These characteristics also make employment of air power more difficult.

Historically, commanders have met with mixed results in attempting to overcome these obstacles. Targets that have been attacked in the past have been transportation systems and command and control systems. As in the other two scenarios, air power has also had a significant role in providing joint fire support.

Attacking an enemy transportation system can be successfully accomplished in a primitive theater. During the majority of the Vietnam war, the Viet Cong were employing guerrilla tactics. During this period, interdiction of any sort and specifically against transportation systems was operationally ineffective. However, in the 1972 Easter offensive, the North Vietnamese began using conventional tactics. Since these tactics were heavily dependent on logistics, including petroleum and ammunition, the North Vietnamese required a logistics system capable of sustaining this because their guerrilla supply system could not. Once they adapted a more conventional logistics system, it became vulnerable to air. At this time, American interdiction efforts became much more successful.[70] In a primitive

theater, if the enemy has been using guerrilla tactics, and suddenly switches to more conventional tactics, this is a signal to the commander that an operational attack on the enemy transportation system may be effective.

Attack of enemy command and control systems is another historical use of air power in primitive theaters. Effectiveness of a systematic attack of these systems is, of course, highly dependent on being able to locate them. In a primitive theater, this is no small task particularly if the enemy is using good communications security. An additional hinderance to locating command and control nodes, would be encountered if the enemy is using guerrilla tactics. The dispersed nature of these tactics will also disperse the command and control locations. This makes them harder to locate and destroy.

The final use of air power in a primitive theater has been in the area of joint fire support. Air power has usually been effective when cast in this role since it obviates one of the key problems associated with air operations in this type theater, locating the target. In a CAS mission, the location of the enemy is accomplished by the ground forces or a Forward Air Controller working with the ground forces.[71] Freed from this requirement, air power has a greater chance of effectively accomplishing its task. Even so, as the results from

Operation ATTLEBORO show (1.6 sorties flown and 12 tons of ordnance expended for each enemy soldier killed), air power is not extremely efficient in a primitive theater.

It also should not be forgotten that the enemy will react to friendly action. During the Vietnam war, B-52 sorties flown in support of ground forces initially had a high level of success. As the war progressed, casualties inflicted on the enemy dropped drastically for the same level of air effort.[72] Perhaps, this is a partial explanation for the results of a survey of U.S. Army Generals in which 15% stated that close air support was "not worth the effort."[73]

Air power can be successfully employed under finite circumstances against decisive points in a primitive theater. However, that role is limited by the terrain and tactics employed in the theater. The idea that air power may have a limited operational role in a campaign and is better used tactically is certain to raise eyebrows and emotion. It must be remembered that the overall mission should come first.

> "Within the Department of Defense, emotion overcame logic on discussions of the role and importance of air power and the specific missions of air power in Vietnam. Somehow the bombing of North Vietnam became the symbol of the importance of air power, which was both tragic and illogical. Advocates of air power should have been first to point out the fallacies in this line of reasoning, but instead were, in many cases, persons espousing it most vehemently. Air power was playing a

> vital role in the war - in transport between theaters and within the theater, in search-and-rescue, in reconnaissance and intelligence gathering and in close air support of ground forces. Air power enthusiast strangely said little of these impressive military achievements."[74]

In a primitive theater, the commander would be better served by planning to use his air power predominately in a joint fire support role, using it in an interdiction role by exception when presented with a target of opportunity.

Chapter 6: Conclusion

"Take time to deliberate, but when the time for action arrives, stop thinking and go on."

Andrew Jackson[75]

Edward N. Luttwak makes the following observation about the "situational" limits on air power.

> "The value of bombardment depends on the strategic value of the targets it can actually destroy, and the less a war is conventional, the fewer are the stable and easily identifiable targets of high value. Against elusive guerrillas who present no stable targets at all of any value (as in Vietnam), bombardment remains of little use even if it is perfectly accurate."[76]

In this observation is the advice to also consider the enemy, the geographic setting, the terrain and weather characteristics of the theater. In developing the three scenarios for each type of theater, the geography and value of the targets was a key criteria in determining

the best use of air power. The following figure provides a synopsis of the analysis conducted in this paper. The numbers represent the priority the commander should give each decisive point in employing air power in his campaign.

Decisive Point	Mature Theater	Immature Theater	Primitive Theater
Transportation	3	1	3
Petroleum	1	3	4
Command and Control	2	2	2
Fire Support	4	4	1

In Scenario 1, the mature theater, the most effective and efficient use of air power, given friendly freedom of action, is to attack the enemy's petroleum distribution systems. Without friendly freedom of action, the commander should mass all assets, including air, and plan the initial effort of his campaign toward gaining the initiative. In this situation, initial use of air should be as joint fire support. As soon as initiative is gained, air power should be redirected towards the enemy's petroleum system.

In Scenario 2, the commander should direct his air effort toward attacking the enemy's transportation system. This decision should be made with the realization

that by attacking this system, it will be denied later use by the friendly forces. Allowance for this should be made in the campaign plan.

