
1



VISION, MISSION STATEMENT & CORE VALUES

VISION

To acquire strategic reach and capabilities across the spectrum of conflict that serve the ends of military diplomacy, nation building and enable force projection within India's strategic area of influence.

In this endeavour, **People First, Mission Always** will be the IAF's guiding beacon.

MISSION STATEMENT

To be a modern, flexible and professional aerospace power with full-spectrum capability to protect and further national interests and objectives.

IAF CORE VALUES

The IAF leadership has identified three core values that must govern whatever it does – in peace or war. These are:

Mission, Integrity & Excellence



2



AIR POWER IN THE INDIAN CONTEXT

Doctrine does not fight wars; people do. And although airmen may prefer to be 'doers,' only those who can think rigorously but creatively about future war are likely to be successful when crisis presents itself.

— Colonel Phillip S. Meilinger

AIR POWER IN PERSPECTIVE

The contemporary global environment is characterized by change and the future is expected to be no different. In this dynamic environment, it is essential to have a clear understanding of the attributes, limitations and the potential of air power to enable its optimum exploitation for furthering national objectives. India's security environment is an amalgam of its history, geography, culture, politics etc and thus the security challenges facing India are varied, complex and dynamic. Therefore, for India national security is an essential adjunct of overall national growth and development. The new millennium has witnessed sweeping changes with India emerging as a fast growing economy with a major stake and influence in the global arena. As the nation marches ahead on the path of socio-economic growth and seeks to fulfil the legitimate aspirations of its citizens, it can ill afford to be complacent about the existing and future security challenges. Seeking optimal solutions to these challenges would be imperative for our uninterrupted growth and development.



India's response to these challenges through the years has always been restrained, measured and moderate. This is because India's national security objectives have evolved against the backdrop of its core values of democracy, secularism, peaceful co-existence and the national goal of social and economic development. Even though as a nation India has no extra-territorial ambitions, it is still essential that it possesses a potent instrument of national power capable of deterring conflict and maintaining peace.

Air power fulfils all these needs. The varied roles played by air power have been demonstratively proven in the recent past. The aerospace medium has enabled nations vastly removed in distance and time to exercise their power and influence across continents with astonishing rapidity. On the other hand, non-state actors have also exploited gaps in air defence to fly passenger aircraft into buildings. The opportunities and challenges, therefore, are manifold. It is only a clearly articulated air power doctrine that allows nations to leverage and exploit its tremendous potential.

Air power doctrine is primarily a derivative of the fundamental principles that guide the application of air and space power and offers innovative ideas for the optimum exploitation of the medium. Fundamental principles draw on operational experiences and are time-honoured ways for achieving optimum success. They are guidelines that have worked in the past. Conversely, innovative ideas are futuristic and are limited only by imagination and technology. The interaction of these two constituents, makes an air power doctrine particularly dynamic bound only by experience, imagination and technology.

Unless the unique attributes and limitations of air power are understood, its sub-optimal utilisation would continue. History is replete with such instances primarily because air power is the youngest form of military power. Its relevance and application are yet to be completely comprehended by military strategists and practitioners of operational art. This is particularly applicable in our unique context. It is a historical fact that various empires through thousands of years

were entirely dependent on their armies and navies for survival. Armies and navies have traditionally been visible manifestations of sovereign might and capability. Thus, a generic appreciation regarding the utility of armies, and to a certain extent, maritime power, is inherent in most national psyches.

Air power, by contrast, only arrived in the last century and its optimum exploitation only began in the past few decades. Hence, its relevance, potential and applicability are yet to be fully absorbed into our nation's consciousness. Air power as a powerful and flexible tool of national security, statecraft and overall development is yet to be comprehended in full measure, leading to continued instances of its sub-optimal utilisation. The full-scale utilisation of IAF during conventional wars like the 1965 and 1971 Indo-Pak wars, its non-utilisation during the 1962 Indo-China war and restricted use during the 1999 Kargil conflict serve to illustrate the point.

Air power, in a classic sense is defined as the *total ability of a nation to assert its will through the medium of air*. It includes both civil and military aviation, existing and potential. In the modern sense, air power which has evolved into aerospace power is defined **as the product of aerospace capability and aerospace doctrine**. Air power is the strength of an air force as opposed to an attendant capability. The strength of India's air power lies in the IAF with the capabilities of air arms of the other services reinforcing that strength. Aviation related research and development as also industrial capabilities have a force multiplier effect. Space capabilities further add to the above to enhance the aerospace power of the nation.

The IAF has played a pivotal role in the country's security ever since its inception nearly 80 years ago. The IAF was established as an independent force on October 8, 1932 making it one of the oldest, continuously functioning independent air forces of the world. Over the years the IAF has evolved from being primarily a tactical auxiliary arm of the Royal Air Force in India, to an independent professional strategic force which endeavours to be at the forefront of national service.





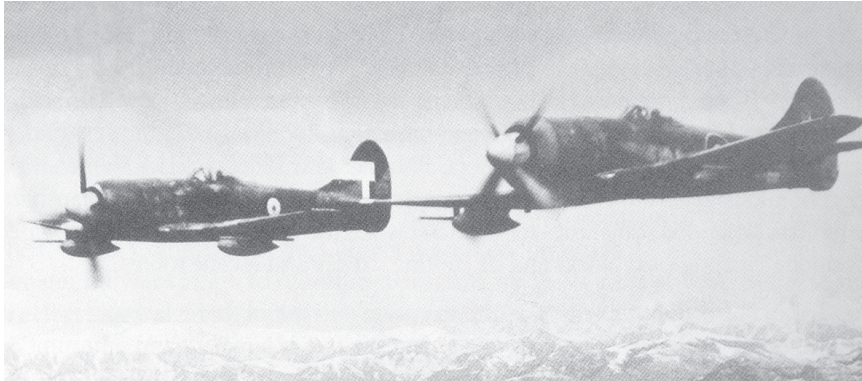
AIR POWER AND NATIONAL SECURITY

The dominant role played by air power in modern warfare, the high cost of aircraft and allied equipment, and a host of other factors demand that its capability and role in securing national interests be closely scrutinised. The case of the IAF can be no different, since the strength of our nation's air power is rooted in the IAF. It is hence essential to understand the place of the IAF in the national security matrix.

The Preamble to the Indian Constitution summarises our aims and objectives as a nation which in turn determines our national security objectives. These, in turn, dictate the military strategy, which is the process of coordinating the development, deployment and employment of military forces to achieve national security objectives. Military strategy essentially is a combination of land, maritime and air strategies. Since land, sea and air have their distinct characteristics, advantages and limitations, the strategic options enabled by land, maritime and air power are equally distinct.

