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RESEARCH REPORT

HOW TO EMPLOY AIRPOWER ON THE BATTLEFIELD

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REPUBLIC OF SINGAPORE AIR FORCE

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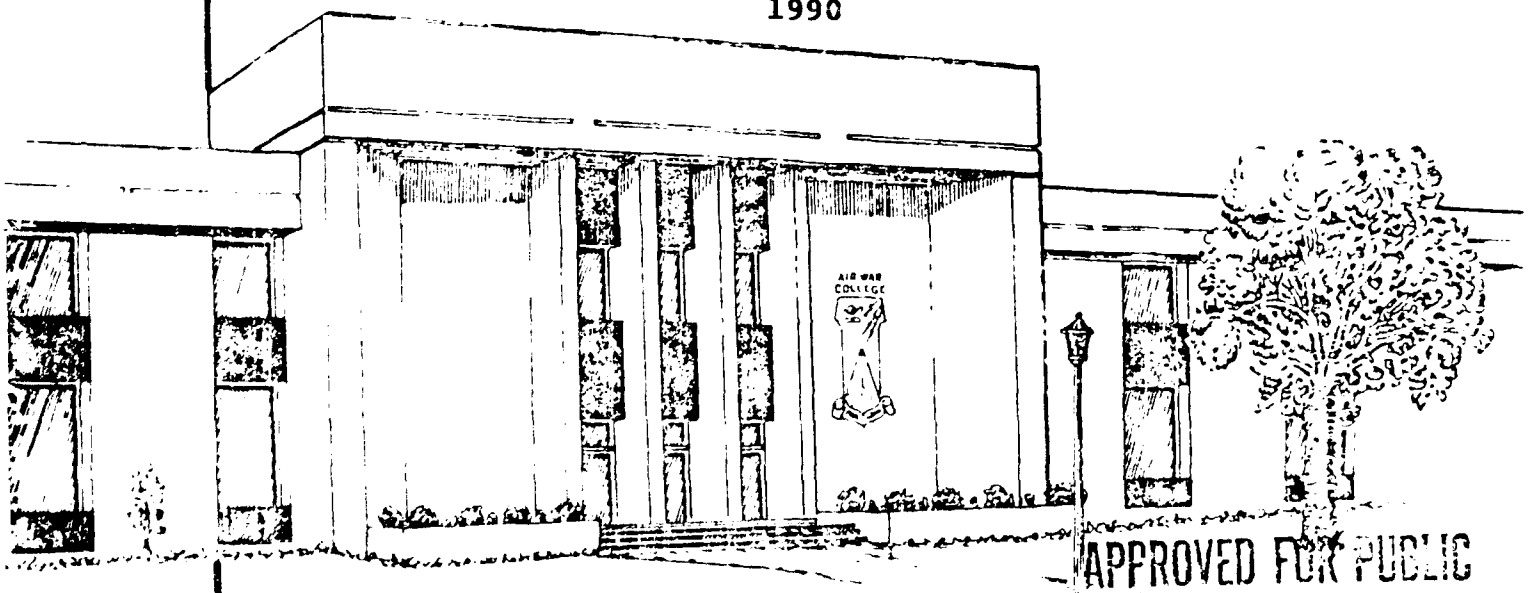

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UNITED STATES AIR FORCE
MAXWELL AIR FORCE BASE, ALABAMA

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HOW TO EMPLOY AIRPOWER ON THE BATTLEFIELD

by

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Republic of Singapore Air Force

A DEFENSE ANALYTICAL STUDY SUBMITTED TO THE FACULTY

IN

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Advisor: Colonel George P. Gaines, IV

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EXECUTIVE SUMMARY

The Republic of Singapore Air Force (RSAF) must know how best to employ airpower in support of the land battle in any future conflict. Several historical examples demonstrate the efficacy of battlefield air interdiction (BAI) over close air support (CAS). Difficulties inherent in CAS are severely aggravated by the presence of sophisticated air defense weapon systems in the modern battlefield. The USAF is already moving away from dedicated CAS aircraft in favor of the more capable multi-role A-16 to meet the challenges of the future battlefield. Also, the nature of the terrain in the RSAF's operational environment complicates the conduct of CAS missions, while offering excellent opportunities for pursuing BAI campaigns. Furthermore, employing airpower in the BAI role comes out superior to CAS when analyzed from the perspective of the principles of war.

RSAF doctrine should make battlefield air interdiction the main role of tactical airpower in supporting the land battle, since it enables the most effective employment of airpower. Close air support should be relegated to an emergency role, because of the inherent difficulty of attacking enemy targets in close contact with friendly forces, particularly in a high air defense threat environment.

BIOGRAPHICAL SKETCH

Lt. Col. Allan F. Chua is a fighter pilot and a qualified flying instructor in the Republic of Singapore Air Force (RSAF). He completed his last command appointment as Commanding Officer of the RSAF Flying Training School in 1985. Before attending the Air War College class of 1990, he held the appointment of Deputy Head of Air Operations in HQ RSAF, where he dealt with operations planning and doctrine development. Having been involved in many army exercises in the capacity of Air Liaison Officer, Lt. Col. Chua finds challenge in addressing the role of tactical airpower in supporting the land battle.

CHAPTER I

INTRODUCTION

Overview

Doctrinally, gaining air superiority is the well recognized first priority mission of the air force. With air superiority, tactical air forces can play a decisive role in the conduct of the ground battle. But how best to employ tactical airpower in support of the ground battle remains a controversy and raises important questions. How should commanders apportion fighters between close air support (CAS) and battlefield air interdiction (BAI)? Which is the more effective way to employ airpower in the modern battlefield? Should CAS be provided only in urgent situations and after suppressing the air defense threat? These issues present critical doctrinal challenges for any modern air force.

