

AIR DOMINANCE AND THE FUTURE OF AIR POWER

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An air campaign must consist of three phases, corresponding to the three priorities:

First Priority: To gain the necessary degree of air superiority. This will be accomplished by attacks against aircraft in the air and on the ground, and against those enemy installations which he requires for the application of air power.

Second Priority: To prevent the movement of hostile troops and supplies into the theatre of operations or within the theatre.

Third Priority: To participate in a combined effort of the air and ground forces, in the battle area, to gain objectives on the immediate front of the ground forces.

— US Army Air Force FM 100-20, 1943¹

The doctrine that was spelt out by the US War Department was born out of the extensive experience during World War II by army officers and would not undergo any substantive change over the following decades even though some of the details and vocabulary got modified, especially in respect of the

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1. US War Department, Field Manual FM 100-20, *Command and Employment of Air Power*, (Washington DC, July 1943), pp. 10-11.

third priority after the experience of providing close air support during the Korean War. It was also well understood that the prioritisation, as indicated above, was for guidance and not rigidly linear. For example, the Israeli Air Force, whose doctrine closely followed the tenets of FM 100-20, threw in most of its air force for attacking the Arab Armies which had managed to launch a surprise land offensive, especially with Egyptian armour having crossed the Suez Canal in the 1973 Yom Kipper War. The Indian Air Force, which did not have a written doctrine at that stage, opened its account in a world war with counter-air missions by attacking Japanese air bases across the Burma border in Thailand in early February 1942 with slow reconnaissance aircraft. But it had no hesitation to send in the available force of lower technology with a setting sun to stem the Pakistani “Grand Slam” [covered by F-86s and F-104 Combat Air Patrols (CAPs)] heavy armour-artillery surprise thrust across the border and bringing it to a halt on September 1, 1965, losing four aircraft (1/7th of the attacking force) in the process.

We do not wish to enter into a discussion of the relative merits or demerits of air superiority and offensive air support (through interdiction and or close support) in this study, but will try to make an assessment of the technological and operational changes taking place that would make it possible in future to gain air dominance, not only in aerial warfare but also in air-to-surface warfare.

SEMANTICS AND SUBSTANCE

The continuously changing nature of war in history has been mostly driven by changes in technology and our understanding of the changes it brings into war-fighting. Hence, the terminologies in the military forces of the world also change, often more than war itself, mostly even introducing esoteric vocabulary. The term “air dominance” in this context is of comparatively recent origin. In some respects, people are correlating it to the terminology of the early decades of air power in the early 20th century when overly optimistic assumptions about air power, the new weapon in the henceforth unconquered medium of the band of air above the earth’s surface, that had

not ever before been fully exploited, led to the use of the term “command of the air” which would allow direct attacks on the enemy’s centres of population and industry, forcing it to collapse, instead of having to defeat its armies (and/or naval forces) mile upon mile while marching up to the capital to change the regime. The concept of command of the air also assumed that air power could overwhelm the enemy completely, and there may even be no need for a ground war. To a large extent, this actually represented not so much the realities of air power at that time, but the hopes and perhaps even aspirational thinking of nations and their strategic thinkers who had watched the horrors of bloody massacre of the then modern weapons like machine-guns, etc, during the land battles of World War I in Europe, where casualties were counted in each battle in tens of thousands per day.

However, by the time World War II broke out, the concept had been watered down somewhat to a more realistic “air superiority” and attacks on the enemy homeland and surface targets were brought under the label of strategic bombing offensive which was to subdue the enemy and its economic-industrial assets. All air warfare was not similar; different technology, tactics and training produced results which seemed to justify the concept of air superiority. It is worth recalling in this context that the German offensive in 1941 had led to the Soviet Air Force losing 40,000 aircraft in one week to the Luftwaffe. By the time World War II ended, the term command of the air had completely disappeared, being perceived as unachievable (due to the shrinking of air forces), unnecessary (in view of nuclear weapons achieving far more with much less to subdue the enemy), and unaffordable (due to the rising costs of air power systems).

The dawn of the nuclear age since Hiroshima and Nagasaki brought about another change in the doctrine of air power. Strategic bombing was now seen to be co-terminus with nuclear strike (initially with aircraft and later joined by ballistic missiles, both land-based and sea-based) and nations came to believe that in the nuclear age, there would not be enough time or capability to even fight the battles for air superiority, leave alone achieve it. Advances in technology and the concurrent higher costs of aircraft and their weapons had begun to reduce the size of air forces down from tens of thousands in the

most powerful countries to a few thousands though far more capable aircraft. The inventory of a few hundred combat aircraft in the air forces of the middle powers, along with improvements in radar, etc., reduced the potential for aerial engagements. The demands on air forces for support of land forces, if anything, increased if for no other reason than technological advances which had also increased the firepower and mobility of ground forces, in a way making them more vulnerable to attack from the air.

