DOCTRINE
OF THE
INDIAN AIR FORCE

IAP 2000-22

DOCTRINE TEAM

- Directorate of Operations, Air Headquarters

- Team from College of Air Warfare

- Air Marshal Diptendu Choudhury (Retd) PVSM AVSM VM VSM and officers of No 1 Warfare and Aerospace Strategy Programme

PHOTO CREDITS

- Directorate of Operations (Media and Public Relations)

Published in India by

Indian Air Force
Air Headquarters
Vayu Bhawan
Rafi Marg
New Delhi 110106

IAP 2000-22

TABLE OF CONTENTS

DOCTRINE
OF THE
INDIAN AIR FORCE

But if you will not wage this righteous warfare, then forfeiting your own duty and honour, you will incur sin.

Bhagavad Gita

IAP 2000-22

FOREWORD

Air Chief Marshal VR Chaudhari
PVSM AVSM VM ADC
Chief of the Air Staff

The IAF has, over the years, transformed into a modern aerospace power that is capable of controlling and exploiting air and space environments in order to achieve India's national and security objectives. Operating in an ever evolving geo-strategic scenario, against varied threats, the IAF has performed all its tasks with utmost dedication and professionalism. Through the years, our concepts have evolved based on operational experiences of real conflict situations as well as exercises within the country and with friendly foreign air forces. The lessons learnt from these experiences need to be amalgamated into our doctrine so as to provide comprehensive guiding document for the future.

The emergence of asymmetric and hybrid warfare concepts require us to dovetail our Space and Information Warfare capabilities into the CONOPS to ensure an operational continuum. Network Centric Warfare is now fundamental to IAF's power projection, with Offensive and Air Defence Operations being conducted synergistically through an Integrated Air Command and Control System. At the same time, enterprise level digitisation drives the techno-logistics and administration aspects of the IAF. While networking and automation has enhanced operational efficiency at all levels, the precept of conduct of air operations through 'Joint Planning, Centralised Command, Distributed Control and Decentralised Execution' remain at the core of our doctrinal belief. In this context, the doctrine has been reviewed after studies on op applicability, combat leadership and conduct of air war in all possible scenarios.

The updated version of the IAF's Doctrine is deliberately concise and more focused. It lays down the pervasive concepts of aerospace power while providing adequate freedom in application of its elements. The IAF derives its strength from aerospace power's exclusive attributes of reach, mobility, responsiveness, flexibility, offensive lethality and trans-domain operational capability. The multi-role capabilities of modern day platforms and weapon systems offers wide ranging opportunities. These platforms are capable of rapid role change and thereby provide multiple options to the aerospace power practitioner. It is important that such flexible assets are employed cohesively as per the emerging situation and not limited to constrained usage in a defined area or in a particular role. The doctrine brings together aerospace power knowledge and experience to provide a basis for understanding the utility of the aerospace domain and assets. It highlights the characteristics of aerospace power and explores their interdependence with other elements of national and military power. This edition of the Doctrine focuses on the aspects that would provide guidance in Peace, War and No War No Peace situations to ensure continued operational success in the coming decades. I am certain that this will enable a better understanding of the fundamental approach of IAF towards military operations not only within the organisation but also amongst the other Services, government agencies, media, think-tanks and universities.

The Doctrine provides a collective thought to guide our training and application of concepts in war. Therefore, this document should be read by each member of the IAF to understand the essence of Doctrine and the operational impact of aerospace power functions. I am sanguine that further deliberations and suggestions from diverse stakeholders of national security, based on this doctrine will enrich the overall knowledge of aerospace power in our country

(VR Chaudhari)
Air Chief Marshal
Chief of the Air Staff

24 Jun 22

CHAPTER-1

VISION AND CORE VALUES

VISION

To be an agile and adaptable air force that provides decisive aerospace power in furtherance of our national interests.

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

Fighter Formation led by Netra AEW&C

Su-30 carrying out Buddy Refuelling of a Mirage

CHAPTER-2

NATURE OF AEROSPACE POWER AND PRINCIPLES OF WAR

"Indian Air Force should become Aerospace Force and be ready to protect the country from ever evolving threats."

~Raksha Mantri's Keynote Address, MoD PIB Delhi Release: 05 May 2022

Air Power to Aerospace Power

The statement by the Hon'ble Raksha Mantri of India alludes to the prominent role of the Indian Air Force in the domain of space. Two decades ago, Air Commodore Jasjit Singh had presciently articulated, "With no dividing line between air and space, it is indeed a continuum of the third dimension above the earth surface; growing economy, trade expansion and commercial interests will necessitate the pursuance of the aerospace continuum in our national interest. Military operations in the future will increasingly use this continuum to further national security."

Space capabilities are essential for nation's development, besides being crucial for conduct of military operations. Some peaceful civil applications of space that are utilised by military include navigation, mapping, surveys, exploration, weather and communication. The near space and space applications towards national security include Intelligence, Surveillance and Reconnaissance; transit of military vehicles, weapon passage and guidance; secure military data links and communication; tracking and interception of weapons utilising the medium of space. Space based assets are the new centres of gravity due to their expanding operational capabilities and capacities but they are also vulnerable to targeting. The increasing usage of the continuum between atmosphere and space by ballistic missiles, long range vectors, hypersonic glide vehicles, high altitude pseudo satellites etc pose a greater challenge to air defence. While IAF's utilisation of the air and space continues to evolve, the term aerospace power assumes great significance. As an important

stake holder for its expanding operational capacities, the command and control structures that the air force develops, must have the requisite capability to leverage the entire spectrum.

India already has a robust civil space programme, which is aligned towards national scientific and developmental goals. While utilisation of space for economic and developmental purpose is likely to increase, the concurrent vulnerabilities of our country to hostile action seeking to destroy, degrade or deny our space capabilities as well as national capabilities through the medium of outer space are increasing. There is a requirement for the nation to have a robust defence mechanism for its space assets against threats from space. IAF, as an aerospace power, needs to be prepared for a greater role in space exploitation towards national objectives. The involvement of the IAF in India's first voyage into space in 1984 as well as the ongoing 'Gaganyaan' programme are testimony to the trajectory of IAF towards space.

Space exploitation requires formulation of a National Space Strategy. This would require focused civil-military interaction with the role of each being specified by the government under the umbrella of relevance, flexibility and reliance. Our established civilian space programme already provides us with an excellent start for civil-military fusion towards developing Space control capabilities.

Understanding Aerospace Power

Aerospace power exploits the air and space continuum, and its nature is a function of the physical attributes of this dimension. This dimension not only serves as a medium for conduct of operations but also for manoeuvre, concealment, surprise and a host of other factors. An understanding of the distinct characteristics and limitations of this dimension is the basis for optimal exploitation of power. The core characteristics of aerospace power are reach, flexibility, mobility, responsiveness, offensive lethality and trans-domain operational capability. These core characteristics within the frames of force, space and time provide employability options towards National Security Objectives.

Characteristics of Aerospace Power

- **Reach**. The medium of air and the continuum of space does not hinder the employment of aerospace power. The ubiquity of the air medium enables operations across vast continental and maritime spaces. In the 1965 war, Peshawar airbase was considered safe as it was a depth airfield, but it was attacked by IAF Canberras launched from Agra, displaying their reach. In present day, IAF's capability has enhanced to have a greater reach. While aircraft such as SU-30 and Rafale can project firepower onto Malacca and Sunda straits, the C-17s and C-130s can reach most parts of the globe. This capability of airpower, if exploited judiciously, can shape the outcome of the conflict.

- **Flexibility and Versatility**. Flexibility implies the ability to use combat aerospace power tailored to suit the situation, while versatility implies that the same platform, whether fighter aircraft, transport aircraft, helicopter or an RPA can be used both in peace and war in a wide variety of kinetic and non-kinetic applications. Fighter aircraft are used for air defence of nation's air space and island territories, for protecting national interests in the maritime domain, offensive action deep into enemy territory, and for intelligence gathering and reconnaissance. Transport aircraft and helicopters are used for air logistics, HADR, casualty evacuation, search and rescue, offensive action etc. RPAs carry out ISR, target designation and offensive action. Their employability arises from the ability to adapt to all kinds of operational and peace time contingencies and requirements. They can be equally employed at strategic, operational and tactical levels individually, as well as simultaneously.

- **Mobility**. A combination of elevation, speed and reach allows aerospace power the mobility to meet variety of contingencies and a wide array of combat applications. The freedom of movement and agility enable aircraft to seamlessly switch between domains, theatres and areas of operations. The timely air lift of troops to Srinagar in 1947, the brigade airlift across the Meghna River by night in 1971 and the more recent rapid mobilisation of combat elements of the Army, and the equally swift build-up of IAF combat airpower in Ladakh are examples of mobility overcoming limitations of terrain friction.

- **Responsiveness**. It is the fundamental ability to react and respond swiftly across the spectrum of conflict. In a crisis, the use of aerospace power will normally be the option most readily available and usable by the government. All of IAF's combat resources, both defensive and offensive, attain the highest levels of alert status and operational readiness, within hours of any contingency. IAF's aerial platforms, air defence radars, and surface to air guided weapon systems maintain a 24x7x365 operational alert status towards response to any air threat and airspace violations. The speed with which the IAF deployed paratroopers within hours to Male in response to the Maldives crisis in 1988, was a demonstration of IAF's responsiveness.

- **Offensive Lethality**. Today the erstwhile characteristics of shock effect, concentration of force and offensive action have merged into offensive lethality. The ability of airpower to deliver high quantum of weight of attack while compressing the factor of time and space adds to the offensive lethality. Precision targeting by new generation weapons enables destruction of specific targets with accuracy and minimal collateral damage. The capability of aircraft to precisely launch multiple Long Range Cruise Missile (LRCM) from stand off ranges demonstrates the offensive lethality of aerospace power today.

- **Trans-domain Operational Capability**. The physical contiguity of the media of air and space has transformed into operational contiguity. With the advent of new generation technologies, platforms, vehicles and weapons are now being developed which would transit seamlessly from one medium to the other; thus acquiring trans-domain character. This has also expanded the zone of defence in the third dimension. The possibility of threat from contiguous aerospace medium demands a seamless capability of detection, identification, tracking, and neutralisation in both the layers of air and space. Space does not have territorial limits. Territorial airspace is derived from the surface limits of national boundaries. In between lies an undemarcated zone in which increasingly operations will take place and threats will emanate or transit through this zone to eventually be dealt with in territorial airspace. Thus, air remains a defined and most

important layer of defence. This needs aerospace power practitioners to have clear understanding of distinct physical, operational as well as legal characteristics of space, and yet devise a contiguous Op philosophy of aerospace power. The characteristics of space continuum are an accentuation of characteristics of aerospace power. However, space has distinct characteristics of Global Commons, Legal Considerations and Space Treaties besides advantages of negligible friction and relative permanence of space assets. While the continuum is frequently used by weapons and platforms, space is a critical enabler for aerospace power.

Blending Aerospace 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. The nature of warfare, however, evolves due to considerable technological advances and environmental changes. These have led to changes in the hitherto accepted principles and aerospace power blends into them due to its basic characteristics, organisational structure and its core competencies.

