JOINT OPERATIONS IN MODERN WARFARE

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Brigadier **M. Sabharwal** being congratulated by Marshal of the IAF **Arjan Singh** DFC after receiving the Second Prize on October 16, 2005

India's security environment includes land borders of 3,300 km with Pakistan and 3,900 km with China, with whom India has major territorial disputes; 5,400 km of main coastline; and approximately two million sq km of exclusive economic zone (EEZ). The defence perimeter encompasses some of the most difficult and treacherous terrain which includes the glacial region and high mountain ranges of the Himalayas in the north and northeast, high and low mountains and jungles in the east, and sandy deserts and the Rann swamps in the west. India also has more than 650 islands in Indian Ocean region (Andaman and Nicobar group and Lakshadweep Islands) where lie our sea lanes of

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communication; 95 per cent of India's overseas trade moves through the medium of the sea. Our current oil consumption is 80 million tons per year and by the year 2020, it is likely to rise to 150 million tons per year. Any blockage will have a crippling effect on the economy.

India has a regional and global economic status which implies that she would have to project her military might to support her allies to safeguard their interests in Southern Asia. To do this, it is imperative that our future force structure be integrated and tri-Service in nature.

At the time of our Independence, the need for a joint approach was well appreciated by our military leadership. We had inherited a command structure for the Services where we had unity of command, under a commander-in-chief (C-in-C).We soon set up a joint Services wing for training officer cadets, which later became the National Defence Academy (NDA). The Defence Services Staff College (DSSC) continued as another joint institution, and in 1964, the National Defence College(NDC), as the apex joint institution, was set up. Hence, joint Service cooperation is not new to us and nor are we reinventing the wheel, if we aim at the concept of integrated operations.

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Owing to rapid advances in technology, forces on land, at sea, and in the air reinforce and complement each other. Therefore, synergised application of military power at the theatre, operational and tactical levels is the essence of winning wars. The future of war is based on mastering the flow of information and conducting combat operations jointly. The side that can best synergise the efforts of its armed forces jointly will win military operations in the future. The joint approach, to be effective, must start at the very top and must percolate to the lowest levels. The armed forces must operate as an interdependent team. The focus, therefore, should be on joint doctrine, joint intelligence and evolution of joint plans, joint combat support organisations and joints logistics.

This paper gives a perspective on the evolution, concepts and principles of planning and execution of joint operations, and the role of air power to achieve the political-military objectives.

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CONFLICT SETTINGS

The question that arises is, what kinds of warfare can one envisage in our case, because it shall impact the doctrines and the development of weapon systems? There would be four types of likely conflict scenarios in our regional context as enumerated below.

Nuclear War

The Government of India has already announced the main features of the nuclear doctrine. This is based on the concept of "no-first-use" of nuclear weapons which implies possession of a "second strike capability." India has also declared "non-use" of nuclear weapons against states not in possession of nuclear weapons. Organisation of standby command, control, and communication centres would be needed and their security will have to be ensured. The air force will be the primary military element involved in the conduct of a possible nuclear exchange at this stage since the delivery systems at present with India are the nuclear capable aircraft of the Indian Air Force (IAF). Now that longer range surface-to-surface missiles are being brought into active service, a joint strategic command has been raised to command the integrated missile forces and nuclear capable aircraft fleet for a strategic role in a nuclear war.

Conventional War

This is the most likely type of conflict which the regional countries could face in terms of an all out war. Wars in the future would be multidimensional, with air power fighting its battles for command of the air so that our own forces in

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the air, on the ground, and at sea would be able to conduct their operations without enemy air interference. In this type of operation, it is necessary to have all air power assets under the single point control under a theatre air commander.

Limited War, Border Skirmishes and Hot Pursuit

A war of the kind fought in Kargil that was limited to a specific areas of conflict. It is here that the role of air power assumes greater importance. Precise military targeting not only limits the number of fatalities, but also reduces the threat of possible expansion. Earlier, the assumption was that if you use air power, the conflict would expand; and if you keep air power out, the conflict would remain limited. But the use of air power in the Kargil conflict kept the war limited, especially since precise targets were being taken out.

Low Intensity Conflict

Since Independence, India has been facing insurgency and militancy in the northeast, and during the last 10-15 years, in the northwest of the country also. Such militant movements have been abetted and aided by external forces, which provide training, weapons, and sanctuary to the militant organisations in addition to giving them moral and political support. Since the paramilitary and police forces have not been able to deal effectively with this type of threat, well organised and well armed by external powers, the Indian Army has been deeply involved in anti-militancy operations in the border states of India and it has achieved a very significant degree of success in both the northeast and northwest. Air power, in the form of helicopter operations and air maintenance by

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EVOLUTION OF JOINT OPERATIONS

Military development is a continuous and evolutionary process. Tactics were based on fire and movement and they remained essentially linear. Warfare was also a response to the increase in battlefield firepower. In World War I, the Germans were aware that they could not compete with the Allies because of their weaker industrial base; hence, they developed radically new tactics, which were based on manoeuvre rather than attrition.

The advent of aircraft and tanks brought about a major shift in World War II. This operation was named *Blitzkrieg* by the Germans, in which emphasis was placed on manoeuvre, speed and tempo to carry out wide outflanking movements, avoiding defences, to strike at rear areas in order to cause psychological collapse. The Germans exploited their tactical excellence to cause unprecedented defeats in the first two years of the war.