The war in Korea took place during the twilight period when nuclear weapons had not begun to completely dominate strategic thinking across the world. For the US/UN Command, eliminating the North Korean Air Force was a necessary starting point for its own air campaign, but in itself, it was insufficient to ensure air supremacy. Ground-based air defence systems remained a constant danger and ultimately accounted for 816 of the 1,041 UN Command aircraft lost to enemy action.² Of the remaining 225, as many as 147 were shot down in air-to-air combat and 78 lost to other enemy action. US fighters also made a seminal contribution to the war on the ground. The US Air Force (USAF) alone flew seven close support and interdiction missions for every counter-air (including air-to-air) mission.³ But this ratio must be seen against the reality that the US/UN Command possessed air dominance rapidly after the war started because the North Korean Air Force had been destroyed completely very early in the war and the Chinese Air Force intervention, relying on bases inside China, had remained geographically limited to what came to be known as the “MiG Alley” extending to a maximum of around 150 km from the Chinese border. By that time, the ground war had settled down to the 33rd Parallel, the original ceasefire line between the two Koreas. In view of a negligible air threat, except for the MiG-15 farther north, this also allowed the US/UN Command to concentrate heavily on offensive air support and interdiction to the land forces even with daylight bomber attacks on targets in North Korea. According to Futrell, “The Chinese recognised that they had failed

2. Robert F. Futrell, *The United States Air Force in Korea 1950-1953* (Washington DC: Office of Air Force History, Revised Edition, 1983) p. 692.

3. This is generally similar to what the Indian Air Force flew in 1971.

on the ground in January 1951 because they had failed in the air.”⁴ But the same could be said for the US/UN Command at that stage.

The reality was that the ground war was stalemated, and for the next two years, the two sides were left with no option but to engage each other in a classical battle for command of the air. And even here, the exchange ratio was almost even. The Chinese could not provide direct support to their ground forces because the battle front was beyond the radius of action of the MiG-15s, nor could they establish airfields in northern Korea because of the US/UN Command bombing and strike missions. And the US/UN Command could not cross the Yalu River due to political-strategic constraints (especially after Gen MacArthur was removed from command), thus, making the Korean War in reality a limited war since the primary players on either side, the US and USSR, were both nuclear armed. The final outcome of the air war in Korea was then narrowed down to calculations of the exchange ratio where the US/UN Command did not necessarily and unambiguously come out on top even after deploying the latest F-86s against the Russian/Chinese MiG-15.

Since then, with nuclear weapons ready to be launched to even destroy the world, based on various factors for one reason or the other, the term air superiority appeared to be an idle luxury in spite of the fundamental realities having remained unchanged. The Western strategic thought and literature started to believe that nations that did not possess nuclear weapons were not expected to prosecute what was believed to be a prolonged conflict if air superiority was to be achieved. Overall, the lack of time to wage a long struggle in the air, the air space having been made more transparent by radar, and lack of such capacity in war-torn nations was believed to have made the battle for air superiority ephemeral. The concepts accordingly got altered and the best outcome in employment of air power in air warfare was seen as creating a “favourable air situation.” This is what the staff colleges started to teach

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4. Futrell, n. 2, p. 285.

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and air forces started to believe in. Of course, it could never be clearly defined what this term “favourable” implied; and in what time and space paradigm this could work. If it meant that the hostile air force would be forced on the defensive, thus, providing favourable advantage to own air force, then it was no different from the concept of air superiority. In that case, the issue was merely one of scale rather than concept.

But semantics have a strong influence on actions and the substance of war. A combat campaign aim circumscribed by semantics instead of concepts would be very likely to limit the scope and the ways and means of the desired end, in turn, affecting the achievement of the substantive aim which, in this case, would be dominance over the other air force, especially its offensive power.