- **Selection and Maintenance of Aim**. This would be a combined Politico-Military aim. In war, it is essential to identify an aim clearly 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 finalising the desired end state, especially in asymmetric conflicts. The military aim should ensure maximum post conflict advantage while being achievable. The aim must be selected after due consideration is given to all politico-military factors and it should be reconsidered if the circumstances change. All components of national power should be focused towards attaining this aim.

- **Leadership and Morale**. Good leadership is a prime requisite for success in war. Leadership persuades and inspires air warriors to achieve objectives even in the face of adversity and

danger. Leadership is much more than application of management skills, it is an output of personal character. Morale is a state of mind, but it is extremely sensitive to material conditions. It remains high when it is based on a clear understanding of the assigned task, periodic practical training, and discipline. 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. 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. Therefore, the emphasis should be more on achieving and exploiting freedom of action across all levels and domains 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 enabled forces, sound deployment, cooperation of effort, prompt offensive action and robust logistics. The side that loses freedom of action loses its ability to influence the conduct of war.

Pair of Mirage 2000s on a Mission

- **Command, Control, Communication, Networks, Intelligence, and Interoperability (C^{3}NI^2)**. Unity of command, effective control, seamless communication, leverage of information technology, shortening the OODA loop through real time intelligence and interoperability are the imperatives for war fighting and winning wars. The key to offensive aerospace power is targeting, which is not possible without intelligence relating to the potential enemy's intentions, dispositions, and the pattern of his operations. Advanced ISR capability and battlespace transparency permits accurate and effective targeting.

- **Concentration of Force and Decisive Fire**. Traditionally, success in war depended on the ability to field forces superior to those of enemy at a particular time and place. However, it is better to concentrate decisive fire power on crucial locations and vulnerabilities to achieve the desired effect. Aerospace power with its offensive lethality encapsulates this principle. Aerospace power targets systems and networks causing strategic paralysis, which gives it capability to deliver disproportionately large effects. Aerospace power with its ability to circumvent the enemy's massed forces, coupled with superior technological capabilities that go beyond visual range engagements and stand off weapons has changed the focus from the earlier concept of concentrating mass to achieving concentration of force and application of decisive firepower. Effects and not mass lie at the heart of concentrating aerospace 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 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. Joint planning would ensure correct force to task matching and would be a key factor to achieve economy of effort.

- **Security**. The physical protection of assets such as critical information infrastructure and information denial is essential for all military operations since it enables friendly forces to achieve their objectives despite enemy interference. Security of own bases, vital areas, vital points and key combat enablers would be crucial for success in war. Adequate measures must be taken to ensure their physical security on ground even against asymmetric threats. In today's environment, security of information and networks is of utmost importance. While cyber security plays a key role in ensuring denial of information to the enemy and prevention of disruption of own networks; the physical security of critical infrastructure is equally important.

- **Surprise**. Speed, reach, and elevation endow aerospace power with a high degree of inherent surprise, which plays a key role in war, and has an exponential effect on morale of own forces. Deception can be combined with initiative and innovation to increase the element of surprise. Air landed operations at Hulhule airfield during Op Cactus highlighted all the elements.

- **Favourable Asymmetry**. Increased battlespace transparency may reduce the impact of surprise at all levels of wars. It is therefore important to not only use surprise but continue to keep the enemy off balance. Generating asymmetry at the desired time and space will bring significant combat advantage in all domains. 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.

Sources of Aerospace Power

Aerospace power is a derivative as also an indicator of national power. The ability of a nation to use all aerospace power resources at its disposal determines its aerospace power capabilities. Aerospace power, hence, is the sum of a nation's aerospace capabilities. The various sources are:-

- **Air Force**. This is the traditional term for the independent military force that delivers aerospace power. The Air Force would be capable of employing aerospace power to prosecute all the air and surface operations, and this is reflected in their structure, technology, organisation, training and infrastructure.

- **Air Arm**. An air arm is an organic component of armies, navies and paramilitary forces. These provide aerial capability that is not inherent in other elements of that force. This arm usually supports the service or force in undertaking its primary task and achieving its primary objectives.

- **Civil Air Resources**. Civil aircraft and all aviation related assets and infrastructure are vital elements of a nation's aerospace power. They augment airlift capabilities and are a valuable resource to support combat operations.

- **Space Based Assets**. The acquisition, exchange, and exploitation of information and leveraging of space based capabilities are a major constituent of aerospace power. Aerospace power will increasingly be dependent on this multi-user domain of growing salience.

C-17 Globemaster operating from a High Altitude Airfield

Pair of Mirage on an Air Defence Mission

CHAPTER-3

AEROSPACE POWER AND NATIONAL SECURITY

"The IAF is the only military institution exclusively devoted to military operations in the aerospace continuum for national defence as well as protecting our national interest which is expanding with the growth of the economy and expansion of trade and commercial interests where they can best – or only – be pursued through the aerospace continuum."

- Air Commodore Jasjit Singh

An Air Warrior is a professional who is trained and nurtured to undertake his or her primary role, mission and task. These air warriors are also the Indian Air Force's future leadership. They must be trained to not only lead people, but also innovate ideas and concepts not necessarily limited to aerospace power. As the nation's intellectual capital, they must receive an education that expands their horizons beyond the scientific and technical construct. They need to develop a nuanced understanding of the Indian Air Force's place in national security and the role of an air warrior in a vibrant society. The grooming of air warriors continues through all stages of their career and should constantly prepare them to stay current in an evolving national security environment.

In the process of education, the subsequent paragraphs aim at providing conceptual clarity on the National Security matrix and the position of IAF's doctrine in it. These aspects have been enunciated in the Joint Doctrine of Indian Armed Forces (JP-01/17) and a few of them are reproduced below.

National Security – A Perspective

"National security is an appropriate and aggressive blend of political resilience and maturity, human resources, economic structure, and capacity; technological competence, industrial base, and availability of natural resource and finally the military might."

~ A definition by the National Defence College, New Delhi

National Vision and Values

A vision is a concept of the desired condition that serves to inspire, and provide moral and political authority for policy preferences and choices. Our vision emanates from India's national values which are reflected in the beliefs and ideals of our society. National values evolve from our nation's culture and history, and are based on our enduring social, moral and ideological principles. Our core national values are best reflected in the Preamble of our Constitution, which defines India as a sovereign, socialist, secular and a democratic, republic which promises justice, liberty, equality to its citizens and promotes fraternity assuring the dignity of its citizens.

National Aim

The National Aim, as gleaned from our Constitution and strategic vision enunciated by our leadership over the years, is directed towards 'Comprehensive National Development'. Our National Aim is to create a conducive external and internal security environment for unhindered and inclusive socio-economic development.

National Interests

India's National Interests have evolved against the backdrop of its core values of democracy, secularism, peaceful co-existence, social and economic development and are summarised as follows:-

- To preserve the sovereignty, unity, and territorial integrity of India.

- To preserve the democratic, secular, and federal character of the Indian Republic.

- To safeguard India's existing and emerging strategic, political, economic, and military goals in consonance with the National Aim.

- To ensure a stable, secure, and peaceful internal and external environment conducive to unhindered economic growth and prosperity.

- To contribute towards promotion of international peace and stability.

Grand Strategy

It is the interplay of a combination of resources that a nation uses comprising military, diplomatic, economic, cultural, and political to achieve the ends of security. Kautilya provides a grand strategy in Arthashastra where he gives guidance to a king to employ the elements of national power to achieve a state of continuing advantage. Grand strategy for a country necessitates a view of security that provides for a forward looking action which accounts for threats and opportunities.

National Security Objectives

National Security Objectives flow from, and are designed to safeguard, our national interests. National Security Objectives, directly and indirectly influence our political, military, and economic dimensions. National Security not only entails military security but security of the vital constituents of national power which are water, economy, energy, food, health, education, technology, cyber, space, nuclear power and environment. They provide the framework for formulation of National Security Policy. India's National Security Objectives are listed below.

- To maintain a credible deterrent capability to safeguard National Interests.

- To ensure defence of national territory, air, space, and maritime space.

- To maintain a secure internal environment to prevent threats to our national sovereignty.

- To expand and strengthen a constructive engagement with other nations to promote regional and international security, peace and stability.

National Security Policy

A policy determines the political objectives that provide the purposes for strategies. Nation's Security Policy will be based on our National Security Objectives and all components of national power, weighed against the prevailing and assessed future domestic and global environment. It would entail inherent right of self-defence, possession of deterrence capability, strategic autonomy, self-reliance, cooperation, security and friendly relations with countries in the national interest. A policy would provide greater clarity and direction on the role of the military instrument in the nation's security and interests.

National Security Strategy

National Security Strategy (NSS) flows from the National Security Policy and is centred on safeguarding our nation from any type of internal and external threats or aggression. In addition, the NSS encompasses preservation and strengthening of India's democratic polity, development process, internal stability, and unity in its unique multi-cultural identity. It is inclusive of the general wellbeing of our citizens, the vitality of our economy and technological domain in the larger geo-political context. A regional and international environment of peace and cooperation will facilitate the safeguarding of our interest. Maintenance and strengthening of effective conventional and nuclear deterrent capability is central to our NSS.

National Military Objectives

The National Military Objectives (NMOs) which emerge from National Security Strategy are:-

- To ensure defense of India, its national interests and sovereignty.

- To prepare and train to prosecute all military means necessary to defend territorial integrity and ensure the desired end state in war and peace to achieve the National Objective(s).

- To prevent war through strategic and conventional deterrence.

- To provide assistance to facilitate and enable internal security, when called upon to do so.

- To provide assistance in contingencies at home and abroad to render HADR, aid to civil authority, International Peacekeeping and any other emergent situation, when called upon to do so.

- To foster and contribute towards enabling the required degree of self-sufficiency in defence equipment and technology through indigenisation to achieve desired degree of technological independence.

Military Strategy

A military strategy is the art and science of employing force or the threat of it by the military of a nation to achieve its goals. Clausewitz, defined tactics as the use of armed forces to win engagements, and strategy as the use of engagements to achieve the purpose of war. A military strategy should, thus, be formulated to include all elements of the nation's military instruments to provide a framework for application of military means to fulfil the ends of national policy, both in war and peace.

Objectives for the IAF

The objectives for the IAF are gleaned from the National Security Objectives and the National Military Objectives. These objectives encapsulate the spectrum of conflict from peace to war. These form the basis of air strategy and air operations flowing into the roles, tasks, and missions for the IAF. Consequently, the IAF's objectives are:-

- To ensure defence of national air space, air and space domain and contribute to defence of national territory, maritime areas, and other relevant domains.

- To prosecute offensive parallel air operations to ensure achievement of the desired military or politico-military objective(s), independently as a Service or jointly with other Services.

- To prevent war through credible conventional and strategic deterrence.

- To provide assistance to enable internal security as and when called upon to do so.

- To provide assistance for contingencies at home and abroad to render Humanitarian Assistance and Disaster Relief (HADR), Aid to Civil Authority, International Peacekeeping and any other emergent situation when called upon to do so.

- To contribute to the expansion and strengthening by means of aerospace power towards constructive engagement with other nations to promote regional, global peace and international stability.

- To foster and contribute towards enabling the required degree of self-sufficiency in the aerospace industry and aerospace technology through indigenisation to achieve desired degree of technological independence.