The Americans picked up ideas from the Germans regarding "manoeuvre warfare." They propagated a simultaneous engagement of operational components of the enemy's defensive system, along its entire depth, to cause "operational shock" and development of an operational momentum far exceeding the reaction capability of the opponent. The US Airland Battle concept talked of a main strike into the opponent's main operational weakness.

Just a decade after the Kitty Hawk's maiden flight, it was during World War II that air power emerged as an essential element of all modern wars. Without air power, no nation could think of executing a successful war. It was in the last decade of the 20th century that certain events have defined the unique role that air power is destined to play in the 21st century. The nature of conflict has undergone a transformation. Large land forces would be launched to capture vast tracts of land, which would coerce the enemy to conform to the dictates of the superior power. However, this underwent a change during the Gulf War of 1991 and the conflict in Yugoslavia, wherein air power was used as a coercion tool, from the erstwhile occupation of land. Land occupation cannot be tolerated

by the global community, as was evident by the misadventure of Iraq to capture the territory of Kuwait. Not only is it unacceptable globally but also it would not be possible to hold such tracts of land if achieved by default. Coercion by air power, which can be projected deep into enemy territory, has replaced occupation as a dominant strategy.

Air power has a lead role in executing the strategy of coercion. With its formidable firepower and unmatched reach, air power is the instrument of choice for any leader of modern warfare. It enables precision engagement deep into the heart of the enemy's hinterland. Its ability to circumvent defences and destroy the enemy's centres of gravity with minimal application of force makes it the most cost-effective and efficient tool of war. It has the ability to deliver an immediate and direct message to the enemy to desist from an evil design, or risk the wrath of destruction of its various of centres of military, economic and political power

The North Atlantic Treaty Organisation (NATO) countries, having appreciated the strength of the three Services, have now integrated and synergised the war-making assets of their fighting machinery. As an example, in the Afghanistan War, the objective was the elimination of the Taliban regime and the destruction of the Al-Qaeda terrorist network. Despite massive bombings from the air, without ground troops this could not be achieved. Air power in support of the Northern Alliance fighters had led to the initial retreat by the Taliban and AI-Qaeda forces from Kabul to Kandahar. Air strikes also harassed that retreat, but without armed and more mobile ground troops to encircle Kabul, the enemy would not have been surrounded and encircled.

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CONCEPTS AND PRINCIPLES OF JOINT PLANNING

During the US offensive against the Taliban, air power could not have succeeded on its own. Even if the air force had succeeded in

destroying all the targets like command posts and ammunition dumps, this in itself would not have weakened the Taliban. The air force was guided onto targets by small mobile land forces having satellite communication and accurate positional data. The final mopping up and occupation of ground had to be done by the ground army. Hence, the outstanding cooperation between the land and air forces ensured total annihilation of the Taliban.

The concept of joint operations should be one of integrated operations. This would imply an integrated command structure at the strategic and operational levels. As a start, an integrated command of the Andaman and Nicobar Command has been put into place. This now needs to be duplicated in all other theatres as well so as to synergise the resources available in all theatres of operations.

The Chiefs of Staff Committee (COSC) is the apex forum where the Services come together. At the level of the Services, it is essential to have a Chief of Defence Staff (CSD), so that a holistic approach to doctrine development, joint military operations, force structuring and budgetary issues concerning the three Services can be taken. The CDS should have both command and management functions.

The essence of integrated operations is to convert the political objective, i.e, the strategic goal, into military objectives, with least cost on our side. This advocates a tri-Service approach to achieve the strategic goals of the theatre of operations through use of synergised technology, firepower and manoeuvre. This advocates integration of all elements in a theatre, under a single commander and, thus, the planning, conduct, methodology and procedures will have to be jointly evolved

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and operational level war-games with connected software to monitor and analyse new threats, new technologies and new concepts. This will help in validating any new doctrine that we need to evolve in the future.

Currently, in our context, planning for war is being done by each Service separately. There is now a need to integrate the three Services so as to plan and operate as one formidable force under the CDS.

JOINT DOCTRINAL ASPECTS

Definitions

Doctrine is a system of views adopted in a given period on the aims and character of a possible war, on the preparation of a country and its armed forces for such a possibility as well as on the method of waging war should it break out. Changing circumstances (e.g. demography and technological changes) must be constantly evaluated because they can modify beliefs and necessitate changes to doctrine

Doctrine is the technical language with which we communicate the commanders' intent, battlefield missions, control measures, combined arms and joint procedures, as well as command relationships. Doctrine is not confined to one level of war – strategic, operational or tactical – it embodies all. In order to achieve the full synergistic effects of joint combat power, the war-fighting doctrine must be common to the three Services.

A joint doctrine would be a set of fundamental principles, which will guide the employment of all the forces of the army, navy and air force, and in certain contingencies (e.g. low intensity conflict (LIC) operations), even paramilitary forces and units of the central police organisations (CPOs).

Current Doctrinal Status

Currently, there is no joint operational doctrine for both conventional and non-conventional warfare, as well as for LIC. Hence, joint doctrine needs to be formulated. The initial focus should be at the operational level, as activities at the operational level analyse, select, and develop institutional concepts and doctrine for employing major forces to achieve strategic objectives within a theatre.

