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**AIR DEFENSE IN THE "LOWER"
END OF THE CONFLICT SPECTRUM**

A Monograph

by

Major Gary J. Tocchet

Air Defense

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

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The monograph concludes that a doctrinal void exists between current air defense doctrine and the demands of the lower end of the conflict spectrum. Doctrinal guidelines are presented to provide the basis for a needed and suitable air defense doctrine. These include: The importance of considering the vertical dimension in the IPB; specific considerations when offering military assistance in the form of air defense; an appreciation for the political complexities in these conflicts and their effect on air defense; the special effects air defense systems may have in such operations; and a caution against rigid application of conventional high-intensity air defense tactics to the lower end of the conflict spectrum.

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- the international situation
- low intensity conflicts*

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THE CONFLICT SPECTRUM

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Major Gary J. Tocchet
Air Defense

School of Advanced Military Studies
U.S. Army Command and General Staff College
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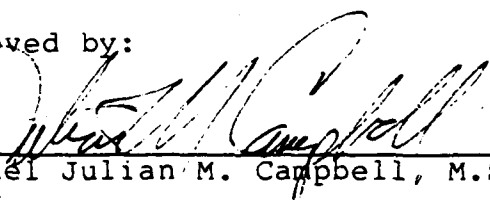
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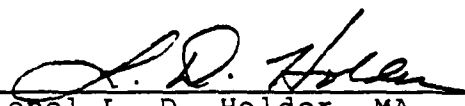
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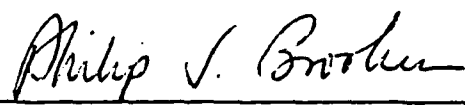
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ABSTRACT

AIR DEFENSE IN THE "LOWER" END OF THE CONFLICT SPECTRUM
By Major Gary J. Tocchet, USA, 50 pages.

This monograph discusses the importance and growing role of air defense in the "lower" end of the conflict spectrum. There is not a broad understanding in our current doctrinal literature of the increasing air threat in "low-intensity conflicts" and "limited wars" and how air defense can be used to counter that threat. This monograph examines the air defense demands that these modern conflicts may engender and shows how they have implications for U.S. air defense doctrine.

This study first examines the general role of air defense in tactical theory and then develops theoretical guidelines for a tactical theory of air defense in the low-intensity to limited war range of the conflict spectrum. Next, the historical examples of Vietnam, Afghanistan, The Falklands, and Lebanon are analyzed to test the validity of the theoretical constructs. Finally, current doctrine is compared to the findings of the theoretical and historical examinations to determine how well it meets the demands of low-intensity conflicts and limited war.

The monograph concludes that a doctrinal void exists between current air defense doctrine and the demands of the lower end of the conflict spectrum. Doctrinal guidelines are presented to provide the basis for a needed and suitable air defense doctrine. These include: The importance of considering the vertical dimension in the IPB; specific considerations when offering military assistance in the form of air defense; an appreciation for the political complexity of these conflicts and its effect on air defense; the special effects air defense systems may have in such operations; and a caution against rigid application of conventional high-intensity air defense tactics to the lower end of the conflict spectrum.

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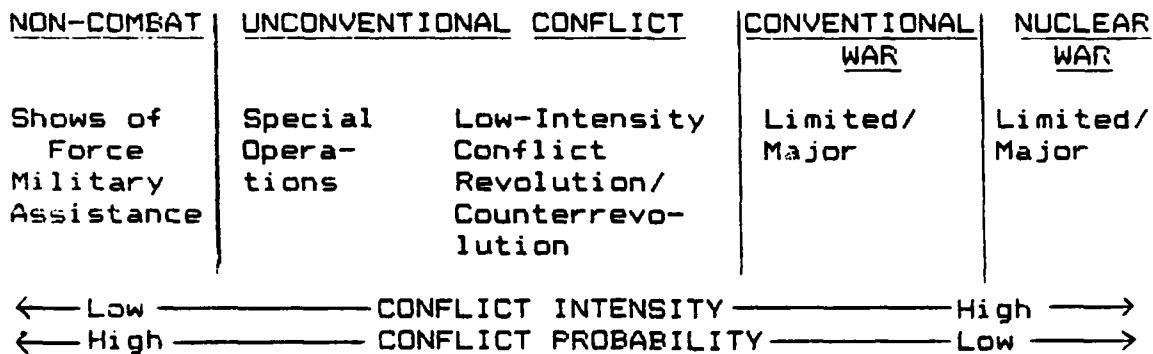
I. INTRODUCTION

Air defense came into existence to fulfill a tactical role on the high-intensity battlefield; however, since 1945, occurrences of "low-intensity conflict" and "limited war" have increased in frequency. These occurrences have led to a maturation of thinking about conflict that involves military action. It has convinced political and military thinkers that such conflict consists of a spectrum of intensity characterized by different activities and requiring different responses.¹ Developing a spectrum model and analyzing its utility have become the basis of a small separate industry in academic circles. Arguments over definitions and the characteristics of certain types of conflicts have produced little consensus. Yet it is important for the purposes of this study to establish a preliminary concept of conflict to develop a later analysis of air defense doctrine in the lower end of the conflict spectrum. For the purposes of this study, a recent model developed by Sam C. Sarkesian will be useful.

Sarkesian developed a model of conflict that spans military activity from non-combat military operations to "major" nuclear war.²

The following diagram graphically portrays Sarkesian's conflict spectrum:

CONFLICT SPECTRUM³



Under the rubric of "unconventional conflict", Sarkesian sees "special operations" as primarily highly precise small unit operations whose roots rest in conventional doctrine, planning, training and operations.⁴ They are usually operations of short duration and include surgical strikes, hit-and-run raids, counterterrorism, some drug interdiction operations, and hostage rescue. Sarkesian argues that "low-intensity conflict" (LIC) is primarily revolution, counterrevolution and terrorism evolving from such conflicts.⁵ These conflicts are usually long term in scope and focus on the political-social milieu of indigenous systems. Specific parts of this model and definitions of key terms will be addressed in more detail as this study progresses.

With this model in mind, one must understand that a debate now rages over the perceived shortcomings in the U.S.