Success in conventional conflict has historically hinged on the destruction of an enemy's fielded forces, followed by the capture or capitulation of the enemy's leadership. Hence, land and naval forces had few options apart from fighting their way through even if it meant having to accept significant attrition. The advent of air power changed all that. Air power could circumvent the enemy's land, naval forces and directly attack the enemy leadership, their command and control centres and other critical vulnerabilities, which would hasten the enemy's capitulation. This was illustrated in ample measure during the 1971 Indo-Pak war when following the bombing of the governor's house in Dhaka by the IAF, Pakistan agreed to a ceasefire when most of its military forces in the western sector were largely intact.

Air power can also decisively interfere with enemy land and sea operations without the reverse being true. A striking example of this is the battle of Longewala, wherein, Pakistan's armour was decimated by the IAF without reciprocal damage. The IAF dominated the skies and hence it could operate freely as it pleased.



Tempest over Kashmir Valley, 1948

The ability of the IAF to rapidly project military force and influence statecraft has become increasingly evident post-independence. The speedy aerial reinforcement of Srinagar during the 1947-48 conflict with Pakistan was the first visible exploitation of air power by India to further national strategy. Similarly, the aerial evacuation of King Tribhuvan of Nepal in 1950 and his subsequent restoration to the



Poonch: Refugees being evacuated in 12 Squadron Dakotas



throne paved the way for the Indo-Nepalese treaty of friendship. The swift air landed operation undertaken by the IAF during *Operation Cactus* in 1989 to airdrop Indian forces at Male was crucial in the foiling of a coup attempt and the subsequent restoration of the Maldives government.

In keeping with its mandate of enabling national development, the IAF also plays a significant role in aid to civil population during disasters, crisis etc. Notwithstanding the size of the country and the varied terrain, it deploys swiftly and frequently across the country for disaster mitigation and control. The IAF is frequently deployed for supply drops as also aerial evacuation during natural disasters such as earthquakes, cyclones, landslides, floods etc both within the country and even beyond. For instance, during the 2004 Tsunami, the IAF undertook airlift and relief operations in the Andaman & Nicobar Islands as also in the Maldives and Sri Lanka. Its transcontinental reach was apparent when during Hurricane Katrina the IAF rapidly responded and delivered aid and supplies to St Louis, Mississippi, USA. The IAF has conducted numerous such operations as for instance: evacuating thousands of people during snowstorms in Jammu and Kashmir in 2005; airlifting of more than 100,000 Indian citizens from Iraq and Kuwait during Gulf War I in conjunction with Air India and Indian Airlines which are the other elements of Indian air power. The IAF also serves the ends of democracy by periodically transporting paramilitary and civilian personnel for election duties.

The role of the IAF in defending the skies on a daily basis is carried out by fully armed aircraft on live Operational Readiness Platforms (ORP) or Combat Air Patrol (CAP). These are capable of launching within minutes to signal the resolve of the government of India for deterring any aerial misadventure. All the above examples demonstrate that air power enables force projection, both benign and otherwise, to support national security objectives in more ways than one.

RECENT PERSPECTIVES

Following World War II, the invention of nuclear weapons changed the concept of both warfare, and strategic deterrence. The emphasis during the Cold War was on nuclear balance and strategic bombing was linked to this balance. This led to the development of nuclear bombers and high altitude interceptors. The large payloads carried by these aircraft and the unmatched rapidity with which they could deliver them made air power the instrument of choice. Achieving air superiority quickly, proved crucial in the 1967 Arab-Israeli war for neutralising superior Arab capabilities. The Vietnam War highlighted the limitations of air power against low value low contrast target systems and the need for Suppression of Enemy Air Defences (SEAD) to reduce aircraft losses. As air defences against aircraft flying at medium and high altitudes improved, air forces around the world came to prefer the protection offered by a high-speed low-level ingress while operating in a densely hostile air defence environment.

The 1973 Arab-Israeli war clearly highlighted the potency of air defence (AD) weapons and reinforced the importance of SEAD to reduce attrition. In the 1980s, the **Air Land doctrine was enunciated by the US army**. It highlighted the significance of manoeuvre warfare and the synchronised application of air power to manipulate the battlefield for swift success in wars. In the 1982 Bekaa Valley operations, force multipliers such as RPAs, AWACS, and EW played a vital role in gaining technological asymmetry and for creating conditions which would quickly achieve air superiority. In the 1991 Gulf War, once again **medium and high attitude operations came back into favour** to prevent aircraft losses to shoulder fired missiles and highly lethal low level air defences. This was also validated during the Kargil conflict of 1999. In the 1991 Gulf war technology created a paradigm shift albeit selectively in the employment of air power. The enemy was treated as a target system and air power was used strategically to carry out parallel attacks on the enemy's vital Centres of Gravity. In Kosovo, air power was the only military instrument used to achieve coalition objectives.





Air power's ability to create strategic outcomes without transiting territories on ground made it a primary instrument of choice.

However, subsequent air campaigns in Afghanistan and Iraq along with the Israeli experience against Hezbollah and other non-state actors have yielded mixed results. The clear lesson is that while air power remains an instrument of choice, its effectiveness depends to a large extent upon the adversary, the kind of target systems that can be engaged through the medium of air, and the ability of military and political leadership to use it for maximum effect.

The major post Cold War innovations included stealth, precision, extended reach, night sensors and enhanced computing power. Leadership now became a viable target. A significant shift also took place with the development of night fighting enabling technology that reduced the flexibility enjoyed earlier by surface forces to manoeuvre at night. Further, **space became closely integrated with warfare** and was utilised for Intelligence, Surveillance and Reconnaissance (ISR) functions, secure communications, integrated early warning, weather forecasting and navigation. Space based assets significantly enhanced the potency of air power. Due to increased battlefield transparency, it also became easier to discern enemy intentions. **Use of precision weapons at long range proved effective in causing a strategic paralysis.**

The media brought warfare into living rooms and therefore significantly influenced the way in which wars were conducted. It created international pressure and sensitivity regarding friendly losses and collateral damage. Whilst short duration of wars meant there was little time for the strategic effect to manifest itself, but the necessity of making a swift strategic impact, increased especially when operating under nuclear thresholds. With technological advancement, air power provided the capabilities that linked tactical actions with strategic outcomes that could prove crucial, especially in short duration wars.

