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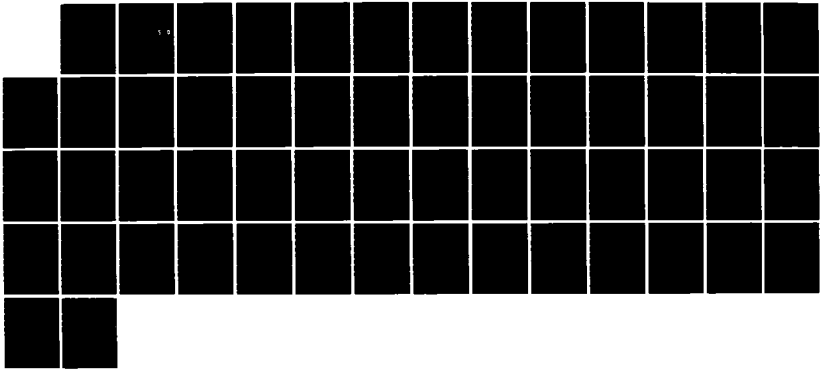

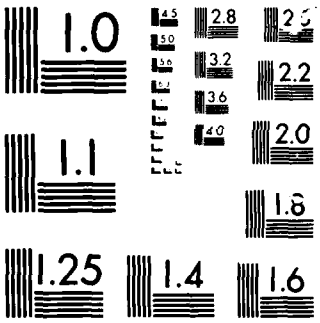

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Counterair Operations in the Light Infantry Division

by

Major William C. Bielefeld
Air Defense Artillery

School of Advanced Military Studies
U.S. Army Command and General Staff College
Fort Leavenworth, Kansas

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School of Advanced Military Studies
Monograph Approval

Name of Student: Major William C. Bielefeld

Title of Monograph: Counterair Operations in the Light Infantry Division

Approved by:

_____ Seminar Leader
Lieutenant Colonel Barrie E. Zais, PhD

_____ Director, School of
Colonel Richard Hart Sinnreich, MA Advanced Military Studies

_____ Director, Graduate Degree
Philip J. Brookes, PhD Programs

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ABSTRACT

COUNTERAIR OPERATIONS IN THE LIGHT INFANTRY DIVISION, by Major William C. Bielefeld, USA, 54 pages.

This study is an analysis of the air defense posture of the light infantry division under the constraints imposed by a two Vulcan/Stinger battery air defense battalion. The potential air threat facing the light infantry division is defined, and then British counterair operations during the Falkland Islands War of 1982 are examined to gain a recent historical perspective on air defense of a light force. Air defense lessons from that conflict are used with other historical examples to suggest a concept for counterair operations in the light infantry division.

The study concludes that the light infantry division faces a formidable air threat across the conflict spectrum. The light infantry division can provide for an adequate air defense posture even though it has a more austere air defense artillery force structure than any other type of division. Counterair operations must be an integral part of division plans, and a combined arms responsibility. The air defense artillery battalion remains the focal point for the light infantry division's air defense. However, all the division's units must employ active and passive air defense measures to counter the enemy air threat.

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SECTION I

INTRODUCTION

The development of the light infantry division was a United States Army response to senior leaders' concerns about a hollow, inflexible force.[1] The United States Army Combined Arms Combat Development Activity Field Circular 100-1 states, "A Need was identified for a fighter-heavy, more deployable force that could be delivered with minimum resources, and would represent a credible force on the future's most likely battlefield."[2] The light infantry division was designed primarily for low-intensity conflict, but is to have utility on the high-intensity battlefield as well.[3] General John A. Wickham Jr., Chief of Staff of the United States Army, states that light infantry divisions can be deployed in all scenarios from low- to high-intensity, and that they give commanders more flexibility:

> Correctly employed in cities and close terrain, light infantry divisions on the mid- to high-intensity battlefield free up armored and mechanized formations to counter the enemy on more suitable terrain. At the low end of the spectrum, light divisions are equally capable of responding to more likely threats of low intensity conflict.[4]

The light infantry division's organization is limited by a force structure ceiling of 10,000 soldiers and specific design criteria. The division is optimized for employment at the low end of the conflict spectrum with utility at higher conflict levels. It is deployable in 400 to 500 aircraft. Its

force structure consists of approximately 50 percent infantry organized into nine maneuver battalions. Additionally, the light infantry division's organic ground and aviation assets are capable of transporting one infantry battalion each.[5]

Protecting the light infantry division from hostile air attack is primarily the function of the air defense artillery battalion.[6] This battalion was designed within the constraints of the light infantry division. Specific design criteria for the air defense artillery battalion are that it will be deployed in a low-intensity conflict environment, there is no habitual association with infantry brigades and battalions, it is manned by no more than 322 soldiers, and it can be deployed in 23 C-141B aircraft sorties.[7] The resultant air defense artillery battalion is more austere than the air defense artillery battalion in any other type of division.

The Problem

Active air defense in the light infantry division is provided by the air defense artillery battalion. This battalion is organized with two gun/Stinger batteries and a headquarters battery. Each gun/Stinger battery consists of nine Vulcan squads and 20 Stinger teams for a total of 18 Vulcan squads and 40 Stinger teams in the battalion.[8] As envisioned, the battalion will provide air defense to the division on an area basis.[9] Additional air defense will be provided by 50 non-dedicated Stinger teams interspersed among divisional

units. The light division's air defense artillery battalion is organized as follows:

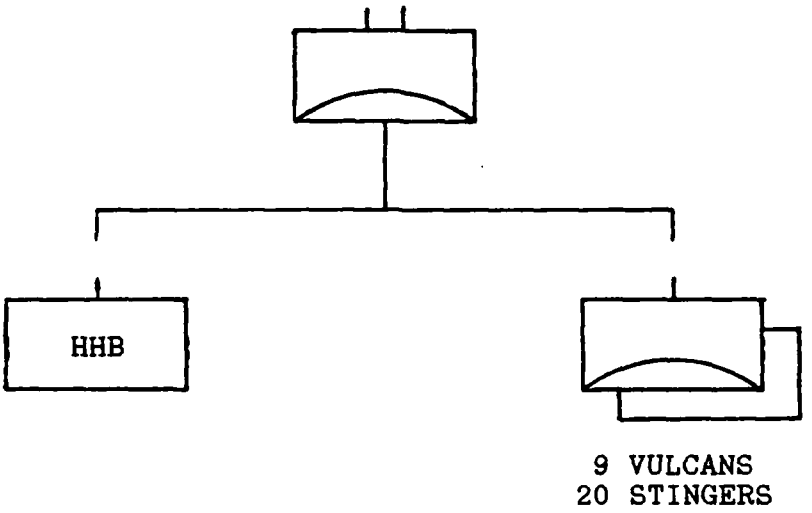

Figure 1

The challenge facing the light infantry division in counterair operations is to protect itself from enemy air operations with less dedicated air defense assets than those available in other divisions. This will require a keen awareness of and innovation in countering any air threat. Counterair operations will become a combined arms responsibility involving tactical employment considerations for both the air defense artillery battalion and other divisional units including maneuver battalions and brigades. Active and passive measures will have to be adopted division-wide, to provide a synergy in self protection. The air defense artillery battalion remains the centerpiece for light

infantry division counterair operations, but other units will have to assume a greater share of the burden.

Purpose

In light of the reduced air defense artillery force structure, traditional counterair tactics need to be evaluated to determine what techniques and tactical methods of air defense artillery employment will provide an effective air posture for the light infantry division. Current force constraints preclude additional air defense artillery assets, except at the expense of other divisional units. Therefore, this paper focuses on counterair operations within the current force design limitations.

The methodology of this paper is to discuss the expected air threat facing the light infantry division across the conflict spectrum, and then to look at the British counterair operations during the Falkland Islands War of 1982 to gain a recent historical perspective on air defense of a light force deployed in a contingency operation. Air defense lessons from that conflict will be used with other historical examples to suggest a concept for counterair operations in the light infantry division.

SECTION II

THE AIR THREAT

The light infantry division's design is optimized for use in low-intensity conflict scenarios, with utility at higher levels of conflict. In this section, the potential air threat facing the light infantry division is examined for both low-intensity conflict employments and high-intensity missions. An understanding of the potential air threat is necessary to develop counterair tactics.