Army's current war fighting doctrine, AirLand Battle. Some writers, such as Colonel Richard M. Swain, have described it as a "doctrine of traditional warfare between continental armies" and, thus, not directly applicable to LIC.⁶ In all fairness, the Army's published expression of AirLand Battle, Field Manual, Field Manual 100-5, Operations, does not ignore LIC or "mid-intensity" conflicts. However, with the recent completion of the final draft of Field Manual 100-20, Military Operations In Low-Intensity Conflict, there are indications that the Army will have to wrestle with the articulation of two separate doctrines.

This debate deserves consideration in the development of U.S. Army air defense doctrine. All the Army's combat and support branches have been developing their specific operational concepts, "how to" procedures, and supplementary publications with Field Manual 100-5 as the war fighting standard. U.S. Army air defense doctrine is no exception. If there are doubts and confusion about U.S. doctrine in the range of conflicts short of "major" or "general" conventional war, then there may be cause for doubts about current tactical air defense doctrine and its applicability to those types of conflict.⁷

The development of a tactical doctrine for air defense in the LIC and limited war portions of the conflict spectrum is significant for several reasons. First, air defense is one of the seven battle operating systems, which also include intelligence/electronic warfare, maneuver, combat

service support, mobility/survivability, fire support, and command and control.⁹ It is important to determine if the peculiarities of LIC and limited war affect the function of air defense systems and operations. Second, modern nations and particularly many third world nations, where these types of conflicts are more likely to occur, have modernized and increased their fixed and rotary wing assets. This has intensified the potential air threat in these scenarios. Finally, one can discern from the recent historical record a growth in the importance of air defense to these conflicts.

Considering the topic's significance, this paper poses the following question: Is there an air defense doctrinal void between current doctrine and the demands engendered by low-intensity conflict and limited war? The following sections of this paper offer an answer to this question by developing an appropriate tactical theory for air defense. This theoretical construct is developed through theoretical and historical analysis. Finally, this construct is compared to current air defense doctrine. This study concludes with a summary of basic guidelines for a tactical theory of air defense in the lower end of the conflict spectrum, an estimate of where we are today, and some recommendations for future study.

II. TACTICAL THEORY AND AIR DEFENSE

"The airspace of a theater", according to Field Manual 100-5, "is as important a dimension of ground operations as

the terrain itself."⁹ This airspace is used for various purposes to include maneuver, reconnaissance, transportation, delivery of fires, and command and control. Joint Chiefs of Staff Publication 26 states, "counterair operations are those operations conducted to attain and maintain a desired degree of air superiority by the destruction or neutralization of enemy forces."¹⁰ U.S. doctrine currently sees counterair operations as joint operations which include offensive and defensive measures taken against the enemy air threat. Air defense is the term for the ground forces' contributions to joint counterair operations.

Field Manual 44-100, U.S. Army Air Defense Operations, states that, "at the tactical level of war... air defense artillery protects the force and preserves freedom to maneuver."¹¹ The ground force is capable of conducting various active and passive counterair operations that assist air defense units in this mission. Passive defensive counterair operations include dispersal, hardening, camouflage, cover, concealment, and signature reduction. In addition to the air defense weapons' fires, active defensive counterair operations include rotary wing air to air combat, combined arms fires from tanks, artillery, and fighting vehicles, and all arms for air defense.¹² Ground forces can also conduct offensive counterair operations with ground raids and the direction of fire support and electronic warfare assets against a threat's airfields, arming and

refueling points, and his command and control nodes. Finally, ground forces can contribute assets to suppress enemy air defenses in a counterair operation.

Air defense is most often seen as an important component of the battle function of "protection". It was J.F.C. Fuller, between the two World Wars, who first integrated this protection function into modern tactical theory. Fuller argued that five tactical functions provided the framework for tactics, organizational structure, and equipment design. These were: "To discover, to hold, to hit, to protect, and to smash."¹³ The purpose of "protection" was to shield one's forces from enemy blows. Fuller believed that one of the main factors that influenced protective measures was "command of the air".¹⁴ Fuller believed that along with advances in aircraft technology "anti-aircraft appliances and artillery" would grow "so effective as to make it highly dangerous for aircraft to attack a strongly protected area."¹⁵ For Fuller, armies would never really be outside of aircraft striking distance, and this fact "vastly increased the importance of the protective problem."¹⁶

The U.S. Army's current doctrine identifies maneuver, firepower, protection and leadership as the four elements of combat power.¹⁷ A commander needs to protect his resources so that he can apply them at the decisive time and place. Since an enemy can use air means to destroy one's combat power, protection of the force must include operations to

counter the enemy's air power. Given this general understanding of U.S. counterair theory, we can now move on and establish some theoretical air defense considerations in LIC and in limited wars.

III. A TACTICAL THEORY OF AIR DEFENSE IN LIC AND LIMITED WAR

Field Manual 100-20, Military Operations In Low-Intensity Conflict, defines LIC as "a politico-military confrontation between contending states or groups below conventional war and above the routine peaceful competition among states."¹⁸ Field Manual 100-1, The Army, defines LIC as:

...a limited politico-military struggle to achieve political, social, economic, or psychological objectives. It is often protracted and ranges from diplomatic, economic, and psychosocial pressures through terrorism and insurgency. Low intensity conflict is generally confined to a geographic area and is often characterized by constraints on the weaponry, tactics, and the level of violence.¹⁹

The problem with such definitions is that they do so little to ease the conceptualization of LIC. LIC takes place somewhere in the ambiguous environment between peace and war. Often in LIC, the U.S. will operate "under peacetime parameters in a war-like environment."²⁰ Although current doctrine recognizes the primacy of the political struggle and the political solution in LIC, it also acknowledges the use of military force as a means in that struggle. Field Manual 100-20, echoes the President's National Security Strategy Document when it contends that the "principal U.S.

military instrument in LIC is security assistance."²¹

However, there will be times when the U.S. may engage in more direct military operations "when it cannot protect its vital national interests by other means."²²

According to FM 100-20, direct U.S. military operations in LIC fall into four categories: Insurgency/counterinsurgency, combatting terrorism, peacekeeping operations, and peacetime contingency operations. In insurgency or counterinsurgency operations, U.S. security interests may lie with an incumbent government or with the insurgents. U.S. assistance to the Contras in Nicaragua and to the Mujahideen in Afghanistan are examples of insurgency support. U.S. activity against the Viet Cong in Vietnam and the FMLN in El Salvador are examples of counterinsurgency support. Combatting terrorism includes both antiterrorism and counterterrorism actions throughout the entire spectrum of conflict. Seizure of the hijackers of the Achille Lauro was a counterterrorist action. Peacekeeping operations are military operations "which maintain peace already obtained through diplomatic efforts."²³ U.S. operations in Lebanon and in the Sinai have served this purpose. Finally, peacetime contingency operations include such varied activities as emergency evacuations, disaster relief, certain drug interdiction operations, and selective use of military force in demonstrations or strikes. Grenada and the U.S. air strike against Libya are illustrations of peacetime contingencies.