The army, air force and navy have each developed their individual doctrines without consulting the other two Services. In fact, the Indian Army's new war doctrine advocating primacy to land forces during joint operations against the enemy has evoked a response from the IAF spokesman, "Gone are the days when the air force was treated like an extended artillery and troop carrier. Air operations have become much more sophisticated and it will be unfair to treat us as secondary players under the command of the army as is being suggested in their war doctrine."

Army Doctrine

The central idea of the cold start war doctrine revolves around replacing the age-old concept of mobilisation of forces and strike corps spearheading the attack. The salient features of the new war doctrine are:

(a) The changed world doesn't allow massing of troops, as this invites diplomatic intervention.

(b) Aim for total destruction of the objective but spare the enemy's strategic potential to avoid a nuclear response.

(c) Focus on precision capability and hard impact, since massive air and land campaigns are not possible.

(d) The Indian Army's combat potential would be fully harnessed. The distinction between strike corps and defensive corps in the ground holding role will be gradually diminished.

(e) The offensive military power available with the defensive corps in the form of independent armoured brigades and mechanised brigades, by virtue of their forward locations, would no longer remain idle, waiting to launch counter-attacks. They would be employed at the first go and mobilised within hours.

(f) The strike corps may be reconstituted and reinforced to provide offensive elements for these eight or so battle groups to launch multiple strikes into the enemy territory, fully integrated with the IAF, and in the southern sector, with naval aviation assets.

(g) Obviously, then, India's strike corps elements will have to be moved well

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forward from existing garrisons. It also means that the strike corps would no longer sit idle waiting for the opportune moment.

Air Support. The IAF would have a very crucial and critical role to play in the successful implementation of this new war doctrine. The "cold start" eight or so battle groups cannot undertake *Blitzkrieg* type military operations without an overwhelming air superiority and integrated close air support (CAS). The IAF would, therefore, have to proportionately assign its combat assets to cater for the following:

(a) Achieve overall air superiority so as to paralyse the enemy's air force or render it so ineffective as to be unable to seriously affect the area of operations of the "cold start" offensive battle groups.
(b) Dedicate a fair portion of its combat assets for the air defence of the Indian homeland.
(c) Earmark dedicated CAS and ground attack squadrons in direct support of the battle groups.

Naval Support. Besides its traditional tasks of sea control, naval blockades, etc. the naval aviation support for the battle groups operations is a step in filling some of the voids of IAF combat assets, besides dividing the enemy's aerial combat strength. The Indian Navy should concurrently be focussing in the war doctrine scenario on amphibious operations deep in the enemy's rear, so that Pakistan is forced to fight on three fronts, and in the process, its resistance is fragmented.

Air Force Doctrine

Air power is to be employed to achieve command of the air by counter-air operations while, at the same time, carrying up the war to the heart of the enemy's war-making potential by a strategic air offensive. In addition, air power is to be

used for counter-surface operations, along with the ground and sea forces.

A new technology-based air force is an effective deterrent because of its quick reaction, surprise, speed, reach, and concentration of firepower. Its responsiveness acts as a deterrent, which is highly credible because it can be employed without moral constraints, which is not the case with nuclear weapons.

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Modern multi-role fighter aircraft can be configured to undertake any type of offensive role and deliver a wide variety of conventional or non-conventional munitions. With the advent of precision guided munitions (PGM) and target designation, modern technology has given air power the capability of destroying targets with single digit circular error probable (CEP) and the least amount of collateral damage. Given the wherewithal, these characteristics endow air power with the ability to psychologically and physically imbalance an opponent and achieve strategic aims set by the national leadership.

The air force doctrine involves the systematic application of force to a selected series of vital targets that make up the enemy's key military, political, and economic power base . Integrated strategic and tactical actions produce a cumulative effect on the enemy's ability to wage war. To achieve this, there must be a command structure to control the assigned air power coherently and consistently and to ensure that the air power is not frittered away.

Another important aspect of the air force doctrine is the priority it assigns to gaining control of the air. Air superiority should be the first consideration when employing aerospace forces. Air superiority is essential to success in modern conventional warfare because it prevents the enemy's air force from interfering effectively with the ability of friendly air

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forces to conduct strategic attacks' air interdiction, surveillance and reconnaissance, airlift, close air support, and other important air operations. Friendly control of the air not only makes these air operations more effective, which, in turn, greatly enhances the effectiveness of surface forces, but can also enhance the effectiveness of surface forces by preventing detection and interference with their employment by the enemy's air force. In addition, control of the air denies these same advantages to the enemy.

Navy Doctrine

The Indian Navy today is a blue water navy and seeks a dominating role in the Indian Ocean. The outcome of India's emerging enemy's profile is the security of the sea lanes of communication in the Indian Ocean and beyond. Apart from the high traffic density of oil and cargo vessels in this area, there are issues of piracy and maritime terrorism to be considered. Thus, the safe transportation of oil and gas requires enhanced sea-land defence capability. The navy also has a major responsibility to ensure the protection of not only our own shorelines but also the shores of our friendly neighbours when called upon to do so. Thus, the naval doctrine needs to be all-encompassing to ensure that the tasks given to it are carried out in the best possible manner.

Joint Doctrine

Defence analyst Maj Gen Afsir Karim, in fact, questions the very concept of the army's new war doctrine on that ground. "How can the army unilaterally seek to adopt a new war doctrine? Adoption of it needs the active involvement of the air force and the navy."

