Emerging Trends in Battlefield Air Strikes

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Introduction

Battlefield air strike (BAS) is an important facet of the operations conducted by air forces in supporting the ground forces in the tactical battle area (TBA). BAS missions had their beginnings in the early 20th century with bombs dropped by hand. In less than a century, we have transitioned from open-air cockpits to the higher-performance aircraft of World War II through the sound barrier and now to sophisticated technologies of stealth aircraft designs and unmanned aerial vehicles (UAVs). The aim of this paper is to highlight the significance of BAS in air-land operations and examine the emerging trends which would enable successful and effective BAS operations.

The Air-Land Battle

Future wars will be characterised by emerging at short notice, being of short duration and being fought at high tempo and intensity.[1] In such a proactive war, the army would bank heavily on the air force (AF) to provide the first punch. In pursuance of the military objective, the air commander would employ the air forces through three distinct but interrelated air campaigns. The air dominance operation for complete control of the air is the first campaign for air forces. It is only through offensive action that control of the air can be achieved, especially when facing an adversary with a capable air force. This permits own air and surface forces to operate more effectively and denies the same to the enemy.[2] With the requisite

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degree of control of the air, an air commander can deliver combat power on the enemy when and where needed to attain the military objectives at any level of the war. This is done through strategic interdiction and counter-surface force operations (CSFO). The air dominance and strategic operations are conducted by the AF through stand-alone operations. CSFO which consists of air interdiction (AI), battlefield air interdiction (BAI), BAS and tactical reconnaissance missions would require to be meticulously planned to be in sync with the requirements of the joint plan. The key ingredient of such air-land battle is synchronisation and integration of various elements of firepower so that their effects complement and reinforce each other.

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Counter-Surface Force Operations

Aircraft contribute to the land battle in one of three ways.[3] First, by attacking enemy ground forces which are actually engaged in combat with friendly ground forces. This activity is known as BAS. Second, by attacking enemy forces which are within the battlefield and may be closing to join the ground battle in the immediate future. These air attacks would take place a relatively short distance behind the battle area and would seek to have an indirect but speedy impact on the battle itself. These operations are known as BAI. Third, by targeting strategic reserves, reinforcements and resupply of the entire battlespace up to several hundred kilometres behind the front line. These are known as AI. All three activities are designed to influence one particular battle area, or theatre of operations, and are usually cited as examples of the tactical use of air power.

Battlefield Air Strikes

Battlefield air strikes are defined as "air action against hostile targets by fixed or rotary wing aircraft 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."[4] The detailed coordination and synchronisation is absolutely essential for terminal guidance of the aircraft and to avoid fratricide and collateral damage. In the US and British air manuals, these are termed as close air support (CAS)

operations.[5] In the ongoing operations in Afghanistan, the UAVs have come of age as potent attack platforms and should be included in the definitions of BAS.

The significant characteristic of today's battlefield is that it is non-linear, technologically intensive, with a high tempo of operations, dense in air defence systems as well as targets like communication centres and seamlessly networked to the minutest detail. The shadow of sub-conventional warfare is also a reality today and the modern-day battlefield would also include low intensity conflict operations (LICO), UN missions, and military operations other than war (MOOTW). The AF would, thus, be required to conduct BAS across varying terrains, threat scenarios and in asymmetric conditions in future battles.

Characteristics of Present-day BAS

BAS provides firepower in offensive and defensive operations, day or night, to destroy, suppress, neutralise, disrupt, fix, or delay enemy forces in close proximity to friendly ground forces.

- ***Proximity*** Since close proximity is that distance within which terminal control is required for fratricide avoidance and targeting guidance, BAS is not defined by a specific region of the theatre/joint operations area, rather it can be conducted at any place and time where friendly surface forces are in close proximity to enemy forces.
- ***Availability*** The AF commander, in consultation with the surface force commander, determines the amount of tactical air effort to be applied to BAS. The air effort will be drawn from the total available tactical strike force allotted to the air commander. During Operation Anaconda (a US operation in Afghanistan and discussed later), the AF commander was not involved in the planning stage to the extent that he should have. As a result, the planned BAS proved inadequate and a much larger air strike force was ultimately required to turn the tide of the battle.
- ***Command of the Air*** Some degree of air dominance is an absolute necessity for success. In case the enemy has a powerful air force, the first priority must be given to the achievement of control of the air. The Arab-Israeli Wars of 1967 and 1973 demonstrated the strategies and counter-strategies used to wrest the initiative by gaining control of the air and turning the tide of the ground battle in one's favour. The Israelis relied heavily on the offensive use of air power, so as to shape the battlespace and create conditions for an eventual victory. The Beka'a Valley operation of 1982, which resulted in the spectacular Israeli victory, laid the foundations for future battles and was in many ways a preview of the Gulf War.[6]

- ***Reaction Time/Responsiveness*** Air force units tasked for close support maintain aircraft on various stages of alert to ensure immediate response and rapid reaction.