Low-Intensity Conflict

United States Army Field Manual 100-20 defines two types of low-intensity conflict. Type B involves advisors, combat support, and combat service support, and will not be discussed in this paper. Type A low-intensity conflict is defined as follows:

> Internal defense and development assistance operations involving actions by US combat forces to establish, regain, or maintain control of specific land areas threatened by guerrilla warfare, revolution, subversion, or other tactics aimed at internal seizure of power.[10]

By definition, the light infantry division's low-intensity conflict mission is aimed at deployment to third world regions to assist friendly governments. The most intense operations envisioned in this end of the conflict spectrum are on the scale of Grenada or the Falkland Islands War.[11]

Since low-intensity conflict involves insurgency and counter guerrilla operations which occur in the third world,

the light infantry division is intended for deployment in third world countries. Often the air threat will be negligible or nonexistent, but there is a significant and increasing combat air potential in many third world nations. Because of the transfer of aircraft technology and eager armament vendors, third world countries are developing significant air forces which can participate in future conflicts. This was one of the lessons the British learned in the Falkland Islands War.[12]

Examples of the growing third world air threat abound. Many African countries are increasing their air potential. Angola has increased its air forces in the last few years. Combat aircraft available to Angola include multirole fighters such as the MiG-21 Fishbed, MiG-23 Flogger, and Su-22 Fitter, and helicopters such as the Swiss Aerospatiale Gazelle and the French Dauphin.[13] Mozambique has acquired at least 44 MiG-21 Fishbeds.[14] Libya, Algeria, and Ethiopia have numerous Soviet aircraft, as well as Soviet advisors and pilots.[15] The armament of one country leads to the armament of its neighbor, increasing combat air capabilities throughout the region.

Latin American nations are also busy increasing their combat air power. Argentina's air exploits during the Falkland Islands War dramatically demonstrated its air power, which is now being reconstituted through aircraft acquisitions and an upgrade of the national aircraft industry.[16] Peru and Chile are purchasing Mi-24 Hind helicopters to augment their

air forces.[17] Peru also purchased Mi-8 Hip helicopters[18] and the French Mirage 2000,[19] while Venezuela has obtained American F-16s.[20] In one of the most volatile areas of Latin America, Nicaragua is rapidly increasing its air power. Nicaraguan pilots are in Eastern Europe training to fly MiGs. The Soviet Union has supplied Nicaragua with transport aircraft such as the An-2 Cub and helicopters such as the Mi-24 Hind D and Mi-8 Hip. Additionally, Nicaragua has been building new airfields and improving existing airfields at which to base their growing air might.[21] The United States can no longer rely on total air superiority in third world regions, where nations are rapidly building their air potential assisted by eager armaments vendors from the more industrialized countries. Anthony Cordesman makes a case for the growing third world combat air capability when he states:

> The probable scale of such [technology] transfers is indicated by the fact that during 1975-1979, 860 supersonic jets were sold to Africa, 615 to East Asia, 165 to Latin America, 1,380 to the Middle East, and 305 to South Asia. It is also indicated by the fact that during 1972-81, the developing world bought 6,630 supersonic jets, 2,070 subsonic attack fighters, 35,735 surface-to-air missiles, well over 6,000 anti-aircraft guns, 31,840 tanks, 54,555 artillery weapons, and 1,491 naval combatants. The bulk of these transfers are from the Soviet block and beyond Western control.[22]

This arms build up creates an air threat to any American force committed to low-intensity conflict missions.

High-Intensity Conflict

The air threat facing the light infantry division in high-intensity conflict situations needs little elaboration.

The air potential of the Soviet Union and its allies in Eastern Europe is immense. The Soviets have spent more on modernizing their air components than any other service.[23] Close air support has received particular attention. The Su-25 Frogfoot has been deployed,[24] with capabilities similar to the American A-10,[25] and the Mi-24 Hind is used in close air support and attack missions.[26] The light infantry will have to deal with an active air threat in high-intensity conflict missions, and must be prepared to counter this threat.

Tactics

Threat air tactics will be similar in both low- and high-intensity conflicts depending on the available aircraft and training of the pilots. Third world countries with Soviet equipment receive Soviet training and can be expected to use Soviet tactics. Aircraft or helicopter availability may require third world countries to improvise tactics, using aircraft in missions for which they are not designed. For example, fighter aircraft may have to be used in close air support roles. For the most part, tactics encountered in third world countries will resemble those encountered in high-intensity conflicts except in scope.

Soviet air tactics have evolved to the point where the primary close air support aircraft will be helicopters. Fixed wing aircraft will usually perform battlefield interdiction type missions.[27] Aircraft can be expected to employ low-level attack profiles when attacking combat forces in order to avoid

radar detection.[28] When helicopters are not available, fixed wing aircraft can be expected to perform close air support missions, especially in third world countries that do not have a well developed attack helicopter capability.

Summary

The light infantry division could face a formidable air threat regardless of the type of conflict in which it is employed. The combat air power of third world countries is increasing at a fast pace, posing even greater challenges for forces deployed in low-intensity conflict areas. The high-intensity air threat is imposing and increasing. No matter where the mission sends the light infantry division, third world or NATO, the potential exists for the enemy to mount an air threat.

Threat air tactics indicate that helicopters will be the primary threat to front line forces, while fixed wing aircraft can be expected to attack deeper targets. The light infantry division counterair effort must counter helicopters in the forward divisional areas and fixed wing aircraft in the rear areas. Counterair tactics must be weighted towards these threats while maintaining the flexibility to adjust to surprises.

SECTION III

AIR DEFENSE ARTILLERY EMPLOYMENT

Field Circular 100-1 states that the air defense artillery battalion has the primary responsibility for air defense of the light infantry division.[29] This battalion is severely limited in its capability to provide active air defense to the division due to its austere force structure and the short ranges of its organic air defense artillery systems.[30] To maximize effectiveness of the limited organic active air defense assets, air defense coverage must be designed based on an intense evaluation of air defense priorities and force allocation. Mission, enemy, troops, terrain, and time must be considered in air defense planning, as well as air defense artillery principles, employment guidelines, and priority evaluation.[31]

In this section the air defense artillery employment principles of mass, mix, mobility, and integration are defined. These principles are the foundation of air defense artillery employment, and provide the criteria for the evaluation of air defense artillery employment.

Mass

Mass is the principle of air defense that requires the concentration of combat power at the critical point. Air defense fire units are concentrated to achieve mass. In the

case of the light infantry division, mass will be achieved by assigning no less than a Vulcan platoon or a Stinger section to defend an asset.[32] Depending on the size of the asset, this may or not be enough to achieve mass.

Mix

Mix is achieved by assigning complementary air defense weapons systems to the defense of an asset. This principle compliments mass. Mix forces enemy pilots to worry about more than one air defense capability when attacking. In the light infantry division, mix will be achieved by defending assets with task forces comprised of Stinger and Vulcan.[33]

Mobility

Mobility permits the application of the principles of mix and mass. Air defense artillery units must be mobile to reconfigure defenses in order adapt to changing tactical situations, and to avoid detection by enemy aircraft. They also must be able to move with the units they are defending.[34]

Integration

Integration is a close coordination between air defense forces that allows each force to maximize its effectiveness without interfering with the other. Air defense artillery weapons are integrated into the light infantry division scheme of maneuver to ensure the maximum degree of effectiveness.

There are two levels of integration. First, air defense artillery units coordinate with each other to ensure they do not interfere with the other's coverage, and that they enhance the other's capabilities. Second, air defense artillery units coordinate with the elements they are defending to ensure they respond to the defended element's needs.[35]

SECTION IV

FALKLAND ISLANDS WAR: AIR DEFENSE OF THE LAND FORCES

The Falkland Islands War offers the most recent historical example of light forces operating in an active air threat environment. An analysis of the British counterair effort in the land campaign provides insight about the counterair problem facing the light infantry division for many of its deployment options. Argentine air was the first threat that faced the British, and had to be defeated to ensure success of the campaign.

The British divided the Falkland Islands War into five phases as follows: work up phase, blockade, landing and establishing a beachhead, main battle, and end of the land war.[38] This section will focus on counterair operations during the land operation phases. A brief overview of the campaign and the land battle will set the stage for an analysis of counterair operations in support of the land operation. Lessons learned from the Falkland Islands War may be applicable to counterair operations in American light infantry divisions.

Overview

The Falkland Islands War began on 2 April 1982, when the Argentines invaded the Falkland Islands, easily overpowering the small British garrison. The Argentines invaded and subdued another British detachment on South Georgia Island on

3 April, successfully completing their goal of regaining sovereignty over the long-claimed islands.[37] The Argentines assumed that the British would negotiate for a transfer of the islands based on the fait accompli. The British did not concur.