With increasing globalisation, power concepts are moving away from territorial acquisitions to the extracting of political/economic



concessions. While traditional threats have reduced, threats from non-state actors have increased. From attrition oriented warfare, war waging concepts have rapidly moved towards **Effects Based Operations**, wherein functional paralysis is more desirable than the physical destruction of target systems. The **Revolution in Military Affairs** has transformed the role of technology and doctrines in fighting wars. The aim now is to isolate the enemy's command and control structures, augment psychological warfare and precision strikes on the critical vulnerabilities deep inside enemy territory. **These changes favour employment of air power more than any other form of military power.**

The importance of sequential advantage in warfare has been recognised and its relationship with force and space appreciated. As such, **air power today applies parallel force at all levels of war.** The strategic, operational and tactical levels themselves have been merged and are now more related to functionality than to location or type of targets. The networking of sensors, operators and decision makers has significantly reduced the sensor-to-shooter time period. This has also resulted in transforming linear warfare into non-linear warfare. The increased **focus today is on knowledge and effect** and to apply forces synergistically **to achieve the desired outcome in the shortest period of time, with minimum casualties and collateral damage.**

AIR POWER AND JOINTNESS

The IAF has always been cognizant of the fact that air power delivers best when used in synergy with the other components of military power. The conflicts and developments of the past three decades indicate a growing role for air forces. In fact, certain air campaigns conducted in the 1980s and 1990s led to the emergence of a school of thought that believed that wars could be won entirely by air forces. However, the IAF does not subscribe to this view since it is based on the experiences of air forces pitted against markedly inferior militaries with little or no air power capabilities.



In India's case, it is clear that air power alone cannot win a war, but at the same time, no modern war can be won without it. Our experience indicates that in almost every war fought since independence, the IAF has played a significant, and at times a pivotal role. It is also clear that air power can best be exploited not only in synergy with the other two components of the military, but also in tandem with diplomatic efforts and other national civil processes. The spectrum of modern conflict is significantly different and modern wars, whether conventional or sub-conventional (with or without a nuclear overhang) cannot be won singly by any one of the three primary components of military power. Modern conflicts can be decisively influenced only by each component of military power operating in synergy with each other and optimally exploiting the unique attributes of its medium of operation (air, land and sea) to achieve national objectives. Since the objective is common, joint operations would be the most logical response to national challenges. Integrated and joint operations are the cornerstone of modern military operations and air power must be seen as the binding factor. This is so, mainly because land and naval forces historically operated independent of each other until the advent of air power. It is air power that enables land and naval forces to undertake sustained operations beyond their physical operating mediums, leading to the increasingly accepted perception that air power is the lynchpin of joint operations.

3



PRINCIPLES OF WAR AND THE NATURE OF AIR POWER

The raison d'être, the reason for its (the air force's) very existence, is to try and neutralise the enemy's various war potentials in wartime, by every possible means and to protect one's own.

— Air Chief Marshal PC Lal

BLENDING AIR POWER WITH PRINCIPLES OF WAR

The principles of war are the most fundamental form of doctrine. They have evolved from the experience of previous wars and are designed to provide a better understanding of combat operations. However, the characteristics of wars have undergone significant changes due to the considerable technological advances. These have led to changes in the hitherto accepted principles and introduced a few new ones that reflect the changing nature of warfare.

- **Selection and Maintenance of Aim.** This would be a combined Politico-Military aim. In war, it is essential to identify an aim clearly so as to provide a focus to all elements involved in warfare. Thereafter, synchronised efforts must be made for its attainment. Since war is an extension of state policy, military aims are based on political objectives.



Further, multiple constraints including domestic pressures could play an important role in defining the desired end state, especially in asymmetric conflicts. The military aim should ensure maximum post conflict advantage while being achievable. The aim must be decided after due consideration of all politico-military factors and it should be modified if there is a change in circumstances. All components of national power should be focused towards attaining this aim.

- **Intelligence.** The key to air power is targeting and the key to targeting is intelligence relating to the potential enemy's intentions, dispositions and the likely pattern of his operations. Intelligence is vital for identifying the enemy's crucial vulnerabilities, weaknesses and strengths and his Centres of Gravity which in turn will help in devising an effective strategy. A force needs precise intelligence if it is to employ precision weapons. Intelligence also has a direct bearing on the attainment of effect and managing change.
- **Maintenance of Morale.** Morale is a state of mind, but it is very sensitive to material conditions. It remains high when it is based on a clear understanding of the assigned task, periodic practical training and discipline. It is especially responsive to good leadership and effective leadership can sustain high morale even when all other factors go against it. It is adversely affected by inferior or inefficient equipment and poor administration. History shows that success in battle is the best stimulant for morale. In the case of asymmetric warfare, morale can play a significant role due to the involvement of the civilian population. The factors important for the maintenance of morale include dynamic leadership, sound administration, discipline and the welfare of personnel.
- **Offensive Action.** In conventional wars, offensive action was the prime means of seizing the initiative and establishing moral ascendancy over the enemy. This entailed control over the purpose, scope and intensity of operations while placing premium on early action. In unconventional or sub-conventional conflict, the initiative may not be with the state and pre-emptive action without proper



intelligence may prove counterproductive. Hence, most states end up reacting to situations rather than taking a pro-active approach. However, the freedom to act at a place and time of one's choosing even while reacting to a scenario, would wrest the initiative from the enemy at any level of conflict. In these circumstances, the emphasis should be more on achieving and exploiting freedom of action across all levels and dimensions of war as well as denial of the same to the opponent. This would need accurate real time intelligence, physical and information security, a sound and focused strategy, technology savvy forces, effective deployment, synergy of effort, prompt offensive action and sound logistics. The side that loses freedom of action loses its ability to influence the conduct of war.

- **Concentration of Force.** Traditionally, success in war depended on the ability to field forces superior to those of the enemy at a particular time and place. However, modern concepts of warfare look at systemic targeting and ensuring strategic paralysis rather than the amassing of forces. It is better to concentrate decisive fire power on crucial locations and vulnerabilities to achieve the desired effect. Air power with its ability to circumvent the enemy's massed forces, coupled with superior technological capabilities that go beyond visual range engagements and standoff weapons has changed the focus from the earlier concept of concentrating mass to concentrating fire power at the decisive point. Effects and not mass lie at the heart of concentrating air power.
- **Economy of Effort.** Economy of effort is the principle of judiciously employing available resources in warfare. However with the advent of effects based operations, it may be more prudent to view this principle as attainment of the desired effect. By shifting the focus to attainment of effect rather than merely economising effort, the emphasis shifts to the goal rather than the means. Further, economy of effort automatically forms part of attainment of effect, because achieving the desired outcome by causing functional paralysis is always more economical than causing physical destruction of target systems.