  Thus, an efficient and reliable communication system is a prerequisite to ensure rapid processing of requests.
- ***Changing Scenarios*** BAS can decisively contribute to surface combat success with air attacks during the frequently varying battlefield breakthroughs, counter-attacks, defence against enemy assaults, and surprise attacks.

Limitations of BAS

Battlefield air strike is one of the most complex missions performed by the AF and has some inherent limitations.

- ***Close Integration*** Integrated planning and execution, understanding the nuances of BAS by the staff at Services Headquarters, competence of the aircrew and ground forward air controller (FAC) and the surface formation—the variables are many and success is achieved only when all players adhere to the complicated orchestration process.
- ***Fratricide and Collateral Damage*** This is often the result of confusion on and over the battlefield. Causes include misidentification of targets, target location errors, friendly locations incorrectly transmitted or received, and loss of situational awareness by terminal controllers, BAS aircrews, or air support request agencies.
- ***Enemy Air Defence*** Most enemy ground forces bring some level of tactical air defence into the battle. Such defences consist of anti-aircraft artillery (AAA), man-portable or vehicle-mounted infrared surface-to-air missiles(IR SAMs). Indiscriminately pushing BAS missions beyond the range of organic firepower can be very dangerous. Such missions will outrange ground-based suppressing fire and may fly into a much higher threat arena and, as such, higher attrition rates would have to be accepted.
- ***Air Space Management*** BAS aircraft face a problem of air space management over the TBA. An engagement by own surface forces, in the fog of war, is what the fighters face more than helicopters. The sheer numbers operating in a narrow space, the dynamic nature of air operations and proactive tasking are severe constraints. Detailed procedures for air space management have to be worked out and the limitations imposed by night and adverse weather have to be borne in mind.

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Emerging Trends in BAS

Addressing Joint Issues

There is a need for doctrinal adaptations in the air-land battle and how the air force and army should accomplish it in the future. This was outlined by the vice chief of the air staff during a recent seminar.[7] He said that the important factor in war today is that the strategic firepower of all three Services be synergised. The conflict is very transparent and the forces have to contend with many external factors too; the media, non-governmental organisations (NGOs), the Red Cross, and Geneva Convention, among others. The conflict has to be effect-based, the weapons precise to avoid mass destruction and collateral damage, as these would alienate the world. In the TBA, there is a plethora of air defence (AD) weapons which belong to the various Services. For effective usage, their command and control should be singular. The core competence of each Service must be respected, honoured and exploited. Turf battles should be avoided and duplication of role, effort and financial implications should be seriously considered in a developing country. For effective firepower and a synergised war effort, the essential requirements are:

- Real-time sensor input to decrease the sensor-to-shooter time.
- A common network for all the Services which will give the complete picture of the battlefield.
- Weapon to target matching to use the correct weapon for the intended target; thus, precision guided munitions (PGMs) are necessary.

Changes in Operational Philosophy and Employability Considerations

- ***Planned v/s Unplanned BAS*** In a high tempo war, there would be a severe time constraint on launching planned BAS. In the future, BAS would have to be decided on the spot, depending on the resistance offered and changing tactics by the opposing forces. At times, special operation force (SOF) teams operating beyond the range of organic surface fires may require emergency BAS if compromised, and many combat search and rescue (CSAR) situations also require BAS. BAS is particularly important to offset shortages of surface firepower during the critical landing stages of airborne, airmobile, and amphibious operations by friendly forces.