Definitions

The definitions of specific air force missions in the Republic of Singapore Air Force (RSAF) are similar to those found in U.S. manuals. According to the U.S. Joint Chiefs of Staff's definition,

> Close air support (is) air action against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces.[1]

Close air support missions are generally conducted against enemy targets between the forward edge of the battle area (FEBA) and the fire support coordination line (FSCL). These boundaries are established to facilitate planning and co-ordination for the safety of own forces. Ground attack missions flown against enemy targets beyond the FSCL are called battlefield air interdiction (BAI). According to U.S. Army Manual FM 100-5, Operations,

> Air interdiction attacks against targets which have a near term effect on the operations or scheme of maneuver of friendly forces, but are not in close proximity to friendly forces, are referred to as battlefield air interdiction (BAI). The primary difference between BAI and the rest of the interdiction effort is the near term effect and influence produced against the enemy in support of the land component commander's scheme of maneuver.[2]

Successful BAI operations delay, disrupt, divert or destroy an enemy's military potential before it can be brought to bear on friendly forces.

Purpose of this Study

The purpose of this study is to analyze and assess the CAS and BAI roles in the modern battlefield and to recommend a doctrine for the effective employment of tactical airpower in the RSAF.

Country Background

Singapore is a small island nation-state situated at the southern tip of the Malaysian Peninsula. Following her

[1] U.S. Department of Defense, Joint Chiefs of Staff, Dictionary of Military and Associated Terms (Washington, D.C., 1 June 1987), p. 70.

[2] U.S. Army Manual FM 100-5, Operations (Washington, D.C., 5 May 1986), pp. 48-49.

independence in 1965, Singapore built up her national defense capability. Today the SAF consists of a three-division Army complete with support arms, an independent Air Force and a Navy. The defense of Malaysia and Singapore are secured under the Five-Power Defense Agreement (FPDA) involving the United Kingdom, Australia, New Zealand, Malaysia and Singapore.[3] While nowhere near a NATO-type alliance, the FPDA provides the framework for defense measures to be considered by the five nations in the event of an external threat to the security of Malaysia and Singapore. Defense co-operation activities have been steadily increasing, signifying member countries' commitment to the arrangement. A major air defence exercise, "Lima Bersatu," ("Five Together") was held over Malaysia in September 1988, and recently, a command-post army exercise, "Lion Spirit 89," was held in Singapore. Another army exercise will be held in Malaysia sometime this year.[4]

Possible Scenario

As a nation, Singapore has no war experience. Predicting how a future war will be fought therefore presents some difficulty. However the Japanese invasion of Malaysia and Singapore in World War II provides some useful insights.[5] The

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[3] Dick Wilson, The Future Role of Singapore (New York: Oxford University Press, 1972), p. 113.

[4] Gerard Le Blond, "Exercise Lion Spirit 89 - Commitment and Co-operation," Pioneer, News Magazine of the Singapore Armed Forces (Dec 1989): pp. 12-17.

[5] Stanley L. Falk, Seventy Days to Singapore (New York: Putnam, 1975), p.30.

Japanese landed three divisions in the Isthmus of Kra (southern Thailand) and northern Peninsular Malaysia, advanced rapidly southward along the main north-south lines of communication, and finally captured Singapore, all within a period of 70 days. Similarly, the scenario in this paper assumes the threat to Peninsular Malaysia and Singapore to be REDLAND, a fictitious country situated somewhere to the north of the region, whose armed forces have a Soviet-type force structure, weapon systems, and fighting doctrine.[6] Within the framework of the FPDA, the SAF could be involved in military operations against such an aggressor.[7]

SAF Doctrine

The fighting doctrine of the Singapore Armed Forces is generally adapted from the more modern Western armed forces. For this reason, doctrinal developments such as the U.S. Army's Airland Battle are of specific interest to the SAF for perspectives on how future battles might be fought.

The CAS Issue

In support of the U.S. Army's AirLand Battle doctrine, the USAF intends to replace the dedicated close air support A-10 with the multi-role A-16, an enhanced ground attack variant of the F-16. The issues regarding CAS currently debated in the U.S. are relevant to the SAF because they

[6] The scenario assumes a threat axis from the north since the topic deals with the air-land battle.

[7] For the sake of simplicity, discussion in this study is limited to SAF doctrine only, although the basic principles considered may also apply to the FPDA in general.

provide insight to the best way to employ airpower in the modern battlefield.

RSAF Mission

The mission of the RSAF in war, after ensuring the air defense of Singapore Island and air superiority over the SAF's area of operation, is to provide air support to the Army and Navy. The RSAF's force consists of multi-role combat aircraft. To support the Army, the RSAF will employ strike aircraft in both the CAS and BAI roles. However, the 1973 Yom Kippur War has demonstrated the high cost of conducting CAS missions in a high air defense threat environment.

The RSAF has only five operational fighter squadrons: two F5 and three A4. These five Squadrons will perform all tactical air force missions. The F5 squadrons will most likely be committed to counter-air missions, leaving the three A4 squadrons to perform the ground attack missions. With such a small fleet, every fighter must be considered an extremely precious resource; the RSAF cannot afford the kind of high attrition suffered by the Israeli Air Force in the Yom Kippur War.

CHAPTER II

HISTORICAL PERSPECTIVE

History presents many examples of airpower's role in past wars. In this chapter, we will examine the CAS and BAI roles in past campaigns to gain some useful insights into the employment of airpower from a historical perspective.

World War I

During World War I, air forces were completely under the control of ground commanders. Close air support began in October 1918 when fighter aircraft played an important role during the Meuse-Argonne Offensive in keeping the Germans continually off balance by bombing and strafing enemy troop concentrations in the battle zone. Towards the end of the war, in recognition of the importance of airpower, a number of ground attack squadrons were planned to enter service. However, only a few made it because of changes in priority in the subsequent years.