As noted earlier in this paper, Sarkesian takes more pains to delineate these activities than FM 100-20 does. For example, Sarkesian argues that many of the operations that FM 100-20 categorizes as LIC contingency operations are not LIC at all but are better understood by terming them "special operations". Regardless of these differences both sources agree that the term, "low-intensity conflict", is often a misnomer. Sarkesian contends that these conflicts should be categorized as low-intensity conflicts primarily for policy purposes, "not because of the character of the conflict on the ground".²⁴ For the indigenous groups involved, such conflicts cannot be seen as a conflict short of war for it may in fact be total war for them. In many cases, FM 100-20 argues, these military actions are distinguishable from those in conventional war often in objective and "more by differences in kind, than by degree of intensity".²⁵

Similar to the differences in definitions and categories of LIC are the problems presented by LIC's conflict neighbor, limited war. Field Manual 100-1 defines limited war as "armed conflict between two or more nations, at an intensity below that of general war, where means and/or ends are constrained".²⁶ This differs from "general" war or, as Sarkesian terms it, "major" war. General war is seen as armed conflict "between major powers, in which the total resources of the belligerents are

employed and the national survival of a major belligerent may be in jeopardy."²⁷

Once again, intensity level is often an inadequate measuring device. The wars in Korea and Vietnam are labeled limited wars from the U.S. perspective. They were not limited wars from the Vietnamese and Korean perspectives. Sarkesian argues that in advanced phases of LIC, U.S. light infantry forces could take part in active combat.²⁸ A different view was presented by General Paul F. Gorman (Retired) who separated LIC from mid-intensity or limited war when he trenchantly argued that when U.S. combat forces are introduced in a LIC scenario, the conflict ceases to be LIC.²⁹ U.S. fire and maneuver and America's cultural baggage transform and escalate the conflict.

The purpose of this discussion is to illustrate the confusion and grey areas that exist, not to develop more definitions or new philosophical concepts of what does or does not constitute war or a distinctive level of conflict. That is beyond the scope and purpose of this paper. What is needed by the military doctrine writer is an understanding of the given conditions within which he must perform so that he can discriminate between categories of military action. This paper will try to do that for air defense. Much of our categorization and thinking about conflict is filtered through a lens of past military perceptions and Western culture. That is short sighted. The character of conflict is constantly changing. We need to understand that the

majority of future conflicts will be wars of subversion in some form. They will range between what we will, in this paper, loosely term low-intensity conflict and limited war--taken together, the "lower" end of the conflict spectrum.

What "kind" of battlefield peculiarities will the lower end of the spectrum gender? More often than not the "battlefield" will be located in a country that lacks a national infrastructure that can easily support modernized forces. The battlefield will usually have a nonlinear character and this will require unique aspects of intelligence gathering and preparation, a focus on politico-military objectives, and a tailoring of forces. The operational context is often a Third World culture. In LIC operations particularly, the resources used and the strategy, doctrine, and tactics must be "congruent to the indigenous system".³⁰ Success in LIC is not measured by merely winning battles and military campaigns because political objectives "cannot be met with the use of military power alone".³¹ Finally, although a "primitive" LIC foe does not automatically nullify technological advantage as some would have us believe, mere possession of advanced technology does not bring one closer to victory.³² One must use technology judiciously and appropriately in LIC.

Technological advances have impacted on the entire spectrum of conflict, but they have had dramatic effects in LIC and in limited war. The vulnerability of developed societies has increased at the same time that more advanced

weapons are available to potential enemies. Nowhere is the technological impact more pronounced than in the technological advances in aircraft. Aircraft have become the weapons of choice for power projection. They can provide firepower, transportation, reconnaissance, and the rapid insertion of ground forces.

The transfer of these advances to Third World air forces poses a growing threat. Between 1972 and 1982, the developing world bought 6,630 supersonic jets and 2,070 subsonic attack fighters. Fifty-six percent of these transfers were from the Soviet bloc and beyond Western control.³³ This proliferation threatens a major power's ability to unilaterally project military power into many areas, and the "cost of such projection is rising sharply"-34

To counter the advances in aircraft technology, there has been a similar technological advance in and proliferation of air defense systems. This is not without its own set of implications. During the same ten year period referred to above, 35,735 surface-to-air missiles and well over 6,000 anti-aircraft guns were acquired by developing world nations.³⁵ Not only is it highly possible that both sides will have aircraft in some scenarios, but it is just as likely that both will have air defense systems. Depending on the individual conflict, the vertical dimension of the battlefield in a low-intensity conflict may, for

periods of time, harbor a mid- to high-intensity conflict environment.

This preceding discussion permits us to establish some important guidelines for air defense in the lower end of the conflict spectrum. It is not within the scope of this paper to develop a specific tactical doctrine for every scenario and for every weapon system. However, it is possible to suggest a framework upon which a theoretical, general, and tactical doctrine can be built. Several important guidelines need to be considered.

First, in planning for such operations a detailed intelligence preparation of the battlefield (IPB) must include considerations of the air and air defense threats. The ground commander must realize that LIC or a limited war does not always equate to a low-intensity air threat. Similarly, the air component commander must assess the air defense threat in the area of potential air operations.