- ***Types of Weapon Platforms*** Modern-day multi-role fighter aircraft, which are equipped with PGMs and can engage multiple targets at a time, are more committed for strategic missions. The dedicated tactical aircraft, attack helicopters and carpet bombing transport aircraft would, thus, be available for the BAS missions. The selection of the right platform depends on the type of targets and the effect required on them.
- ***Types of Targets*** Typical targets are troop concentrations, gun positions and mechanised elements. Positioning of all these targets changes as the battle unfolds; pre-planning as to the weapons carriage and OTR (over the target requirement) cannot be totally accurate. However, the thrust lines of our surface forces and the enemy could be predicted and other variables of weather, fuel, terrain, etc. could be factored in to reduce reaction time.
- ***Types of Weapon Systems*** Precision weapon systems should be the norm. Tailoring off-the-shelf to the existing AF platforms for delivery and employment is the immediate need. For future acquisitions, the PGM delivery system should be an integral part of the aircraft. As far as possible, employability of all precisions and non-precision weapons in various attack profiles on all available platforms should be practised in peace-time. The actual use in the TBA would be dictated by the contours of the battle where it could be a trade-off between damage to the enemy (mission effectiveness) vis-à-vis risk to own aircraft.
- ***Terrain Peculiarity*** In the desert regions, where targets are obscured by dust, portable laser designation system (PLDS) coupled PGMs would provide a solution. In the mountains and high altitude, only high performance aircraft should be employed.
- ***Responsiveness*** Helicopters can be closely integrated with the army at the corps and division level and the attack helicopters (AH) operating from the forward area rearm and refuel point (FARRP) are optimally poised for quick reaction. Optimal response time for fighter aircraft would be achieved with the integration of the RISTA (reconnaissance, intelligence, surveillance and target acquisition) platform such as the unmanned aerial vehicle (UAV) for near real-time intelligence to the shooter aircraft.
- ***Terminal Guidance and Control*** At the terminal phase of a strike, the air control team (ACT) provides the final clearance and fratricide avoidance instructions to BAS aircraft. This team consists of the forward air controller (FAC), ground liaison officer (GLO) and system operators who are personnel below officer rank (PBOR). The PLDS, interoperable and secure communication, modern

kits for providing accurate target coordinates and joint training of the FAC and GLO will increase the accuracy of BAS.

- ***Army Units for Terminal Guidance*** The concept of the FAC using PLDS could be changed to deployed army units for illuminating the target, thereby freeing the FAC for better control of the aircraft in the TBA and efficient air space management.
- ***Kill Box Operations*** One air space control measure that has been used successfully in the execution of CSFO is the kill box. [8]They are often employed through pre-identified map grids that are common to both air and ground components, and can be easily activated and deactivated without confusion. Kill boxes provide one way to undertake CSFO targeting in near-real-time against mobile ground forces that defy long range pre-planning.
- ***Vulnerability and Survivability*** The factors affecting vulnerability are primarily the types of AD weapons. This will further drive attack profiles, speed, tactics, concealment and stand-off ranges of weapons. While stand-off precision weapons ensure high survivability, delivery of dumb weapons from high altitudes and, hence, larger ranges compromises on target acquisition and weapon accuracy. The joint direct attack munitions (JDAMs) could be an effective option in such a scenario. Electronic warfare (EW) suites would increase survivability. The Su-30, Mirage-2000, Jaguar, Bison, MiG-27 UPG and the AH have good suites with high probability of survival. Moreover, equipment like AI radar, identification friend or foe (IFF), radar warning receiver (RWR), airborne self protection jammer (ASPJ) enhances the situational awareness (SA) of the crew. The survivability of the AH deep into enemy territory is questionable and should be employed for TBA missions only.
- ***Weather and Day/Night*** Radar-cued aiming or global positioning system and inertial navigation system(GPS/INS) tactics are now allowing BAS aircraft to hit stationary targets through the weather. For night targets, UAV guided laser guided bombs are being used.

Use of Unmanned Aerial Vehicles

The primary role of the military UAVs is to undertake reconnaissance as well as attack missions. Often preferred for missions that otherwise are termed as too "dull, dirty, or dangerous" for manned aircraft, the UAVs come across as the favoured option. The present-day UAVs can carry a variety of payloads such as electro-optic synthetic aperture radar, electronic support measures (ESM) and

communications intelligence (COMINT). The armed UAVs, in addition, carry guided or unguided weapons. The capability of UAVs to see beyond the hill, while staying within own territory, places them at a great advantage over other conventional reconnaissance assets. They perform the following tasks:

- Intelligence gathering, interpretation and dissemination to nodal agencies.
- Surveillance of designated area.
- Reconnaissance of target systems.
- Laser designation of targets.
- Battle damage assessment.