The IAF does not agree with the army doctrine's formulation that during joint operations, air power should be in support of land forces' operations. "It is not correct to say that the objective of the air operations should only be to degrade the enemy's air power and reduce its capability to interface with the operations of own land forces." Further objections arise with the army's take on joint planning of air operations, where it has been suggested that the air support operations should be decided by a joint army air operations centre and that this

body should tell the Air Command about the targets, the degree of neutralisation and the timeframe in which to finish the task.

As an example, the IAF may conduct a brilliant campaign and substantially degrade the enemy air force, but it would be meaningless if the land operations get stalled due to lack of effort for offensive air support.

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A joint doctrine must be the result of an examination of the military capabilities in being and others that are needed. Our plans for introduction/upgradation of equipment should be based on this. With ever increasing complexity of conflict, and the overpowering need for quick, effective and efficient actions, we need a doctrine on the basis of which training is effected and our capabilities tested.

A joint doctrine must be based on a clear concept of jointmanship. The first essential for effective jointmanship is trust and confidence. This can come about only through an understanding and respect for the capabilities, limitations, strengths and weaknesses of the other Services. Individual requirements must give pride of place to what is operationally needed.

Thereafter, much time and effort is required for contingency and operational planning. A large standing team of planners is needed. After planning and acceptance of plans, strategic and tactical, the implementation should be decentralised to the maximum possible extent. With information systems available today, senior echelons in the military hierarchy can remain updated and, hence, in a position to lend support, and advise as and when required, but must refrain from unnecessary interference.

The doctrine should include intelligence collation and analysis, information warfare, psywar, economic and commercial war, diplomacy, and media management which are as much, if not more, important during periods of relative peace when the 'hot' war is less active. Similarly, use of space assets should find a place in the doctrine.

USE OF AIR POWER IN RECENT CONFLICTS

Recent conflicts are helpful in understanding the role of air power. Classic examples have been the Arab-Israel Wars of 1967 and 1973, the 1991 Gulf War, Yugoslavia, Afghanistan, Iraq and Kargil. Let us examine these in the light of the effectiveness of air power and, therefore, the future role and impact of the air force in our context.

Arab-Israel Conflicts

The Arabs and Israel have had two major wars, in 1967 and 1973. During the 1967 conflict, the Israelis, by a preemptive strike, were able to destroy most of the Arab Air Force on the first day of the war. After this, the Israeli Air Force was utilised to attack the Arab mechanised columns. The Israelis thereafter launched their offensive with their armed columns and gained control of Arab territory, more or less unopposed.

Having learnt their lesson after the 1967 War, the Egyptians built concrete shelters for its aircraft and similar steps were taken by other Arab countries, and also India. Also, the Arabs strengthened their air defence systems by acquisition of surface-to-air missiles and anti-aircraft guns which were radar controlled. Most other countries of the world, too, having learnt a lesson from this war, augmented their air defence system by acquiring surface-to-air missiles and radar controlled anti-aircraft weapons, in addition to interceptor aircraft with ground-based/airborne early warning radars.

During the 1973 October War, Israel could not mount a preemptive strike due to the strong air defence of the Arabs. To counter this, Israel used electronic counter-measures (ECM) and other counter-measures like Chaff. Hence, it was proved that a closely integrated air defence system could deny enemy air power air superiority over the tactical area. Methods to circumvent this were, however, utilised during the 1991 Gulf War by the Coalition forces which were able to defeat the Iraqi air defence system. However, in air-to-air combat, the Israeli Air Force outperformed the Arabs due to superior training, modern air-to-air missiles and technically superior weapon systems and aircraft. More than 70 per cent of Israeli aircraft were lost due to anti-aircraft weapons and 20 per cent due

to air-to-air combat, whereas the Arabs lost 80 per cent of aircraft due to air-to-air combat and 20 per cent due to ground-based anti-aircraft weapons.

1991 Gulf War

In the 1991 Gulf War, the task given to the Coalition Air Force was to seize and retain air superiority, isolate and incapacitate the Iraqi leadership, destruction of Iraq's nuclear, biological and chemical (NBC) capability and elimination of its offensive and defensive capability. The primary target of the Coalition forces was the Iraqi air defence network and command and control centres. In addition, attacks were mounted on the electric supply, water supply, bridges, principal roads and oil refinery installations. The ground offensive was a mopping up operation.

The first strike was mounted by more than 400 aircraft, including in-flight refuelling tanks and airborne warning and control system (AWACS). The main attacks were mounted by F-117 A Stealth aircraft, supported by cruise missiles, which reduced the detection range of the Iraqi air defence radar systems. The Iraqis were relying on their air defence system, as did the Arabs in the Arab-Israel conflict of 1973, which was defeated by the superior technology of the Coalition forces.

The synergies that resulted from his employment of air power gave General Schwarzkopf overwhelming advantages by the time he launched his ground offensive. The Iraqi Army had been severely weakened physically by intense, almost continuous air attacks that had demonstrated that aircraft can be extremely effective tank killers. The Iraqi Army had also been greatly weakened psychologically by the knowledge that it had almost no ability to resist the Coalition's devastating air attacks. Thanks to his AWACS and joint

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surveillance target attack radar system (JSTARS), General Schwarzkopf possessed unprecedented near real-time information on air and surface operations of both Coalition and Iraqi forces.