In the interwar period, the importance of the close air support mission began to diminish. Airpower enthusiasts such as Douhet, Trenchard and Mitchell argued that strategic bombardment would prove the decisive factor in future wars. Also, the close air support mission would have meant continued subordination to the ground army at a time when the Air Corps was fighting for independence with the doctrine of strategic bombardment.[1]

World War II

During World War II, the close air support mission continued to be accorded low priority. The new air doctrine, crystallized in the publication of FM 100-20 in mid 1943, boldly exhorted three fundamental beliefs: first, land and airpower are co-equal and interdependent forces; second, gaining air superiority is the first requirement for the success of any major land operation; and third, control of airpower must be centralized because the inherent flexibility of airpower enables its whole weight to be employed against selected targets in turn. With regard to the CAS mission, the document further stated,

> "Massed air action on the immediate front will pave the way for an advance. However in the zone of contact, missions against hostile units are most difficult to control, are most expensive, and are in general, least effective..... Only at critical times are contact zone missions profitable."

Even though close air support was accorded lowest priority, in operational practice Army Air Force units in the European, Mediterranean and Pacific theatres flew thousands of CAS missions. Most notable were those supporting the breakout battle in Normandy during Operation *Overlord* in June/July 1944, e.g. the bombing of Cassino, Cherbourg and St. Lo. These massive air efforts however, had dubious effects on enemy resistance, and inflicted considerable casualities on own forces as a result of battlefield confusion. On the other

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[1] Jeffrey G. Barlow, "Close Air Support and The Soviet Threat," Backgrounder, 11 Aug 82, pp. 2-4.

hand, XIX Tactial Air Command's protection of the Third Army's right flank was extremely successful, leading to the formation of air groups working directly with armoured divisions.[2]

As for air interdiction, the air forces also learnt important doctrinal lessons. In the air interdiction campaign called Operation *Strangle*, the Allies hoped to force the German armies to withdraw from Italy by severing their lines of communication, thus denying them essential supplies. The air interdiction campaign proved ineffective until combined with major ground manuevers. The German defenders had to displace their forces frequently to counter the allied ground offensive, which subsequently exposed them to air attacks. Air interdiction was therefore most effective during battles of movement when mobility was critical to an enemy forced to displace forces frequently, consuming large quantities of supplies.

The pattern of mobility denial was repeated with great success during Operation *Overlord* in Normandy. Destruction of the railway system west of Paris and the bridges across the Seine delayed the movement of German reserves to Normandy. The crack Panzer-Lehr Division, located 150 kilometers from the Allied landings, was forced to be committed to battle piecemeal, and failed to counter the Allied ground initiatives. Heavy air attack against German supplies of fuel

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[2] James A. Huston, "Tactical Use of Air Power in World War II: The Army Experience," Military Affairs 14 (Winter 1950): pp. 175-177.

and ammunition also foiled the enemy counter-offensive in the Ardennes.[3]

Korean War

The North Korean invasion strategy counted on rapid movement led by armoured forces to win quickly before external intervention. Air interdiction, however, impeded their advance and bought the time desperately needed for consolidation of the Pusan defence. The North Koreans were unable to break through the U.N. defenses because air interdiction denied them tactical mobility. Conversely, the Inchon landing forced the North Koreans into a rapid withdrawal which made them vulnerable to air interdiction.

Air interdiction caused the collapse of the North Korean fighting capability and greatly assisted the Pusan breakout. Operation *Strangle*, however, like its namesake in Italy during World War II, failed to achieve substantive results for many similar reasons. By this time the war had become static and air interdiction had only limited effects when not combined with any ground offensive. The surprise infiltration of Chinese troops into Korea nearly led to disaster but intense air interdiction and close air support operations checked the Chinese pursuit, inflicted heavy losses and forced them to break off.

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[3] Price T. Bingham, "Ground Maneuver and Air Interdiction in the Operational Art," Parameters (March 1989): pp. 19-24.

The war in Korea also saw the innovative introduction of airborne FACs (Forward Air Controllers) necessitated by the fighters' limited time-over-target, the land battles' fluid fronts and the undulating terrain. But to quote General Weyland, FEAF Commander, "Although close air support contributed, the major effect upon the enemy was produced by airpower applied in the rear of his front line combat zone."[4] Battlefield air interdiction was the major contributor. Air interdiction helped transform the ground situation by reducing the strength of the enemy before contact with friendly ground forces enabling MacArthur's famous counter-offensives.

Vietnam War

The Vietnam War was perhaps not the best classroom for airpower doctrine. In this limited undeclared war, many constraints were placed on the use of airpower. Later, once the conflict intensified from an insurgency to a more conventional war, airpower began to play a more decisive role.[5]

In the early part of the war, CAS missions were flown mainly against suspected troop concentrations. The enemy often adopted close-up tactics to aggravate the problem of U.S.

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[4] General William W. Momyer, Air Power in Three Wars (Washington, D.C.: U.S. Government Printing Office, 1978), p. 170.

[5] Richard H. Kohn and Joseph P. Harahan, ed., Air Interdiction in World War II, Korea and Vietnam (Washington, D.C.: Office of Air Force History, 1986), pp. 64-71, 81-85.

aircraft hitting own forces. The airborne forward air controller became the key element in CAS misions. He had to know exactly where the friendly forces were and the best method for fighters to attack the targets. Fighters could make multiple attacks against the same targets with air superiority and a low air defense threat environment.[6] The favorable air situation therefore enabled successful close air support, especially in the defense. Indeed, massive close air support proved to be the saving factor in the major defensive battles of Junction City, Khe Sanh and Tet.[7]

Air interdiction, on the other hand, proved to be ineffective during the *Rolling Thunder* campaign due to a number of factors. The Ho Chi Minh trail had multiple paths under heavy foliage which made attempts to cut off the enemy infiltration of supplies to the South extremely difficult. Moreover, the target list was politically constrained with the air component commander having little influence on it. While politically expedient, the piecemeal commitment and graduated escalation of the air war achieved only limited military results. Lastly, during this period the war was more insurgency than conventional in nature. Supply interdiction did not have much impact when the enemy consumption rate was low.