AN-32: Workhorse of IAF over Himalayas

ALH Mk IV Dhruv: Light, Multi-mission

Rafale landing at High Altitude Airfield

Apaches getting Airborne for a BAS Mission

CHAPTER-4

EVOLVING AEROSPACE POWER DOCTRINE

"What we need is to strengthen the leadership at the three levels of warfare without compartmentalising them. Such strengthening of leadership development for the future would depend on the degree of institutionalised Professional Military Education that we invest in beyond what an individual pursues as his personal interest."

- Air Commodore Jasjit Singh, Defence from the Skies

What is Doctrine?

The word doctrine originates from the Latin word '*doctrina*'. In a military context, it is essentially a body of thoughts and teachings, a shared way of thinking; a set of proven and existing concepts, principles, capabilities, capacities, and structures related to the use of military during war and peace. Doctrine contains not only that which 'is in use' and 'in existence', it brings out as to 'who are we', 'what we do' and 'how we do' in a basic and generic manner. It is a 'box that contains our distilled wisdom' built over a period.

Understanding the Strategy – Doctrine link

Doctrine is a notable enabler 'of', and guide 'for', strategies. A strategy flows from a policy and is underpinned by a doctrine. All the three are inter-related but not inter-changeable. All three run on parallel tracks with feedback loops. An existing doctrine or strategy may be referred to by the policy maker during formulation/revision of existing policy.

In the military context, strategy is the comprehensive employment of power, whereas tactics is the immediate employment of forces and weapons. While their employment is tactical, when taken in conjunction with other forces and elements of power, the ultimate outcome is strategic.

Military strategy involves selection of military objectives, course of action, selection and priority of targets, and selection of forces to be employed. Military strategy is concerned with the ends sought with the ways and means to attain those ends. Doctrine by contrast, has nothing to do with ends sought, as they change with policy, but it is related to the ways and means to achieve whatever the ends may be.

Purpose of a Doctrine

A Doctrine serves as a reference or guidance for familiarisation, to policy makers, military practitioners, bureaucrats, strategic community, academia, the fourth estate and citizens of the country. Equally important is communication of the place and role of the military instrument of a nation. It is the knowledge base/ repository/ record of distilled wisdom, which serves as a building block/intellectual foundation for formulating policies and strategies. A doctrine importantly serves as a reference point for public discourse to enable the public to understand the military instrument and its place in national security and its connect with policy formulation.

Levels of Doctrine

Doctrines exist from the national to the tactical level. At present, the Joint Doctrine of Indian Armed Forces (Military Strategic Level Doctrine) enables the assessment of the National Security Objectives from which it draws the National Military Objectives (NMOs). From NMOs, flows the Military Strategy and individual Service Strategy which are underpinned by Joint and Service Doctrines (Operational Doctrines) respectively. The broad doctrines are unclassified and are available in the open domain while some operational level doctrines of services remain in the classified domain. Below the operational doctrines are tactical doctrines of each Service, specific manuals, Standard Operating Procedures (SOPs) and Techniques, Tactics, Procedures (TTPs).

NATIONAL SECURITY MODEL

National Vision

National Aim

National Interests

National Security Objectives

National Security Policy

**National Security Strategy
(Underprinned by National Security Doctrine)**

National Military Objectives

Raksha Mantri's Op Directive

**Joint Military/ Armed Forces Strategy
(Underpinned by Joint Armed Forces Doctrine)**

**Military Strategy of Individual Service
(Underpinned by Services Doctrine)**

Fig. 1: National Security Model

Aerospace Power Doctrine

Aerospace Power Doctrine refers to the central beliefs and principles that guide the Indian Air Force in employment of aerospace power in furtherance of National Objectives.

Indian Air Force was the first Service to publish a doctrine in 1995 as the 'Air Power Doctrine of IAF'. It was revised in 2007 as Indian Air Force Publication (IAP) IAP 2000-07 (Part 1 and 2). These were further revised and an unclassified Basic Doctrine of the Indian Air Force was published in 2012. The concepts and principles have been acquired from the study and analysis of the IAF's experiences in wars, conflicts, crises, peace and exercises. In addition, various military and air power theories, operating environment, other elements/instruments of military and national power, interactions with practitioners and users of aerospace power within the country and world over, influence the formulation of doctrine.
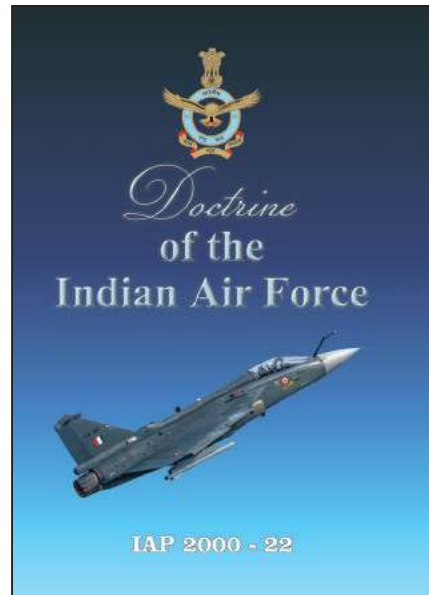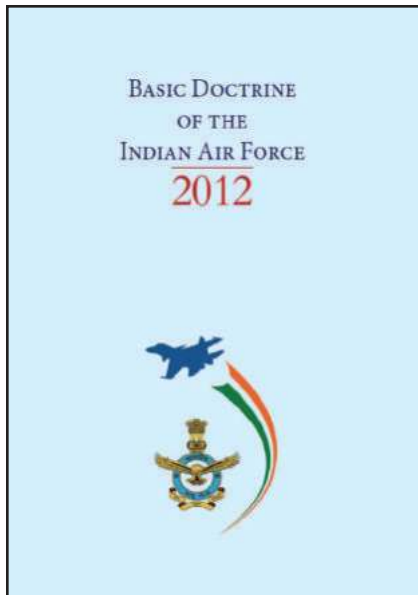
The Doctrinal Loop

A doctrine is formulated based on inputs. The input into a doctrine passes through the sieve of Clausewitzian 'Critical Analyses' before being absorbed. The output provides the framework within which viable military capability can be developed. These capabilities are validated through peace time exercises or war experiences and the feedback is used to refine the doctrine further.
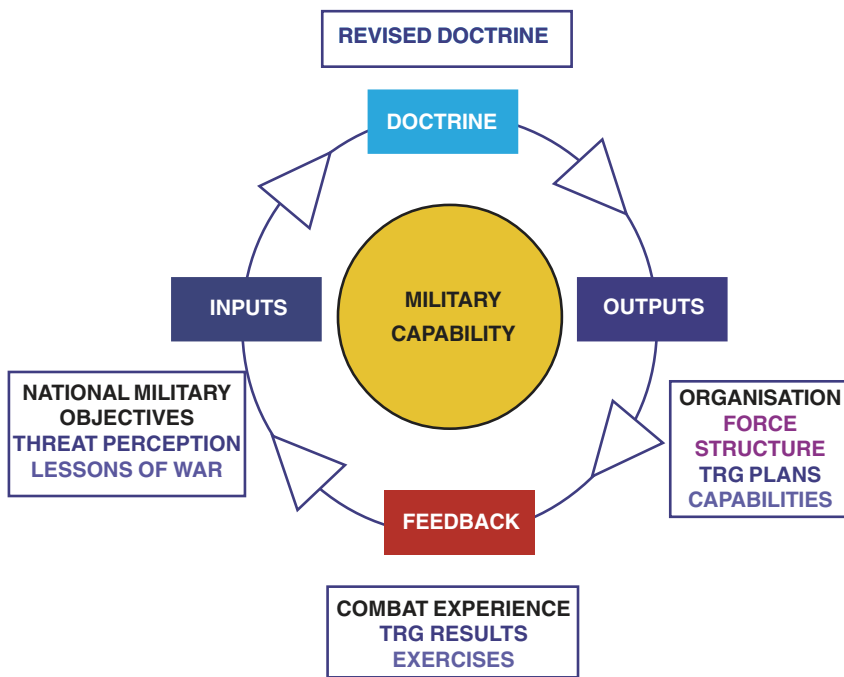
Fig. 2: Doctrinal Loop

Evolving the Doctrine in 2022

The major inputs from the past decade that have gone into revision of the present doctrine are tabulated below:-

INPUTS	FEEDBACK
National Leadership Vision - IAF Aerospace power Self Reliance (Atmanirbharta) Integration **Threat Perception: External** - Border Stand-off's: 2013 DBO, 2014 Demchok, 2015 Burtse, 2017 Doklam and PangongTso, 2020 Galwan - Uri, Pulwama and National Propensity for Mil Response - Mil relations between China and Pakistan **Threat Perception: Internal** - Volatility in high Information Warfare scenario **'Here and Now' Response to other National Security concerns** HADR, Diplomatic and Aid to Civil Authority (Tripura, Himachal, Nagaland, Kerala, Uttarakhand, COVID-19 response), Non Combatant Evacuation: Yemen, Ukraine.	**Combat Experience** 2020: EL and Enemy Response **Sustained Operational Deployment** -2019: Post Balakot -2020: Eastern Ladakh **24x7 Air Defence Deployment** **War Simulation and Air Exercises** **All Air Force and Command level exercises** **Inter Service Exercises** Tropex, Shatrujeet, Malabar etc **International Air Exercises** Bilateral and Multilateral. **New National Education Policy**

INPUTS	FEEDBACK
Joint Doctrine of Indian Armed Forces **HDO Restructuring** **Airpower Lessons from all Conflicts (Global)** **Technology in Aerospace Application** - Artificial Intelligence (AI), Machine Learning (ML), Low-Cost Drone Tech, Manned-Unmanned Teaming (MUMT), Quantum Key Distribution (QKD) in Space Tech, Space ISR (Hyperspectral Scanning, anomaly detection), Anti Satellite Capability, High Altitude Platform Systems (HAPS), Precision over Long Range, Extended AD Weapon Ranges.	**IAF Capability and Enhancement** **Growth of Air Power Capability in Other Services** **Inputs from other sources of National Aerospace Power**

Key Assessments

- Increasing utilisation of 'Space' in the operational domains of land, sea and air has made space a common enabler. The air and near space domain are increasingly a continuum for the IAF due to the increasingly high dependency for ISR, navigation, imagery, targeting, meteorology, communication, operational networks, command and control, enhanced AD responsibility etc.

- Aerospace power is a key enabler in military strategy and for prosecution of surface and sub-surface operations. Expansion of air elements of other Services reinforces this.

• Control of air has assumed great importance in military strategy the world over because adversarial air power can increasingly interfere with progress of operations on land, sea and air.

• Aerospace power provides a 'here and now' response mechanism to an increasing range of national security concerns.

• The 'effects based' approach of aerospace power as a precept is reinforced due to its ability to produce credible outcomes and multiple order effects, both kinetically and non-kinetically. The desired effect can be produced by multiple options now available. Cost versus benefit is becoming an important variable towards the achievement of desired outcome.

• Kinetic reach of aerospace power can be complemented by surface based long range vectors to increase concentration and lethality.