The British were quick to respond to the aggression, on both the diplomatic and military fronts. By 5 April the British had negotiated United Nations Security Council Resolution 502 calling for an immediate withdrawal of all Argentine forces,[38] and a British carrier task force was enroute to the Falklands.[39] A maritime exclusion zone of 200 miles around the Falkland Islands was declared effective on 12 April.[40] On 21 April the British invaded South Georgia with Special Air Service (SAS) and Special Boat Service (SBS) forces. The island was recaptured by 25 April.[41] The British had set the stage to turn their attention to the Falklands.

The British carrier task force arrived in the Falkland Islands maritime exclusion zone on 29 April. The maritime exclusion zone was extended to a total exclusion zone on 1 May. The early weeks of May were of major significance to the operation. Two major events were the sinking of the Argentine cruiser General Belgrano and the sinking of the British air defense destroyer Sheffield. The Argentines never ventured out to sea again, and the British were forced to operate their carriers outside the range of land based Argen-

tine aircraft. This was to have an impact on air support for the land forces.[42]

Land Campaign

Land operations began on the Falkland Islands on 1 May with the landing of SAS and SBS forces to assess the Argentines' strength and dispositions.[43] Based on the SAS reports, it was decided the landing force would conduct an amphibious assault at San Carlos Bay on East Falkland Island away from the main Argentine positions at Port Stanley and Goose Green. San Carlos offered several advantages as a landing site other than that there were no Argentine defenses. The bay was surrounded by high ground that would limit Argentine aircraft attack profiles. Pilots would have to cross a ridge line and acquire targets in a relatively short time. The British hoped that Argentine aircraft could be defeated by the Rapier air defense systems from T Battery 12 Air Defence Regiment that were attached to 3 Commando Brigade. San Carlos Bay also provided protection from Argentine submarines and Exocet missiles.[44] Its main disadvantage was its distance from the main objectives of Port Stanley and Goose Green.

The British selected 3 Commando Brigade of the Royal Marines to conduct the amphibious assault. The brigade, under the command of Brigadier Julian Thompson, consisted of 40 Commando, 42 Commando, 45 Commando, 2nd Battalion Parachute Regiment (2 PARA), and 3d Battalion Parachute Regiment (3 PARA). The assault started before dawn on 21 May . The

British had hoped the prevailing thick clouds and rain would cover their assault from enemy air observation, but the day dawned clear. To mask its intentions, the assault force made a feint at Stanley before sailing to San Carlos, and a number of diversionary attacks were launched by SAS and SBS troops. The assault achieved complete surprise as the British met no resistance except for a small Argentine detachment. Landing on seven beaches, the British got all of 3 Commando ashore on the first day.[45]

After five days of consolidating their positions at San Carlos and building up their logistic base ashore, the British resumed the offensive. 3 Commando advanced along two axes. The 2nd PARA was to secure Goose Green 20 miles to the south, while 3rd PARA and 45 Commando were to take Teal Inlet and Douglas Settlement in the north. Launching the attack on foot over rough terrain the 2nd PARA secured Goose Green by 1000 hours on 29 May 1982. 3rd PARA and 45 Commando managed to secure their objectives by 30 May, after grueling 50 mile foot marches.[46] As in the American light infantry division, most of the equipment used by these soldiers had to be carried on foot.

The next phase of the land campaign was to press on to Port Stanley to defeat the main Argentine force. It was decided to attack along two axes. 3 Commando was to attack from the north, and 5 Infantry Brigade under the command of

Map of the Falkland Islands

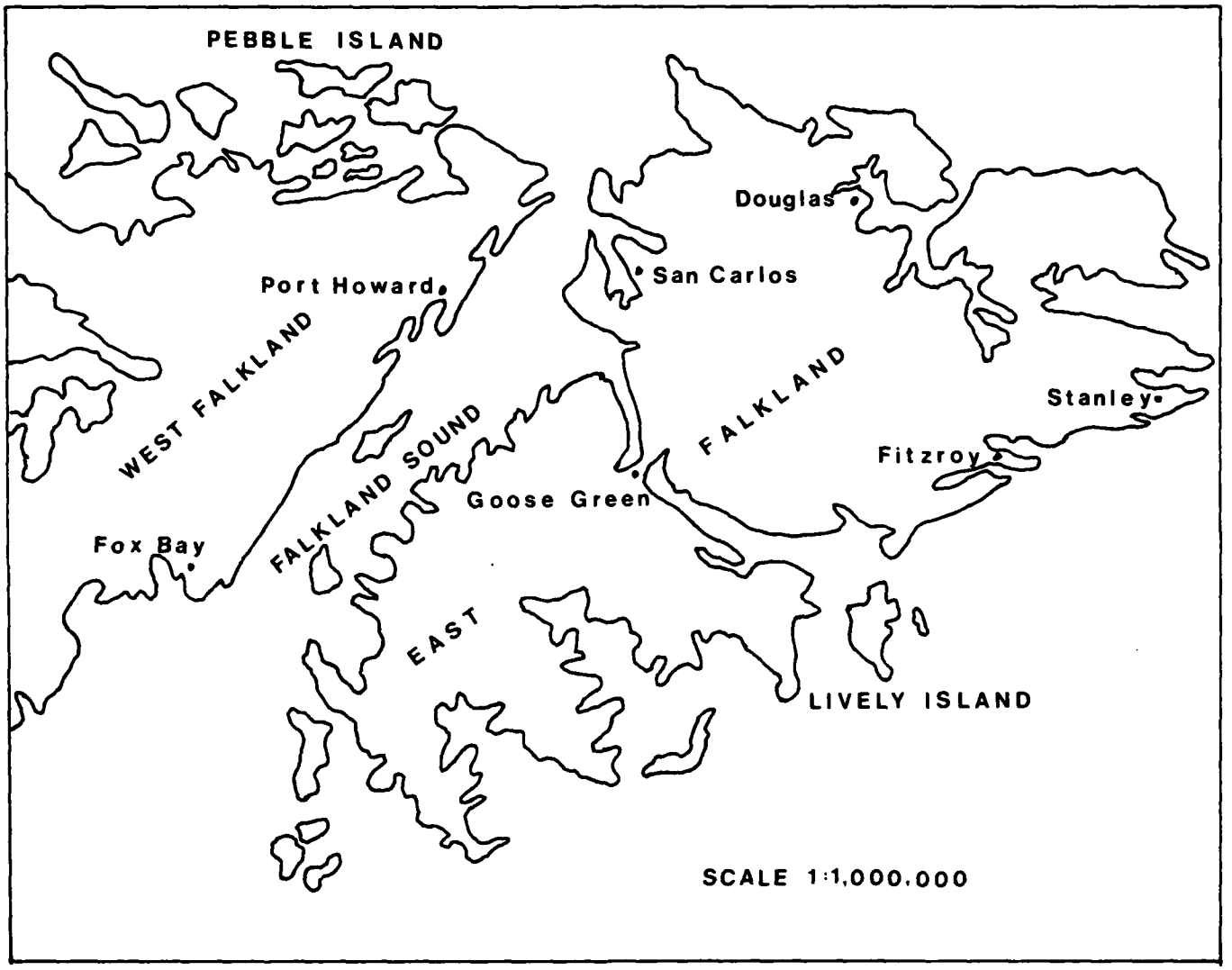

Figure 2

Brigadier Anthony Wilson was to attack from the south. 2 PARA was attached to 5 Brigade, and after using a commercial telephone to gain intelligence, moved to Bluff Cove to link up with 5 Brigade.[47] After a futile attempt to walk across the island, 5 Brigade attempted an amphibious assault into Bluff Cove. Because of problems with landing ships and Argentine aircraft, 5 Brigade did not get ashore until 7 June, and the assault on Stanley did not begin until 12 June. The final assault on Stanley began on 12 June with 3 Commando attacking in the north. On 14 June, 5 Brigade attacked from the south, and by nightfall the Argentines had surrendered.[48]

Counterair Operation

British counterair operations actually began during the 3 April Argentine invasion of South Georgia. The Royal Marine garrison on the island was attacked by Argentine marines who made a heliborne assault. The Royal Marines engaged one Puma helicopter and two Alouette helicopters with small arms fire, destroying two of the helicopters.[49] The gravest threat to the British task force throughout the remainder of the war was posed by Argentine aircraft.