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[6] General William W. Momyer, "Close Air Support," National Defence (Nov-Dec 1973): pp. 210-213.

[7] Momyer, Air Power in Three Wars, pp. 301-302, 310-311, 319.

The North Vietnamese invasion of South Vietnam in early 1972 escalated the conflict to full scale war. It involved highly organised enemy forces supported by tanks, artillery and surface-to-air missiles. Round the clock close air support proved decisive in checking the enemy's advance in the battles of An Loc and Quang Tri, despite the intense threat posed by enemy SAM and anti-aircraft gun systems which had to be suppressed by fighters.

The change in U.S. strategy in this phase of the war, enabled air interdiction to play a decisive role in reducing the enemy's combat potential. Air interdiction took its effect when the North Vietnamese began their southward push, consuming more combat resources. *Linebacker I* was successful at isolating North Vietnam from external supplies, destroying stockpiles and restricting the flow of forces and supplies to the battlefield. It brought the North Vietnamese to the negotiating table. But it was the unrestricted application of airpower in *Linebacker II* that eventually forced the enemy to seriously seek a ceasefire.[8]

Yom Kippur War

New lessons concerning the use of tactical airpower emerged from the Yom Kippur War. The Israelis were caught by surprise and the bulk of their armed forces were not ready when the Arabs invaded. The Israeli Air Force therefore played a key role in stopping the Arab advance. In the process, they

[8] Ibid., p. 33-34. These operations did however include strategic bombing as well.

lost 105 combat aircraft, about 20% of their total force. 79 of these aircraft were lost in the ground attack role, mainly to Soviet built SAM-6 and ZSU 23-4 anti-aircraft guns. Furthermore, most of the losses were incurred over the FEBA. The emergency situation had forced the Israeli Air Force to conduct CAS without the benefit of a SEAD (suppression of enemy air defense) campaign to clear the battlefield of the air defense threat. The severe consequences of that decision were demonstrated in the Golan Heights battle.

With 700 Syrian tanks facing them, the Israelis were outnumbered 12 to 1. Massive CAS finally managed to turn the battle in favor of the Israelis. But on the first full day of fighting alone, they lost 40 aircraft. Complacency and failure to appreciate the seriousness of the air defence threat had cost the victors of the 1967 war dearly. Only Israeli innovation managed to turn the tables against their adversaries. In a joint SEAD effort, the Army opened an air corridor for the IAF to penetrate and systematically destroy the SAM sites.[9]

The Israelis learned a major lesson from the 1973 war. Where previously aircraft could roam freely to strike at will, the modern battlefield was likely to be saturated with air defence systems. Haim Herzog, a former army general and present Isreali President, wrote:

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[9] Major Ross L. Smith, "Close Air Support - Can it Survive the 80s?" (Thesis, U.S. Army Command and General Staff College, 1978), pp. 46-57.

> The proliferation of light portable missiles in the front line means that close support will be the exception to the rule in future, with the air force being obliged to concentrate on isolating the field of battle, maintaining supremacy of the air, and destroying the forces in and near the battlefield.[10]

The air defense threat will make CAS operations less profitable. CAS aircraft will have to carry sophisticated electronic countermeasures for self protection, and pilots will be forced to use tactics that ultimately decrease his ability to acquire and strike the target. The result is reduced mission effectiveness. The Israelis believe that tactical airpower is best employed against massed ground forces before they have dispersed into battle formation. However, they still believe in providing CAS in emergency situations, such as when vital positions are in critical danger of being overrun, and tactical airpower is the only means of stopping the enemy.[11]

Relevance of the Past Wars

History provides important lessons regarding the employment of tactical airpower for the RSAF. In World War II, Korea and Vietnam, CAS was able to make an impact on the outcome of battles because the air defence environment was relatively benign. However the modern battlefield will be very different with a high air defense threat environment. As the Israeli Air Force learnt in 1973, CAS can prove very costly. SEAD will be needed to regain freedom of the skies, which

[10] Chaim Herzog, The Arab-Israeli Wars: War and Peace in the Middle-East, (New York: Random House, 1982), p. 311.

[11] Smith, p. 57.

means diverting precious air resources. CAS should be the exception rather than the norm, and tactical airpower should go mostly to air superiority and BAI roles.

Battlefield air interdiction proved extremely effective in past wars, especially in battles of movement. The BAI campaigns in *Overlord*, *Strangle* and *Linebacker* weakened the enemy significantly by disrupting his supplies, impeding his mobility, and preventing his forces from entering battle. Battlefield air interdiction should therefore carry greater weight when employing airpower in support of the ground battle.

CHAPTER III

THE CAS PROBLEM

In order for CAS to be successfully executed, every part of the CAS operation has to proceed smoothly. Several interelated factors affect the CAS problem: the FAC, survivability, target acquisition and identification, and weapon accuracy.[1]

The Forward Air Controller

The primary reason for the FAC's control is to provide the pilot with up-to-date strike information and to ensure the safety of nearby friendly forces. Attacks often have to be constrained to specific directions to ensure that bombs do not inadvertantly fall on friendly forces. Airspace constraints over the ground force's area of operation and FAC saturation limit the number of aircraft to be employed in a CAS package. The FAC passes vital information to the pilot via a UHF/VHF radio, which accounts for another problem. In the Yom Kippur War, the Israelis found communication on all frequencies jammed within one minute of transmission. Communications jamming can be expected in the modern battlefield, and the

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[1] Wg Cdr Jeremy G. Saye, RAF, "Close Air Support in Modern Warfare," Air University Review (Jan-Feb 1980): pp. 5-16.

attack may have to be aborted if no contact can be made with the FAC.