• Drones, UCAVs and Counter Unmanned Aerial Systems have made the battlespaces a dense environment. Their usage needs nuanced assessment, considering various factors of capabilities, benefits, costs and vulnerabilities in a contested battlespace.

• Ingenuity and innovation in tactics and techniques can defeat/mitigate/degrade weapon systems with high end technology.

• To be cost effective, there is a need for pooling in and inter services integration of resources.

• Information Warfare/protection from enemy Information Warfare is critical to outcomes in the entire spectrum of war.

C-17 Globemaster carrying out Non Combatant Evacuation

IAF Aircraft participating in a Multinational Exercise

Fighter Formation followed by Suryakiran Aerobatic Display Team: Hard and Soft Power in the Same Frame

Sarang Aerobatic Display Team: Poetry in Motion

CHAPTER-5

AIR STRATEGY

"One must be clear when Diplomacy of persuasion must end and Diplomacy of threat of force and force itself should be considered."

- Mr K Subrahmanyam

Spectrum of Conflict and Air Operations

In the ever changing geo-political conditions and ever expanding threats and challenges, Aerospace operations must cater for the full spectrum of conflict. The clear distinction between peace and war has been blurred with the inclusion of an intermediate continuum of No War No Peace. This entails the IAF to be prepared not only for the widened spectrum of conflict, but also to simultaneously deal with the unexpected in a grey zone conflict. Technology and strategic-operational-tactical agility enable IAF to conduct a wide range of roles, missions and tasks, leveraging the unique characteristics of aerospace power.

Aerospace power as an element of national power provides multiple options to the nation in the emerging battlespace. Indian aerospace power offers multi domain options spreading from conventional to nuclear operations and kinetic to non-kinetic actions.
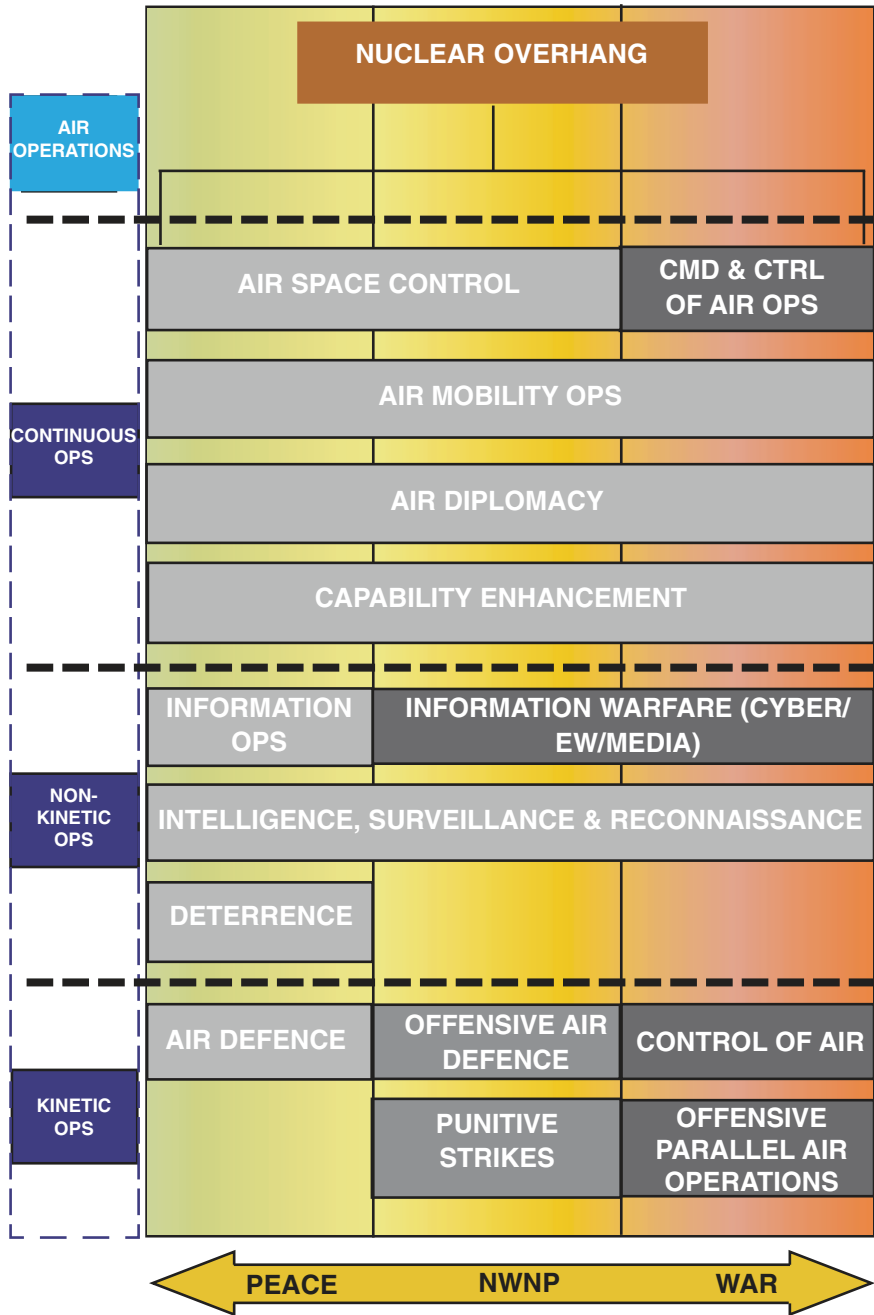
NUCLEAR OVERHANG			

AIR OPERATIONS

	AIR SPACE CONTROL		CMD & CTRL OF AIR OPS

CONTINUOUS OPS

AIR MOBILITY OPS		
AIR DIPLOMACY		
CAPABILITY ENHANCEMENT		

NON-KINETIC OPS

INFORMATION OPS	INFORMATION WARFARE (CYBER/ EW/MEDIA)	
INTELLIGENCE, SURVEILLANCE & RECONNAISSANCE		
DETERRENCE		

KINETIC OPS

AIR DEFENCE	OFFENSIVE AIR DEFENCE	CONTROL OF AIR
	PUNITIVE STRIKES	OFFENSIVE PARALLEL AIR OPERATIONS

PEACE   NWNP   WAR

Fig. 3: Spectrum of Conflict

Air Strategy

Air strategy is the process of coordinating the development, deployment, and employment of aerospace power assets to achieve National Security Objectives. It flows through the Joint Military Strategy and is laterally interlinked with the land and maritime strategies. Aerospace power when applied under the umbrella of political will and national resolve enables the achievement of national aim most effectively in the entire spectrum of peace, no war no peace and war. The air strategy must be specific to each of these conditions.

Fig. 4: Air Strategy

PEACETIME AIR STRATEGY

The peacetime strategy of aerospace power consists of four broad strategies:-

- Sovereignty Protection

- Deterrence

- Air Diplomacy

- Nation Building

Fig. 5: Peacetime Air Strategy

• **Sovereignty Protection**. Our national security objectives include defence of national airspace and space domain. The overall responsibility of Air Defence of the country as per the Union War Book has been vested in the IAF. The area of responsibility includes Island territories, off-shore installations, and defence of airspace within the limits of ADIZ's, except AD of Naval assets at sea unless specific assistance is sought for. During peacetime, this protection of national sovereignty is achieved through air defence and air space management. This role requires 24x7x365 monitoring and management of the Indian Airspace. Sensors along with control and reporting structures monitor Indian Airspace round the clock. Enforcement of airspace control through Air Defence Identification Zones, acts as a deterrence and to respond to any aerial threat, armed aircraft are maintained on live Operational Readiness Platforms (ORP) or Combat Air Patrol (CAP). They are supported by Surface to Air Guided Weapons (SAGW) being maintained on alert status. Since, substantial resources of IAF are dedicated towards this peacetime role, a large part of IAF remains in a state of readiness even in peacetime. This results in high responsiveness of IAF and allows it to rapidly and seamlessly transit to higher levels of conflict. Detection of threats from other domains necessitates continuous collection of data, processing, and dissemination of intelligence, across all spectrums; electromagnetic, infrared, optical, cyber, etc. Therefore, ISR in peacetime becomes an important facilitator of sovereignty protection. Air Defence, Air Space Management, and ISR operations undertaken by the IAF during peacetime thus contribute to the national security.

• **Deterrence**. One of the important national military objectives is to prevent war through credible deterrence across the spectrum of conflict. IAF actively and extensively contributes to deterrence, both in strategic and conventional domains thereby preserving peace. In the conventional domain, 24x7 AD readiness, forward deployment of combat elements, capability demonstration in operational exercises, fire-power displays, testing/upgrading inventory and credible active participation in International Exercises are constant actions towards demonstration of capability, intent as well as resolve. The air-vector, which is the most flexible element of our nuclear deterrence, remains robust, ready and resilient.

- **Nation Building**.   Nation building in a geographically large, ethnically varied and culturally diverse country like India primarily involves getting people together and working collectively to achieve national aims and objectives. This is a commitment that is based on three important pillars-governance, development and security. The armed forces have a vital role to play in development and security, and it is in this context aerospace power assumes significance. The IAF has continued to perform in the overall process of nation building and integration. Extensive involvement by IAF during the COVID-19 pandemic in 2020 and 2021 contributed extensively to the national effort toward preserving lives domestically as well as internationally.

    - **Aid to Civil Power**.   IAF has always remained at the forefront in assisting civil administration during natural calamities and sustaining remote areas in multifarious ways. Assistance to government and civil administration is provided through Humanitarian Assistance and Disaster Relief (HADR operations), medical relief operations, usually conducted in adverse conditions due to inclement weather, lack of communications, inhospitable terrain and poor accessibility of remote areas, relief and supply etc. The IAF also assists various government agencies like ISRO, DRDO, Paramilitary Forces, NDRF, BRO, Election Commission and various ministries by facilitating rapid deployment; air movements and logistical support; both as routine assistance and during crisis.

    - **Sustaining Military Power**.   Our armed forces are deployed in far-flung and remote border areas and Island territories of the nation with limited connectivity. IAF ensures that they are sustained through Air Mobility Operations which in peace time include Air Maintenance Operations, Routine Transport Role (RTR), Scheduled Air Services, Casualty Evacuation, and Search & Rescue Operations. Air Maintenance operations involve landing on forward airfields, Advanced Landing Grounds (ALGs), and semi-prepared surfaces located at high altitudes and difficult terrain, as well as air drop of supplies in inaccessible areas. Many of these operations also assist in sustaining civilian population in those areas.

● **Impetus to Indigenisation**. The IAF is fully committed to contributing to national growth and prosperity by encouraging the induction of indigenously developed defence equipment in consonance with government's Atmanirbhar Bharat initiative. IAF's involvement in testing, trials and evaluation process is a key driver in research, development and formulation of indigenous equipment.

● **Air Diplomacy**. Aerospace power provides a multitude of options in furtherance of nation's foreign policy through air diplomacy.