The first step in the British counterair effort was an attempt to deny the Argentines the use of the Port Stanley airfield. One Vulcan bomber flying out of Ascension Island attacked the Port Stanley airfield. Approaching at low level, the aircraft climbed to 10,000 feet to deliver its bombs. Twenty-one 1,000 pound bombs were dropped, one cratering the

tarmac. The same day twelve Sea Harriers from the aircraft carrier Hermes attacked the airfield at Goose Green, radar and anti-aircraft sites at Stanley, and the Port Stanley airfield.[50] The effort to deny the Argentines the use of the Port Stanley runway failed. The Argentines were able to restore the airstrip quite quickly, filling in bomb craters and repairing damaged hangers. They were able to use the airfield throughout the campaign, but limited their use to Pucaras and C-130s. The Argentines were afraid to risk basing their fighters at Port Stanley, which reduced their effectiveness greatly since they had to operate out of bases on the Argentine mainland 400 miles away.[51]

The next step in counterair operations was to eliminate an airstrip on Pebble Island north of West Falkland Island. Pucaras operating out of this airfield could pose a threat to the landing at San Carlos. This counterair operation was performed by SAS troops who conducted a raid on 11 May. The SAS destroyed six Pucaras, a Short Skyvan, and five other aircraft by placing plastic explosives in their cockpits. A radar site and ammunition dump were also destroyed by the SAS.[52]

The British had to rely on three air defense systems for ground based air defense. Rapier, which is a land-mobile airportable surface-to-air tactical guided missile,[53] was the primary defense against supersonic aircraft.[54] Rapier weighs almost 7,000 pounds, and can be fired in a radar or optical mode.[55] Blowpipe, a man-portable surface-to-air missile

weighing 47 pounds, was the primary air defense system employed by foot mobile forces. Its design is optimized for an incoming target, and guidance is by radio/optical tracking.[56] Stinger is a man-portable, shoulder-fired, infrared radiation (IR) homing (heat-seeking), guided missile system. The Stinger weapon system weighs about 39 pounds, and was deployed by SAS forces.[57] Ground based air defense operations began with the amphibious assault on San Carlos on 21 May 1982.

The initial air defense at San Carlos was to be provided by ship based air defense systems, until ground based systems could be emplaced ashore.[58] The Rapiers of T Air Defence Battery, 12 Regiment had been counted on to protect the landing force, but serious problems arose on the first day.[59] Load plans had not placed the Rapier systems where they were readily available. During the sea voyage the Rapiers suffered significant damage from rough handling and exposure to salt air, and once in the landing zone they had to wait for other equipment of lower priority to be moved before they could be off-loaded.[60] Most of the Rapiers did not even begin movement ashore until after the first air attacks were under way.[61]

Numerous problems were encountered by Rapier. On the first day, up to eight of the ten launchers ashore were non-operational at any given time for a variety of reasons. Electronic components were damaged by exposure to salt during the sea voyage. Logistical support was tenuous and spare parts were difficult to obtain from supplies aboard ship.

Unexpected problems arose when missile retaining pins on the launchers snapped, dumping the missiles on the ground. Crew training was not up to combat standards. It had been up to one year since the last live fire of a Rapier, and the crews had problems when they were forced to fire optically because their radars interfered with ship board radar systems.[62] A test fire was planned at Ascencion Island, but was canceled when deployment came faster than expected.[63] A final problem experienced by Rapier related to its computer selected positions on the high ground. Rapier could not depress to cover the valleys, while positioning in the valleys severely limited its coverage. Argentine aircraft attacked at high speed flying at altitudes of less than 50 feet using terrain for obscuration. Rapier was unable to acquire targets at ranges greater than three kilometers, and was, therefore, used as a tail-chase weapon.[64]

Since Rapier was experiencing problems on the first day, the British were forced to rely on Blowpipe, Stinger, and small arms for ground based air defense. High altitude coverage was provided by ship board air defense systems, and air cover was provided by Harrier aircraft flying off the aircraft carrier Hermes.[65] The Argentines mounted their first air attack on the beachhead shortly after dawn on 21 May.[66] A pair of Argentine Pucara ground attack aircraft attacked 2 PARA positions. Stinger fired by SAS troops returning from diversionary attacks on Goose Green brought down one Pucara,

while air defense fires from the ships destroyed the other.[67] In all the SAS fired five or six Stingers, but only the first one hit an aircraft. Part of Stinger's lack of success can be attributed to the training of the gunners. Only one SAS soldier was trained with Stinger, and he was killed on 19 May[68] when the helicopter he was riding in hit an albatross and crashed into the sea.[69] Gunners firing the Stingers at San Carlos were untrained.[70] Training once again contributed to a systems failure.

For six hours on 21 May, the Argentines mounted a tenacious air attack on the ships and beachhead at San Carlos. Harriers provided combat air patrol, but for lack of early warning, were in most cases unable to intercept incoming aircraft. The Harriers were relegated to tail-chasing much like the Rapiers.[71] The first day's battle boiled down to a fight between Argentine aircraft and Blowpipe, Rapier, ship board air defenses, and Harriers. It became apparent the Argentines' main effort was to destroy the ships, and ground based air defenses were employed in protecting those assets.

After the attacks on 21 May, the Argentines were able to launch only sporadic attacks. The next major effort was to be on 24 May, when the Argentines attacked with twelve aircraft. The Rapiers were operational by then and killed three aircraft. Five more Argentine aircraft were shot down during the attack. Two of them were destroyed by anti-aircraft guns on

the amphibious warfare vessel Fearless, and three were shot down by Sea Harriers from the aircraft carrier Invincible.[72]

The ground forces faced direct air attack only once during the build up phase at San Carlos.

> At last light one evening, without warning, two Skyhawks burst over San Carlos settlement at very low level. In slow motion, men watch in horror as parachute retarded bombs floated down towards 40 Commando's position. Yet only two men were killed by direct hits, and three wounded, demonstrating the effectiveness of deeply dug entrenchments and the weakness of bombs in soft Falkland peat.[73]

At the same time more Skyhawks attacked the brigade's maintenance area across the bay, inflicting heavy damage and starting fires in 45 Commando's ammunition dump. These supply areas were extremely vulnerable, but the Argentines never again tried to take them out.[74] One problem experienced by the landing party was boredom. They would watch as the Argentine attacked the ships, cheer as Argentine aircraft were shot down, and fire their rifles, machine-guns, and Blowpipes whenever an attacker came within miles, causing a logistical strain on ammunition.[75]

Blowpipe moved forward as the foot soldiers moved out of San Carlos on 27 May. A Royal Marine Blowpipe detachment in support of 2 PARA downed a Pucara near Goose Green.[76] There were two major problems during this phase. First, Blowpipe weighs 47 pounds, and is difficult to carry over long distances. Second, Harrier support for the striking force was

sporadic. While Harriers on the Hermes were weathered in, Argentine Pucaras were able to fly from land bases.[77]

The final air defense action, and greatest failure, occurred at Bluff Cove/Fitzroy. The Argentines had not conducted air attacks for several days, reducing the sense of urgency in bringing the air defense artillery systems to an operational status. When the Sir Galahad was late in disembarking troops, it was exposed to enemy air in broad daylight. The planned air cover's time elapsed, and Rapier units had not become operational.[78] The result was a devastating air attack that sunk the ship and killed 51 men. Part of the problem has been attributed to Rapier's immobility. Rapier had not been able to keep up with the advancing forces causing them to rely on the less accurate Blowpipe for air defense.[79]

Lessons

The lessons of the Falkland Islands War can be applied to counterair operations in the light infantry division. Although the air defense weapons in the American light infantry division are different, the principles are the same. Futhermore, the light infantry division is similar to the light forces employed in the Falkland Islands. In many scenarios, the light infantry division will have to deploy to a contingency area, establish an airhead, and conduct operations. This is basically what the British did in the Falkland Islands. The light infantry division can also expect its

first threat to be aircraft, much as the British experienced. Therefore, the following lesson have application to the light infantry division.

A better mix of air defense systems would have enhanced British coverage. Relying on Rapier proved costly, since it took such a long time to get the fire units totally operational. Even when operational, Rapier had problems firing at low angles. If another air defense system had been available to complement Rapier, coverage would have been enhanced. Such a system need not have the same capabilities as Rapier, but it should be readily available for immediate operations, and it should be able to fire into Rapier's dead zones, either with different capabilities or complementary positioning. The light infantry division's Stinger and Vulcan have complementary capabilities that provide such a mix. To defeat Stinger, aircraft must fly low and counter Stinger's infrared guidance system. Aircraft threatened by Stinger are forced to fly where Vulcan, which is immune to infrared countermeasures, is most capable. Vulcan, in turn, forces aircraft to fly higher, where Stinger is more capable. The light infantry division must employ its Vulcan and Stinger assets in a proper mix. The synergy of the two systems working together will result in capabilities far greater than those of either system employed by itself.