Survivability

While the threat from enemy fighters may be eliminated, the enemy can still deny freedom of the skies by employing SAM and anti-aircraft gun defences. The new systems are extremely lethal and sophisticated, extensively exploiting the electromagnetic spectrum. The CAS aircraft must depend on tactics and electronic countermeasures to defeat the threat systems. For fixed-wing aircraft this means either maneuvering close to the ground or employing stand-off delivery profiles. In the low level option, poor weather and hilly terrain present significant operational hazards, particularly when the pilot's attention is drawn away to seek out the targets or dodge SAMs. In the stand-off option, the target identification problem is aggravated.

Target Acquisition and Identification

Target acquisition can be difficult because of camouflage and terrain obscuration, even under favourable weather conditions. High-speed low-level ingress permit little time for the pilot to visually acquire the target, while stand-off deliveries present the additional problem of identifying enemy from friendly forces. In the 1982 Lebanon War, Israeli aircraft accidentally attacked an Israeli armored column. Greater stand-off distances, necessitated by the SAM

threat, will further increase the risk of accidental "friendly" kills.[2]

One solution to solve the target acquisition problem is to have the FAC designate the target. Laser designation can be an excellent method but limited ground mobility and visibility may restrict the ground FAC. The airborne FAC, on the other hand, may not be a viable concept in the presence of an air defence threat.

Weapons accuracy

Finally the aircraft must deliver the weapons accurately. CAS attack profiles in the presence of an air defence threat will require aircraft to be equipped with good avionics to reduce pilot workload and increase weapon accuracy.

Summary of Analysis

Modern armies move under the cover of organic mobile air defenses. The air defense threat severely compounds the already difficult target acquisition, identification and weapon delivery problems inherent in CAS. With their increasing sophistication, modern air defense weapon systems will become more difficult to suppress or evade. CAS prospects in the future appear extremely dim.

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[2] Hirch Goodman and W. Seth Carus, The Future Battlefield and the Arab-Israeli Conflict, (New Jersey: Transaction Publishers, 1989), p. 63.

CHAPTER IV

THE CURRENT CAS DEBATE IN THE U.S.

Following the Vietnam War experience and concern for NATO's central front, the U.S. saw close air support as the key to blunting the Warsaw Pact's armored offensive. Designed primarily as a tank killer, the Fairchild A-10 was conceived as a dedicated CAS aircraft capable of carrying a high payload of mixed ground attack weapons. Due to survivability considerations and to meet the demands of the modern battlefield as defined in the U.S. Army's AirLand Battle doctrine, the USAF proposes to replace the A-10 with the A-16, an enhanced ground attack variant of the F-16. The CAS issue subsequently became a controversy with some very fundamental questions re-surfacing. Consequently, the Senate Armed Services Committee's defense authorization FY 89 report stated that instead of seriously addressing the CAS issue, the USAF was redefining the problem so that it need not procure an aircraft dedicated to close air support.[1]

The Congressional controversy stems from a dispute over the basic characteristics required in a close air support aircraft. The faction opposed to the Air Force are proponents of the "Mud-fighter", a notional low-cost aircraft, heavily

[1] Jeffrey Ethell, "Close Air Support Bogs Down", Aerospace America (Dec 88): p. 83.

armored and armed, capable of loitering over ground troops in contact with the enemy, providing responsive and massive airborne firepower.[2] The "Mud-fighter" proponents also argue that high speed aircraft like the A-16 will not be able to perform the CAS mission effectively. The confused battleground makes single-pass attacks very unlikely to succeed because of target acquisition difficulty. The aircraft will invariably have to slow down to identify enemy targets from friendly forces, maintain eye contact and maneuver into a position to attack them. The A-16 maneuvers poorly at slow speed and becomes vulnerable to enemy air defense weapon systems. Not designed to take hits, the A-16 will be a very costly platform to lose compared to a cheaper "Mud-fighter".

On the other hand, a slower aircraft enables the pilot to acquire the target better and still evade the ground threat. It can be designed to take hits, while enhanced electronic countermeasures can also increase survivability. Quick turn-round, simple field maintenance, and the ability to operate out of short strips close to forward troops increase responsiveness and reduce dependence on conventional airbases. The aircraft can be a low-cost derivative from existing types. The proponents basically want an A-10 follow up, but smaller in size. The A-10 is too big, which not only increases cost, but also makes an easy target for anti-aircraft weapons.[3]

[2] John T. Correll, "What's Bogging Down the AirLand Fighter?", Air Force Magazine (April 89): p. 40.

[3] Barlow, p. 13-15.

There appears to be a difference in philosophy between the "Mud-fighter" proponents and the USAF. To provide close and responsive firepower, the "Mud-fighter" group argue for a slow aircraft, capable of manuevering tightly close to the ground to avoid anti-aircraft weapons fire, and also able to take hits. But the Air Force believes that the "Mudfighter" cannot survive the modern battlefield, especially with the proliferation of the SAM threat, even if it could survive the anti-aircraft guns threat. Studies have shown that aircraft speed is an important factor affecting survivability.[4]

The Air Force believes that aircraft must be able to hit the target on the first pass with minimum exposure to the target defenses. The emphasis here is on "not getting hit" rather than "being able to take hits".[5] The A-16 has the performance and the weapons accuracy to go with it. Its improved avionics greatly reduce pilot workload, and its ability to interface with Army control units resolve many of the battlefield targeting problems.

One of the principal reasons why the "Mud-fighter" proponents are opposed to the A-16 is that they interpret the Air Force proposal as an abandonment of the CAS commitment.[6] With the A-16, they fear that Air Force missions will

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[4] Jasjit Singh, "Offensive Air Support in Modern Warfare," Strategic Analysis (Sept 1984): pp. 578-579.

[5] Ethell, p. 84-85.

[6] Lt Col Daniel P. Leaf, "The Future of Close Air Support," Military Review (March 88): p. 10.

gravitate toward battlefield air interdiction (BAI), which the Air Force has all along preferred. The present A-10 is popular with the Army because it is the first designed-to-purpose aircraft dedicated to close air support, something less assured with a multi-role fighter committed to other missions as well.