● Soft power projection by the IAF includes non-combat operations like civilian evacuation operations, International Exercises, UN Peace-Keeping operations, air displays, and international relief operations (overseas HADR operations). The evacuation of Indian Citizens from Afghanistan during withdrawal of NATO forces, and East European nations during the Russia-Ukraine conflict are examples of furtherance of our foreign policies in protecting and projecting our interests across the world. Over the past decades, extensive IAF participation in multilateral exercises like Red Flag in 2016 (US), Blue Flag in 2017, 2021 (Israel), exercises with Carrier Task Force of US Navy, Carrier Strike Group of Royal Navy in 2021 and Pitch Black in 2018, 2022 (Australia) contributed towards building strategic partnerships and enhancing inter-operability through sharing of best practices. The IAF has been the flag bearer in projecting diplomacy through such air engagements.

● IAF presents hard power options in the form of Kinetic and Non-Kinetic operations/capabilities in Out of Area Contingencies (OOAC), where our forces may be tasked to assist friendly nations on their request or to protect Indian citizens abroad. IAF's ability to react, mobilise and respond swiftly enables the government to leverage these capabilities whenever necessary in the national interest.

NO WAR NO PEACE AIR STRATEGY

A typical No War No Peace (NWNP) environment faced by India is marked by the necessity to alter/control the behaviour of the adversary through calibrated application of Kinetic and Non-Kinetic capabilities while remaining below the threshold of war and preventing onset of major combat operations. India's NWNP environment has seen the IAF evolve and identify aerospace power applications to safeguard our national security and preserve our interests. The prevalent multi-domain threat matrix presents a wide span of external and internal threats and challenges from state as well as non-state actors. Aerospace power plays an important role in mitigating and countering these threats and challenges. The application of aerospace power strategies to deter, deny, coerce or punish as a part of its NWNP strategy are as follows:-

- Information Dominance

- Shaping Operations

- External Security Operations

- Internal Security Operations
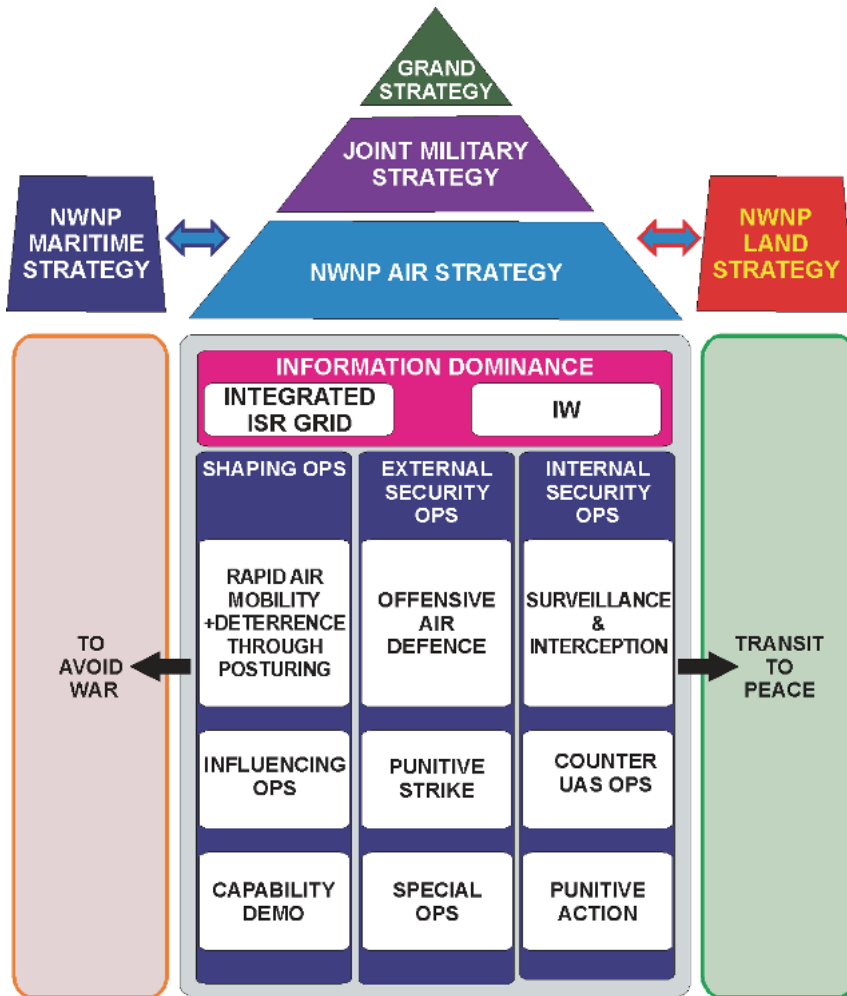
Fig. 6: No War No Peace Air Strategy

Information Dominance

The information domain shapes the environment and is a critical imperative in policy as well as in decision making. An integrated ISR with IW ecosystem not only shape the information domain but also ensure informational edge.

- **Integrated ISR**. Aerospace power contributes to the national ability to gather actionable intelligence within the limited time frames. Synergised integration in the national ISR architecture is a crucial element in NWNP environment.

- **Information Warfare**. In a NWNP environment, aerospace power plays an important role in the synchronised utilisation and application of all measures related to Information Warfare (IW). These include operations related to cyber, electronic, and psychological warfare which contribute towards the achievement of information dominance. Use of all instruments including government and private media for communication by the IAF as a service plays an important role.

Shaping Operations

NWNP condition requires the IAF to continue towards shaping the behaviour of the external threats.

- **Rapid Air Mobility and Deterrence through Posturing**. The primary shaping by aerospace power is multi-front deployment through rapid air mobility and ensuring deterrence through posturing. This was effectively demonstrated by IAF during Eastern Ladakh standoff in 2020 wherein rapid deployment and an offensive posture contributed towards shaping a favourable strategic military environment.

- **Influencing Through Air Diplomacy**. Air diplomacy measures are geopolitical tools used to boost stability and enhance deterrence by influencing behaviour of an adversary. These include air force to air force engagements for training and cooperation, international military sales, and air support infrastructure sharing and development with friendly foreign countries. The location, time, scale, nature of participants and stated objectives of an international exercise can convey powerful geopolitical messages to a common adversary.

- **Capability Demonstration**.   Demonstration of aerospace power capabilities is an important aspect in the NWNP environment to deter potential adversaries and to ensure desired military balance. This is achieved by undertaking tests, trials, demonstration, and development of kinetic and non-kinetic capabilities.

External Security Operations

Soft power options help to shape the geopolitical environment. However, aerospace power also provides several hard power options that can be exercised in the interests of national security while carefully considering the escalation matrix and ensuring effective deterrence against a potential adversary. These are:-

- **Offensive Air Defence Approach**.   In No War No Peace scenario, aerial threats (including those from unmanned aerial systems) are increasing by the day. This necessitates aerospace power to adopt an offensive air defence posture by forward deployment of air defence sensors, combat air patrols, appropriate deployment of long/ medium/ short range SAMs, counter UAS technology and surveillance by aerial/space based platforms to deter aerial incursions by adversaries/non-state actors.

- **Punitive Strikes**.   Aerospace power has the capability for direct punitive actions which serves as a strategic communication for political signalling. IAF has displayed the capability to carry out such strikes while exercising control on escalation. However, such strikes need very high level of intelligence inputs and directions from the highest level of decision making.

- **Special Ops**.   Aerospace power provides a range of special operations which include a variety of covert missions to support insertion and extraction of Special Forces.

Internal Security Operations

A few of the challenges faced by the Indian Security apparatus are Cross Border Terrorism, Insurgency, Left Wing Extremism, Border Management and Coastal Security. Aerospace power has a wide range of capabilities which range from non-kinetic options like ISR, Communication, Logistics and mobilisation to kinetic options. Despite significant capabilities, the use of kinetic options in internal security has limitations with respect to accurate intelligence and collateral damage. These have grave ramifications with respect to civilian casualties and political outcomes. Therefore, such operations can only be undertaken with a clear mandate from the Government. The internal security threats require air assets to be utilised for effective surveillance of border areas, high priority VA/VPs, and critical infrastructure. These surveillance operations form a part of Counter Terrorism (CT) and Counter Insurgency (CI) operations. These need to be synchronised and plugged into the inter-services/inter-agency grid for an effective control and coordination. Interception of aerial threats associated with NWNP operations are also emergent aerospace power roles. Use of a wide range of unmanned platforms for surveillance as well as kinetic operations are increasing the threat to internal security. These unmanned platforms would be countered by kinetic/non-kinetic means.


An Unmanned Aerial Vehicle on an ISR Mission

WARTIME AIR STRATEGY

Indian Air Force is an instrument of military power whose raison d'être is war fighting. The wartime air strategy has application of Combat Power at its core through Coordinated and Strategic Ops. Control of air is vital to all military operations and is an indispensable pre-requisite for effective air operations. The application of combat power and control of air are meshed with each other and are synchronous to other air operations that are carried out to enhance, enable, and sustain air operations. The entire wartime air strategy is executed by an efficient Command and Control (C^2) structure. The composite structure of Wartime Air Strategy is pictorially depicted below and is explained in subsequent paragraphs.
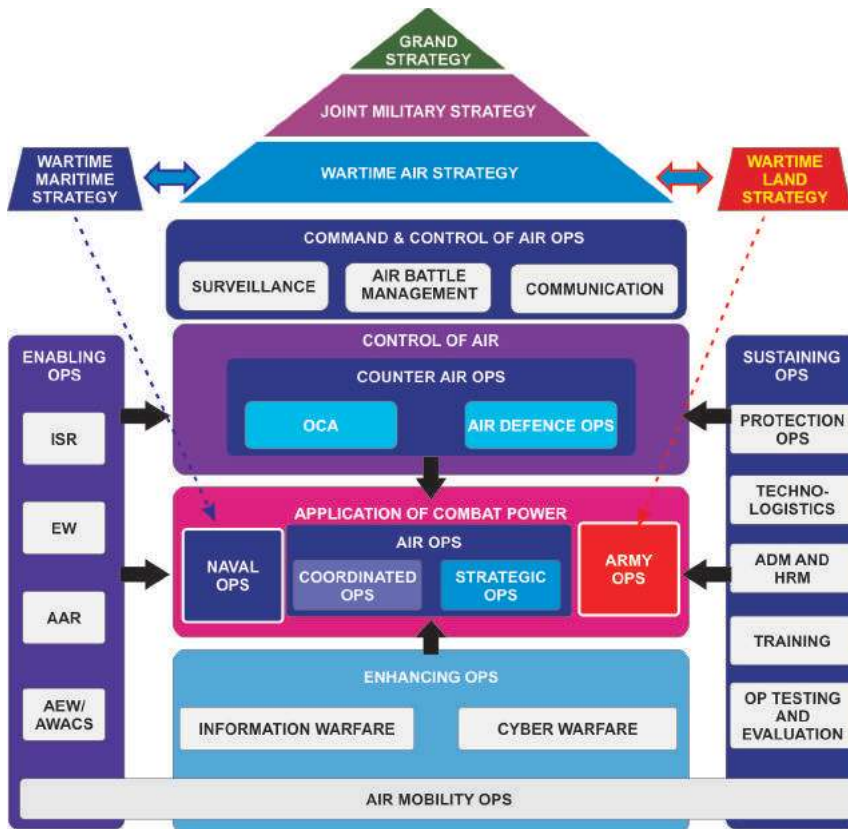
Fig. 7: Wartime Air Strategy

Command and Control of Air Operations

The Command and Control (C^2) structure in air operations aims to have the shortest possible chain of command, and fastest possible execution chain (kill chain). All air operations, whether offensive or defensive, are orchestrated through the concept of unified air battle management. To assist the air commander, various Air Battle Managers (ABMs) are designated and empowered with appropriate operational control. The foundation of Operations rests on Joint Planning, Centralised Command, Distributed Control and Decentralised Execution. Air command and control functions include airspace surveillance, airspace control, and air battle management. It requires a robust, resilient, and secure communication network. The IAF C^2 net centric architecture is structured to provide pan-India surveillance coverage and control capability thus enabling seamless command and control.