Air superiority was not necessarily meant to be achieved as a full force-to-force or/and country-wide equation, though ideally it was meant to be aimed at as a campaign to achieve it in those terms. For example, the Battle of Britain has been seen as, written about, and honestly believed to be, the epitome of air superiority. But it was limited to German bomber attacks on British airfields and later the aircraft factories as the focus of operations. In spite of the battle being fought by the Royal Air Force (RAF) with great courage and élan, the trend was clear: the sheer weight of persistent attacks by the Luftwaffe would finally push the RAF to a tipping point when the output of fighters from the factories would become less than the losses during the battle. The German Air Force was not defeated in the Battle of Britain: it switched its attacks to British cities, allowing just that margin that the RAF needed to recuperate and rebuild its strength and go on the offensive. One could argue that the Battle of Britain was a battle for a favourable situation. But the fact is that if the RAF had lost the battle, with the Germans continuing their attacks on aircraft factories and fighter bases, the RAF would have been debilitated, unable to ward off Luftwaffe offensives, and the resulting advantage would have rested with the Germans, making it possible for them to launch an invasion of the island state.

The essence of air superiority was the hostile air force being pushed back on the defensive as far and deep as possible, and not necessarily destroyed, though that would come in the case of total success. Incidentally, the same principle is a prerequisite in the case of land forces on the surface of the earth. But being pushed back does not necessarily imply a simple falling back or failing to lose its fighting capability because the attacking force is likely to press home the attack and pursue the enemy to the final point of a "decisive victory." Air forces losing air superiority could hunker down in hardened shelters and try and recoup under the cover of air defence weaponry, or, as the Iraq Air Force did in the 1991 Gulf War, simply fly off to another country to escape the persistent offensive for air dominance by the US-led coalition forces.

One effect was that the relative importance of air power missions after the end of World War II started to get diffused and altered. For example, if air superiority, leave alone command of the air, was going to be time consuming and/or unachievable, then air (to air) warfare, as distinct from nuclear delivery by aerial platforms, by itself assumed lower importance than other missions. Strike packages reduced to as little as two aircraft missions even for deep strike and penetration of the hostile dense air defence environment. One effect was that close air support, always perceived to be an important mission, started to be seen as a far more critical mission than even air superiority. Most militaries in the developing countries simply adopted the dominant view in the developed countries that were protected by nuclear weapons, and narrowed their vision on the concept of air superiority. In turn, the view spread among land forces, especially in the developing countries, that air power, except when used with nuclear weapons, was primarily a supporting Service, and the land forces the supported force. On the other hand, Commanders of the North Atlantic Treaty Organisation (NATO) land forces during the Cold War (facing large size air forces of the Soviet bloc) did assert that their first priority was to keep the enemy air off their backs, essentially implying a doctrine of air superiority even though it was not formally included as such! To a large extent, this has been due to historical experiences embedded in professional circles and elite perceptions that armies fight and win wars. The fact that

armies have historically been perceived as the primary instrument of war and the military power of a nation, reinforced this perception. But the UK accorded its Navy the status of senior Service because of its dependence on the Royal Navy to keep any invader away from its shores through command of the seas, besides being the prime instrument to establish the vast empire that Britain set up and controlled till the mid-20th century.

AIR-TO-AIR DOMINANCE

Thus, it transpired that by the time the Cold War ended two decades ago, the dominant doctrines of most air forces were based on seeking and achieving a favourable air situation. As noted above, the purist, of course, would argue that completely favourable air situation in time and space would naturally amount to air superiority. Hence, the more modest doctrine was satisfactory expression of the prevalent realities and practices. But this ignored that the US Air Force had never given up its faith in air superiority and equipped and trained itself to achieve it in the shortest possible time. In fact, the wars of the past quarter century clearly point to the assignment of the almost total air effort of US-led forces to support of the war on the ground and at sea. But the important point is that this could be grossly misleading: in these wars air superiority was *not contested* since the hostile air force was either too inferior or too small to make the requisite impact against the sole surviving superpower employing air power in an offensive role, supported by high-technology combat support air power and intelligence capabilities.

Here we must clarify that we are first addressing the issue of air-to-air dominance, that is more in tune with classical concepts of air superiority, although our study would include the new phenomenon, that of air-to-surface dominance, later on.

After World War II, the simple logic of air power was forgotten that dominance of hostile air power would intrinsically allow for greater freedom of action to the friendly ground and naval forces, and deny the same to the enemy. As air power becomes more potent in lethality and long-range strike capabilities in future, the importance of balance in the air becomes more crucial. In a different way, this has been the lesson of all the wars since

the end of the Cold War where air power enjoyed uncontested supremacy. This is the basic factor that allows air forces to provide a higher level of support to the land forces. And this is the critical factor why air dominance should be treated as the primary mission of air forces in the coming decades, except in extreme contingencies like an enemy breakthrough in our defences, like the situation in Chhamb on September 1, 1965.