With the A-16 then, will CAS missions be relegated to a low priority? The USAF supports the U.S. Army's AirLand Battle doctrine; however, the nature of the future battlefield has changed the doctrine of tactical airpower applications. The future battlefield will be "fluid and non-linear".[7] Previous concepts of warfighting entailed combat forces engaged in relatively clear boundaries. AirLand Battle doctrine emphasizes maneuver warfare and deep operations conducted by mobile forces. There would probably be multiple FLOTs (Forward Line of Own Troops), making it difficult to distinguish when CAS ends and BAI begins.[8]

While acknowledging the need for CAS in urgent situations, the AirLand Battle doctrine recognizes the inherently greater value of attacking enemy targets in depth, before they can be brought to bear on friendly forces:

> The strengths of the enemy in terms of forces, battle sustaining supplies, and combat reserves are most vulnerable to air attack when concentrated, but these targets may be relatively secure when dispersed in their battle areas. While the urgency of enemy actions may require direct attacks against forces in contact, air

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[7] FM 100-5, Operations, p.27.

[8] Correll, p. 42.

> forces are normally more efficiently used to attack in depth those targets whose destruction, disruption, or delay will deny the enemy the time and space to employ forces effectively. The effect of these attacks is greatest when the enemy is engaged in a highly mobile, maneuver scheme of operation dependent on urgent resupply of combat reserves and consumables.[9]

As proven in past wars, airpower is particularly effective when used in the deep battle against an enemy engaged in maneuver warfare consuming combat resources.

This line of thinking is endorsed by the senior Army leadership. LG Edwin S. Leland, Chief of Staff of U.S. European Command with considerable CAS experience in Vietnam, agrees that piecemeal application against dispersed enemy forces merged with friendly forces is not the best way to employ tactical airpower. He advises using "whole bunches against relatively big targets", and believes that the Air Force is presently the best means to conduct follow-on forces attack (FOFA) in the deep battle.

A dedicated CAS aircraft, unable to penetrate deep into hostile territory, offers limited employment prospects. With its better capability, the A-16 can switch from close air support to the deep battle, depending on where tactical airpower is most needed and best used.[10]

Relevance to the SAF

The USAF appears to be moving away from the dedicated slow speed CAS aircraft to the more capable multi-role fighter to support the AirLand Battle doctrine. "Mud-fighters" cannot

[9] FM 100-5, Operations, p. 47.

[10] Correll, p. 43.

survive nor provide the kind of flexible airpower needed in the future battlefield. A high performance aircraft with the necessary avionics can do the job better.

The RSAF is not about to procure a new CAS aircraft, and even if there were plans, the "Mud-fighter" would not be the right way to go. The A4 aircraft will be the main platform for close air support. Lacking the state-of-the-art avionics and the ground control communications interface that the A-16 will have, the adequacy of the A4 for the CAS role in the modern battlefield becomes questionable. Successful one-pass attacks in a high threat environment becomes increasingly improbable. The A4 maneuvers poorly at slow speeds; hence slowing down to acquire or identify the target will only expose the aircraft to greater risk from anti-aircraft weapons. With limited resources, a more prudent alternative must be sought to maximise the use of airpower.

The U.S. Army's Airland Battle doctrine recognizes that, in principle, airpower is best used in battlefield air interdiction against the enemy's forces and supplies when they are concentrated, before they are dispersed and committed into battle. Also the effect is greatest when the enemy is engaged in battles of movement, consuming combat resources. In the next chapter, given the assumed scenario, we will examine why it becomes even more compelling for the RSAF to pursue BAI rather than CAS in the modern battlefield.

CHAPTER V

BAI AND CAS IN THE OPERATIONAL SETTING

The Enemy

The enemy country in this scenario is REDLAND, a fictitious country lying somewhere to the north of Peninsular Malaysia. The RED aggressor, a notional enemy with Soviet-type force structure and equipment, has a large standing army with considerable war experience. He is well equipped with Soviet-built main battle tanks, armoured personnel carriers, artillery and mobile air defenses, notably ZSU-23-4 anti-aircraft guns and SA-7 SAMs. He can be expected to deploy a sizable portion of these forces close to the northern borders of Peninsular Malaysia before the start of conflict. For the offensive, the aggressor will adopt the Soviet doctrine of armour-led penetration, exploitation and envelopment with echeloned forces.

The Terrain

The nature of the terrain will dictate how ground forces deploy and engage in battle. A map study of Peninsular Malaysia (see appendix) reveals several important features. Mountain ranges effectively divide the northern two-thirds of the peninsula into the west and east coast regions. Most of the interior is covered with thick foliage and virgin jungle while the coastal regions are relatively flat with extensive

areas of mangrove swamps. The road and rail network mostly run north-south, with the more economically important western region better developed. The western plains are extensively cultivated with rubber, oil palm and rice. The lowlands in the north on either side of the mountains have been relatively isolated from each other, until the recent construction of the East-West Highway (hand drawn on the map). The main east-west links lie in the southern half of the peninsula. Several large rivers provide drainage to the sea, four to the east and three to the west. Because of the year round high precipitation, these rivers are never dry. Bridges are therefore key links in the transportation system.

The terrain and lines of communication therefore confine enemy overland approaches in the northern half of the peninsula to two narrow coastal corridors with little opportunity for transfer of forces until the road links in southern half are secured. The jungle is impenetrable to sizable conventional forces but allows local flanking by lightly armed infantry.

BAI verses CAS

The nature of the terrain and the enemy doctrine makes it highly probable that the enemy will mass and project his forces along the main north-south axes to rapidly capture the main cities and towns. Enemy concentrations and battles of movement make his forces and supply systems ideal targets for battlefield air interdiction. Furthermore, a detailed target list of the enemy dispositions, the key nodes for

transportation and choke points (bridges, for example) can be prepared even before actual conflict begins. A BAI campaign can systematically isolate the enemy and destroy his combat potential before it can be brought to bear on friendly forces.