- **Security.** The physical protection of assets and information denial is essential for all military operations since it enables friendly forces to achieve their objectives despite enemy interference. Security of key force multipliers such as Aerostats/AAR/AWACS would be crucial for success in war. Adequate measures must be taken to ensure their physical security on ground even against asymmetric attacks. There is a need, therefore, to not only physically guard these vital assets but also have electronic surveillance devices in place to supplement physical surveillance both during peace and in war.
- **Deception and Surprise.** Speed, reach and elevation endow air power with a high degree of inherent surprise. Surprise plays the greatest role in war, and its effect on morale is great. In some operations, particularly when other factors are unfavourable, surprise may prove essential to success. Surprise can be achieved through a manoeuvre, or by exploiting a new doctrine and technology. Its elements are secrecy, concealment, deception, originality, audacity, timing and speed. Deception can be combined with initiative and innovation to increase the element of surprise.
- **Flexibility and Managing Change.** Armed forces should be able to adapt themselves to change. This could be termed as “Managing Change” and goes beyond flexibility and can also be achieved by flexibility in employing combat power. The change could occur in the various dimensions of war – land, sea and air – and also at the various levels of warfare – tactical, operational or strategic. The purpose should be to derive maximum advantage from the altered circumstances. It would require initiative, mobility and flexibility to be encompassed into one philosophy. Air power best exemplifies these attributes because it can be switched from one theatre or area of operations to the other, from one target to the other or from one role to the other.
- **Synergy, Synchronisation and Cooperation.** Modern wars demand the joint and synchronised application of force by all



elements of national power for achievement of national objectives. This is even more valid in limited wars/asymmetric conflicts where limitations of time, space or method demand synergy of effort. In the future, there is a likelihood of large and varied forces including non-military elements being employed; hence unity of command may not be feasible at all times. It is here that coordination and cooperation between different agencies becomes the guiding principle. Joint planning, training, a clear perspective about the functioning of the other services and the establishment of supportive organisations will be essential to ensure synergy. This would also enhance survivability.

- **Generation & Sustenance of Favourable Asymmetry.** The increase in battle space transparency may reduce the impact of surprise at all levels of wars. Therefore, the emphasis now has to be, not only on, catching the enemy off guard but also on keeping him off balance. This would require generating asymmetry at the desired time and place, for wresting significant combat advantage. The methods employed include generating surprise in terms of time, space and force, a favourable differential in technology and weapon systems at the decisive point, exploiting sound operational art, formulating effective and synergistic strategy and maintaining information superiority.
- **Administration.** A sound administration and responsive logistics are a pre-requisite for success in military operations. A disregard of sound logistics has led to failure in wars on numerous occasions in the past. Sustainability is the ability of a force to maintain the necessary fighting power during the time needed to achieve military objectives. The physical and moral sustenance of personnel, the maintenance and repair of equipment and aircraft, the provision of combat supplies and expendable commodities and the treatment, evacuation and replacement of casualties are all aspects of sustainability.



CHARACTERISTICS OF AIR POWER

Air power exploits the vertical dimension and its nature is a function of the physical attributes of this dimension. The vertical dimension is exploited not only as a medium of transit, but also for manoeuvre, concealment, surprise and a host of other factors. An understanding of the distinct characteristics and limitations of the vertical dimension is essential to enable optimal exploitation of air power. These distinct physical attributes make for the distinct characteristics of air power. The core characteristics of air power are speed, flexibility, reach and elevation. These attributes are shared with the space environment, but in a different way, and on an entirely different scale; consequently, the unique features of space power are dealt with separately. These core characteristics make up the larger sub-set of characteristics which are as follows:

- **Flexibility & Versatility.** The first set of characteristics of air power can be placed under the heading of flexibility and versatility. Flexibility consists of the ability to use combat power in ways suited to the situation while versatility implies that the same weapons platform can be used for a variety of missions. For example, a modern multi-role combat aircraft like the SU-30 MKI can be used for almost all roles that are assigned to modern fighter aircraft. Similarly, most modern transport aircraft like the C-130 J Hercules and helicopters like the Mi-17 V5 are designed as multi-role platforms. Flexibility and versatility have a special relevance for the IAF as aircraft and equipment costs are rising exponentially, and there is need to extract the maximum value for taxpayers' money. In short, the IAF cannot afford to operate aircraft, which can only be employed at one level of conflict or for one type of role.
- **Mobility.** The unique ability of aircraft to manoeuvre freely and swiftly in three dimensions gives them the speed and the range to apply military power where needed over a very large area. Mobility has particular relevance in joint operations where forces need to be moved and re-supplied at short notice within and between theatres.



In many circumstances aircraft will be the only means of reacting in the time available.

- **Responsiveness.** Associated with flexibility and mobility is the characteristic of responsiveness. In a crisis, the use of air power will normally be the option most readily available and usable by the government. Air power can be used to demonstrate national resolve quickly by deployment, or heightened states of readiness, and it is the most readily available means for demonstrating combat power. Air forces can also be used to establish and maintain a military presence as an extension of diplomacy.
- **Shock Effect.** It is an effect that goes beyond mere surprise; it is an effect which can induce confusion and psychological disorientation. It is created by the aircraft's ability to concentrate fire power and deliver it with little or no warning. The shock effect of air power has been enhanced greatly with the development of air launched Precision Guided Munitions (PGMs) and other specialist weapons.
- **Concentration.** The flexibility and responsiveness of air power allows a commander to concentrate force. This is of vital importance especially in a fluid tactical situation. The shock effect inherent in air power is the product of its capacity to be concentrated in time and space. However, the capacity to concentrate force can be dissipated by inefficient command and control arrangements, inappropriate division of responsibilities or dilution of core competencies. It takes intelligence and sound judgment to determine where to strike and the quantum of force to be used. If leveraged properly, air power offers national leaders and military commanders the capability to concentrate power in very effective ways. Historically, concentration refers most obviously to offensive power, but it is not limited to that. Apart from concentrating the offensive power of strike aircraft, air power can be used, for example, to deliver land forces in a concentrated form to the point on the battlefield where they can have the maximum effect. The ability to move swiftly, to concentrate and to descend from out of the blue gives the advantage



of shock to air-landed or airborne troops. Concentration is also applicable to large volumes of relief that can be delivered in disaster and humanitarian relief contingencies. This ability to concentrate quickly is the characteristic which must be exploited fully if air power is to be used to its maximum potential, both as a tool for force projection and nation building.