The United States Air Force has consistently placed its trust in the concept of air superiority.

There is, of course another air force – Pakistan’s — which had claimed that it fought and won air superiority in the 1965 War and there are many in India and its air force, even at high levels, who have believed it. John Fricker gave it a degree of perceptive legitimacy by adopting “Battle for Pakistan” as the title for his book on the 1965 War, psychologically linking it with the Battle of Britain. But the facts speak exactly the opposite with the Pakistan Air Force (PAF) losing three aircraft to one of the Indian Air Force (IAF) in air combat in 1965, although the IAF till recently went by what our staff college taught: favourable air situation, often with the rider of its being “local.” The Indian Air Force, which clearly won air superiority in both 1965 and 1971, remained humble but ambivalent.

With the limited size of the combat force available in the western sector in 1965, the Indian Air Force strategy was mainly premised on air superiority in the war zone up to a depth of around 30 km, while providing interdiction and close air support to the Army. This resulted in forcing the Pakistan Air Force on the defensive since it started to lose fighters in a ratio of 3:1 compared to the Indian Air Force, in air combat, and went over to terminal defences of its airfields. Another example was that of the famous “Tikka Offensive” planned by Pakistan in the 1971 War for both the Army Reserves to launch a coordinated attack through the Hussainiwala and Suleimanki headworks with the complete support of virtually the whole of the Pakistan Air Force which expected to lose one-third of the force in the seven days required by the Tikka Offensive to occupy a large chunk of Indian territory south of Sutlej. Ultimately, the offensive never took off because two Mystere “tank buster” squadrons

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had seriously dented the Southern Army Reserves during the opening days without interference by the Pakistan Air Force.

The USAF has consistently placed its trust in the concept of air superiority. For an air force that seeks to operate outside its own territory, it could not be otherwise since it puts the potential adversary on the defensive to start with. As Gen Michael Carns, the USAF Vice Chief Staff in 1992 had stated in his Congressional testimony⁵ “Our job is to stay one technology ahead of the potential adversary, and given that the former Soviet Union has now sold Su-27s and MiG-29s to 11 nations already and is looking for sales to others, we have situations developing even when in a regional contingency, the F-15 (USAF top of the line fighter at that time) might meet its match. That is not our policy. *Our policy is to have air supremacy and to make sure that the (US) Army is never attacked*” (emphasis added).

But there is one other air force – that of Israel — which has consistently believed in the doctrine and strategy of air superiority and in this process, also proved that gaining and maintaining air superiority is not necessarily dependent on prolonged air battles — nor is size the deciding factor. In fact, the Israeli Air Force was clearly the smaller force compared to the Arab Air Forces arraigned against it in every war. The reason why Israel pursued this doctrine is because its very survival depends upon it; and that is why it is perceived within the country as “Israel’s Best Defence” and enjoys a special status. And, hence, every time it had to fight a war, it won essentially because it won the battle for air superiority; and every time, the tactics and strategy were different. That it did so also in a very short time every time only adds to the logic of the doctrine by proving that the dominant view in the world about air superiority — and what we taught in our staff college —

5. US Congress, Senate Committee on Armed Services, *Department of Defence Authorisation for Appropriations for Fiscal Year 1993 and the Future Years Defence Programme: Hearings before the Subcommittee on Conventional Forces and Alliance Defence*, 102nd Congress, 2nd Session, pt.4, 1992, p. 191.

was flawed. In fact, its dramatic success in the 1982 Beka'a Valley⁶ War was the precursor of the 1991 Gulf War a decade later, with the difference that the latter was on a much bigger scale and, hence, attracted greater attention in spite of the fact that over Beka'a Valley, the Israeli Air Force achieved proportionately higher effect with a much smaller force in much shorter time than the US-led Coalition achieved even in the 2003 Iraq War. But the Israeli Air Force had already demonstrated its doctrine of air superiority in the Six-Day War in 1967; and again in the 1973 Yom Kipper War once it had access to Electronic Counter-Measures (ECM) pods from the United States after the first day's fighting when it lost over 100 aircraft in close air support in trying to stem the Egyptian surprise offensive across the Suez Canal.⁷

On the other hand, there is one country that has gone back to the thinking of the early years of air power history. China had used its air force on an extensive scale in the Korean War in 1950-53; but the outcome was inconclusive. During its invasion of Tibet in 1950, in the 1962 Sino-Indian War and the 1969 Sino-Soviet War, it did not use its air force possibly because of its increasing obsolescence. During the 1979 Sino-Vietnam War also, it hardly attempted to engage (leave alone challenge) the Vietnamese Air Force although its 6,000-strong air force possessed a much larger number of MiG-21 fighters than its adversary. Curiously, it also did not really apply its air force for ground support either — a mission it appears to have shied away from in all the wars it has fought sought since the PRC (People's Republic of China) came into being.