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UAV Assisted Strike Operations A UAV provides terminal guidance to the strike aircraft (fighters/helicopters) for UAV assisted fighter strike (UAFS)/ UAV assisted helicopter strike (UAHS). The guidance is given in the following ways:

- Target description and coordinates of target. Prior to strike, scan TBA for enemy AD weapons.
- Live beaming of target pictures through data link.
- There are two types of targets in the TBA – static and dynamic. The UAV can keep tracking the dynamic target and continuously pass information to the strike aircraft. It could also be used for engaging time sensitive targets of opportunity.
- Combat search and rescue (CSAR). The position of a downed pilot can be localised using COMINT and EO payload, passed on to the recovery aircraft and then movement of enemy forces towards the pilot can be monitored

Armed UAVs The first UAV to fire a missile was a Predator drone in November 2001 when it shot a Hellfire missile. By 2009, over a hundred Predator missile attacks had been carried out in Afghanistan alone. Then onwards, the Predator continues to be used as a routine ground attack missile platform in southern Afghanistan and even on the Pakistani side of the Afghan-Pak border.[9]

In addition to guided missiles, various unpowered munitions, smart or otherwise, are also being adapted for attack purpose. The challenge, of course, is to reduce both the cost and the size and weight of the armament as well as the UAV carrying it. A plethora of missiles is being developed currently, not only

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for the bigger Predator-class UAVs but also to arm smaller UAVs. With a number of simultaneous efforts underway, it is reasonable to expect significant breakthroughs in the field of unmanned combat air vehicle (UCAVs), especially the stealth equivalents in the next few years. What is unclear, however, is whether the air forces of the world have developed or are developing out-of-the- box strategies and practices for deploying such platforms. There is little point in deploying them merely as substitutes for manned platforms. Philosophies and concepts need to be developed in order to optimise benefits from the unique capabilities of these machines.

Training for Operations

Successful BAS operations would involve training the following personnel:

- ***HQ Staff*** Understanding the concepts should be part of the courses carried out at all levels in the three Services. Headquarters Integrated Defence Staff (HQ IDS) has recently released a Joint Doctrine for Air-Land Operations[10] which would serve as the keystone doctrinal document for employment of military power in a joint operations scenario. Dissemination of this document across the Services is essential for all to comprehend the strengths and limitations of the other Service and then converse in a common language when planning and conducting operations.
- ***Aircrew*** For improvement in target identification, planned ground reconnaissance by ground crew of the various types of equipment operated by the army deployed in field conditions must be organised. The aircrew should be able to see the equipment in 'mobility' as well as when deployed, with or without camouflage. This should be followed by aerial reconnaissance of the same equipment. Subsequently, simulated attacks on the targets from non-camouflage to semi-camouflage to full camouflage can be carried out in coordination through the tactical air control.
- ***Joint Groups*** Operational discussions and war-gaming of the army should be attended by air force officers who could provide pertinent inputs and make the exercise realistic. Other important aspects are inter-Service liaison visits, procedural training, communication and EW training and participation in exercise and live firing demonstrations. Air space

management in the TBA involves integration of all sensors and inputs from the three Services. Effective surveillance, interoperable communication and integrated command and control have to be practised in peace-time for flawless battlefield management.

- ***Terminal Control*** The training course of the FAC, GLO and system operators should be combined so that economy of air effort, realistic training and fruitful interaction takes place. The course should culminate with participation in live exercises and firing demonstrations for practically trying out the tactics, techniques and procedures learned during the course to have a lasting effect.

Operation Anaconda

A study of Operation Anaconda is a must for all planners of BAS.[11] The salient aspects and the relevant lessons learnt are:

- Inaccurate intelligence of enemy capabilities and intentions was the first thing that went wrong. This led to less concentration of force than was ultimately required, an illustration of how the time tested principles of war should be followed.
- The ground-oriented nature of the battle plan meant that before D-Day, neither US ground nor air forces had engaged in the kind of close, careful cooperation and joint planning that normally would have been deemed necessary to mount a major CAS[12] operation from the onset of the battle onward.
- None of the participating army divisions had recent combat experience in joint operations requiring CAS strikes in support of manoeuvring ground units. The special forces had to do the task of guiding the strikes.
- Unity of command had not been established because the US military presence in Afghanistan was not yet fully mature. The joint task force commander could not order strikes; he could only request the air component commander for them could. All requests for emergency CAS strikes were immediately granted. Getting permission for non-emergency strikes, however, occasionally proved time-consuming: up to 25–45 minutes, in the opinion of frustrated army ground commanders. Such delays were a product of multiple factors, including the need to verify and prioritise targets, enforce rules of engagement, determine proper aircraft and munitions, etc., and manage the large volume of requests coming from the ground forces, which sometimes exceeded the number of aircraft immediately available.