A second guideline consists of factors that deserve consideration when advanced air defense technology is offered to a belligerent engaged in LIC. If such technology is transferred, it should create an economical counter-measure against devices that provide undue leverage to the adversary.³⁶ Air defense systems can be very expensive and may preclude other aid that could be more useful. Yet, in relative terms, these air defense systems are much less expensive than the aircraft they can destroy. Additionally, the supplier should appraise the average user's skill and

the operational environment. The supplier and recipient should carefully consider training requirements, employment possibilities, maintenance requirements, and operation simplicity. Finally, there are risks in sending air defense weapons and technology to one of the antagonists. First, as with other weapon systems, the supply of air defense systems may escalate the conflict. Is this desirable? Lastly, if the weapons are sent through intermediaries and indirect channels, are the recipient and supplier able to tolerate "losing" a percentage of the weapons enroute? How will this affect the recipient's plans? Can the supplier afford the risk of having his technology fall into "other" hands--terrorists, unfriendly nations, hard to control allies, or weapons competitors?

A third guideline emerges from the political complexity of these conflicts. Political decisions may affect aircraft targeting, flight paths, air defense weapon locations, and rules of engagement. These parameters can have a profound effect on air defense planning and design.

Air defense weapons, as a fourth consideration, can provide LIC insurgents with the important elements of surprise and buoyed morale. These weapons reduce the feelings of fear and frustration that the ground insurgent often experiences when facing hostile aircraft. These weapons are also excellent for propaganda purposes in LIC and in limited wars because they are seen by sympathetic

noncombatants as "defensive" weapons and are indicators of formidability and serve as a source of belligerent pride.

Finally, there should be no slavish acceptance of high-intensity conventional doctrine for the lower end of the conflict spectrum. Current U.S. air defense doctrine stresses the universality of the air defense employment principles of mass, mix, mobility, and integration.³⁷ Mass refers to the concentration of air defense combat power. Mix is the employment of a combination of weapon systems to protect the force from the air threat. Mobility is the capability to move from place to place while retaining the ability to perform the air defense mission and maintaining survivability. Finally, integration refers to the coordination of air defense operations with the supported commander's concept of the operation. In LIC, perhaps more than in conventional conflicts, the operational reality may preclude compliance with these principles. At other times these principles may be adhered to in novel ways. This may also hold true for specific weapon employment guidelines.

This discussion of principles and guidelines holds implications for U.S. air defense doctrine as well as technology, command and control, and security assistance. In the remainder of this study, we will explore how well these implications face the test of history and how well our current doctrine considers them.

IV. AIR DEFENSE AT THE LOWER END: AN HISTORICAL PERSPECTIVE

Military operations in Vietnam, Afghanistan, the Falklands, and Lebanon provide us with a series of historical examples of the planning and execution of air defense in the LIC-limited war range. The purpose of these historical illustrations is to test the validity of the theoretical guidelines presented in the previous section of this paper.

Vietnam

The surprise of massed Vietminh artillery and the poor tactical location of the French base at Dien Bien Phu in 1954 are often cited as the causes of the French defeat there.³⁸ However, less known are the Vietminh's preparation and execution of a counterair campaign that contributed substantially to the defeat of the French.

At the beginning of the siege, French intelligence located 170 enemy antiaircraft positions. By the time the French garrison surrendered, 740 had been located.³⁹ Soviet and Chinese 12.7mm, 37mm, and 20mm antiaircraft guns, artillery fire, and a raid against the Cat Bi air base which destroyed 18 transport aircraft on the ground contributed immeasurably to the stranglehold on Dien Bien Phu.⁴⁰ Dien Bien Phu was connected to French resupply and air support by an ALOC of 100 transport aircraft and 75 combat aircraft.⁴¹ During the siege, 48 French aircraft were shot down, 14 were destroyed on the ground at Dien Bien Phu, and 167, of some

time during the siege, reported flak damage.⁴⁰ The Vietminh massed their air defense weapons on the major air approach pattern to Dien Bien Phu and around their deadly artillery.⁴¹

At Dien Bien Phu, air defense weapons were used to isolate the besieged force, nullify interdiction, and provide the attackers with freedom of maneuver. The French underestimated the threat Vietminh air defense posed to their air support of the French garrison. The Vietminh conducted a thorough and effective IPB. At the lowest tactical level, Vietminh antiaircraft systems were as well camouflaged as their artillery emplacements.⁴² At times, they sacrificed early engagement and mutual support between weapons to maintain concealment until final commitment. Dien Bien Phu stands as an impressive example of air defense supporting an offensive operation.

The deployment of U.S. Air Force fighter and bomber squadrons, in a limited war scenario, to Southeast Asia in 1965 represented the largest gathering of American air power since the Korean War.⁴³ While the U.S. amassed this air armada, the North Vietnamese were building a defense system which reached densities never before seen or experienced in air warfare. It consisted of Russian MIGs (First MIG-17s, then MIG-21s), SA-2 surface-to-air missiles (SAMs), antiaircraft guns, and radar sites. As this contest over North Vietnamese bridges, troop areas, and logistic targets wore on, it elicited more sophisticated U.S. offensive

weapons and evasive tactics. Approximately 850 USAF craft were destroyed in Vietnam from 1965 through 1972.⁴⁶ Two thirds of that number were lost as a direct result of enemy action. With the appearance of the Soviet SA-7 Strela, a shoulder fired surface-to-air missile in 1972, most of the air defense weapons that were to gain such wide notoriety during the 1973 Arab-Israeli War were already deployed in Southeast Asia by 1972.⁴⁷

Some important lessons can be gleaned from the North Vietnamese air defense. First, political considerations established rules of engagement (ROE) that created sanctuaries for the North's missile and antiaircraft gun sites.⁴⁸ This imposed a high level of predictability on air operations and assisted the North in air defense planning. Second, the North's air defense effectiveness cannot be measured simply by the SAM average success rate of only one "kill" in every 50 launches.⁴⁹ Contrary to the exaggerated claims of the North, this was a poor kill ratio.⁵⁰ However, the SAM threat did dictate U.S. entry and approach tactics, required the diversion of effort and development of expensive force packaging with new munitions, caused reflown missions because of jettisoned ordnance and missed targets, disrupted missions, and provided a morale boost to the North's population. Third, the North used an impressive mix of air defense systems. They combined their older antiaircraft guns with 85 and 100mm guns and SA-2 missiles.