- **Offensive Action.** Only air forces have the ability to carry offensive action deep into enemy territory while operating from secure bases. Defensive action may prevent defeat, but wars can be won only by offensive action. This principle of war, which is also the central characteristic of air power, is often neglected or overlooked by policy-makers unversed in the application of military power. Offensive capability provides the best defence. It changes one's stance from reactive to active and allows one to seize and hold the initiative in operations. The potential to apply air power offensively is a positive contribution to deterrence. It forces a potential aggressor to look at his own vulnerabilities and divert resources to their defence. The effectiveness of deterrence depends on the perception of the potential enemy regarding the likelihood of success in relation to the costs and penalties he will incur. Air power, with its inherently offensive characteristic can raise the costs, and impose penalties that would be unacceptable to the potential aggressor. Combined together, the core characteristics of air power coupled with modern space enabled communication systems, sensors; precision positioning and navigation capabilities offer tremendous capabilities that can decisively influence both the strategic and operational environment.
- **Reach.** The medium of air and the continuum of space does not hinder the employment of air power. Isolated and distant targets in difficult terrain do not prevent engagement of such targets from the third dimension. Modern technology has matured to such an extent that air power has unparalleled reach, and if exploited correctly, will provide a tremendous advantage to the side exploiting it.



LIMITATIONS OF AIR POWER

Like its strengths, air power has its limitations too. These limitations are relative rather than absolute and need to be understood as such. Some of these limitations are highlighted below and will enable a holistic understanding of air power.

- **Sustainability.** The sustainability of air forces is frequently limited by logistics, particularly in the case of technology intensive platforms. This could prove critical in a long drawn-out war. Air forces consume large amounts of resources; infrastructure demands are extensive and expensive, and the training takes considerable time. Sustainability becomes critical when air operations are prosecuted well beyond national boundaries in expeditionary operations, the likes of which have been undertaken by the US and its coalition partners in Iraq and Afghanistan.
- **Base Dependency.** Air power operates most effectively from permanent bases, although rotary wing aircraft can operate away from fixed facilities. This dependence on a large supporting infrastructure is a negative feature of air power. It results in air power assets becoming concentrated at readily identifiable points where they are vulnerable to attack. This dependence can also limit the effectiveness of air power in a particular area if suitable airfields are not available. The ability of aircraft to operate from short and unprepared landing strips derives its strength from this limitation.
- **Sensitivity to Technology.** Air power is a product of technology and because of this it tends to be more sensitive to technological changes than the other two services. Even minor technological innovations can have a major impact on air power effectiveness.
- **Vulnerability.** Air power assets are necessarily concentrated at bases owing to their infrastructural requirements. Besides being vulnerable in the air, they are high value targets when on the ground. Protective measures such as Hardened Aircraft Shelters (HAS), can reduce their vulnerability. However, by their very nature aircraft are fragile and even comparatively low grade battle damage can



have catastrophic effects. This limits the extent to which they can be exposed to the risk of enemy fire.

- **Impermanency.** This limitation relates to air power's inability to hold ground. As such, air power is an impermanent form of military force. The effects it creates are transient, and to sustain those effects, operations have to be repeated or complemented by other arms of military power.
- **Political Constraints.** The limitations of air power's relevance, especially in sub-conventional contingencies, lie not in its capabilities, but in the political will to use these capabilities. Political constraints on the use of air power can only curtail its effectiveness and make it counterproductive. Managing perceptions regarding the effectiveness of air power in diverse situations is key for shaping political opinion on the employment of air power, particularly in the sub-conventional domain.
- **Weather.** Notwithstanding the technical advances that facilitate 24x7 operations, air power continues to be more affected by weather compared to land and maritime power.

SOURCES OF AIR POWER

Air power is a derivative as also an indicator of national power. The ability of a nation to utilise all air power resources at its disposal determines its air power capabilities. Air power, hence, is the sum total of a nation's aviation and related capabilities. It comprises national aviation assets usually described as air forces, air arms and civil aviation, along with their associated organisations, infrastructure, logistics and personnel. The use of space, either independently or in support of air power, is on the rise and consequently the term 'aerospace power' is coming increasingly into vogue. The different sources of air power are as follows:

- **Air Force.** This is the traditional term for the independent military force that delivers air power. The capabilities of air forces reflect national perspectives, priorities and strategic needs. It is only the air



forces, that are capable of employing air power to prosecute all the air campaigns, and this is reflected in their structure, technology, organisation, training and infrastructure. **It is this that sets an air force apart from an air arm.**

- **Air Arm.** In exceptional cases, an air arm is an organic component of armies, navies and para military forces, and provides a capability that is not inherent in other elements of that surface force. However, this arm would be in support of the tactical objectives of the surface force unlike the objectives of the air force that are strategic in nature. Air arms also tend to be much smaller than air forces. As a result, they are not capable of prosecuting all the air campaigns. An exception to this is the US which maintains large air arms integral to its naval and land forces.
- **Civil Air Resources.** Civil aircraft and infrastructure also contribute to a nation's air power. They augment airlift capabilities and if suitably modified, could also be used for combat support operations.
- **Space.** The acquisition, exchange and exploitation of information in the modern world have been revolutionised by the onset of the space age. An important aspect of modern air power is that it is really an 'air and space power'. The demarcation between 'air' and 'space' is becoming increasingly irrelevant, and a modern air force must be prepared to operate seamlessly in both elements. An air force that can tap into space based assets can dramatically improve its ability to prosecute a war quickly and with minimal risk.



4



AIR POWER DOCTRINE AND THE IAF

A doctrine of war consists in a common way of objectively approaching the subject; second, in a common way of handling it.

— Ferdinand Foch: Precepts. 1919

‘Doctrine’ is derived from the Latin ‘*doctrina*’ and signifies a code of beliefs or a body of teachings. In military terms, doctrine refers to the central beliefs that enable an organisation to optimally fulfil its national obligations. Air power doctrine refers to the central beliefs and principles of the IAF that guide the employment of air power in the furtherance of national objectives. These beliefs have been acquired from the study and analysis of experiences in conflicts and crises, as well as field exercises, equipment tests etc in peace time. Where experience is lacking, the IAF in its collective wisdom analyses the theory and postulates action. Thus a doctrine is a guide to the “best way to conduct Air Force affairs”

IMPORTANCE OF DOCTRINE

The national strategy is determined by the Union Cabinet and is based on the National Security Policy. Its purpose is to combine all components of national power, political, diplomatic, economic, military, technological, informational, social and cultural, to



safeguard national interests and achieve national security objectives. The national strategy entails the coordinated employment of all elements of national power. The doctrine offers precepts for the development and employment of national power. For example, India's nuclear doctrine as operationalised by the CCS note of January 4, 2003, guides the national strategy. The joint military strategy decides the development and employment of military power, along with the respective land, maritime and air strategies. Military doctrine provides the conceptual framework for the role, scope and application of military power and underpins the formulation of military strategy.