General Schwarzkopf demonstrated that it was possible to achieve campaign objectives at an extraordinarily low cost in terms of friendly casualties when surface forces were used to support the employment of air power. He did this by using Coalition ground and amphibious forces at the beginning of the campaign to fix Iraqi units into positions where air interdiction could inflict terrible destruction, while simultaneously denying these units effective resupply. During this time, General Schwarzkopf also used surface forces to protect his air bases and disrupt Iraqi surface-based air defences. After his air power had destroyed the ability of the Iraqi Army to fight effectively, he used the manoeuvre of his surface forces during the ground offensive to seize Iraqi air bases as well as to force Iraqi units into the open where air power could pursue them and inflict even greater destruction.

Control of the air allowed General Schwarzkopf to used the electromagnetic spectrum to communicate quickly with his forces, whereas the Iraqi military was often reduced to using couriers. Observation made possible by control of the air greatly enhanced the effectiveness of Coalition artillery, while simultaneously rendering Iraqi artillery largely ineffective. Finally, unlike the Iraqis who had almost no supplies of any kind because of the Coalition's air interdiction, General Schwarzkopf was able to support his advancing manoeuvre forces with bumper-to-bumper convoys of trucks.

Yugoslavia

In the Balkans, the NATO air operation caused immense damage to the Serbian military machine and its economy, causing Slobodan Milosevic to surrender in Yugoslavia. It was a cumulative effect of strikes which led to the surrender. Like in the Gulf War, NATO planned to send in troops into Kosovo after ground resistance had been neutralised by air operations so that there were no casualties of NATO troops. As in the case of the Gulf War, in Serbia also, ground forces were required to capture and hold ground, which cannot be done by air power.

Afghanistan

In Operation Enduring Freedom, the US operations in Afghanistan, US air power directed by special forces and air force personnel operating in conjunction with local forces, crushed the Taliban and scattered AI-Qaeda in a matter of a few weeks. The conventional army was employed only at the commencement of Operation Anaconda in March 2002 after the Taliban regime had fallen. The regular army 's role in these operations had been to eliminate the Taliban and AI-Qaeda remnants and to provide assistance to the new government in Kabul.

Iraq War

The Coalition military strategy for capture of Baghdad was simple. Their mechanised and armoured formations would advance unhindered into the enemy territory till they came across a major defence line of Iraqi regulars; they would pause, let loose their air power, both in the shape of fixed wing and rotary wing (helicopters) platforms, decimate about 70 per cent of the defenders' combat power and overcome the rest with their superior ground weaponry. This was the pattern throughout the campaign till Baghdad was reached.

Although the Coalition ground forces had far superior weaponry and were better trained and equipped than their Iraqi counterparts, this must be balanced by the fact that Iraqi motivation as defenders had to be of a higher level; also they were fighting for survival in their own backyard and their knowledge of the terrain had to be superior to those of the aggressors. The one single factor which made the entire operation so lopsided that even conventional resistance in the form of counter-attacks by Iraqi forces was doomed,

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was the Coalition air power which achieved air supremacy from the very beginning of the campaign and practically decimated the Iraqi armed forces, and their command and control infrastructure, thus, preventing them from executing any form of military manoeuvre to counter the advancing Coalition ground formations. It paved the way for a relatively easy passage for the Coalition ground troops.

In Operation Iraqi Freedom, there are many examples of the use of air power to achieve strategic aims. In northern Iraq, the refusal of Turkey to allow the US 4th Infantry Division to stage through Turkey posed a major operational dilemma for the US Central Command (CENTCOM). Instead of using the regular army in the north, they employed elements of the 3rd and 10th Special Forces Groups, together with the Kurds militia to engage the Iraqi Army. Operating with US fighter aircraft and AC-130 gunships, this force tied down four Iraqi corps and prevented them from being shifted south. Whenever the Iraqi forces were able to organise a new defence, aerial firepower either destroyed them or drove then off their positions.

Another example of the effectiveness of the US air power is of Iraqi armour that manoeuvred during a sandstorm in order to meet the Coalition forces as they closed in on Baghdad. Iraqi's Medina, Baghdad and Hammurabi divisions, counting on the cover provided by the sandstorm, repositioned to meet the coalition forces. JSTARS and long range unmanned aerial vehicles (UAVs) detected the movement and guided B-1 and fighter-bombers to intercept them. using infra-red (IR) targeting devices that could penetrate the clouds of sand, and the aircraft inflicted severe damage.

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The conflict in Iraq has proved once again the dominance of air power in the modern battlefield. A force of about a hundred thousand combat troops invaded a country the size of Iraq, which itself fielded about five hundred thousand reasonably equipped regular and irregular forces, and

inside three weeks, captured the capital city Baghdad, after traversing over 400 km of hostile desert and even more treacherous crossing points. It was a victory of modern technology of the Coalition forces over the raw courage of a handful of Iraqi defenders.

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Kargil

The IAF was first approached to provide air support on May 11, 1999, with the use of helicopters. This was followed by a 'go ahead' given on May 25 to the IAF to mount attacks on the infiltrators without crossing the line of control (LoC). While there was considerable pressure from outside the IAF to operate only attack helicopters, the Chief of Air Staff succeeded in convincing the government that in order to create a suitable environment for the helicopters, fighter action was required.

Operation Safed Sagar, as the air operations in the Kargil area were called, was indeed, a milestone in the history of military aviation, as this was the first time that air power was employed in such an environment.