Attempts to defeat the missiles by low altitude ingress brought aircraft into the gun envelope. The SA-2 was designed as a point defense weapon against single mid- to high- altitude bombers. It gave off a dramatic signature and had limited maneuverability. By using camouflage, reducing radar emissions, and constructing multiple launch sites, the North turned the SA-2 into an integrated area defense weapon employed in an operational environment far different from that which its Soviet designers originally intended.

A final example from the Vietnam War is the Lamson 719 operation in Laos. It typifies what may be encountered when a large rotary wing assault force conducts a deep strike. Lamson was a 45-day operation that began in February 1971. Supporting ARVN ground forces, the U.S. committed more air and artillery to a single battle than at any other time during the war.³¹ More helicopters received combat damage and were shot down during Lamson than at any other comparable time in the war. Of the 659 Army helicopters committed, sixty-eight percent received combat damage and fourteen percent were destroyed.³² As Lamson unfolded, combat air assaults were planned primarily on intelligence pertaining to crew served antiaircraft gun locations rather than enemy troop concentrations.

Two important tactical lessons can be gleaned from this operation. First, although not officially sanctioned at the time, many U.S. pilots felt they had to change tactics and

use "nap of the earth" (NOE) flying techniques. Those who were skilled enough to use them believed these tactics enhanced aircraft survivability in what became a mid-intensity, high antiaircraft threat environment.⁵³ Second, north Vietnamese antiaircraft engagement discipline created a formidable challenge to aerial and ground artillery air defense suppression. Communist guerrilla and regular forces had often practiced "hugging" tactics when engaging U.S. or U.S. supported ground forces. Enemy forces would try to engage U.S. ground forces at close range to negate superior U.S. indirect and stand off fire power. These hugging tactics plus a large dispersion of high troop concentrations which massed small arms and heavier antiaircraft weapons made suppression difficult. The majority of aircraft losses occurred in or in close proximity of landing zones.

Afghanistan

The experience of the Mujahideen in Afghanistan offers an excellent case study of the potential implications of providing air defense weapons to an insurgent/rebel group. Although there is no hard evidence at this time to show that it was air defense weapons that altered the essential stalemate, no one seriously doubts that advanced air defense technology caused Moscow considerable discomfort. Before 1986 and the Mujahideen's receiving of shoulder-fired-man-portable British Blowpipe and U.S. Stinger missiles, the Soviets were losing approximately 100 aircraft to

operational attrition and 20 aircraft to rebel air defense a year. Rebel air defense consisted of small arms fire, 12.7/14.5mm guns, 20 mm Swiss Derlikon guns, and a few Chinese/Egyptian SA-7 clones.⁵⁴ Although there has been some exaggeration of the statistics, the most conservative estimates now place Soviet aircraft losses at .8 a day. With a conservative thirty-three percent kill probability attributed to the new missiles and continued operational attrition, the Soviets were losing 390-510 aircraft a year when they began their limited withdrawal.⁵⁵

The supply of applied air defense technology to the rebels made LIC more expensive for the counterinsurgents. The British and American decisions in 1986 to supply missiles were conscious and deliberate decisions to escalate the war to force the Kabul and Soviet governments to pay a higher penalty for their actions. The Soviets have repeatedly protested these transfers.⁵⁶ The missiles became an economical countermeasure to advanced Soviet air technology. Again on the conservative side, it is costing the Soviets \$2.5 billion a year in aircraft losses to rebel air defense. Total rebel missile supply costs approximately \$60 million a year. This creates a 35 to 1 cost ratio.⁵⁷ Whereas up until 1986 the Soviets used the skies over Afghanistan with relative impunity, direct Soviet air support has now dwindled. Recent reports from Afghanistan indicate that this has been "a severely demoralizing factor for Soviet and Afghan Army troops."⁵⁸

In arming the Mujahideen, the technology appears appropriate and the U.S. Stinger has become the weapon of choice. Easy to operate, Stinger introductory training is usually accomplished in Pakistan.⁵⁹ Unlike Blowpipe, it is a fire and forget weapon. The rebels are not concerned with identifying friendly aircraft that could be mistakenly engaged--there are no friendly aircraft. The gunner does not have to expose himself as he attempts to steer the missile to the target on a hot battlefield. The Stinger is more reliable than the SA-7 and less bulky and expensive than the Blowpipe. Finally, in the present environment of the war, the Stinger makes great sense tactically. It is difficult to achieve a "mix" or "mass" of air defense fires. Small arms and antiaircraft guns and cannons are relatively ineffective because of the difficulty of concentrating them to maximize their hitting power. Although useful for defending permanent bases or for operations in constricting mountain passes, they do not provide the mobility and surprise that the Stingers allow.

This proliferation of air defense technology, however, has its impact on Western society. The Soviets are studying captured Stingers and are making changes to reduce aircraft exhaust and to enact suppressive countermeasures. They have also experimented with tactical innovations to include evasive maneuver, safer altitudes, and more secure approach patterns.⁶⁰ These adaptations make the Soviets and possibly their surrogates more formidable opponents when they next

face Western technology. Of equal concern are the estimations that from twenty-five to fifty percent of the missiles may never reach the hands of the rebels.⁴¹ A percentage of these weapons is no doubt being siphoned off by Pakistan. This may or may not be covertly sanctioned by the U.S. Some of these missiles may be diverted to the black market where they could become popular items with terrorists or other insurgent groups.