● **Airspace Surveillance and Control**. Success of air operations depends on the shortest 'sensor to shooter loop' and the fastest 'kill chain'. This is achieved through seamless integration of ground-based, airborne and space systems through Operational Data Link (ODL), SATCOM and Software Defined Radio (SDR). The integration of multi-organisation/multi-service sensor systems is necessary to achieve timely early warning and contribute effectively towards strengthening the surveillance and C^2 network in range and volume by providing additional layers and redundancy. This would require integration of Akashteer (IA network) and Trigun (*IN* network) with IACCS (IAF network). The purpose of airspace control is to achieve effective control and coordination, ensure de-confliction, minimise fratricide, and enhance all operations by coordinated use of airspace by all the elements involved in joint air, land, and sea operations. This will increase in complexity with the increase in the types of platforms, long range weapons, and multiplicity of users of the contested airspace.

● **Air Battle Management**. Air operations include formations of fighter strikes supported by elements of SEAD, AD escorts, EW elements, AAR, AWACS as well as long range SAM systems, ISR platforms, transport, and helicopters, all operating

in the same airspace. Various composite offensive air packages will be operating simultaneously, independently, or in coordination with other air and surface operations. Air battle management, therefore, involves orchestration of these operations simultaneously or sequentially and in close coordination with combat elements of other services. Such complex air operations can only be undertaken by the net centric Integrated Air Command and Control System and managed in real time by a qualified and experienced operator with substantial exposure to air operations.

• **Communications**. The effectiveness of C^2 depends on an integrated and secure communications network. Without secure and reliable communications even the most carefully developed systems could prove ineffective in modern air operations. The terrestrial networks (AFNet, Tropo Scatter Communication Network) and SATCOM with their multi-layered security protocols provide a secure, reliable and redundant communication architecture for all IAF operations.

Control of Air

Control of the air is a priority as it is vital for execution of the overall military strategy. This permits own air and surface forces to operate more effectively in the battlespace and denies the same to the enemy. The required degree of control is achieved through coordinated execution of Offensive Counter Air and Air Defence Operations. The degree of control of air varies from Air Supremacy (nil enemy air interference), Air Superiority (minimal enemy air interference) to Favourable Air Situation (limited by time and space with expected higher degree of enemy air interference). The degree will vary based on the degree of air contestation prevailing over the battlespace. In the sequence of desirability towards execution of the military strategy, these are:-

• **Air Supremacy**. Air supremacy exists when the enemy air power has been incapacitated to the extent that it is incapable of any air interference and there is total freedom of all operations in the battlespace. This is the highest desirable degree of 'control of air' which is not limited by time and space.

- **Air Superiority**. Air superiority exists when there is a high degree of dominance over the battlespace which permits the conduct of land, sea and air operations at a given time and place with minimal interference from the enemy air force.

- **Favourable Air Situation (FAS)**. FAS is limited by time and space to a much greater extent from the other two degrees of control of air. There is a lower degree of control of the air with a higher possibility of enemy air interference. Such control of air is limited to smaller battlespaces and the extent in time and space will depend upon the success of Counter Air and SEAD/DEAD operations in synergy with own SAM systems. While higher degree of control of air is desirable, fighting against adversaries with strong air forces will entail highly contested airspace in which only FAS may be possible.

Counter Air Operations

Two distinct but complementary operations form part of Counter Air Operations towards Control of Air. These are Offensive Counter Air (OCA) and Air Defence operations. AD operations are inextricably linked to Offensive Counter Air Operations. Success or failure of one will affect the requirements and execution of the other. These operations are interdependent and if executed in isolation, would not only be disjointed but also ineffective in design or execution of the Joint Strategy. Moreover, Flexibility, one of the characteristics of aerospace power, gives a planner the freedom to swing roles of aerial platforms from offensive to air defence operations depending on the air situation.

Modern networked radars of the IAF, both ground and air based (AWACS and AEW&C) riding on the IACCS backbone, have the capability to detect, identify, intercept and destroy hostile intruders while simultaneously controlling own offensive packages deep inside enemy territory. Therefore, while Offensive Counter Air and Air Defence form separate verticals in the airpower doctrine, the systems employed for these two functions are not segregated and earmarked. This flexibility and ability to multitask only comes with modernisation of platforms and networking.

Fig. 8: Counter Air Operations

Offensive Counter Air Operations

OCA operations are aimed at destroying, disrupting, or limiting the enemy airpower. The targets could be enemy aircraft, SAGW systems, AD radars, other sensors, communications, C^2, and Integrated Air Defence System nodes. Targets may include associated infrastructure that supports enemy air operations - weapon storage, fuel storage, airfields and operating surfaces, and aircraft servicing facilities etc. Effective and concentrated targeting of these target sets will impact enemy air operations directly and facilitate achievement of control of air. Few of the roles and missions as part of OCA would be:-
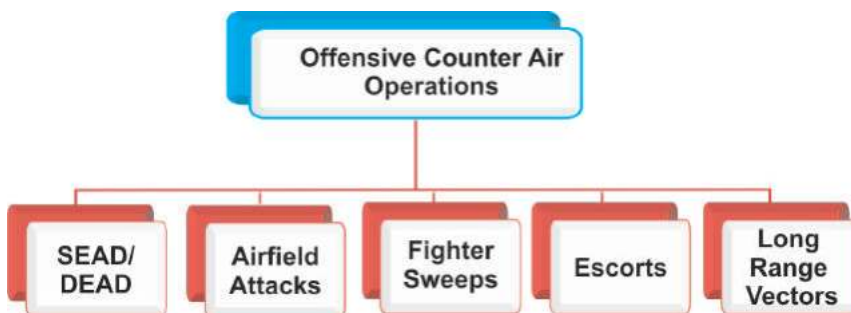
**Fig. 9: Offensive Counter Air Operations**

- **Suppression of Enemy Air Defences (SEAD)/ Destruction of Enemy Air Defences**. SEAD/DEAD are specific missions to neutralise, destroy, or temporarily degrade enemy air defence systems in a specific area by physical attack (hard kill) and/or electronic attack (soft skill). SEAD/DEAD are vital to reduce effectiveness of enemy AD which in turn enables offensive air operations. While SEAD operations are primarily carried out by the Air Force; Special Forces, long range rockets/artillery, and naval fire support can also contribute to DEAD operations jointly.

- **Airfield Attacks**. Enemy airbases and all facilities and infrastructure which support air operations are targets for offensive counter air attacks. Though rapid runway rehabilitation systems can enable resumption of operations, these attacks will impact the intensity of enemy air operations. Airfields, besides aircraft operating surfaces and manoeuvring areas, contain some high-value targets such as aircraft on ground, C^2 centres, critical maintenance facilities, fuel, ammunition and weapon storage areas. Some of the C^2 centres may be located outside the airfield area. Attack against these targets impacts enemy's operational capability.

- **Fighter Sweeps**. These missions are carried out to draw-out and destroy enemy aircraft in the air in a designated area of operations. These offensive missions enable creation of sanitised corridors for own operations.

- **Escorts**. These missions provide protection to strike packages and all other air operations undertaken in hostile airspaces. Like fighter sweeps, escort aircraft target enemy aircraft interfering with own strike forces.

- **Long Range Vectors**. Vectors fired from surface or sub-surface platforms in coordination with other elements of CAO can also contribute towards achievement of counter air objectives. These could include Long Range Surface to Air Missiles, Surface to Surface Missiles, Sub-surface to Surface missiles, or long range artillery which can be employed to neutralise counter air targets within adversary's territory.

Air Defence Operations

These missions involve the employment of air and ground based weapon platforms and systems, in combination with passive and active measures, to counter or reduce the effectiveness of enemy air attacks or hostile ballistic/cruise missile attacks. Effective AD depends on the integration of all AD weapon systems within IAF's IACCS architecture. Integration of AD elements of other services will enable an effective AD cover for the surface forces, both over the battlespace and those in reserve. The degree of reliability and redundancy in the Air Defence system is a critical aspect and must be factored in the Joint plans to enable effective continuation of AD operations through the war.
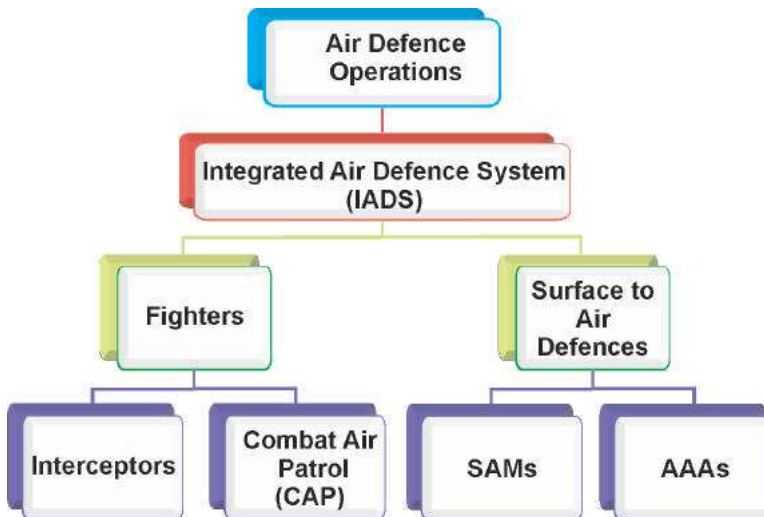
Fig. 10: Air Defence Operations

• **Integrated AD System (IADS)**. The IADS includes all air and surface AD weapon systems deployed with an offensive outlook. This enables effective engagement of enemy aircraft, ballistic/cruise missiles and aerial weapons before it can affect own forces. AD fighters, LRSAMs, MRSAMs, SRSAMs and CIWS system of all services should be networked to create an integrated AD zone. IADS will normally consist of two complementary components, fighter aircraft and surface-to-air defences.

- **Fighter Aircraft**. Fighter aircraft have limited endurance which can be increased through air-to-air refuelling (AAR). They are flexible and can swing roles for tasks other than air defence, should the operational situation demand. Fighter aircraft can be used to protect large areas or be concentrated rapidly to counter enemy saturation raids. They can be used for the following types of tasks:-

    - **Interception**. An intercept mission may involve the scramble of fighters from a high state of readiness, or the redirection of aircraft from previously launched combat air patrols. Interceptions can be carried out autonomously or with the assistance of AD radars.

    - **Combat Air Patrol (CAP)**. Combat air patrols are mounted to intercept and destroy hostile aircraft, ideally before they enter friendly airspace and reach their weapon release ranges. Fuel and weapon state permitting, fighter aircraft, post an offensive mission, can also be employed towards this role. With AWACS cover and AAR, CAP missions can be employed offensively with increased combat persistence.