LEVELS OF DOCTRINE

Apex doctrines relating to national security and military power, offer precepts for the development and employment of power at the strategic, operational and tactical levels. Accordingly, doctrines have distinct levels that broadly correspond with the levels of war fighting, viz. strategic, operational and tactical.

Strategic Level: This doctrine enunciates the fundamental and enduring principles which guide the use of air forces during war and crises. It establishes the framework for the effective use of air power. For example, the tenet that: 'control of air becomes a prerequisite for effectiveness of all military activities' is an enduring principle.

Operational Level: This translates the principles of the basic doctrine into military action by prescribing the proper use of the air forces on the basis of: distinct objectives, force capabilities, broad mission areas and operational environments. An example of an operational doctrine in consonance with strategic doctrine could be: 'AOC-in-C employing his air force in counter air operations by orchestrating a variety of roles to achieve control of the air'.

Tactical Level: This converts basic and operational doctrine by delineating the proper use of specific weapon systems to accomplish



detailed objectives. Tactical doctrine prescribes how roles and tasks are to be carried out and is usually published in manuals such as those brought out by the Tactics and Air Combat Development Establishment (TACDE). For example if Mirage-2000 aircraft are flying escort to an airfield attack package, then tactical doctrine would indicate how the Mirage 2000s would be integrated and co-ordinated within the force package.

THE DOCTRINAL LOOP

A doctrine is formulated on the basis of inputs. The output would then provide the framework within which viable military capability can be developed. These capabilities would require validation through peace-time exercises or war experiences so that the feedback could be employed to refine the doctrine further. The doctrinal loop is pictorially depicted below.

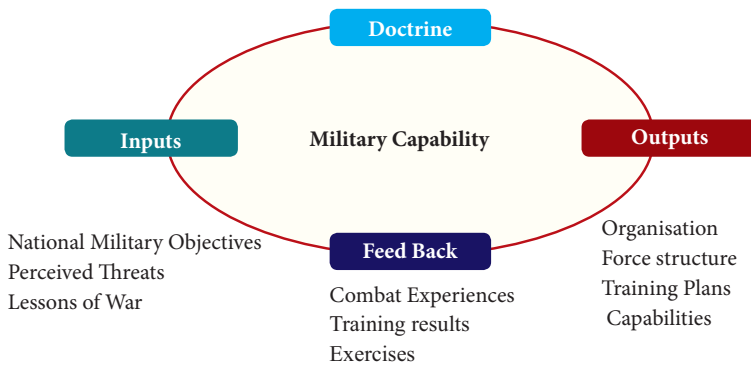


Fig. 1: The Doctrine Loop

DOCTRINE AND TECHNOLOGY

Doctrine is derived from the past and developed in the present for application in the future. Its true benefit is not what it tells us about the past, but what it suggests about the future. The doctrinal process therefore should analyse and influence the course of new and developing



technologies. In the Indian context, it may not always be possible for doctrine to drive technology due to resource and technological constraints. Instead, doctrine may be limited to playing an interactive role with technology. As such, our doctrine must be receptive to the potential advantages that new technologies have to offer. India has taken many strides in exploiting the new technologies for defence applications. An example of technology driving doctrine is the evolution of net centric warfare. Doctrine evolves post the absorption of such technological developments.

DOCTRINE AND FORCE STRUCTURE DEVELOPMENT

Doctrine is an important element in the development of future force structures and capability requirements. Although force structures keep changing they also exhibit enormous inertia and must be given the right direction and impetus. The guiding influence of doctrine in relation to force structure and capabilities can best be illustrated by an example. A decision on whether or not to acquire Remotely Piloted Aircraft (RPA) will depend on a host of factors that include cost, maintainability, operational characteristics and doctrine. The impact of doctrine on this decision is not to select a particular type of RPA or the numbers to be acquired, but to determine the applicability of this technology or capability to the employment of air power. The doctrinal argument in favour of its acquisition may proceed along the following lines:

In isolation, the RPA is neither an offensive weapon system like an aircraft, nor a defensive weapon system like a SAM. The key to its usefulness, however, is in the opportunities that the RPA offers to other offensive weapon systems with its ability to provide real time reconnaissance and intelligence that is so vital for targeting and making the battlefield transparent. In addition, the use of RPAs for Battle Damage Assessment would make air power more responsive and make it unnecessary to risk manned aircraft for the same purpose.

The doctrinal argument thus supports the procurement of RPA technology.

SUMMARY

This chapter highlights the following:

- Military doctrine could be defined as “a set of fundamental principles by which military forces direct their actions in the quest of national objectives”.
- Air power doctrine enunciates the “fundamental principles that guide the employment of air power elements to achieve national objectives”. It is a statement of officially sanctioned beliefs, war fighting principles and terminology that determines and directs the correct use of air forces in military operations.
- An air force doctrine determines the manner in which air forces organise, train, equip, fight and sustain their forces.
- Doctrine is authoritative but its application requires judgment.





5



STRUCTURE OF AIR POWER

Air Forces are defeated or weakened at least as much by their internal illusions as by the enemy. The minute that, readiness data ceases to be realistic; training is cut back or separated from realistic combat conditions; effectiveness is exaggerated; equipment performance and lethality are overstated; gaps in training and doctrine are ignored; and an Air Force becomes a bureaucracy rather than a ruthlessly self-critical fighting machine; an Air Force places itself in the position when it must try to carry out in war the preparation it should have carried out in peacetime.

— Anthony Cordesman

AIR STRATEGY

Air strategy could be termed as the process of coordinating the development, deployment and employment of air power assets to achieve national security objectives. Air power with its intrinsic characteristics of speed, elevation and reach provides tremendous strategic options. These strategies are then prosecuted by air campaigns which comprise of a variety of air operations.