No aircraft has yet been designed to operate in a Kargil-like environment. At high altitudes, a crucial factor in aircraft performance is the reserve of power available, which for the MiG and Mirage fleets, was a strong point in their favour.

IAF air strikes against enemy supply camps and other targets yielded rich dividends. Most operations on the ground were preceded by air strikes, each and every one of which was the result of coordinated planning between 15 Corps and the air officer commanding (AOC), Jammu and Kashmir (J&K).

In the area of interdiction of enemy supplies, the successful and incessant attacks on the enemy's logistic machine had culminated in serious degradation of the enemy's ability to sustain himself in an increasing number of areas. The series of attacks against Pt 4388 in the Dras sector was an excellent example of how lethal air strikes, combined with timely reconnaissance, detected the enemy plans to shift to alternate supply routes, which were once again effectively attacked. In this, the IAF succeeded in strangling the enemy supply arteries,

Of the two warring sides, it was the Pakistan Army that suffered the air strikes, which, obviously, contributed significantly to its casualties. Without the use of air power, our own casualties would have increased considerably.

Normally, an enemy defending a well fortified position suffers between 3-6 times less casualties than does the force on the offensive. However, this operation had seen the reverse, with the enemy casualties far in excess of those suffered by us. Of the two warring sides, it was the Pakistan Army that suffered the air strikes, which, obviously, contributed significantly to its casualties. Without the use of air power, our own casualties would have increased considerably.

Attack choppers like the Mi-35 were incapable of operating at that altitude, which promoted the use of armed and modified Mi-17s for the role. Besides the capability of the machine itself vis-a-vis the area of operation, the creation of the right air defence environment is a crucial factor which would determine the employment of this platform. Effectiveness versus vulnerability would need to be examined. The abundance of man-portable surface-to-air missiles (SAMs) in all enemy-held areas precluded the effective employment of attack choppers. As a result, whether the army or IAF, choppers were constrained to operate in SAM-free areas. Nevertheless, helicopters were instrumental in carrying out frontline roles like providing a platform for the airborne forward air controller.

Night operations were carried out using ingenuity and imagination; at times, excellent results were achieved by aircraft like the MiG-21, using little else but a stop watch and a global positioning system (GPS) receiver. These operations had a significant effect on the enemy's resilience, stamina and very will to fight.

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well as night proved an effective deterrent which ensured total air superiority. At times, Pakistan Air Force (PAF) F-16s orbited a scant 15 km (on their own side of the LoC) from our strike formations, attacking Pakistani targets, kept at bay by our own air defence fighters flying a protective pattern above the strike.

ISSUES ARISING FROM RECENT CONFLICTS REQUIRING DELIBERATION

Air Defence

As a result of the Arab-Israel conflict of 1967, air defence became a major factor to be pondered over in all future wars. A sizeable expansion of India's air-defence network would be required with multilayered air defence in terms of surveillance, range capabilities and engagement ranges. This would need to be backed by effective command, control, communications, computers and intelligence (C^4I) systems integral to the air defence system. Mobile air defence weapon systems for the strike formations, combat area air defence network, rear areas air defence networks for vital areas (VAs) and vital points (VPs) and all air bases, call for significant investment. An effective air defence system for IAF bases would enable release of that many combat aircraft on air defence duties to support combat operations. India's air defence planning should now also incorporate ballistic missile defence systems. Pakistan has a strong ground-based air defence capability, which they have strengthened to offset their weakness in air power.

Enhanced Modern Technology and Political Will

In both the Gulf War and Iraq War, with air power taken out of the equation on both sides, such an invading force could have eventually prevailed but at a terrible cost to itself. It was Coalition air power that practically made it impossible for any reasonable size Iraqi ground troops to manoeuvre for the battle. In addition, with the ability to have a near complete battle picture of the disposition of Iraqi forces through their aerial surveillance platforms, the Coalition commanders had an edge which earlier battlefield commanders could only dream of. The US Air Force and Naval Aviation was able to deliver PGMs, either in direct support of ground forces or in strike operations where ground

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forces were not participating. This ability of air power to deliver precision fire in all types of terrain, in all weather, if acquired by the Indian armed forces, will call for a sea-change in the methodology of military operations. It promises a capability of achieving operational and strategic level objectives. The Indian armed forces require enhanced intelligence, surveillance and reconnaissance capability and greater quantity and variety of precision munitions. But most of all, we require a national will for an "air-first" response considering that the Indian Air Force was made to sit out the war in 1962, and in Kargil in 1999, the air response was delayed as it waited to be cleared by the government.

Balance Between Air and Ground Operations

A review of ground operations reveals that the only real impediment to the Coalition advance had come from Iraqi irregular forces in the form of ambush attacks, many in the garb of civilian dress. The air power of the Coalition forces almost single-handedly had rendered the Iraqi regular forces practically irrelevant. No matter how much devastation air power had caused among the Iraqi forces, it was the ground force that eventually had to occupy the land and secure it. Removal of Saddam and his regime was one of the principal military objectives of the invaders. This could not have been achieved without physical occupation of the Iraqi territory.

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It was, thus, seen during the Iraq War that while the navy provided a long-term presence in the initial stages of the war, land-based air power emerged as a dominant factor during the critical stage as the war progressed and the build-up of ground forces was considered essential to occupy land.