The Falklands

Usually cited as a vindication for light infantry and specially trained elite units, the Falklands campaign of 1982 also stands as an unplanned contingency in air defense. As the British task force moved to its advanced base on Ascension Island in the South Atlantic, "most officers of all ranks admitted later that, at this stage, they gravely underrated the power of the Argentine Air Force."⁴² As the campaign progressed, more and more operational decisions were made with the air threat as the major planning factor. At the conclusion of the Falklands conflict, the British had lost six ships to air attack. They also lost five fixed wing aircraft to Argentinian air defense weapons and small arms fire as well as four helicopters to a mixture of air attack and air defense fires.⁴³ Argentina had placed the 601 Antiaircraft Battalion in the Falklands. This unit had one Roland and three Tiger Cat missile systems, numerous twin-barrelled 35mm Swiss Oerlikon guns and German-made 20mm

guns, and a handful of British Blowpipes.⁴⁴ Although sources differ on the exact numbers, Argentina lost approximately three ships to air attack and 109 aircraft to various causes. Thirty aircraft were destroyed or captured on the ground and another thirty were destroyed by a mixture of naval and ground force air defense fires.⁴⁵

One glaring lesson from this contingency operation is the threat posed by the transfer of advanced technology to third world military forces. Argentinian pilots were a well trained and highly motivated foe. The combined defenses provided by all the British services forced the Argentine pilots to fly in ways that negated much of their outdated time-fused ordnance. The long flight distances from air bases in Argentina did not give Argentine pilots time to dogfight or take additional target runs in the Falklands. British losses could have been much greater.

A second area worth noting is the difficulty of coordinating air defense over the initial lodgement and bridgehead areas in a contingency operation. Air defense was organized in three belts. The first belt consisted of approximately 40 British Harrier aircraft which received limited early warning from naval horizon radar and a make-shift series of observation posts near the coast of Argentina. The second belt consisted of naval ships in three rings. The first ring consisted of combat ships equipped with high altitude medium and long-range air defense missiles. The second ring consisted of two ships

outfitted with the Sea Wolf short-range air defense missiles. The third ring consisted of ships with a handful of old antiaircraft guns, heavy machineguns, and a limited number of Blowpipes. The final belt was comprised of 12 Rapier systems and 12 Blowpipes supplemented with all arms for air defense.⁴⁶ At times, this defense design was hard pressed to resist air attack. The British "White Paper on the Lessons of the Campaign" stated that the absence "of an airborne early warning system was a severe handicap against Argentine air attacks mounted at very low level."⁴⁷ The British faced a serious problem in locating aircraft with sufficient speed and in disseminating warning information to firing units. The Harriers could not provide constant and simultaneous combat air patrols (CAP) over the fleet, the landing areas, and the advancing ground forces. As a result, the Harriers often engaged enemy aircraft after they had released their munitions.

The high altitude naval missiles were not effective against the threat's low level attacks and the low altitude Sea Wolf performed poorly. The air attack at Fitzroy, which led to the sinking of the British Galahad and to serious casualties in the 5th Brigade, is a sad illustration of the coordination difficulties that can be encountered in a beachhead operation. The success of the five Argentine A-4 Skyhawks in this attack was largely due to British mistakes and risks. The British decided to discharge equipment and ammunition before personnel during daylight hours. There

was no Harrier CAP and no advanced warning of the attack. The British failed to line the decks with observers and machinegun crews. Finally, although some air defense coverage was to come from the establishment of some Rapier systems ashore, a delay in getting the systems ashore and positioned and then the added time required to get them operationally ready after a 8,000 mile sea voyage did not permit any ground based coverage during the attack.⁴⁸

If anything, the Falklands underscores the importance and difficulty of integrated counterair operations. In addition to the mix of weapon systems, the British conducted a raid on Pebble Island where they destroyed 11 Argentine aircraft. In the Falklands, the British were disappointed with the performance of the Blowpipe. Its bulky and heavy 47 pound configuration made it difficult for gunners to carry and to keep up with supported units. Gunners had to expose themselves to enemy fire in order to properly engage aircraft and track the missile. This early version of the weapon system used a rather slow missile and had little success against high speed crossing targets. It did prove useful against the slower Pucara, the Argentine ground attack aircraft. During the campaign, the Blowpipe was credited with destroying eight of them. The British were pleased with their Rapier system although it took 24 hours to get some of them operational once they were put ashore and it took helicopter lift assets to reposition them. Some sources credit this system with 14 kills.⁴⁹ The biggest

surprise to the British in their counterair effort was the effect massed gun fire had on Argentine pilots. Robert Fox has written that selected gunners were directed to increase the amount of tracer rounds because machinegun fire "was to prove as effective as any other weapon; the pilots could see the streams of tracer coming at them... and it intimidated them."⁷⁰

Lebanon

On June 9, 1982, the Israeli Air Force destroyed 17 of the 19 Syrian air defense batteries deployed in Lebanon's Bekaa Valley. The Israeli anti-SAM offensive took advantage of Syrian mistakes rather than of any inherent weakness in air defense. This historical example holds some important air defense lessons and, in particular, lessons for LIC strike missions.

For more than a year before the attack the Israelis sent remotely piloted vehicles (RPVs) with electro-optical sensors over the valley to gather intelligence information. One of the crucial elements of information learned by the Israelis was "that the Syrian SAM batteries had, for the most part, remained static for many months."⁷¹ This tactical blunder permitted the Israeli Air Force to launch a multi-phase operation against the Syrian defense complex which consisted of a mix of SA-2, SA-3, and SA-6 batteries. The phases were electronic warfare, deception, SAM attack, and counterair.⁷²

First, a variety of electronic airborne platforms identified missile site radars and performed real time analysis. Then jammers disrupted Syrian communications nets and long-range radars. Next, the Israelis launched waves of decoy drones and rocket dispensed chaff to simulate an air strike. The Syrians reacted by turning on radars and engaging the drones with their ready-to-fire missiles. In many instances, once the radars were turned on missile sites continued to radiate long after target data was needed. This phase was then followed by the actual attack. First fighter-bombers armed with anti-radiation missiles (ARM) attacked each battery. After the radars were destroyed, other attack aircraft used cluster munitions and bombs to destroy the sites. In this same phase, airborne early warning systems together with airborne jamming platforms and fighter aircraft were able to intercept or disrupt Syrian MIGs sent toward the Bekaa Valley.

Although this large but successful strike package took painstaking and detailed preparation, the Syrians could have avoided the magnitude of this debacle if they had adhered to some simple tactical considerations. First, the Syrians clearly violated the principle of mobility by failing to periodically relocate many of their highly mobile SAM batteries to enhance survivability. Second, the Syrians failed to employ radar emission control. Only a minimum of selected radars should have radiated for acquisition.⁷³ Coordinated engagement ranges should have minimized tracking

radar emissions. Finally, the Syrians made no attempt to construct dummy sites or to mix anti-aircraft guns into the defense to protect sites and create flak traps along approach routes.