MiG 29 on Combat Air Patrol

• **Surface-to-Air Defences**. Surface-to-Air Defences consist of surface to air missiles (LRSAMs, MRSAMs, SRSAMs, CIWS) and anti aircraft artillery (AAA). These defences allow a state of high readiness to be maintained over long periods, enable quick response and in certain cases can be used to counter ballistic missiles as well. A well networked, integrated area defence capability will ensure protection of high priority targets by multiple weapons providing defence in depth.

Live Firing of Saksham SAM

Precepts for Counter Air Operations

The major doctrinal aspects of Counter Air Operations are:-

• Control of the air is vital for the successful execution of a nation's military strategy, joint operations and service specific operations.

• To achieve the required degree of control of air, dedicated and persistent counter air operations are necessary.

- Control of Air in contested airspaces is critical. While, Tactics, Techniques, and Procedures (TTPs) are designed to handle tactical level threats to airborne platforms, requisite degree of control of air should be ensured for joint and service specific operations.

- SEAD/DEAD are essential components of CAO and must be integrated into air operations.

- The relationship between the offensive and defensive components of the Counter Air Operations is dynamic and complementary.

Application of Combat Power

Once some degree of control of air is achieved, the subsequent air and surface operations can be coordinated to ensure maximised application of combat power needed to attain military objectives. Here, combat power is applied in parallel against surface targets in depth, intermediate depths and the Tactical Battle Areas (TBAs). These include Coordinated Air Operations (or Counter Surface Force Operations) and Strategic Air Operations which are prosecuted simultaneously.
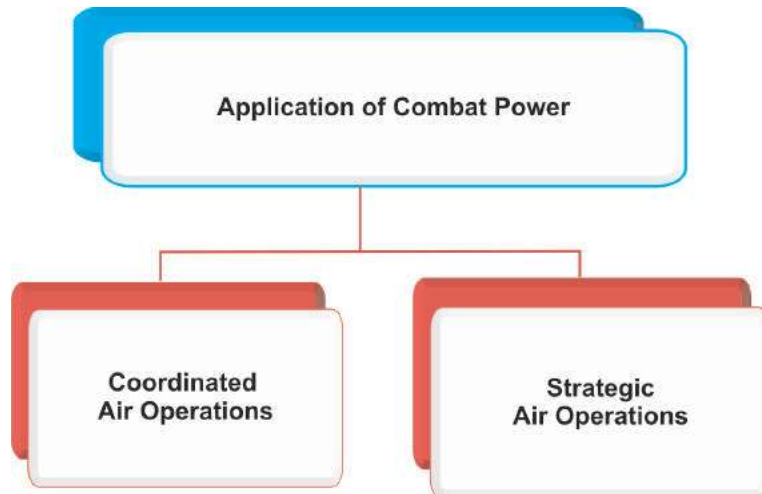

Fig. 11: Application of Combat Power

●   **Coordinated Air Operations (Counter Surface Force Operations)**.   Coordinated Air Operations (Counter Surface Force Operations) are carried out for and in coordination with own Land and Maritime forces either in furtherance of their objectives or an integrated military objective. These operations emerge from the military strategy and involve all air operations that are carried out in cooperation or in direct coordination with friendly surface forces to deter, contain, neutralise, or defeat the enemy's surface forces over land and sea. Coordinated operations, namely Air Land and Maritime Air Operations, necessitate joint planning with respective services. In the execution phase, Air Interdiction and Coastal Strike operations/missions maybe independent but, all others need coordination with the surface forces.
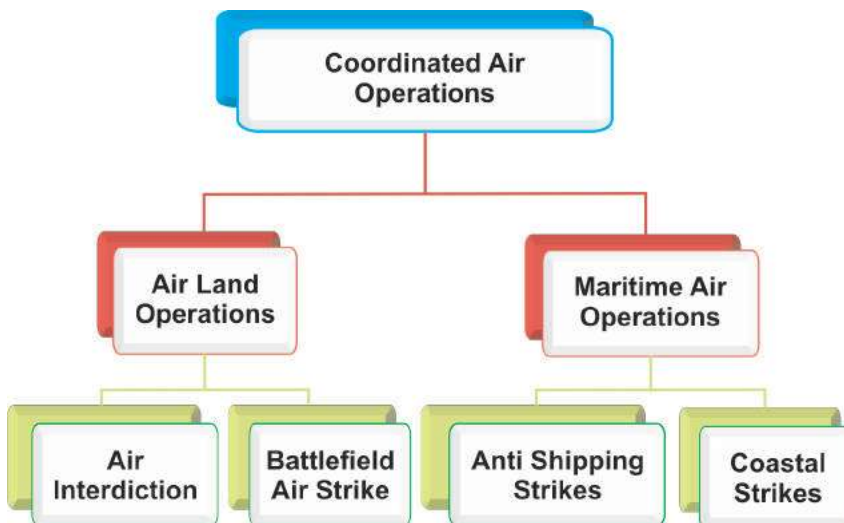
Fig. 12: Coordinated Air Operations

● **Air Land Operations**. Air Land Operations involve all air operations in cooperation with own and friendly land forces to deter, contain, neutralise, or defeat the enemy's land forces.

● **Air Interdiction**. Air Interdiction operations are designed to destroy, neutralize or delay the enemy's reinforcements, supplies, or strategic military potential before it is effectively brought to bear in the battlefield. These operations may be used to isolate the enemy forces in the battle zone and to restrict his freedom of manoeuvre. These targets are not in immediate vicinity of own (engaged) forces. Air Interdiction also shapes and impacts the battlespace by targeting military assets and infrastructure in depth such as road/rail communication networks, railway sidings, troop and vehicle concentrations, supply trains and convoys, logistics nodes, strategic ammunition dumps, fuel storage, and C^2 nodes. The effects of Air Interdiction are cumulative, and these operations must continue to degrade the war fighting capacity of the enemy's land forces. Joint planning and coordination of fire are key to effective Air Interdiction operations.

Su-30 dropping 1000 Lbs Bombs

- **Battlefield Air Strikes (BAS)**. Battlefield Air Strikes are the air actions conducted against enemy targets in the close vicinity of own ground forces. These require not only joint planning but close coordination with the fire plan, disposition and movement of own forces, and IAD operations. BAS maybe time sensitive which requires it to be employed quickly and decisively while being concentrated in space and time. However, BAS environment has limitations such as target acquisition, identification, enemy AD threat, jamming of communication, and the possibility of fratricide. Ground and airborne forward air control will enhance mission success by identification of friend and foe to reduce the possibility of fratricide.

Hawk carrying out Rocket Firing

Precepts of Air Land Operations

The Doctrinal aspects of Air Land Operations are as follows:-

- The degree of control of the air directly impacts the extent and effectiveness of Air Land Operations.

• Joint planning and execution are imperative for successful Air Land Operations, especially BAS.

• Integration and coordination of firepower, EW and COMJAM is imperative to enhance the efficacy of Air Land Operations.

• Surveillance and tactical recce is crucial to Air Land Ops, both, for targeting and battle damage assessment.

Maritime Air Operations

These Air operations are carried out for/in cooperation or coordination with the maritime forces. Control of IAF aircraft would be exercised by HQ Maritime Air Operations (MAO) in coordination with the Indian Navy. Aerial refuelling and long range standoff weapons significantly increase the reach of land based airpower and make it effective for the conduct of MAO. This also adds flexibility and options for engaging maritime targets well beyond shore and into deep seas. Air superiority fighters on CAP, fighter sweep or free escorting duties could have a profound deterrent effect on the adversary in the maritime domain.

The IAF can be called upon to carry out following maritime air roles:-

• **Anti-Shipping Strikes**. These are strikes on targets at sea in coordination with friendly naval forces. The detection and identification of these targets is the responsibility of Indian Navy for which Maritime Reconnaissance (MR) aircraft is utilised.

• **Coastal Strikes**. These include attacks against enemy naval facilities on shore as well as naval vessels and installations in harbours and ports, and airfields with maritime air assets of the enemy. These strikes could be conducted independently but must be planned in coordination with Indian Navy.

Precepts of Maritime Air Operations

The Doctrinal aspects of Maritime Air Operations are as follows:-

- Maritime Air Operations must be planned in coordination with the Indian Navy.

- Strikes against enemy's shore based Naval assets and facilities may be executed independently or in coordination with the *IN* depending on the joint plan.

- SEAD/DEAD missions are prerequisite for strikes on heavily defended coastal targets.

- FAS may be necessary against coastal targets with enemy air force in the vicinity.

- Indian Navy inputs will play an important role in AD of own Naval and civilian shore based facilities.
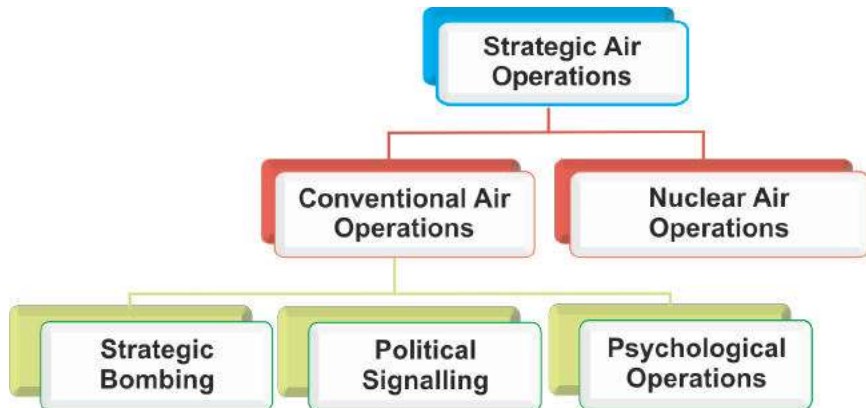

Jaguar on a Maritime Mission

Strategic Air Operations

Strategic Air Operations are conducted by the Air Force directly towards achievement of military and national objectives. These operations are independent of other services.

Fig. 13: Strategic Air Operations

• **Conventional Air Operations**. Conventional Air Operations consist Strategic Bombing, Political Signalling and Psychological Operations. Strategic Bombing is in reference to depth and importance of target and not to be confused with use of nuclear weapons.

• **Strategic Bombing**. Strategic Bombing is designed to target the enemy's capability to fight or his will to resist. In the context of short duration wars, strategic targets that weaken the adversary's capability to wage war, have long term effect on his national capacity, and put him under extreme pressure must be identified and neutralised to achieve the desired political objectives quickly. Strategic targets include key industrial infrastructure, war waging production centres and factories, energy and power facilities, national reserves, major transportation system hubs, vital economic targets, data and network centres and leadership. Such operations

would need consultation and clearance from the highest level of military and political leadership.

- **Political Signalling**. The mere threat of conventional air strikes or enforcement of no fly zones provide governments with a flexible and responsive instrument of crisis management. It enables them to send the desired political signals regarding their intent and determination to deter impending aggression, threaten escalation or eliminate specific enemy capabilities or facilities.

- **Psychological Operations (Psy Ops)**. These are designed to change the attitude and behaviour of enemy combatants and civilian population. Psychological operations directly focus on the enemy's morale and are intended to weaken the enemy's will to fight. Offensive air action could also be employed as part of Psy Ops to propagate the cost of war and influence enemy population and leadership.