As aerial warfare evolved and the importance of command of the air grew, a distinctive strategic area for application for air power emerged. This involved operations to deter, contain or defeat the enemy's air power, a strategy which came to be termed as "counter air". Air forces can also be employed both independently of, and in



co-ordination with the surface forces to attack vital target systems. Historically, the purpose of an independent strategy was to weaken the enemy’s ability to wage war and degrade his will to resist by attacking his sources of power. In contrast, the purpose of the co-ordinated strategy was to help friendly surface forces contain or defeat the enemy’s land and naval forces. The operations mounted to prosecute the independent strategy came to be known as the “strategic bombing campaign”, while those mounted to prosecute the auxiliary strategy were termed “tactical air support”, or more recently as a “counter surface force campaign”. Counter air, strategic air and counter surface force operations are the three elements of air strategy. Historically, the choice between these three strategies has tended to be one of emphasis rather than on their employment in isolation. In most recent conflicts, air forces have undertaken to prosecute all the three air strategies simultaneously, although the resources devoted to each have varied considerably. Therefore, air strategy would encompass all these options.

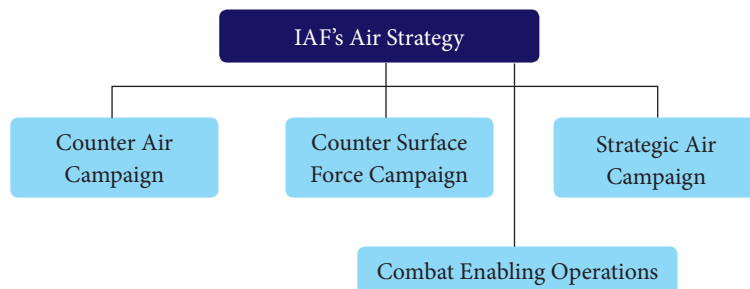


Fig. 1: Air Strategy

AIR CAMPAIGNS

Since each of these strategies is meant to achieve a specific aim, and does so by using distinct methods, its prosecution requires a dedicated “campaign”. Hence, an air commander may have to wage three distinct but interdependent air campaigns in pursuit of his chosen air strategy. The sheer flexibility and versatility of modern aerial platforms and



weapons allow a commander to conduct parallel operations by prosecuting all campaigns simultaneously.

A definite order for the employment of air power can be discerned in each air campaign. For example, the counter air campaign comprises two basic air operations; **Offensive Counter Air (OCA)** and **Defensive Counter Air (DCA)** better known in the IAF as **Air Defence (AD)**. Similarly, the strategic air campaign consists of **conventional** and **nuclear** operations, and the counter surface force campaign consists of **air land** and **maritime air operations**. An additional example would be air mobility operations that would form part of the combat enabling operations.

Normally, control of the air should be the first priority for air forces. This permits own air and surface forces to operate more effectively and denies the same to the enemy. The required degree of control is achieved through counter air operations. Thereafter, the air commander can deliver combat power when and where needed, to attain military objectives at any level of war. This he does by conducting strategic air and counter surface force campaigns. All the air campaigns can be conducted independently, parallel with, or in support of surface operations. A description of the various air campaigns, as well as of the combat support operations is given below:

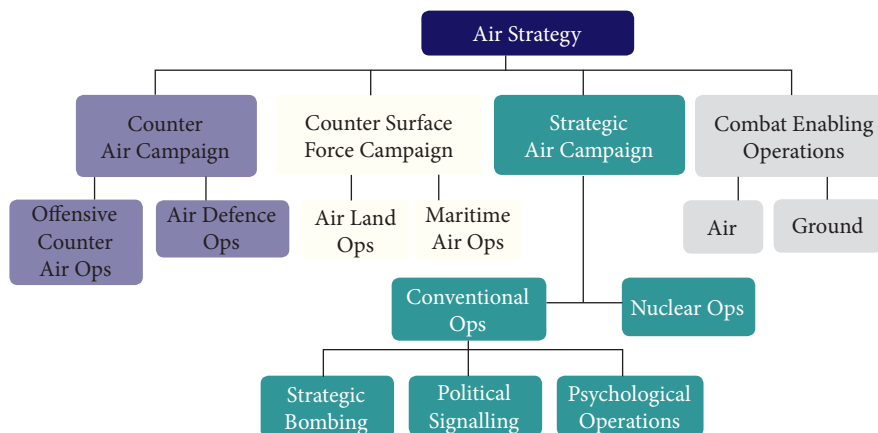


Fig. 2: Air Campaigns and Support Operations



OPERATIONAL ART

Operational strategy employs the forces earmarked for the military/air campaigns. It can be defined as the art and science of planning, orchestrating and directing military/air campaigns within a theatre to achieve national security objectives. A campaign consists of a series of related major operations, each of which may involve a number of battles, which together seek to achieve a particular objective. Within a campaign the capabilities of various forces must be combined to achieve synergy and on a broader scale, separate campaigns must be combined harmoniously to achieve war objectives. Whilst the air strategy is developed at the Air HQ, the operational art for employing air power is evolved at IAF Command HQs. For successful execution of operational art a commander must have:

- An awareness of the national security environment and the political aims
- A clear grasp of the military aim and the strategy
- Technological awareness
- An understanding of civil military affairs and media management.

TACTICS

Tactics are the art and science of employing forces at the battlefield. The difference between tactics and higher levels of strategy is that tactics are employed on the battlefield while operational strategy brings the forces to the battlefield. Modern wars necessitate that tactics must keep pace with advancements in technology and weapons. Failure to do so could prove to be devastating, especially for the air forces. Tactics should be designed to exploit the capabilities of equipment and weapon systems to enhance effectiveness and reduce vulnerabilities. However, in some circumstances, equipment may need to be adapted to fulfil tactical requirements. Innovative and unpredictable tactics will always produce positive results.

INTER-RELATIONSHIPS WITHIN AIR CAMPAIGNS

Each air campaign includes conduct of **specific air operations**, which encompass various tactical level air power functions or “**roles**”. These not only include combat roles but also combat enabling roles. For example, the combat roles needed to prosecute **OCA** include suppression of enemy air defences (**SEAD**), **airfield attacks**, **fighter sweeps** and **escorts**. To be fully effective these missions need to be enabled by electronic warfare assets, surveillance and reconnaissance information, airborne warning and control systems (**AWACS**), air-to-air refuelling (**AAR**) and at times air transport support. Also necessary, are a sound command, control, communications and intelligence system, ground defences, maintenance, logistics and administrative support.

Combat roles tend to be specific to a particular air operation, combat enabling air roles can apply to many, if not, to all air operations, while ground support activities apply to all air operations.