Massing of fires proved to be the most effective means to defeat enemy aircraft. When the Argentines attacked at San

Carlos, they were met by a barrage of fire from every weapon available including small arms. Argentine pilots had to adjust their attack patterns to avoid fires, choosing low-level routes that reduced their effectiveness. When confronted by the mass of fires coming from ships and shore, pilots would release their loads and head home. The requirement for massed air defense fires has two implications for the light infantry division. First, the Vulcan and Stinger fires of the air defense artillery battalion must be concentrated to maximize their effectiveness. Therefore, fewer assets will be provided dedicated air defense artillery coverage, because division commanders' higher priorities must be adequately defended. Second, all available weapons systems should be used to counter an air threat. Each position should have a designated individual responsible for coordinating air defense fires. When the decision is made to engage an aircraft, all weapons, including small arms, should engage it. Jonathan Bailey points this out.

> It was observed that, in fact, anything fired at an attacking aircraft had good effect. Not only can aircraft be shot down, but the pilot can be frightened into aborting his mission or using weapons prematurely. It was pointed out that even a Schermuly rocket flare fired from the ground into the path of a low-flying aircraft may be sufficient to deter a pilot flying at a speed who is already expecting a variety of deadly missiles to meet him.[80]

Any air defense system should be as mobile as the troops it is defending. Blowpipe proved too heavy on extended dismounted operations, and Rapier had problems each time it

moved. The light infantry division will experience similar problems with Stingers and Vulcans. Stinger weighs ten pounds less than Blowpipe, but at 39 pounds it is still heavy. Stinger gunners must be trained and conditioned for dismounted operations, and they should expect to perform them. However, each gunner will be able to carry only one round. Other soldiers will be required to carry additional Stingers if more rounds are required. Towed Vulcan is as mobile as its prime mover, the Gamma Goat. Many times it will not be able to move with foot mounted formations in close terrain. Vulcan and Stinger must make every effort to move with the troops they are supporting, and when this proves impossible, they must be positioned to provide air defense from overwatch positions.

Air Defense fires must be integrated, and, as much as possible, coordinated under one commander. Jonathan Bailey noted:

> The problem of air defense took on great immediacy for all arms and was a great preoccupation. The command and control of all arms-air defense, Rapier, Blowpipe, and small arms-proved essential. In the Bluff Cove/Fitzroy area on 8 June, small arms proved a great danger to other troops in neighboring positions. They actually prevented or hindered missile systems from being used. It was clear that centralized coordination was required to authorize air-raid warning categories and to direct fire. This task was given to commanding officer, 2nd Battalion, The Parachute Regiment, and subsequently to an air defense cell in brigade headquarters.[81]

Each position must have a designated individual responsible for coordinating the air defense of that position. When his unit is present, the air defense artillery unit commander will assume that responsibility. When a unit is relying on its

organic weapons or non-dedicated Stinger, one of its officers will have to be designated to control air defense fires.

Air defense artillery equipment requires a heavy commitment of logistical support. Not only will resupply of air defense missiles require significant transportation assets, but spare parts will prove critical as in the case of Rapier at San Carlos. The British were surprised at the amount of fuel required to run generators for Rapier.[82] The light infantry division is likely to discover the same problem with Vulcan which is powered by a 1.5 KW generator. Additionally, Vulcan consumes large amounts of ammunition. Resupply of Vulcan ammunition, which weighs one pound per round, could prove overwhelming in an active air threat environment. The light infantry division must plan for this potential logistics problem to insure that air defense systems are capable of firing when needed.

Training of air defenders is essential. The British feel that the fact that the Rapier crews had not fired their systems in over a year contributed to that system's poor performance during the early stages of the campaign. American Stinger gunners fire one round per Stinger section annually. That equates to one round per ten men a year, and often that round is a Redeye missile. Even though Stinger gunners receive intense training in the Moving Target Simulator, the lack of the experience of firing live rounds is bound to have

an adverse affect on the gunners in their first combat engagements.

The British demonstrated the value of offensive counterair operations. The raid on the Pebble Island airfield and the air attack on the Port Stanley airfield attrited the Argentines' close air support capability. The light infantry division must use every means available to reduce the enemy's ability to conduct air operations. Destroying aircraft on the ground, either by air or ground attack, eliminates aircraft as a threat. The best way to counter enemy air is to take it out before it threatens friendly forces.

SECTION V

COUNTERAIR OPERATIONS IN THE LIGHT INFANTRY DIVISION

The mission of the light infantry division's air defense artillery battalion is to to nullify or reduce the effectiveness of hostile aircraft after they are airborne[83] by providing "low-altitude air defense of high value assets and ground combat forces, in priority, as determined by the supported force commander."[84] This implies a mission that is reactive in nature. The light infantry division's air defense artillery battalion is required to perform this mission with fewer air defense artillery systems than in any other type of division. Traditionally this mission has been performed by air defense task organizations defending such high priority assets as tactical operations centers, ammunition supply points, and bridges, while Vulcan platoons and Stinger teams were often in support of maneuver elements.[85] To compensate for its austere air defense artillery force structure, the light infantry division will have to take a different approach.

Air defense in the light infantry division will have to assume the mantle of counterair operations to be successful. Counterair operations encompass all measures active and passive to reduce the enemy's ability to disrupt friendly operations with his air power. FM 100-5 defines AirLand battle as "using every available element of combat power" to

secure the "initiative as early as possible and" exercise "it aggressively."[86] This concept must be applied to counterair operations. The light infantry division can't wait for the enemy to come to it. When enemy air threatens, counterair operations take their place with deep, close, and rear operations, and must be fought as combined arms actions. The air defense artillery battalion forms the keystone upon which this operation rests, but it can only be a part of the structure.

Counterair operations in the light infantry division must be viewed as a combined arms operation. Passive and active air defense measures pertaining to division units must be considered and employed. Based on the presumed threat and lessons from the Falkland Islands War, a concept for counterair operations needs to be developed. The goal is to apply the tenets of airland battle to counterair operations to keep the enemy off balance to assure the light infantry division freedom to maneuver.

Passive Measures

FM 44-1 defines passive air defense as as follows:

> All measures other than active air defense taken to minimize the effects of hostile air action. These include but are not restricted to the use of cover, concealment, camouflage, dispersion, and protective construction.[87]

The value of protective construction was demonstrated by 40 Commando's success in surviving direct hits from parachute bombs with minimum casualties. Passive air defense can provide an integral part of the light infantry division's counterair

posture by not providing targets to the enemy, and confusing the enemy on actual dispositions. The use of decoys, dummy positions, deception, cover and concealment will disrupt the enemy pilot's decision cycle causing him to fail in his mission.

The Finns used deception in the Russo-Finnish War, 1939-1940, to reduce the effects of Soviet air power. Strips of cellophane were spread over frozen lake beds to make them appear as if they had not frozen. This fooled Soviet reconnaissance aircraft, which reported the situation, causing ground force to maneuver through other terrain more favorable to the Finnish battle plans.[88] Positions on the ground look different from the air, and it may be worth the effort to mislead a pilot flying at high speed as part of an overall deception effort.

Dummy positions and decoys can be effective in drawing an air attack away from friendly positions. During the Philippines Defense Campaign in World War II, Battery G, 60th Coast Artillery moved into temporary positions while permanent positions were being prepared. Upon occupation of the permanent positions, the battery built dummy anti-aircraft guns and bunkers in the temporary positions. The Japanese continually attacked the dummy positions while the battery operated from their new site a short distance away.[89]

Cover and concealment provides an excellent counter to enemy air. What the enemy can't find, he can't harm. In

Korea in October-November 1950, Chinese Communist forces moved south despite US air superiority. Using low ground, and by hiding in woods and villages, the Chinese were able to avoid detection by aerial reconnaissance.[90] Moving at night has similar effects.

The light infantry division will have to use passive air defense measures to alleviate its shortfall of active air defense assets. In the defense, deception, decoys, dummy positions, and protective construction will prove most beneficial. In the attack, the division should attempt to take advantage of darkness or inclement weather, since these conditions give a great advantage to the attacker.[91] In all cases a passive air defense plan should be a part of counterair operations at all echelons of command.