China, which otherwise cannot be accused of transparency in its policies, spelt out its official policy in the *White Paper on National Defence 2004*, that it is planning for a local border but which will be won by "command of the air" (besides command of the sea and use of strategic forces).⁸ It may be noted

6. For a more detailed account and assessment, see Jasjit Singh, "Air Superiority: The Struggle for Dominance" in Jasjit Singh ed., *Air Power in Modern Warfare* (New Delhi: Lancer International, 1985), pp. 1-33.

7. Ibid.

8. "Revolution in Military Affairs with Chinese Characteristics" in the *White Paper on China's National Defence in 2004*, Chapter III, p.1, published to illustrate China's national defence policies and the progress made in the previous two years in *China Daily*, December 28, 2004, at http://www.chinadaily.com.cn/english/doc/2004-12/28/content_403913.htm.

that China is the only country in the world, after a gap of eight decades since the days of Douhet and Mitchell, to formally define “command of the air” as its stated strategy for winning future wars. This appears a far more aspirational than realistic doctrine in the modern world. But given China’s rise to power, and the massive modernisation of its air force during the past two decades, one needs to take note of the nature of this pronouncement regarding its defence policy and its future implications. This announcement did not come as a complete surprise since Chinese political and military leaders had been stating in earlier years that China would shift from the classical doctrine of “People’s War” to a more modern and offensive concept. The air force leadership had been pointing to a clear shift toward a larger air offensive role for dominance in and from the air. For example, in 1999, the Commander of the Chinese Air Force had publicly sought a greater role for the People’s Liberation Army (PLA) Air Force, declaring that the Chinese Air Force will strive for a transformation from the air defence type to an offensive and defensive type as soon as possible. He announced, “At the turn of the century and in the early part of the new century, the Air Force will have a batch of new types of early warning aircraft, electronic-equipped fighter planes, and ground-to-air missiles” and that the air force “*must give more prominence to air offensive, gradually integrate offensive and defensive, and build up a crack, first-rate air strike force*”⁹ (emphasis added).

It is against this historical background that we need to understand air dominance and its future. Most people who use this term actually refer to it in lieu of air superiority. But, in reality, this is only one of the aspects of air dominance. Air-to-air dominance of the adversary is certainly crucial for any future war even among nuclear weapons states if they do go to war; and may be the only way to apply coercive and punitive conventional military power in a nuclearised environment. Air-to-air warfare had moved out of the line of sight limitations long ago to become all-weather and day-night warfare. But air-to-ground warfare had remained limited to line of sight strikes and, hence, also fair weather essentially because of limitations of the available technology

9. “Air Force Commander Liu Shun Yao on Air Force Transformation”, FBIS-CHI-1999-1107, dated November 7, 1999.

to locate moving targets on the ground. In recent years, the envelope of air-to-air warfare has vastly expanded in height as well as in distance due to the increasing ranges of air interception radars and longer range air-to-air guided missiles. Availability of Airborne Warning and Control System (AWACS) and Airborne Early Warning and Control (AEW&C) capabilities had further contributed to this process, bringing these capabilities within the reach of even countries like Pakistan whose economies are disastrously fragile.¹⁰ Beyond Visual Range (BVR) air-to-air guided missile ranges have increased substantively, even claimed beyond 100-km. Hence, the battle for air-to-air dominance would certainly exist as a follow-on to the struggle for air superiority.

But the real change taking place, technologically, doctrinally and operationally, is in the increasing potential of air-to-surface dominance with long-range strikes with precision guided weapons.

The above also raises the issue of what is the fundamental difference among the three components of military power. All three components of military power operate in three different mediums that have their own attributes imposing limits and enabling capabilities as a consequence of this factor. This differential character of air power had led Lord Trenchard, the “Father” of Royal Air Force to state:

A strategic force can be defined as a military force capable of assuming command of its own medium by its own resources. Until the advent of the airplane, the army and navy were valid expressions of the nation’s ultimate military power on land and sea, respectively. With the development of aircraft, however, that ceases to hold true.