In Scenario 3, the commander should plan on using his air power primarily for joint fire support. The restrictive nature of the terrain coupled with the tactics the terrain forces the enemy to adopt, cause a lack of viable targets for air power to attack. This is not to say that should such targets be found, they should not be attacked. Obviously, they should be vigorously attacked as they have a high payoff. However, a commander should not plan on being able to systematically locate those targets. While he is attempting to locate those targets, his air power is best utilized in joint fire support.

Theory has stipulated and history has proven that air superiority is an essential pre-condition for success in a campaign. This paper has shown that, depending on the theater, interdiction may also be a pre-condition for success. It provided some of the thought patterns required by a commander in making his decision about the best use of air power after he has gained air superiority. It focussed on decisive points within situational and geographic limits placed on the commander by a theater. The paper provides answers to Col. Warden's question about how to use large numbers of airplanes and what they are supposed to accomplish in war.

Table 1

Monthly German Oil Products

(in Thousand Metric Tons)

Date	Synthetic Production	Other Synthetic	Domestic Refining	Production (Occupied)	Imports	Total	Aircraft Fuel
1944							
Jan	336	162	175	48	179	900	160
Feb	306	172	160	48	200	886	164
Mar	341	201	191	49	186	968	180
Apr	348	153	157	48	104	810	175
May	285	151	170	47	81	734	156
Jun	145	153	129	44	40	511	54
Jul	86	143	115	38	56	438	35
Aug	47	137	134	16	11**	345	17
Sep	26	126	113	5	11	281	10
Oct	38	117	124	3	34	316	21
Nov	78	107	105	10	37	337	39
Dec	56	108	108	9	22	303	25
1945 Jan	37	*	*	*	*	*	*
Feb	13	*	*	*	*	*	*
Mar	12	*	*	*	*	*	*

* Data not available

** Ploesti oilfields captured by Soviets

Source: Webster and Frankland, Strategic Air Offensive against Germany, IV 516-517

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1. U.S. Air Force, AFM 1-1, Basic Aerospace Doctrine of the United States Air Force (Washington: Department of the Air Force, 1984), 2-1.

2. Larry Grossman, "Colonel John A. Warden III, Air Force Veteran Battles for New World Order" Government Executive, Vol 24, Number 2 (February 1992):46.

3. The reader should not directly associate these three cases with high, mid or low intensity conflicts. Nor should the reader assume these cases relate directly to a high or low threat environment. Some characteristics of those terms might apply to the three cases but the terminologies also carry excess baggage which render them less useful in terms of this paper. The cases specifically address theater characteristics and the opponent's capability. In each case the opponent has options he can choose to employ, or may be forced by circumstances to employ.

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5. U.S. Department of Defense Joint Pub 1-02 Dictionary of Military and Associated Terms Washington D.C. 1 December 1989, 34.

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9. AFM 1-1, 3-2.

10. U.S. Department of Defense Joint Pub 3-09, Doctrine for Joint Fire Support (Final Draft). (Washington: June 1991) III-1.

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18. AFM 1-1, 3-3.

19. U.S. Army FM 100-5, Operations (Washington: Department of the Army, May 1986), 10.

20. Ibid.

21. For development of this model of the interrelationship between domain of battle and the cohesion, disorganization, and disintegration of an enemy force see James J. Schneider, "Theoretical Paper No. 3: The Theory of Operational Art." (School for Advanced Military Studies, Ft Leavenworth KS, 1 March 1988), 6.

22. General Richard Cavazos in discussion during Battle Command Training Program at the School for Advanced Military Studies, Ft Leavenworth KS 9 Mar 92.

23. The island of Pantelleria in the Mediterranean surrendered within 20 minutes of ground forces arriving after being subjected to an extended period of bombardment. Wesley F. Craven and James L. Cates, eds. , The Army Air Forces in World War II, Vol II, (Chicago: University of Chicago Press, 1949) 428-430. Additionally, the phenomenon occurred in the Falaise Gap in France as reported in Weigley, Eisenhower's Lieutenants,(Bloomington: Indiana University Press, 1981) 214.

24. D. Wolfgang Pickert, The Impact of Allied Air Attacks on German Divisions in Zones of Combat (Karlsruhe Ge: Studiengruppe fuer den Luftkrieg, 1958) 176.

25. Richard H. Kohn & Joseph P. Harahan eds. Air Interdiction in World War II, Korea, and Vietnam (Washington D.C. Office of Air Force History, 1986), 33.

26. Rostow, Pre-Invasion Bombing Strategy, 92.

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28. Historical Evaluation and Research Organization, Historical Data on Tactical Air Operations (Phase II): Disruption in Combat (Washington D.C.: Headquarters United States Air Force, 1970), 35.

29. Ibid.

30. Pickert, Impact of Allied Air Attacks ,47.

31. W.W. Rostow, Pre-Invasion Bombing Strategy(Austin: University of Texas Press, 1981),72-75.

32. Rostow, Pre-Invasion Bombing Strategy, 92.

33. Rostow, Pre-Invasion Bombing Strategy , 153.

34. Whitmore, Logistics as a target system 189.

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45. James F. Dunnigan & Austin Bay From Shield to Storm (New York: William Morrow and Co.) 151.

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56. Mrozek, Air Power and the Ground War, 99.

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59. Bernard William Rogers, Cedar Falls-Junction City: A Turning Point (Washington D.C.: Department of the Army, 1989), 11-12.

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