The air power roles are accomplished through a series of tasks, which involve a number of missions and each mission may involve one or more sorties. For example as part of air strategy, we would execute a counter air campaign, involving **OCA** operations by aircraft in **SEAD** role which could be tasked to target high power radar inside the enemy territory. To accomplish this task, a mission of strike aircraft (with appropriate force packaging) undertaking a number of sorties would be planned. The structure of air power is as follows:





THE STRUCTURE OF AIR POWER AND ITS INTER-RELATIONSHIPS

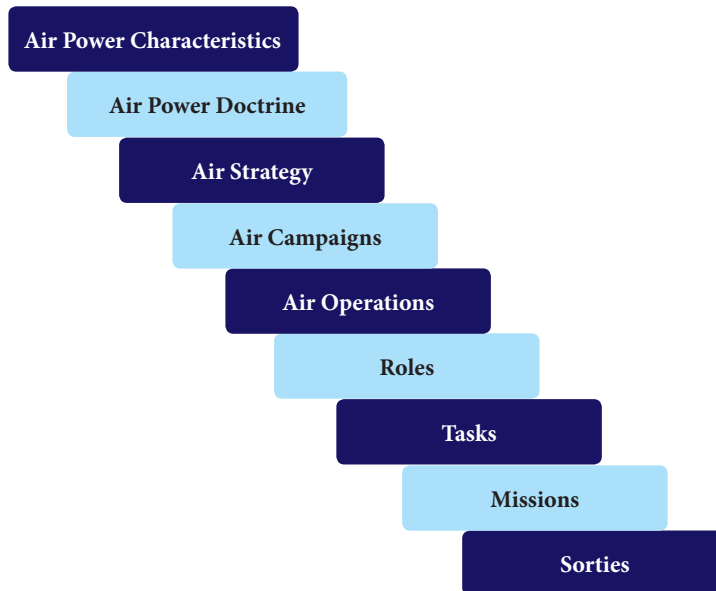


Fig. 3: The Structure of Air Power

AIR CAMPAIGNS AND ENABLING FUNCTIONS

The relevance of the various air campaigns and enabling functions can be better understood by viewing air power employment in its four basic functions. These are:

- **Control of the Air.** This is achieved by a dedicated counter air campaign through offensive counter air and defensive counter air or air defence operations. Their objective is to gain and maintain the required degree of control of air so as to permit effective employment of all facets of air and surface power.
- **Application of Combat Power.** This is achieved through strategic air and counter surface force campaigns. Here, combat power is applied against surface targets and does not include the targets that are specific to the counter air campaign. Typical roles for air land



operations are air interdiction, battlefield air interdiction, battlefield air strike, tactical recce, search and strikes while anti shipping and maritime air strikes are undertaken by the maritime air arm.

- **Enhancing Combat Power.** The air power roles contributing to enhancement of combat power increase the mobility, lethality, accuracy, survivability or flexibility of air and surface forces. This is achieved by combat enabling air operations and air mobility operations. Combat enabling air operations include airborne assault, special air operations, special heliborne operations, air-to-air refuelling, electronic warfare, surveillance and reconnaissance, airborne early warning and search and rescue. Combat enabling air operations also involve testing and evaluation and research and development.
- **Sustaining Combat Power.** If air operations are to be successful they need to be sustained and supported by combat enabling ground operations. Runway rehabilitation, CBRN defence, ground defence, passive air defence (including camouflage and concealment), training, administration and HRD are some examples of these.

ROLES

The exact role that an air force will play would depend on the nature of the threat, resources available and the unique nature of the campaign. Usually, roles envisaged for the air force are as follows:

- Defence of national and island territories, against attacks from air and space both during peace and war.
- Deterring an aggressor from carrying out hostile acts and if deterrence fails to mount an effective response.
- During operations, achieve control of the air to the required degree to provide full freedom of action to the air and surface forces.
- Applying direct pressure on the enemy's power of resistance by attacking his crucial centres of gravity.
- Synergising the combat potential of air power with that of the surface forces to achieve joint military aims and objectives.



- Deploying and employing forces to protect and project the national interests in any out of country contingency operation.
- Assisting the government in disaster management or humanitarian relief tasks.
- Executing counter terrorism and counter insurgency operations.
- Fulfilling international commitments requiring air power assets, consistent with our national policies and interests.
- Providing viable second-strike capability in case of a nuclear attack.

6



THE AIR CAMPAIGNS

THE COUNTER AIR CAMPAIGN
THE COUNTER SURFACE FORCE CAMPAIGN
THE STRATEGIC AIR CAMPAIGN

SECTION I

THE COUNTER AIR CAMPAIGN

Any one who has to fight, even with the most modern weapons against an enemy who has complete control of air, fights like a savage, under the same handicaps and with the same chances of success.

— Field Marshal Rommel

INTRODUCTION

With the increase in the effectiveness of air power, the need to contain the enemy's air power also increased significantly. As early as in World War I, air power was used in airfield attacks, air to air combat and offensive sweeps to seek and destroy enemy aircraft in the air as well as on the ground, so as to achieve control of air. During World War II, the need for a dedicated counter air campaign was realised not only for the success of air operations, but virtually for all types of surface and sub-surface operations. Various campaigns e.g. the Arab-Israeli war in



1967 and the India-Pakistan conflict of 1971 highlighted the successes achieved due to control of the air.

AIM OF THE COUNTER AIR CAMPAIGN

The aim of the counter air campaign is to **achieve and maintain the necessary degree of control of air**. These operations are directed against the enemy's air power either in air or on ground with the objective of preventing the enemy from using his air power effectively against friendly forces, yet permitting own use of air power against him.

DEGREES OF CONTROL OF THE AIR

The three classical degrees of control of air are:

- **Air Supremacy.** Air supremacy exists, if the enemy air power has been incapacitated to the extent that it is incapable of any air interference. This is characterised as: firstly, not being limited by time and space and secondly, being representative of the highest degree of 'control of air.'
- **Air Superiority.** Air superiority can be defined as a high degree of dominance in air, which permits the conduct of land, sea and air operations at a given time and place without prohibitive interference from the enemy air force. This condition is said to exist when, firstly, aircraft of all types can operate in all types of roles at a given time and place without serious interference from the enemy and secondly, it can limit the enemy's air operations. Further, this provides the additional advantage of information superiority due to own ability to execute desired reconnaissance missions, while preventing the enemy from doing so.
- **Favourable Air Situation (FAS).** FAS is limited by time and space to a much greater extent and it assures a lower degree of control of the air. Therefore, a higher degree of enemy air interference can be expected. The level of control of air is such that it enables the exercise of specific capabilities or conduct specific operations. An example of FAS is when one acquires just the required degree of