Active Measures

The air threat against the light infantry division is primarily helicopters and close air support fixed-wind aircraft flying at low-levels. Since the division has no weapon system capable of countering high to medium altitude threat aircraft, corps air defense artillery units or air force fighter aircraft will have to deal with that threat. The division's active counterair operations will be directed primarily against low level threat aircraft.

Counterair operations must follow the tenets of AirLand battle to gain freedom from enemy air. All elements of the division play a part in the counterair effort, and their

actions must be synchronized to insure unity of effort. The counterair battle must have the agility to respond to different threats, and to take the offensive. There must be depth to the counterair effort. If enemy aircraft defeat one element, another must be able to pick up the battle. Initiative and aggressive actions across the division will be necessary to defeat the enemy air threat. The following is a possible counterair structure.

The foundation for the division's active counterair operation is active air defense conducted by all divisional units in the rear and the front. Each position must have an air defense plan to incorporate the use of small arms for air defense just as in a ground defense plan. The key to active air defense is fires at unit level. Each position must designate an air defense commander who makes the decision to engage and coordinates that position's fires[92]

Non-dedicated Stinger teams in the military police company, field artillery batteries, division headquarters and headquarters company, brigade headquarters and headquarters companies, and mortar platoons[93] must be integrated into the active defense plan and controlled in the same way as small arms fire. The signal to fire will not always be the identification of enemy aircraft. The security of the position must also be considered. Once Stinger is fired, its position

is revealed. Therefore, the fires of non-dedicated Stinger must be controlled to avoid premature engagements.

The air defense artillery battalion must assume a more aggressive role in counterair operations than it has in the past. It must transition from static defenses to more offensive deployments. Captain Terry Reed states:

> The objective is to seize the initiative to destroy enemy aircraft en route to their ordnance release points and to deny them low-altitude approaches and stand-off firing positions..[94]

The Falkland Islands War showed that massing fires is the key to successful air defense. The fire units of the air defense artillery battalion must be employed to allow sufficient mass to defeat enemy aircraft. Task organizations of guns and Stinger should be deployed to provide mix. This can be done at the platoon level with a Stinger section attached to a Vulcan platoon. The gun/Stinger platoon will be employed in depth by positioning the Stinger teams to engage enemy aircraft as early as possible. The Vulcans will be positioned closer to the defended asset to engage any aircraft that has evaded Stinger fires, and to drive the aircraft back into the Stinger engagement envelope.[95]

In the defense, kill zones should be established along enemy avenues of approach. In mid- to high-intensity conflict, the light infantry division is designed to control close terrain, freeing mechanized forces for battle elsewhere.[96] The close terrain will tend to canalize low-level avenues of approach. These avenues should be identified

and weighted for air defense coverage. When possible, weapons free zones[97] should be established along these avenues to allow air defense artillery gunners the least restrictive engagement requirements.[98]

In the offensive, air defense artillery units must be as far forward as possible to provide air defense to the maneuver forces. Towed Vulcan's limited mobility will preclude it from performing many front line missions such as defense of foot mounted operations in restricted terrain, but Stinger must be prepared to move with the infantry, even when this involves dismounted operations. Dismounted operations pose a particular problem for Stinger because of the weight of the weapon system. Although Stinger weighs less than the Blowpipe carried by the British in the Falkland Islands, its 39 pounds are significant. Stinger gunners must be trained and conditioned for dismounted operations in the light infantry division.

While the air defense battalion can be positioned and task organized for a more offensive air defense, it can not cover the entire division sector with air defense fires. The division requires some type of rapid response force that can react to enemy air penetrations. Integration of artillery fires and aviation in an air-to-air role could provide the counterthrust needed to defeat enemy helicopters. FM 1-107 recognizes the potential for helicopters to perform an anti-

helicopter mission.[89] This capability should be exploited and integrated into the division's counterair operation.

Field artillery fires also can be integrated into the division's counterair effort, although response times and ammunition availability may restrict this mission. Kill zones along known avenues of approach could be pre-registered for artillery fires. As enemy aircraft move along the avenue of approach, artillery fires could be triggered as the aircraft cross key reference points.

Conclusion

Although the light infantry division has an austere air defense artillery force structure, aggressive application of the division's combined arms assets may be able to provide for an adequate air defense posture. Air defense must be replaced by counterair operations in which the air defense artillery battalion plays a key part. By innovative tactics across the combined arms spectrum the light division can do much to counter the enemy air threat.

ENDNOTES

[1] Field Circular (FC) 100-1, The Army of Excellence (Fort Leavenworth, KS: US Army Combined Arms Combat Developments Activity, Force Design Directorate, 1984), p. 1-3. The US Army was seen as hollow because many units were manned at reduced Authorized Levels of Organization (ALO) and were assigned missions in multiple theaters. Once a unit was committed to a mission, it would not be available for planned missions in other theaters. The US Army was seen as inflexible since it consisted of units that were large and powerful on the battlefield, but were not rapidly deployable.

[2] Ibid., p. 1-3.

[3] Sam Damon and Ben Krisler, "'Army of Excellence'? A Time to Take Stock," Armed Forces Journal International, May 1985, p. 87.

[4] John A. Wickham Jr., "Today's Army: Landpower in Transition," Army, October 1984, p.31.

[5] FC 100-1, p. 2-19.

[6] Ibid., p. 2-3.

[7] Frank D. Craig, "Force Structure Reflects Strategic Realities," Air Defense Artillery, Summer 1984, p. 33.

[8] Field Circular (FC) 71-101, Light Infantry Division Operations (Fort Leavenworth, KS: US Army Command and General Staff College, 31 July 1984), p. A-10.

[9] FC 100-1, p. 2-3.

[10] Field Manual (FM) 100-20, Low Intensity Conflict (Washington D.C.: Headquarters, Department of the Army, January 1984), p. 14.

[11] Damon and Krisler, p. 87.

[12] Anthony H. Cordesman, "The Falkland Cirsis: Emerging Lessons for Power Projection and Force Planning," Armed Forces Journal, September 1982, p. 32.

[13] "Intelligence," Air Defense Artillery, Summer 1985, p. 54.

[14]Soviet Military Power: 1985 (Washington D.C.: US Government Printing Office, April 1985), p. 123.

[15]Ibid., pp. 125-126.

[16]David M. North, "Budget, Politics Hamper Reequipment," Aviation Week & Space Review, 25 July 1983, pp. 34-36.

[17]"Intelligence," Air Defense Artillery, Summer 1983, p. 55.

[18]"Intelligence," Air Defense Artillery, Summer 1984, p. 57.

[19]"Intelligence," Air Defense Artillery, Fall 1984, p. 57.

[20]"Intelligence," Summer 1984, p. 59.

[21]Soviet Military Power, pp. 120-121.

[22]Cordesman, p. 34.

[23]Donald R. Kirk, Division Air Defense for the Deep Battle Component of the Airland Battle Doctrine (Fort Leavenworth, KS: School of Advanced Military Studies Master of Military Arts and Science Thesis, 1984), p. 12.

[24]Soviet Military Power, pp. 80-82.

[25]Kirk, p. 39.

[26]Field Manual (FM) 44-1, US Army Air Defense Artillery Employment (Washington D.C.: Headquarters, Department of the Army, 9 May 1983), p. 2-10.

[27]Greg Palier, "The Transformation of Soviet Frontal Aviation," Air Defense Artillery, Winter 1984, p. 41.

[28]Rudolf Walter, "Air Defense on the Battlefield," NATO's Fifteen Nations, October-November 1982, p. 108.

[29]FC 100-1, p. 2-3.

[30]FC 71-101, p. 4-34.

[31]Ibid., p. 4-35.

[32] Field Manual (FM) 44-3, Air Defense Artillery Employment Chaparral/Vulcan/Stinger (Washington D.C.: Headquarters, Department of the Army, 15 June 1984), p. 6-3.

[33] Ibid.

[34] Ibid., p. 6-4.

[35] Ibid.

[36] Sir Jeremy Moore and Sir John Woodward, "The Falklands Experience," Journal of the Royal United Services Institute for Defence Studies, October 1982, p. 27.

[37] Max Hastings and Simon Jennings, The Battle for the Falklands (New York, London: W. W. Norton & Company, 1983), p. 72-74.

[38] London Sunday Times, War in the Falklands: The Full Story (New York: Harper & Row, 1982), pp. 112-114.

[39] Hastings and Jennings, p. 95.

[40] Ibid., p. 116.

[41] Ibid., pp. 126-134.

[42] Ibid., pp. 143-163.