Arguably, CAS could also be used to blunt the aggressor's armored offensive, similar to the NATO situation.[1] But once the armored forces are dispersed into battle formation and engaged with friendly forces, pilots will have difficulty picking out targets to attack. The thick foliage provide good cover and concealment for ground operations, aggravating the target acquisition and identification problem. Close air support will have to depend on airborne FAC for target direction as in Korea and Vietnam, and pilots will have to overfly the battlefield to become familiar with the tactical situation. But the presence of SA-7 SAMs and ZSU-23-4 anti-aircraft guns will deny CAS aircraft the required tactical freedom. Strike aircraft are better used against vulnerable second echelon forces still concentrated or moving along the confined axes.

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[1] Barlow, p. 6-8.

CHAPTER VI

BAI, CAS AND THE PRINCIPLES OF WAR

Since both BAI and CAS concern the employment of force, we can assess their effectiveness from the perspective of the principles of war. FM-100-5, Appendix A documents the principles of war used in this chapter.

Objective

Both CAS and BAI have objectives. However, because CAS has to be integrated with the fire and movement of ground forces, it is tactical in nature. Air power allocated to CAS has to be parcelled out for piecemeal employment at lower levels. So while CAS can help win some tactical battles, its cumulative effect may not be significant at the campaign level. However, in some situations CAS can prove critical for a particular battle that is crucial to a campaign.

BAI, on the other hand, lends itself better to the campaign level, the level of operational art.[1] For BAI to be effective, as we have seen in Operation *Strangle*, it has to be synchronized with ground maneuver. The enemy is forced to move to oppose friendly forces, which makes him vulnerable to air attack. On the other hand, if he does not move, he is likely to be out-maneuvered by friendly ground forces. BAI is

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[1] Bingham, p. 16-18.

therefore a major component of operational art to achieve campaign level objectives.

Offensive

The key words indicated in FM 100-5 are "seize, retain and exploit the initiative." CAS is normally called for when contact is made with the enemy. In a sense, it is demanded in reaction to a ground situation; in defense, to check enemy penetration or breakthrough; in offense to overwhelm stiff enemy defenses. Aircraft allocated to the CAS missions are therefore sitting idle, waiting to respond to the ground situation as it unravels. Sorties not flown are wasted airpower potential.

BAI fully exploits the initiative. Targets can be attacked at the time and place of the battle commander's choosing. Maximising sortie potential against the enemy places him under constant threat of air attack, and forces him to become defensive, thereby losing the initiative. The Normandy campaign is a good example of this, where Rommel's forces were virtually immobilised in the face of continuous air attack.[2]

Mass

As we have seen, CAS is piecemeal application and does not permit the massing of air power on a large scale. Due to airspace and FAC control limitations, aicraft often have to be employed in pairs or fours at most over a given target area, thereby affording the enemy time to take defensive action.

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[2] Bingham, p. 21.

BAI enables concentration of force to be applied at decisive points against the enemy, therefore optimising one of the inherent characteristics of airpower, flexible massive firepower. At the operational level, most enemy "centres of gravity" such as sizable reserves, vital command and control centres, logistical bases and lines of communications, all fall neatly into the BAI target category. Allocation of air effort to BAI therefore applies airpower at the enemy's vital points.

Economy of Force

Since airpower will always be a limited resource, decisions have to be made on where and how best to use it to achieve the objective with maximum results and minimum effort i.e. with greatest economy of force. We have examined the problems of conducting CAS, especially in a high air defense threat environment. To quote Lt. Gen. David Elazar, former Chief of Staff of the IDF, "The October War reconfirmed my belief that close air support is costly in casualties, and that there is no positive ratio between relatively great losses and limited results."[3] Additional effort also has to be dispensed to suppress the enemy air defences before CAS can be safely conducted.

BAI is aimed at inhibiting enemy deployment into battle. Less effort is required when the enemy is destroyed en

[3] Lt. Gen. David Elazar, "The Yom Kippur War," Military Aspects of the Isreali-Arab Conflict, ed., Louis Williams, (Tel Aviv: University Publishing Projects, 1975) quoted in Smith, p. 56.

masse. BAI also has a multiplier effect because many of tomorrow's battles are being shaped today.

Maneuver

BAI supports the maneuver battle in the vertical dimension. BAI reaches into the enemy's depth, an indirect approach that will disorient the enemy more than CAS because of its independent yet synchronised action.

Unity of Command

Since BAI is more effective at the campaign level it is easier to co-ordinate and direct airpower towards a common goal or objective, demonstrating better unity of command. Centralized control at the operational level enables scarce air resources to be switched flexibly between major sectors by the theatre commander, whereas CAS once parcelled out will be used at the discretion of lower unit commanders.

Security

Enemy air defences pose the main threat to the employment of airpower in the battlefield. CAS aircraft circling to acquire targets at the direction of the FAC are greatly exposed to anti-aircraft fire. Man-portable SAMs are difficult to locate and avoid. While BAI targets may also be defended, the air defence systems around BAI targets are generally the less mobile type, and easier to locate for the SEAD effort. The enemy's air defenses are also degraded in BAI synchronized battles of movement as frequent displacements limit the time available to provide effective coverage.[4]

Surprise

CAS operations are more predictable to the enemy because of the restrictive flight pattern and necessary FAC-pilot communications. The enemy can take countermeasures to jam communications and be better prepared to engage CAS aircraft with his air defences. On the other hand, BAI is executed autonomously, taking the enemy by surprise at an unexpected time and location.

Simplicity

BAI is simpler to execute than CAS. BAI, by definition, is executed well clear of friendly forces. There is no need for cumbersome FAC procedures. All targets beyond the FSCL are hostile. Pilots are free to maneuver in the best direction and profile for maximum effectivenes and minimum risk.