With air power, you may fly over a land forever: you may bomb it, atomise it, pulverise it and wipe it clean of life, but if you desire to defend it, protect it, and keep it for civilisation, you must do this on the ground. It is obvious that a balance needs to be arrived at.

Balance Between a High-Tech Force and Affordability

While drawing lessons from air campaigns involving the advanced Western nations against relatively weak and backward opponents, one must be careful not to get enamoured by air power's sophistry, some of which may have little relevance in our environment. The first point to remember is that the technology ,expertise and high cost of maintaining credible air power effectively means that the benefit of air power primarily is with the advanced Western states, particularly the USA and NATO forces. Air power has tilted the balance of forces between advanced and poor nations to a degree where any armed conflict between them has become totally lopsided. This immense advantage gives the former the ability to enforce their will on the latter without colonising them. Thus, we must be able to maintain a balance between technologies required for sustaining such a state-of-the-art air force with the capability of the nation to afford such a requirement.

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Role of Air Power in Low Intensity Conflict

Although technical advances have made air power very effective to the extent that it dominates the modern battlefield, it is unlikely to be the dominant factor in low intensity conflicts. Air power can only play a significant role in the overall strategy, no matter how effective a weapon it becomes. The present Israeli effort to counter the *Intifada* with its massive military superiority, in which air power is a vital component is a case in point. Air power has been unable to make a

decisive impact in the situation. The situation in Kashmir is also a witness to the relatively low impact of air power. Its role is mostly limited to providing logistic support through helicopters/transport aircraft in the comparatively inaccessible area of conflict.

Joint Planning

One of the valuable lessons that emerged from the Kargil operations was the need for joint army-air force planning and consultations from the very beginning, where the air force would be able to contribute by rendering advice on targeting which could, at the very outset, be incorporated into the army plan of ground operations. This would prove far more effective than a case where the army proceeded as per its own plans made earlier in isolation, and called for air support when they felt it was required. The Kargil operations were marked by a high degree of imagination, flexibility and IAF-army coordination.

Judicious Employment of Air Power

The primacy of interdiction targets was clearly brought out, as also the fact that air power is not to be frittered away on insignificant targets like machinegun posts and trenches, but on large targets of consequence (like the supply camp at Muntho Dhalo, enemy Battalion HQ on top of Tiger Hill, etc). Gone are the days of fighters screaming in at deck level, acting as a piece of extended artillery. The air defence environment of today's battlefield just does not permit such employment of air power any more.

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The effective application of air power had indisputably saved further casualties as well as compressed considerably the timeframe in which the army had made such rapid progress on the ground. In this context, the basic functions of air power have been repeated, though on a much large-scale, when compared to the IAF's operations in this area during

1947-48, when IAF Tempests carried out strafing and rocket on the intruders and Dakotas ferried in as well as paradropped troops and supplies.

EMPLOYMENT OF AIR AND JOINT OPERATIONS IN THE COMING FUTURE

Air Inventory: Dominance Over Pakistan and China

The demonstration of air power during the Gulf War in 1991, in Serbia, in Afghanistan and now in Iraq, can be done on this scale and level of technology only by the United States, whose forces comprised 90 per cent of air power assets employed during these air operation. It is not possible even for an advanced country like Britain or France to possess such expensive air power resources. For a country like India, it would be totally unacceptable to compete with the air power of the United States as this would lead to economic collapse. The only solution in the present international strategic environment is to maintain a positive and comparative technological advantage in air power assets with China and Pakistan, countries with whom India may have to face a military confrontation in the long term and also to look at the assets required for projecting our military might to assist our allies and friends if called upon to assist them in times of crisis.

In a recent report of the Parliamentary Standing Committee of Defence, it has been admitted that the IAF, with its present strength and structure, cannot fight a war on two fronts simultaneously with China and Pakistan. The report also reveals that when facing a war with only Pakistan, the IAF would not be able to achieve a decisive victory, while in an air campaign limited to China, the IAF would find it difficult to defend the Indian air space

Some of the main tasks for the IAF in military confrontation with China or Pakistan during the next 10-15 years could be some of the following in addition to others:

(a) Air defence of the Indian air space
(b) Counter-air operations to gain and maintain air superiority
(c) Strategic air offensive against targets selected at the highest political and military level to degrade and destroy the enemy's military capability.
(d) Attack on surface targets jointly planned with the army and navy.

(e) Supression of enemy air defences (SEAD).
(f) Transport support operations.
(g) Visual and photo surveillance and intelligence gathering from aerial platforms.

In addition to the tasks mentioned above, the IAF would need aircraft to support combat air operations and provide "force multiplier" effect. These support systems have been described in the subsequent paragraphs.