[43] Ibid., p. 176.

[44] Ibid., p. 184.

[45] Donald R. Faint, The Falkland War: A Search for Military Significance (Maxwell AFB, AL: Air Command and Staff College, 29 June 1984), p. 10.

[46] Ibid., pp. 12-14.

[47] Hastings and Jennings, pp. 267-274.

[48] Faint, pp. 14-20.

[49] William Fowler, Battle for the Falklands (1) Land Forces (London: Osprey Publishing Ltd., 1982), p. 8.

[50] Hastings and Jennings, pp. 143-144.

[51] R. Reginald and Dr. Jeffrey M Elliot, Tempest in a Teapot: The Falkland Island War (San Bernardino, CA: Borgo Press, 1983), p. 77.

[52] Fowler, p. 35.

[53]Ronald T. Pretty, ed., Jane's Weapons Systems 1983-1984, 14th ed., (New York: Jane's Publishing Inc., 1983), pp. 102-104. The Rapier launcher is towed by a one ton Land Rover, which also carries the optical tracker and four missiles. Normally, a second Land Rover tows a resupply trailer with nine missiles. The complete Rapier system can be sling loaded by medium lift helicopter such as Sea King.

[54]Fowler, p. 35.

[55]James A. Haggert, The Falkland Islands Conflict, 1982: Air Defense of the Fleet (Quantico, VA: Marine Corps Command and Staff College, 2 April 1984), p. 72.

[56]Fowler, p. 35.

[57]Hastings and Jennings, p. 203.

[58]Faint, p. 22.

[59]Hastings and Jennings, p. 211.

[60]Faint, p. 29.

[61]Ibid., p. 22.

[62]Hastings and Jennings, p. 211.

[63]Ibid., p. 181.

[64]Fowler, p. 20.

[65]Ibid.

[66]Patrick Bishop and John Witherow, The Winter War, The Falklands (London, New York: Quartet Books, 1982), p. 75.

[67]Hastings and Jennings, p. 203.

[68]Ibid., p. 205.

[69]Ibid., p. 191.

[70]John T. Correll, "Air Defense from the Ground Up," Air Force Magazine, July 1983, p. 40.

[71]Hastings and Jennings, p. 206.

[72]Ibid., p. 217.

[73] Ibid., p. 222.

[74] Ibid.

[75] Ibid., p. 221.

[76] John Frost, 2 PARA Falklands: The Battalion at War (London: Buchan & Enright, 1983), p. 90.

[77] Ibid.

[78] Faint, p. 23.

[79] Bruce George and Michael Coughlin, "British Defense Policy After the Falklands," Survival, September-October 1982, p. 205.

[80] Jonathan Bailey, "Training for War: The Falklands 1982," Military Review, August 1983, p. 65.

[81] Ibid., p. 64.

[82] Hastings and Jennings, p. 219.

[83] FM 44-1, p. 1-1.

[84] FM 44-3, p. 1-2.

[85] Terry M. Reed, "Operational Concept Stresses Offense," Air Defense Artillery, Summer 1984, p. 6.

[86] Field Manual 100-5, Operations (Draft) (Fort Leavenworth, KS: US Army Command and General Staff College, July 1985), p. 3-58.

[87] FM 44-1, p. 4-4.

[88] Charles A. Robinson, "Russo-Finnish War, 1939-1940," in Combined Arms Actions Since 1939, ed. L. L. Sims (Fort Leavenworth, KS: US Army Command and General Staff College, 1975), p. 1-6.

[89] Charles E. Kirlpatrick, "Echoes of a Distant Battle," Air Defense Artillery, Winter 1984, p. 5.

[90]Jonathan M. House, Toward Combined Arms Warfare: A Survey of 20th Century Tactics, Doctrine, and Organization (Fort Leavenworth, KS: US Army Command and General Staff College, August 1984), p. 150.

[91]FM 100-5, p. 7-42.

[92]Field Manual (FM) 44-8, Small Unit Defense Against Air Attack (Washington D. C.: US Army Adjutant General Publications Center, 30 December 1981), p. 3-4.

[93]FC 100-1, p. 2-3.

[94]Terry Reed, "MANPAD - Defnse of Maneuver Operations," Air Defense Artillery, Fall 1984, p. 61.

[95]Reed, "Operational Concept," p. 37.

[96]Steven L. Canby, Classic Light Infantry and New Technology (Potomac, MD: C & L Associates, 1981), p. ii.

[97]A Weapons Free Zone (WFZ) can be declared to maximize the effectiveness of air defense artillery fires. The WFZ is a clearly identified area in which the Weapons Control Status (WCS) of Weapons Free has been declared. Weapons Free allows gunners to engage any target not positively identified as a friend, facilitating the engagement decision. Friendly aircraft are alerted to avoid WFZs. The division can request a WFZ in its area, but only the Area Air Defense Commander, who is usually the Air Force component commander, can activate a WFZ.

[98]Reed, "Operational Concept," p. 36.

[99]Field Manual (FM) 1-107, Air-to-Air Combat (Washington D. C.: Headquarters, Department of the Army, 12 October 1984), p. 3.

BIBLIOGRAPHY

Books

Bishop, Patrick, and John Witherow. The Winter War: The Falklands. London: Quartet Books, 1982.

Braybrook, Roy. Battle for the Falklands (3) Air Forces. London: Osprey Publishing Ltd., 1983.

Ethell, Jeffrey, and Alfred Price. Air War South Atlantic. New York: Macmillan Publishing Company, 1983.

Fowler, William. Battle for the Falklands (1) Land Forces. London: Osprey Publishing Ltd., 1982.

Fox, Robert. Eyewitness Falklands: A Personal Account of the Falklands Campaign. London: Methuen, 1982.

Frost, John, 2 Para Falklands: The Battalion at War. London: Buchan & Enright Publishers, 1983.

Hastings, Max, and Simon Jenkins. The Battle for the Falklands. New York, London: W. W. Norton & Company, 1983.

London Sunday Times, War in the Falklands: The Full Story. New York: Harper & Row, 1982.

MacDonald, Brian, ed. War in the Eighties: Men Against High Tech. Toronto: Canadian Institute of Strategic Studies, 1983.

Pretty, Ronald T., ed. Janes Weapons Systems 1983-84. 14th ed. New York: Janes Publishing Inc., 1983.

Reginald, R., and Dr. Jeffrey M. Elliot. Tempest in a Teapot: The Falkland Island War. San Bernardino, California: Borgo Press, 1983.

Articles and Periodicals

"Aircraft Builder Moves Toward Combat Jets." Aviation Week & Space Review, 25 July 1983, pp. 35-36.

"Assault on the Falklands." MacCleans, 31 May 1982, pp. 22-28.

Bailey, Jonathan. "Training for War: The Falklands 1982." Military Review, August 1983, pp. 58-70.

Besch, Edwin W. "Are Out Light Divisions Too Light?" Army, February 1985, pp. 42-48.

Bingham, Price T. "Defense Forum: DIVAD on Target." Armed Forces Journal, October 1985, p. 12.

Bremridge, Michael F. "Counterair or Air Defense." Air Defense Artillery, Fall 1983, pp. 60-61.

Canby, Steven L. "Light Infantry in Perspective." Infantry, July-August 1984, pp. 28-31.

Case, Blair. "Air Defense for the Airland Battle: Coming of Age in the "High Tech" Force." Army, November 1983, pp. 34-48.

----------. "Potshots from the Anti-Aircraft War." Air Defense Artillery, Winter 1985, pp. 16-19

Casmus, David M. and James L. Collins. "Air Defense in Grenada." Air Defense Artillery, Summer 1984, pp. 13-15.

Clements, John. "Air Defence Mythology." Journal of the Royal United Services Institute for Defence Studies, September 1982, pp. 27-32.

Cordesman, Anthony H. "The Falkland Crisis: Emerging Lessons for Power Projection and Force Planning." Armed Forces Journal, September 1982, pp. 29-46.

Correll, John T. "Air Defense from the Ground Up." Air Force Magazine, July 1983, pp. 37-43.

Craig, Frank D. "Air Defense Reflects Strategic Realities." Air Defense Artillery, Summer 1984, pp. 32-35.

Damon, Norman L. and Ben Krisler. " 'Army of Excellence'? A Time to Take Stock." Armed Forces Journal International, May 1985, pp. 86-93.

Dodd, Norman L. "Air Defense of the Field Army." Asian Defense Journal, October 1983, pp. 84-92.

English, John A. "Thinking About Light Infantry." Infantry, November-December 1984, pp. 19-25.