Historical Summary

Vietnam, Afghanistan, The Falklands, and Lebanon demonstrate the importance and reality of air defense in the lower end of the conflict spectrum. In short, history suggests that air defense planning and execution, although not always applicable to every scenario, have grown in importance. Regardless of what role a belligerent plays, if his enemy poses an air threat then he must determine a way to nullify it. Based upon the threat and the assets at his own disposal he may choose passive or active measures or some combination of both.

A proper IPB that integrates the air and counterair threat is fundamental. The Vietminh in 1954 and the Israelis in 1982 owe a great deal of their success to their detailed and accurate IPBs. The French, the Syrians, and the British owe some of their difficulties to inadequate IPBs.

Advanced technology has had varying degrees of success in the Third World. Argentine aircraft was an underestimated threat in the Falklands. The Mujahideen in Afghanistan and the North Vietnamese used foreign technology well. Training and tactical adaptations enhanced weapon

survivability and effectiveness. In both cases, the technology escalated the conflict and made it more costly to the counterinsurgent. The Syrians in the Bekaa, however, offer an example of poor tactical integration of advanced technology.

Political factors inherent in these conflicts appear to affect air defense too. They shaped bombing campaigns for the U.S. and assisted the North Vietnamese in air defense planning. Air bases in Argentina were off limits to British strikes. For the Vietnamese and Mujahideen, air defense weapons were political symbols that buoyed morale and were a source of insurgent pride. Who from the Vietnam era can forget Jane Fonda and the antiaircraft gun?

Finally, the air defense principles of mix, mass, mobility, and integration may not be applicable or suitable to certain scenarios because of the operational environment and availability of resources. Their environment and lack of command and control equipment have limited the Mujahideen's practice of mix or mass in their operations. The British had more counterair means at their disposal, but they discovered the difficulty of complying with these principles in a joint service contingency operation thousands of miles from home turf and the doctrine writers. Some LIC scenarios have underscored the importance of antiaircraft gun systems and small arms fire in countering an air threat. The North Vietnamese in the Lamson 719 operation and the British to a lesser extent in the

Falklands developed tactics in an operational environment that could take advantage of these types of weapons.

V. CURRENT DOCTRINE AND AIR DEFENSE IN LIC

Presently, U.S. LIC doctrine states that the tenets provided in Army Field Manual 100-5 and in Air Force 1 and 2-Series Manuals characterize successful conventional military operations and apply "at the appropriate level in LIC."⁷⁴ The final draft of Field Manual 100-20 differs from most of the currently published doctrinal literature. That latter group is more focused upon "conventional war" and appears more slavish to a professed compatibility with AirLand Battle. Field Manual 100-20 argues that in LIC unique imperatives--"political dominance, legitimacy, unity of effort, adaptability, and patience"--"shape, guide, and add dimensions" to AirLand Battle.⁷⁵ This manual also establishes itself as a capstone publication for military operations in LIC. It states that it "prescribes doctrine and tactics, techniques and procedures that are common to Army and Air Force units operating at the lower end of the conflict spectrum."⁷⁶ Furthermore, it "provides direction for other related publications".⁷⁷ Whereas FM 100-5, Operations, discusses air defense and counterair throughout, albeit almost exclusively in the conventional war reference frame, Field Manual 100-20 mentions air defense once in two hundred and forty-six pages.

That one reference to air defense is found in a thoughtful discussion of force composition for a peace-keeping organization. The manual suggests that if the use of airspace by disputing parties in an area or corridor threatens to renew violence, "air defense units may be required".⁷⁶ The ROE for such a mission would be very restrictive to say the least; but if a unit were given such a mission it could profit from a study of the Bekaa Valley operation. The U.S. Navy's recent experiences in the Persian Gulf clearly illustrate the challenges and risks of using current air defense systems in a police action. Remarkably, no reference to air defense or counterair is made in discussions of border and area denial operations, of force and site protection, of insurgent and terrorist tactics, or of planning parameters in LIC air operations. It is no surprise then that no mention is made of the growing air component of LIC.

Bits and pieces of other doctrinal literature attempt to discuss air defense in the lower end of the conflict spectrum. Field Manual 90-8, Counter guerrilla Operations, devotes two short paragraphs to the subject. It states that an "insurgency does not equate to a low-intensity air threat" because even "a minimal air attack" could destroy friendly counterinsurgency forces.⁷⁷ The remainder of the section, however, is shaped by an assumption that there will be a minimal air threat in LIC. The manual then devotes a good part of its discussion addressing the risks and use of

air defense personnel as additional security forces for the operational support base (OSB). Air defense personnel cannot be above local security on the nonlinear LIC battlefield. Yet, even in South Vietnam where air defense assets were deployed against an air threat that did not appear, gun units had active ground support missions in convoys and in combat unit perimeters outside the OSB.⁸⁰

Air defense in operations at the lower end of the conflict spectrum is handled somewhat better in air defense doctrinal literature, but we still have an incomplete and cursory overview of air defense in these scenarios. The new coordinating draft of Field Manual 44-100, U.S. Army Air Defense Operations, characterizes the air threat in LIC as "low numbers of unsophisticated systems," that are usually employed with "a lack of operational sophistication."⁸¹ The British after the Falklands would raise some eyebrows at this general appraisal, as would the North Vietnamese, the Syrians, and the Mujahideen, albeit from a different perspective. The manual does stress that a few aircraft at this level of conflict "may have effects far greater than the same number of systems employed in other levels of conflict."⁸² These aircraft are capable of conducting operations that will have more of a psychological than tactical impact, according to Field Manual 44-100. The concern is that if they are successful in destroying a key target or of giving the impression that they are able to operate at will in the air, the effect could be devastating

to the opposing force. To its credit, Field Manual 44-100 stresses that the IPB process must incorporate the vertical dimension and it must consider the fact that "the fastest means for an external force to intervene in a conflict with minimum risk is through air power."⁸³ Although their decision was ridiculed by some analysts, the Soviets may have wanted some LIC insurance when they deployed an SA-4 Brigade with their forces in Afghanistan.⁸⁴