AIR-TO-SURFACE DOMINANCE

But the real change taking place, technologically, doctrinally and operationally, is in the increasing potential of air-to-surface dominance with long-range strikes

10. Pakistan has acquired six AEW&C Erieye aircraft from Sweden, is acquiring four AWACS from China, and had made a bid for six Hawkeye 2000 radars to be installed on US supplied P-3 aircraft.

with precision guided weapons. While few countries can possess capabilities of the US Joint Strategic Target Attack Radar System (J-STARS) type, it is clear that advances in sensor technologies and use of Unmanned Aerial Vehicles (UAVs), for example, create capabilities that are within the reach of even middle powers. Here it is useful to note that the ultimate importance of air power rests on its strategic role and capability, unmatched by the other two Services. This is due to the very nature of the medium it operates in. Air power can influence and even control the movements and actions of surface forces. But ground forces and naval forces cannot interfere with the movements and actions of air power except in a limited sense through terminal defence. And if aircraft can launch weapons with the requisite accuracy from beyond the range of such terminal air defence weapons, air power becomes completely independent of even that limited imposition by surface forces. It may be recalled that air-launched, sea-skimming anti-ship missiles used in the 1982 Falklands War, launched from 15,000 ft height and as much as 60 km away from the target ships, had imposed severe damage and limitations on the Royal Navy. Much worse would have been in store if the Argentineans had possessed even a few more Exocet anti-ship sea-skimming missiles and/or their aircraft had some additional range. This is the central factor that makes air forces intrinsically capable of achieving strategic effect.

The basic reason for air-to-surface dominance lies in the basic attributes of air power. Air (and space) power, exploiting the vertical dimension, is in a unique situation of being able to influence, and if properly configured and employed, to control the employment of land and sea forces below. The reverse is not possible, except in an extremely limited way by surface weapons employed for terminal defence to limited ranges. This unique attribute provides air forces with the quality of being a strategic force capable of achieving strategic effect. This is due to the combination of mobility, firepower, reach and flexibility that air power intrinsically possesses. The only serious challenge that air forces have to contend with in the air is that posed by the enemy air forces, which in principle could possess similar or better capabilities. And air dominance cannot be exploited to its intrinsic advantages unless the hostile air force is subdued or, ideally, eliminated

from being a factor in war. It needs to be noted here that many of the lessons of recent wars could be misread since the wars took place in an environment of near total dominance by the US (and its allies) in the air and space.

Logically, air dominance capabilities should be planned for in peace-time. Existential air dominance capabilities provide a powerful conventional deterrence capability. They would then confer a definitive competitive advantage in case of deterrence failure, enhancing the credibility of deterrence. Higher credibility of deterrence itself implies reduction of the risks of deterrence failure. But at this point in our history, while we aim for building future capabilities, air dominance in our case would have to be contested, in all likelihood from a position of disadvantage (if we are unable to rapidly restore the air power balance vis-à-vis China). Given the ongoing military modernisation and the unambiguous priority that China and Pakistan (since 1999) are giving to rapidly build their air forces, the decline in the IAF force level would have to be arrested on the highest priority before we can seriously address the issue of optimising air force capabilities.

It is not clear how far the reality is recognised that it is the Indian Army that is likely to face the brunt of the effects of adverse air power balance far more than the Indian Air Force since the ability of the Army to fight the land battle would be severely constrained by hostile air forces, especially if they can muster sufficient air dominance capability. Those that may doubt this need to recall 1962, when for a variety of reasons (including the Army HQ placing higher priority on air-transported supplies than offensive air support), combat air power was not used in spite of being available, which would have made a seminal difference to the war on the ground. This is likely to be much more crucial in the Himalayan terrain which would severely restrict the Army's ground mobility since the friction is much higher than in the plains. This can be rectified to some extent by the use of helicopters

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and light fixed wing aircraft (like the handful of Otter and Caribou aircraft which were used for this purpose to great advantage in 1962). At the same time, it is clear that artillery firepower would be most crucial in mountain warfare. But the handicap also must be recognised that in the Himalayan terrain, there would be few open spaces for siting the guns; and these could become lucrative targets for enemy air power. In turn, this enhances the premium of air dominance in the Himalayan environment. The abiding lesson of warfare is that advantages in mobility and firepower (individually and collectively) provide the key to war winning, and any disadvantage in this respect could be disastrous. And vulnerability in mobility as well as firepower would severely undermine the force employment options of the ground forces which could only be compensated by air power.