"The Falklands Conflict, Part 2: Missile Operations." International Defense Review 15, September 1982, pp. 1151-1154.

Futernick, Allan J. "The Air Defense of COLORADO." Air Defense Artillery, Spring 1983, pp. 5-7.

George, Bruce and Michael Coughlin. "British Defence Policy After the Falklands." Survival, September-October 1982, pp. 201-210.

Gueritz, E. F. "The Falklands: Joint Warfare Justified." Journal of the Royal United Services Institute for Defence Studies, September 1982, pp. 46-55.

Guertner, Gary L. "The 74-Day War: New Technology and Old Tactics." Military Review, November 1982, pp. 65-72.

Huddleston, Louis D. "Light Infantry Division: Azimuth Check." Military Review, September 1985, pp. 14-21.

"Infantry Division (Light)." Infantry, March-April 1984, pp. 14-16.

"Intelligence." Air Defense Artillery, Fall 1984, pp. 56-58.

"Intelligence." Air Defense Artillery, Spring 1984, pp. 58-60.

"Intelligence." Air Defense Artillery, Summer 1983, pp. 54-51.

"Intelligence." Air Defense Artillery, Summer 1984, pp. 57-58.

"Intelligence." Air Defense Artillery, Summer 1985, pp. 54-55.

Jones, R. V. "The Falklands: An Unplanned Contingency in Air Defense." Journal of Electronic Defense, June 1983, pp. 60-68.

Keiser, Thomas J. "Anti-Aircraft Artillery at Remagen: An Obstinate Lot." Air Defense Artillery, Fall 1984, pp. 44-47.

Kirkpatrick, Charles E. "Echoes of a Distant Battle." Air Defense Artillery, Winter 1984, pp. 4-6.

Lake, Julian S. "The South Atlantic War: A Review of the Lessons Learned." Defense Electronics, November 1983, pp. 82-102.

Landry, Al. "Habitual Association: Redefining the Concept of Air Defense Artillery." Air Defense Artillery, July-September 1982, pp. 8-10.

Lewis, Brenda R. "The Falklands War--A Recap." Army, September 1982, pp. 22-29.

Maloney, James P. "Intercept Point." Air Defense Artillery, Summer 1985, p. 2.

McMichael, Scott R. "Proverbs of the Light Infantry." Military Review, September 1985, pp. 23-28.

Moore, Brian W. "The Falklands War: The Air Defense Role." Air Defense Artillery, Winter 1983, pp. 17-21.

Moore, Major General Sir Jeremy, and Rear Admiral John Woodward. "The Falklands Experience." Journal of the Royal United Services Institute for Defence Studies, October 1982, pp. 25-32.

Muller, Felix. "Air Defense vs Airpower in the Falklands." Armada International, January-February 1983, pp. 82-84.

"Newsweek Special Report: The War Is On." Newsweek, 10 May 1982, pp. 28-37.

North, Daniel M. "Budget, Politics Hamper Reequipment." Aviation Week & Space Review, 25 July 1983, pp. 34-35.

Nott, John. "The Falklands Campaign." United States Naval Institute Proceedings, May 1983, pp. 118-139.

Oblinger, John B. "Intercept Point." Air Defense Artillery, January-March 1982, pp. 2-3.

Olson, William J. "The Light Force Initiative." Military Review, June 1985, pp. 3-17.

Parlier, Greg. "The Transformation of Soviet Frontal Aviation." Air Defense Artillery, Winter 1984, pp. 38-42.

Philippi, de Corbeta Alberto Jorge. "The Odyssey of a Skyhawk Pilot." United States Naval Institute Procedings, May 1983, pp. 111-118.

Reed, Terry. "MANPAD-Defense of Maneuver Operations." Air Defense Artillery, Fall 1984, p. 61.

----------. "Operational Concept Stresses Offense." Air Defense Artillery, Summer 1984, pp. 36-40.

Summers, Harry G. "Yomping to Port Stanley." Military Review, March 1984, pp. 2-16.

Walter, Rudolf. "Air Defense on the Battlefield." NATO's Fifteen Nations, October-November 1982, p. 108.

Watts, Alan W. "Leading a Platoon on the Integrated Battlefield." Armor, November-December 1983, pp. 26-31.

Wickham, John A. Jr. "Today's Army: Landpower in Transition." Army, October 1984, pp. 21-33.

Wood, Derek and Mark Hewish. "The Falklands Conflict, Part 1: The Air War." International Defense Review 15, August 1982, pp. 977-980.

Young, P. Lewis. "The Falkland Islands Dispute: The Military Lessons." Asian Defense Journal, August 1982, pp. 30-42.

Documents

Canby, Steven L. Classic Light Infantry and New Technology, Potomac, Maryland: C&L Associates, 1981.

Faint, Donald R. The Falkland War: A Search for Military Significance, Maxwell Air Force Base, Alabama: Air Command and Staff College, 29 June 1983.

Field Circular 71-101, Light Infantry Division Operations, Fort Leavenworth, Kansas: United States Army Command and General Staff College, 31 July 1984.

Field Circular 100-1, The Army of Excellence, Fort Leavenworth, Kansas: United States Army Combined Arms Combat Development Activity, Force Design Directorate, 1 September 1984.

Field Manual 1-107, Air-to-Air Combat, Washington D. C.: Headquarters, Department of the Army, 12 October 1984.

Field Manual 44-1, US Army Air Defense Artillery Employment, Washington D. C.: Headquarters, Department of the Army, 9 May 1983.

Field Manual 44-3, Air Defense Artillery Employment Chaparral/Vulcan/STINGER, Washington D. C.: Headquarters, Department of the Army, 15 June 1984.

Field Manual 44-8, Small Unit Defense Against Air Attack, Washington D. C.: United States Army Adjutant General Publications Center, 30 December 1981.

Field Manual 44-18, Air Defense Artillery Employment STINGER, Washington D. C.: Headquarters, Department of the Army, 30 September 1981.

Field Manual 44-18-1, STINGER Team Operartions, Washington D. C.: Headquarters, Department of the Army, 31 December 1984.

Field Manual 100-5, Operations (Draft), Fort Leavenworth, Kansas: United States Army Command and General Staff College, July 1985.

Field Manual 100-20, Low Intensity Conflict, Washington D. C.: Headquarters, Department of the Army, January 1981.

Great Britain, Secretary of State for Defence. The Falklands Campaign: The Lessons, London: Her Majesty's Stationery Office, December 1982.

Haggert, James A. The Falkland Islands Conflict, 1982: Air Defense of the Fleet. Quantico, Virginia: Marine Corps Command and General Staff College, 2 April 1984.

Hardin, Steven L. 1986 Army Division Air Defense--Not an Attrition Weapon System, Maxwell Air Force Base, Alabama: Air Command and Staff College Student Research Report, May 1981.

Hines, Kerry and John Hines. Soviet Front Fire Support, Washington D.C.: Defense Intelligence Agency, 15 December 1981.

Hood, Carlton L. Determining the Optimum Aviation Organization for the Operational Level of War, Fort Leavenworth, Kansas: United States Army Command and General Staff College, 1984.

House, Jonathan M. Toward Combined Arms Warfare: A Survey of 20th-Century Tactics, Doctrine, and Organizatio, Fort Leavenworth, Kansas: United States Army Command and General Staff College, August 1984.

Kirk. Donald R. Division Air Defense for the Deep Battle Component of the Airland Battle Doctrine, Fort Leavenworth, Kansas: School of Advanced Military Studies Master of Military Arts and Science Thesis, 1984.

Maressa, Frank Michael & Joseph Thomas Rozman. An Investigation of a Light Division Air Defense System in the Infantry Division, Monterey, California: Naval Postgraduate School, 1982.

Semmens, E. Paul. A Crisis in Chaparral/Vulcan Employment Doctrine, Fort Leavenworth, Kansas: United States Army Command and General Staff College Student Study Project, May 1981.

Soviet Military Power: 1985, Washington D.C.: US Government Printing Office, April 1985.

Sims, L. L. Combined Actions Since 1939, Fort Leavenworth, Kansas: United States Army Command and General Staff College, 1975.

Wetzel, Major General Robert L. and Brigadier General Howard C. Whittaker. MAA Symposium Mission Area Analysis, Fort Monroe, Virginia: United States Army Training and Doctrine Command, May 1983.

Zimmerman, Johan. Air Defense for the Infantry, Redwood City, California: Leo Kanner Associates, 19 April 1979.

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