In each of the principles of war, BAI comes out superior to CAS as a more effective method of employing tactical airpower. As with the principles of war, pursuing BAI over CAS cannot guarantee success, but neglecting it will certainly invite failure.

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[4] Bingham, p. 19.

CHAPTER VII

CONCLUSION

In any future conflict, the RSAF must know how best to employ airpower, despite the lack of operational experience. We have to learn from history and the experience of others. The past wars have shown the great impact made by air interdiction campaigns, particularly in battles of movement. Close air support has also played an important role in the past, but the presence of mobile battlefield air defense weapon systems exacerbates the CAS problem.

The increasing sophistication of the air defence threat in the modern battlefield presents a turning point in the tactical airpower doctrine of modern air forces. The Israeli Air Force believes only in providing CAS in urgent situations. U.S. doctrine accomodates the need for CAS but underscores the preference for BAI. To meet the demands of the modern battlefield, the future USAF air-to-ground fighter is likely to be the multi-role A-16, not a dedicated CAS aircraft.

The RSAF's operational environment is also likely to include advanced mobile air defence systems. CAS missions can prove too costly for a small air force like the RSAF to bear. Furthermore, in the area of operation, thick vegetation aggravates the problem of target acquisition and identification in the zone of contact between friendly and enemy forces. On the other hand, the terrain and lines of

communication favor the conduct of a BAI campaign against an enemy engaged in rapid force projection.

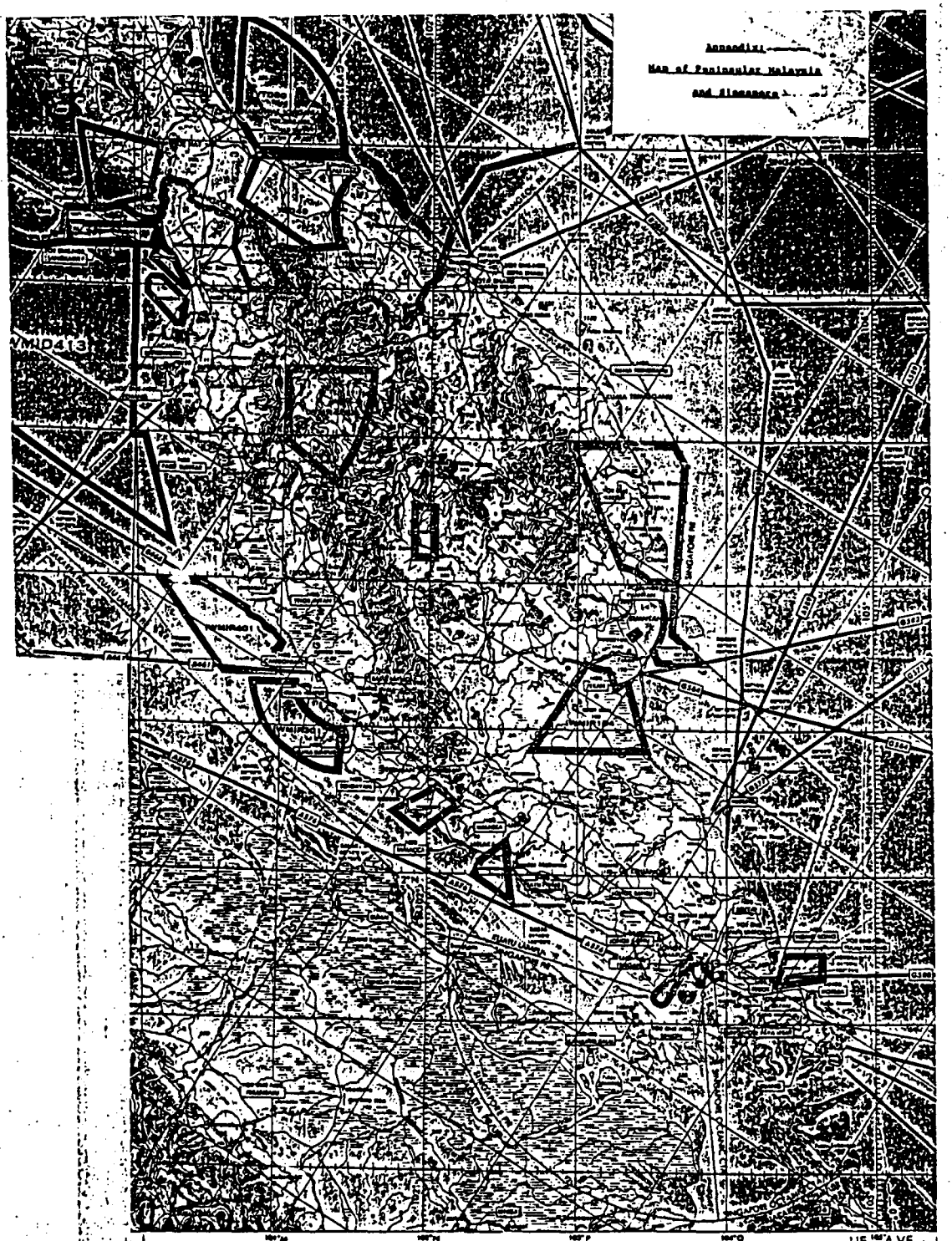
Employing airpower in the BAI role is a better application of the principles of war. Many CAS pitfalls are avoided. BAI maximizes an important characteristic of airpower, the ability to mass destructive power at the decisive point. BAI is able to impact at the operational level of war, not just at the tactical level like CAS.

To sum up, as a doctrine, battlefield air interdiction should be the main role of tactical airpower in supporting the land battle, since it enables the most effective employment of airpower. Close air support should be relegated to an emergency role, because of the inherent difficulty of attacking enemy targets in close contact with friendly forces, particularly in a high air defense threat environment. RSAF tactical airpower doctrine should be revised to incorporate this new thinking.

Appendix

Map of Peninsular Malaysia

and Singapore



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