We need to recall that air-to-surface warfare had remained “line of sight” operations. The pilot of a strike aircraft had to essentially locate the target, acquire it visually, and aim his weapons while keeping the target in his sights. This obviously resulted in strike aircraft having to launch their weapons from as much as around 800 to 1,200 metres range and almost inevitably fly over the target area after weapon launch. This had led to making air defence as intense and dense as possible and, hence, the impact of air power was conditioned by the equation between the attacking aircraft and the air defences around the target system. Most weapons had remained unguided for the simple reason that technology, especially sensor technology, had not advanced sufficiently for precision guided weapons to be launched to hit the target any other way. All this has been changing due to access to new sensor and guidance technologies and almost all weapons launched during the 2001 Afghanistan War and the 2003 Iraq War were launched from 15,000 ft altitude (or more, even up to 25,000 ft, in the case of B-52s), well outside the air defence weapons of the adversary, from long distances, which also meant that the strike aircraft would not need to fly over the target area.

This capability of making air-to-ground strikes BVR and, hence, almost all-weather long-range precision guided accurate, reducing the number of weapons required to neutralise a target as well as reduce the losses of the strike force, has tremendously enhanced the capability of air forces (that

opt for the requisite technologies).¹¹ This process, which had started during the Vietnam War, reached its highest point so far in Afghanistan and Iraq. This ability of air dominance of ground forces and targets with long range precision strikes is now increasingly available to air forces that absorb the lessons of history and refine their doctrines and strategy accordingly. However, the corollary is that the strike force must also have accurate and timely target information. In other words, readily available air intelligence is critical for the success of such air dominance. One can only agree with Richard Hallion when he says in his seminal historical study of air-to-ground air strikes:¹² "Technology devoid of strategic thought and doctrinal underpinning is incapable of serving a nation's defence needs."

But these capabilities have not reduced the tensions between land forces and air forces. The US, which has extensive experience in joint operations, has again found that, "The (US) Army and the Air Force experience the greatest inter-Service tension over the relative roles of ground and air power in warfighting. This tension largely results from how joint doctrine designates areas of operation (AOs) and how the Army views deep operations..."

This is not the only area of tension between the US Army and USAF. In spite of enormous investment in "jointness", the two Services have serious differences (Goldwater-Nichols Act notwithstanding), among other areas, with management and control of the air space in the battle zone. In recent times, this has erupted poignantly in Iraq where at least five collisions have recently taken place between UAVs and combat aircraft/helicopters within a small area of 30-odd sq km above Baghdad, where close to 100 aircraft (including UAVs) are operating on a typical day.¹³ The disagreements are not about ownership, but actually about the "fundamental philosophies of command and control" of the two Services in spite of decades-old foundations of joint operations and unified joint command.

This, in turn, raises the conceptual issues regarding coordination of boundaries between the air and ground forces. Land forces have tended

11. We will examine the technologies for air dominance in a separate study.

12. Richard P. Hallion, *Strike from the Sky: The History of Battlefield Air Attack 1911-1945* (Washington DC: Smithsonian Institution Press, 1989), p. 270.

13. Gayle S. Putrich, "Unmanned and Dangerous: How UAV-Plane Collisions Are Changing US Air Control," *Defense News*, June 11, 2007, pp. 7-8.

The primary role of the Air Force in respect of the joint war-fighting would be to shape the battlespace at the operational and strategic levels, besides providing close air support and performing other roles like ISR, airlift, etc.

to acquire weapons with increasing ranges and lethality and acquire a justifiable interest in what happens over the horizon and what has come to be known as the “deep battle” in hostile territory, well beyond the ground battle contact line. But by their very nature, ground forces are far less effective as a force to conduct military operations well beyond the contact battle as compared to air forces. An objective analysis of the potential, and employment, of the 150-km Prithvi and 300-km Brahmos with conventional warheads to achieve discernible effect on war-fighting and war-winning would indicate their limited utility while complicating coordination challenges, while markedly raising nuclear ambiguities which could hardly serve our interests. Air assets provide the

best, and mostly the only capability to effectively undertake operations in depth and beyond the immediate battle, especially when this is limited to the local-border war framework. This is exactly what strategic reach of the Air Force makes possible to enable strategic effect to be achieved.