- The installation of advanced avionics enabled jet fighter planes to conduct CAS strikes accurately. Use of precision weapons, such as JDAMs, also made a big difference. Equally important was the development of laser target designators and GPS systems, which enabled precise identification of target locations from the ground or air, and between ground and air forces working together. This allowed the strikes to go through with minimum fratricide and collateral damage.
- Finally, creation of modern information networks permitted high-speed communications among air commanders, command-and-control aircraft, tactical combat aircraft, and ground forces. As a result, the air forces at Anaconda were able to promptly embark upon a major CAS campaign even though the original battle plan had not called upon them to do so.

Conclusion

The last conflict fought by India, in the snow-clad peaks of Kargil, showcased the employment of BAS and BAI in a high altitude environment typical to the country. There were initial losses due to extensive use of SAMs by the intruders. The losses resulted in a change of tactics. Fighter operations stayed well above the ridgelines, using high-level bombing and laser-guided bombs. Helicopters followed tactical routing and used electronic counter-measures. Similarly, future wars will also bring a paradigm shift in strategy and tactics which will test the mettle of men and machines. Weapons will be more versatile; the same weapon will be able to reconfigure to fragment for soft targets or penetrate for hard targets. Consequently, mission tasking will be less restricted by aircraft weapons load. Weapons will have greater ranges and stand-off capability. All surface-attacking aircraft will be capable of precision weapons delivery in adverse weather or at night and will, therefore, be BAS-capable. Ground commanders and aircrew will have access to the information from a common network that will electronically model the battlefield.

BAS produces the most focussed and briefest effects of any force application mission and, therefore, rarely creates campaign level effects. It is the least efficient application of air forces, but as in Operation Anaconda, it may be the most critical by ensuring the success or survival of surface forces. The operational difficulties are greater and the risks involved for friendly surface and air forces need to be carefully studied. The army increasingly views air power as indispensable to its future war-fighting concepts and seeks mechanisms to ensure that it is available and responsive to the needs of the land forces. For the air force, counter-land

operations are becoming more important, but airmen remain concerned with ensuring that air power's unique ability to mass rapidly is not lost in efforts to provide on-call fires to small ground elements spread across a large battle.

Notes

1. "Indian Army Doctrine, October 2004", published by HQ ARTRAC, Section 2.
2. Such an air campaign was conducted by the US forces in Gulf War I; for details see, Jasjit Singh, ed., *Air Power and Joint Operations* (New Delhi: Knowledge World, 2000).
3. "Basic Doctrine of the Indian Air Force", Chapter III, Section III.
4. "The Air Precis 2005" issued by Defence Services Staff College, Section Air 2, "Counter Surface Force Operations".
5. For more details on this, see "US Armed Forces' Joint Publication 3-09.3 Close Air Support", "US Marine Corps Warfighting Publication3-23.1 CAS" and "Air and Space Warfare", published by Air Warfare Centre, RAF.
6. Singh, n. 2, pp. 55-57.
7. The second CLAWS-*India Strategic* joint seminar FIREPOWER INDIA 2010, held on June 24, 2010, at New Delhi. Extracts from *India Strategic* Magazine, July 16-August 15, 2010.
8. The kill box is defined as a generic term for air space control measures used by the theatre air control system for controlling air-to-ground operations. It is a three-dimensional fire support control measure (FSCM) used to facilitate the expeditious air-to-surface lethal attack of targets, which may be augmented by or integrated with surface-to-surface indirect fires. Kill boxes are complementary to, and do not preclude or conflict with, other fire support control measures, and may be employed on either side of the fire support coordination line (FSCL). Refer US Army Field Manual 3-09.34 multi-Service tactics, techniques and procedures (MTTPs) for Kill Box Employment.
9. Amrish Sahgal, 'Armed UAVs "Coming of Age," *India Strategic*, July 2009.
10. Cited in *The Hindustan Times,* July 16, 2010.
11. Richard L Kugler, "Operation Anaconda in Afghanistan. A Case Study of Adaptation in Battle," National Defence University Washington DC, Centre for Technology and National Security Policy, 2007.
12. For more details on this see BAS is termed as *Close Air Support*, a US Armed Forces' Joint Publication, 2-09.3; also see *Close Air Support*, a US Marine Corps Warfighting Publication, 3-23.1; also see, *Air and Space Warfare*, published by Air Warfare Centre.