Field Manual 44-100, as does Field Manual 44-3, Air Defense Employment: Chaparral/Vulcan/Stinger, and 44-90, Air Defense Artillery Employment: Hawk, blend LIC into discussions of air defense in non-mature theaters and in contingency missions. The positive side to this is that U.S planners are attempting to integrate air defense into the phases of a contingency mission, especially in the development of, protection of, and expansion beyond the lodgement area. In Operation Urgent Fury in Grenada in 1983, four Stinger teams and a headquarters element accompanied the initial elements of the 82nd Airborne Division's assault force. They protected the Port Salines air head and two co-located field artillery batteries. By October 30th, there were 27 Stinger teams defending the air field, DISCOM, Division Headquarters, and Pearls Airfield.⁸⁵ The March 1988 deployment of elements of the 82nd Airborne and 7th Infantry Divisions to Honduras also included Stinger missile teams in the initial airlift to protect the force from Nicaraguan air strikes.⁸⁶

Forces in these operations faced some of the same mobility and sustainment problems the British did on the Falklands. The Stinger is somewhat lighter and less bulky than the Blowpipe. However, often equipped with a PRC-77 radio and some minimal personal gear, an air defender with one Stinger missile carries a load of 120 pounds in dismounted operations.⁸⁷ There is also a serious resupply problem with the paucity of vehicles in the assault phase or later in areas inaccessible by vehicle. In the Falklands, many Blowpipe gunners marched unencumbered with their units at night and had Blowpipes flown out to them near day-break.⁸⁸

Another common problem highlighted by the Falklands was the lack of a dedicated early warning system for air defense units, especially the ones ashore. An ineffective system concedes surprise to the enemy and makes air defense systems less effective. The Argentine forces tried to piecemeal a system around Port Stanley, but equipment failures and poor positioning made their system relatively ineffective.⁸⁹ For the British, Fitzroy was the result of no early warning. Similarly, British soldiers had been told for so long that they were under air defense warning "red" that they became lackadaisical about air defense cautions until the 3rd Brigade Headquarters was hit by an air attack without warning.⁹⁰ Current JCS Doctrine states that "early warning of enemy attack is vital if in-depth defense is to be maintained."⁹¹

Doctrine gives few clues to the services how early warning is to be accomplished. U.S. Army doctrine sees early warning passed from AWACS or other Air Force radars through a data link to a control and reporting center (CRC) by means of the tactical air control system (TACS) to a Hawk Battalion where a liaison team from short range air defense units (SHORAD) can broadcast early warning to maneuver units and air defense units. However, as Field Manual 44-90 explains,

Early in contingency operations, when there is no established CRC or no Hawk Battalion deployed, the joint task force commander has no procedure available to provide early warning to SHORAD Battalions or other maneuver units.⁹²

The long-term solution for a direct data link between AWACS and Army ADA units requires the development of new hardware. In the meantime, a limited voice link, if AWACS is not already saturated, can be established directly to a Hawk Battalion or a Brigade/Division Headquarters. From there information must be passed to maneuver units and air defense fire units. This temporary fix was tried in Grenada with some limited success.⁹³

Although not fathomless, a gap does exist between current air defense doctrine and the range of air defense demands that can be treated in the lower end of the conflict spectrum. Some of this problem rests on the current doctrine's overwhelming focus on high-intensity conventional war fighting. Part of the problem also rests in our LIC doctrine, which has not clearly acknowledged the important

role air defense can play in LIC. More often than not, the applicability of AirLand Battle tactics and air defense principles to LIC are assumed and not analyzed by our current tactical doctrine. There is recognition of air defense in LIC and in limited wars, especially in contingency operations, but our current doctrine does not emphasize its importance in relation to the growing air threat across numerous scenarios. As a result it does not provide sufficient tactical guidelines.

VI. CONCLUSIONS

This paper began by posing the following question: Is there an air defense doctrinal void between current doctrine and the demands engendered by low-intensity conflict and limited war? The answer is yes.

That void, however, is not a bottomless pit, but a comparison of theoretical and historical air defense considerations with current doctrine indicates that we are not where we should be. To provide a basis for the development of tactics and for more specific study, a series of tactical guidelines with which an air defense tactical doctrine can be created has been proposed. Such a doctrine should incorporate the following guidelines:

- Always prepare an IPB that integrates the growing air and counterair threats.

-When offering military assistance in the form of air defense consider:

1. Does it create an economical countermeasure?
2. What is the operational environment and the average user's skill?
3. What risks concerning escalation and "lost" technology are acceptable?

-The political complexity of conflicts in this portion of the conflict spectrum affects air defense.

-Air defense systems will often have special effects in these scenarios.

-Conventional doctrine should not be slavishly applied to the lower end of the conflict spectrum.

Where are we today and where do we go from there? We have a serious void between doctrine and the demands of the low end of the conflict spectrum. We have made some progress in our integration of air defense in contingency operations. However, we still have problems with early warning, mobility, and sustainment in the early phases of such an operation. These problems occur in varying degree in conventional war fighting in high-intensity conflict too, but they deserve some careful attention in LIC and in limited war because of the higher likelihood of such scenarios in the near future. We have a good beginning with the incorporation of the vertical dimension in the IPB, but our doctrine needs to acknowledge the growing air and counterair threats better than it currently does. ✓

Now that we are finding ourselves supporting insurgents we must reexamine air defense from that perspective. In so doing we must refrain from forcing traditional tactical

principles on unique LIC operational environments. We need to develop flexibility with air defense doctrine and tactics so that we can best serve the insurgent's need and level of conflict while also serving U.S. interests. In some of these scenarios, it may be more advantageous to reduce the role of air defense as an exclusively "protection" asset and develop it more as an offensive-attrition weapon.

Finally, the air defense community needs to evaluate separate weapons and acquisition means to assess their applicability to the different categories of military operations. It is hoped that the general guidelines presented in this paper will assist us in learning and understanding modern requirements well enough to anticipate future developments.

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