As regards optimising single Service capabilities, war in the vertical dimension has to be fought and won by the Air Force by its own means, and air dominance would remain its preeminent role and mission to provide the environment for war-winning. But air dominance, in both air-to-air as well air-to-surface superiority roles, would provide enormous freedom of action for ground and naval forces to conduct operations they are best suited for while undertaking (strategic and operational level) air strikes and support missions contributing to the war-fighting capabilities of surface forces. The primary role of the Air Force in respect of joint war-fighting would be to shape the battlespace at the operational and strategic levels, besides providing close air support and performing other roles like Intelligence, Surveillance, Reconnaissance (ISR), airlift, etc.

Ground forces now possess overwhelming tactical dominance capabilities and the optimum role for their employment in a local border

war would be to force the enemy to react at the operational level by either concentrating forces or moving the reserves, thus, making them vulnerable to air attack with the air-to-surface dominance of the Air Force. Similar principles apply in respect of application of air power in the naval environment, possibly with greater effect since the protection provided by camouflage, dispersal and other survival strategies is not available at sea, making naval assets more vulnerable to air power. In the ultimate analysis, "Air power is a strategic force in that it offers the opportunity to *defeat the enemy's strategy* — sometimes (*sic*) directly but most often in concert with other forces"¹⁴ (emphasis added). Optimising air power capabilities and force application provides seminal asymmetric advantages in war-winning strategies.

As noted earlier, the greatest inter-Service tension in modern militaries across the world has been found in the relative roles of ground and air power war-fighting. The crux of success of joint war-fighting is that both the land force Commander and the air force Commander must accept that the roles and effects created by each component lead to maximising war-fighting effects within the bounds of land and air power capabilities. A recent seminal study by RAND came to the conclusion that a clearer division of responsibility between the roles and missions of ground and air power would go a long way in enhancing joint war-fighting. Thus, it has concluded that the principal role of the land forces would be to employ its overwhelming tactical dominance to:¹⁵

- "Force enemy reaction at the operational and strategic levels by forcing concentration and/or movement, thus, making them vulnerable to air attack.
- "Close with, and finish, enemy tactical remnants, exploit success and seize and hold ground.
- "Deal with the post-conflict security environment until the desired strategic political end state is achieved."

14. Ronald R. Fogleman (then USAF Chief of Staff), "Aerospace Doctrine: More Than Just a Theory," *Air Power Journal*, Summer 1996, p. 45.

15. David E. Johnson, *Learning Large Lessons: The Evolving Roles of Ground Power and Air Power in the Post-Cold War Era* (Santa Monica: RAND, 2007), pp. 193-194.

The role of air power, according to this study, argues the author, should be to:

- “Shape the theatre at the operational and strategic levels.
- “Provide close air support (CAS), intelligence, surveillance, and reconnaissance (ISR), and lift to support ground combat operations.
- “Provide CAS, ISR, and lift for ground-force operations to secure and stabilise the theatre.”

However, we must note a caveat here. The study and experience of the US military in war-fighting since the end of the Cold War (Gulf War 1991, Bosnia 1995, Kosovo 1999, Afghanistan 2001-, Iraq 2003-) have been against enemies that did not possess air power, except for Iraq in 1991, which was rapidly neutralised by the far superior US air power. The clear lesson is that the above recommendations assume total command of the air. In our case, this is not likely to be the case, and that command would have to be contested. Hence, the role of seeking and achieving “air dominance” would be a pre-requisite to the ground and air power roles outlined above. It is useful to recall that NATO land force Commanders in the early 1980s used to specify that their highest priority was for the air forces to “keep the enemy air forces off their backs.”

Where would air-to-surface dominance provide the greatest payoffs? By any logic, this would come from neutralising the enemy’s army reserves, preferably before they can begin moving and at least when they try to reinforce the battle. In a way, this was one of the major achievements of the Israeli Air Force during the Beka’a Valley operations in 1982 when, having neutralised the bulk of the Syrian Air Force, it set about destroying the Syrian 3rd Armoured Division moving up to strengthen the ground battle. This logic was at the root of the US/NATO doctrine of “Follow-on-Force-Attack” (FOFA) in the early 1980s. The logical progression of the capabilities for air-to-surface dominance would lead to the major task of the ground forces to make the enemy move and for the air force now to destroy them. This is the way that air forces can best shape the future battlefield; and by the same logic, the air forces would accord a high priority to protection of our own army reserves from a potential attack by the enemy air force.