Force Multipliers

The lessons derived from the experiences of intensive air operations during the recent wars in the Middle East would provide a strong basis for future modernisation and restructuring of the air power assets in India. It is evident from the lessons which have been discussed earlier in this paper that the new technologies have made it possible to design and produce systems which, while reducing the number of weapon systems required for a specific mission, create much larger impact on the target systems. These have been termed as "force multipliers" and are listed as follows:

(a) Space-based satellite support systems for communications, surveillance, intelligence, navigation, and weather forecasting.
(b) Electronic warfare systems providing electronic support measures, electronic counter-measures and electronic counter-counter measures.
(c) Precision guided munitions like laser-guided bombs, infra-red or radio command guided missiles and rockets for use against aerial and ground targets which include early warning and missile guidance radars.
(d) Air and ground battle management systems like the AWACS and JSTARS which have in-built C^3I^2 capability to conduct air and ground operations deep within the enemy's territory.
(e) Remotely piloted vehicles (RPVs)/UAVs for communication and battlefield surveillance
(f) Aircraft for in-flight refuelling

The above mentioned force multipliers, as we have seen in these wars, have changed the face and nature of warfare at the end of the 21st century. In the 21st century, a new air power and artillery combination of military force would predominate, as was evident during the Kargil operations. The plan to commit ground forces for the land battle with the enemy and suffer heavy casualties may not be so popular and effective as in the past due to the presence of battlefield missiles, attack helicopters, fixed-wing aerial platforms, and remotely launched cruise missiles. It would be necessary in this probable scenario for the military leaders and politicians to consider indepth these changes in the nature of modern warfare so that appropriate planning can be undertaken to meet the needs of the future battlefield. A World War II mindset may cause immense damage to national security.

Economics of Air Assets

In the future, economics of defence is going to dictate basically the structure of the armed forces. The cost of new technology systems in large numbers is beyond the means of developing Third World countries whose resources are so limited that they are not able to support even low technology. The cost of a World War II fighter aircraft like the Hurricane or the Spitfire was about £ 100,000 but the Tornado F3 at present costs £15 million. The F117 A stealth fighter costs $70 million each. The cost of one SU-30 aircraft today is as much as the entire cost of the Hunter aircraft deal with the United Kingdom in 1959 when more than 200 Hunter fighters were inducted into the IAF.

On the other hand, new technologies have reduced the number of aircraft and weapons needed for operational missions, and enhanced operational capability. They also help in reducing attrition rates and increasing accuracy and reliability of systems. The Hurricane and Spitfire aircraft of World War II were capable of only daylight, clear weather operations with a radius of action of less than 160 km and fitted with weapons which had a single-shot kill (SSK) probability of just one per cent. Today's frontline fighters like the Mirage 2000, F16 and SU-30 are capable of operating in all-weather conditions, during day and night, at a speed exceeding Mach 2, with unlimited range by inflight refuelling and with SSK probability of 90 per cent.

Wars of the future can be won only by combining modern weapons with strategies appropriate to the new systems.

The experience and lessons of the Iran-Iraq War which lasted for ten years, with a million casualties and a cost of about $200 billion to both sides, and in which neither Iran nor Iraq gained any political objectives, clearly indicate the disharmony between new technology weapons and the World War II mindset. The lessons of the ten-year war between Iran and Iraq highlight the need for the armed forces to adopt and adjust to new technology weapons – the wars of the future can be won only by combining modern weapons with strategies appropriate to the new systems

For cost-effective employment of modern air power, the entire combat elements of fighter and bomber aircraft, and the combat support systems listed above will need to be closely integrated in a joint plan based on a force doctrine and air strategy to achieve the political aim. For this purpose, the political and military organisations at the top level would need integration so that strategies for effective exploitation of new technology air weapons are formulated jointly for the battlefields of the 21st century.

Requirement of Close Air Support (CAS)

Ever since the success of the US air power against Iraq, air forces of several nations, including India, have been enamoured by the concept of air supremacy and the air war preceding the land operations. In its quest for waging an independent air war, the air force should not neglect to provide adequate support to the army, in terms of offensive air support (OAS). There must not be any dilution in the quantum of OAS from the very first days of the war. This must be weighed against the air effort required for winning the air battle. In our context, the air and land battle may perforce have to be fought concurrently. It is, therefore, essential for our air force to simultaneously strive to achieve a favourable air situation and also provide CAS to the ground forces. CAS missions require access to the battlefield, timely intelligence information, and accurate weapons delivery. CAS must be responsive, flexible and

survivable, and have armour killing capability and first-pass effectiveness. It must be available day and night and in marginal weather. There is another school of thought that suggests that since the threats to CAS aircraft have increased significantly, the army should increasingly rely on battlefield interdiction, and reduce its requirement of CAS. Their view is that in the prevailing context, the value of CAS is questionable, given the high cost of modern generation fighter aircraft and the accurate lethality of present generation air defence weaponry. There is, thus, a need to come to a balance among the three Services with regards to CAS and attainment of air supremacy.

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Future Force Structuring of the Armed Forces

In view of the current and future threat patterns, the force structuring would mandate the development of the following capabilities:

(a) A smaller high technology conventional force to fight limited wars.

(b) Amphibious task force (tri-Service) operating with special forces for defence of island territories and for out of area missions.

(c) Manpower intensive counter-insurgency force to fight insurgencies, proxy wars and for internal employment.

(d) Strategic forces for deterrence. Land component to have multi-range missiles with nuclear warheads capable of a wide range of nuclear responses and options.

(e) Integrated air power at strategic, operational and tactical levels through integrated theatre commands.

CONCLUSION

In the final analysis, it will be seen that in the modern era warfare, air power will play a very significant role as compared to the past. There is a definite need to upgrade the air force to give it capabilities of domination of air space as well as

to provide CAS to the ground/sea force. The air force must possess the capability to reach out and destroy the enemy's centres of gravity that make up his key military, political and economic power base and also be available to the ground forces to assist them in their battle to attain supremacy on the ground/capture space. There is, thus, a need to synergise the efforts of all the three Services and obtain tri-Service integrated armed forces.

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