- **Nuclear Air Operations**. Nuclear weapons have an important role in deterrence, political signalling and escalation control. The authority to exercise the nuclear option rests at the highest political level. India's no first use policy is based on minimum but credible deterrence based on assured and massive retaliation. IAF constitutes the air vector element of India's credible second strike capability.

Precepts for Strategic Air Operations

The Doctrinal aspects for Strategic Air Operations are:-

- Targets for strategic air attacks need to be carefully selected and should be linked to the enemy's strategic or his decision making capability. The neutralisation of these targets should lead to the desired strategic influence.

• Strategic Air Operations can be conducted independent of other air and land operations; however, it tends to be much more effective when fully integrated in the overall operational plans.

• Air superiority is desirable for conducting such operations. However, given the depth of such targets, coordinated planning, surprise, decoy, and deception is necessary to enhance mission success.

• Strategic Air Operations are mostly determined by political considerations which are far more than for Counter Air or Coordinated Air Ops.

Enabling Operations

These are pre-requisites for conduct of any air operations and include Air Mobility Operations, Intelligence, Surveillance and Reconnaissance (ISR), Electronic Warfare (EW), Air-to-Air Refuelling (AAR), and Airborne Warning and Control. Without these roles, conduct of air operations would be either ineffective or would lead to heavy attrition. While ISR and EW are also the pillars of air strategy, their timing and synchronisation with air operations make them enablers too. Enabling Operations are as enumerated below:-
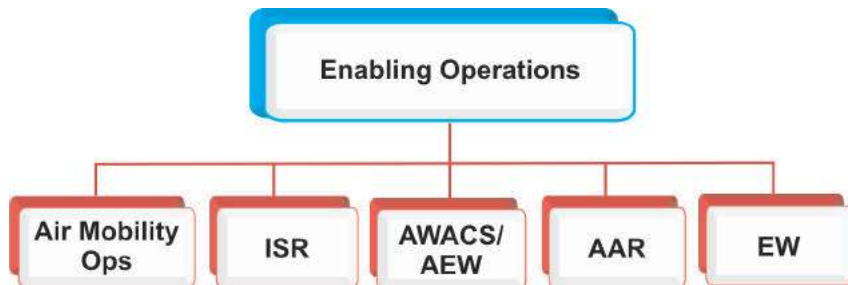

Fig. 14: Enabling Operations

● **Air Mobility Operations**. Air Mobility Operations of the IAF comprise Airborne Operations, Air Maintenance, Special Air Operations, Combat Search and Rescue (CSAR), and Casualty Evacuation (CASEVAC).

Fig. 15: Air Mobility Operations

● **Airborne Operations**. Airborne operations involve the air landing or air drop of combat forces and their logistic support in an objective area from air. These operations require high degree of control of air, should be planned in a tactically sound manner while factoring threats of MANPADS, with a deliberate consideration of depth of operations inside enemy territory. Airborne operation could be used to perform the following three broad roles:-

  ● **Airborne Assault**. Airborne assault is a particular phase of an airborne operation conducted by night/day by specially trained units and formations dropped by parachute or landed by assault aircraft or helicopter, with their equipment for immediate operations.

- **Air Landed Operations**. Air landed operations are those where the troops are landed near their objective, where they organise into combat units and move towards their objective. Helicopters and fixed wing aircraft can be combined to enable rapid insertion or transfer of troops into forward locations, ALGs and inter valley troop transfers (IVTT) in mountainous terrain enhancing the flexibility of surface operations.

- **Special Heliborne Operations (SHBO)**. Helicopters are the versatile component of aerospace power. They can induct troops and equipment direct into action and extricate them on completion of the task.

- **Air Maintenance Operations**. Air maintenance operations are carried out for intra and inter theatre movement of troops, combat equipment, and logistics.

C-17 Globemaster on an Air Maintenance Mission

● **Special Air Operations**. Special air operations are conducted across the spectrum of conflict to support covert and psychological operations. These operations include inserting special forces and agents into the enemy territory. These may be carried out as High Altitude High Opening (HAHO) or High Altitude Low Opening (HALO) para insertion, or low level para or landed insertion. These are standalone and covert operations.

Garuds: IAF Special Forces in Action

● **Combat Search and Rescue Operations**. Combat search and rescue operations involve the use of various types of aerial platforms in combat zones to locate and rescue downed aircrew or combatants. CSAR is a time critical and specialised task which needs to be carried out swiftly. It needs integrated operations involving multiple platforms and intense coordination.

● **Casualty Evacuation (CASEVAC)**. Casualty evacuation involves the movement of injured to and between medical treatment facilities by helicopter and transport aircraft. These are specialist operations that need appropriate configuration and facilities onboard the aircraft.

- **Intelligence, Surveillance and Reconnaissance (ISR)**. ISR involves all activities towards acquisition, processing and provision of relevant information and intelligence to support the Commander in conduct of war. The process of ISR includes collection and analysis of ELINT, SIGINT, COMINT, IMINT (EO/IR/SAR), HUMINT, OSINT and variety of other sources that can provide necessary information vital for conduct of air operations. ISR forms the basis for planning and conduct of military operations. ISR could be collected by airborne, space and surface sensors, interstate and governmental intelligence and remote sensing agencies. ISR is continuous process in peacetime, and assumes great significance prior to operations to build an accurate picture of adversary's ORBAT. During operations, ISR is required to assess movements, redeployments, and damage assessment. Intelligence would require to be in real time for dynamic or time sensitive targeting.

- **AWACS and AEW Operations**. Airborne systems provide extended coverage, better early warning and dynamic coverage, compared to ground based systems. AWACS/AEW aircraft are essential for DEAD/SEAD, CAO and all depth missions undertaken, both over land and sea. The ability of these platforms to provide air picture in mountainous terrain makes these enablers a prerequisite for high altitude air operations. These assets are an essential component of long and complex air operations. AWACS and AEW allow aerospace power to exploit its inherent characteristic of flexibility.


AWACS along with Su-30s on a Mission

- **Air-To-Air Refuelling (AAR)**. Air-to-Air Refuelling increases the reach and combat persistence of air operations both for offensive and AD operations. AAR allow air operations to be launched from depth bases thereby, increasing the safety of our air assets on ground from the enemy's air offensive. For depth targets in maritime domain, AAR is an indispensable necessity.

- **Electronic Warfare**. Exploitation of the EM spectrum through electronic warfare in dense electronic battlespace cannot be over emphasised. The ability to ensure freedom of own use while denying the same to the enemy is a vital imperative in deciding the outcome of an operation.

Enhancing Operations

Enhancing operations increase the mobility, lethality, accuracy or flexibility of air and surface forces. This is achieved by Op Enhancers namely Air Mobility Operations, Information Warfare (IW) and Cyber Warfare. Air Mobility Operations, though part of Enabling Ops, also act as an Op Enhancer by providing resilient and redundant airlift capabilities and ensuring rapid movement of resources to and from, or within, a theatre by air. Enhancing Ops are run simultaneously throughout operations to enhance the war fighting capability.
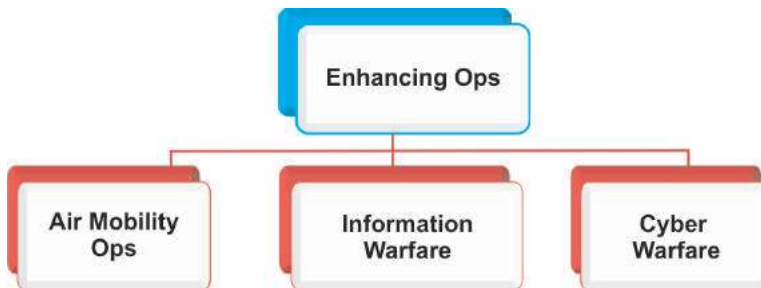
Fig. 16: Enhancing Operations

- **Information Warfare**. Information warfare can be defined as the actions taken to preserve the integrity of ones' own information system, while at the same time exploiting, corrupting or destroying an adversary's information system, and in the process, achieving an information advantage for the application of information operations (IO) - the offensive and the defensive.

- **Offensive Information Operations**. It involves the integrated use of assigned and supporting capabilities and activities, to affect enemy decision-makers by attacking their information and information systems.

- **Defensive Information Operations**. It involves integrating and coordinating policies and procedures, operations, personnel and technology to protect and defend friendly information and information systems.

- **Cyber Warfare**. Wars can be lost and won in the mind and virtual spaces as much as in the physical battlespace. Cyber warfare is an attractive low cost war-waging model because it has some notable features such as: low entry cost, blurred traditional boundaries and an expanded role for perception management. Threats in the sphere of cyber security originate from a variety of sources (known as well as unknown). These can target infrastructure, the financial sector, individuals, governments and the militaries of a country. The gravity of these attacks will vary depending on the objectives. The cyber defence environment requires deployment of technologies and capabilities for real-time protection and incident response. The existing cyber threats to the IAF can be categorised as threats to IT Infrastructure, software/ hardware based threats, cellular/Wi Max networks and sophisticated malwares.

Sustaining Operations

If air operations are to be successful, they need to be sustained and supported by dedicated air and ground activities termed as Sustaining Operations. Air Mobility Operations provide the core of the Indian Air Force's ability to deploy and sustain itself as well as the other Services across entire battlespace. Whether projecting combat power, providing logistics for sustainment of current operations or casualty evacuation, Air Mobility Ops are a vital component for success. Apart from Air Mobility Ops, Sustaining Ops include Protection Ops, Techno Logistics, Administration & HRM, Training along with Op Testing and Evaluation. While Techno-Logistics, Administration and Training are also the pillars of Air Strategy, they acquire greater importance in sustaining operations during war.
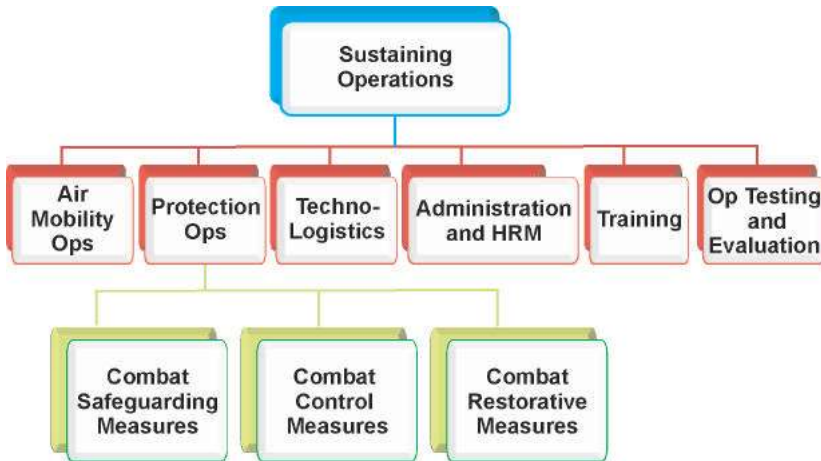
Fig. 17: Sustaining Operations

- **Protection Operations**. The protection operations have three aspects and are as enumerated below :-

  - **Combat Safeguarding Measures**. These are measures taken to defend and protect IAF assets, infrastructure and personnel from any air delivered weapons (Conventional or CBRN) or ground-based threats. The actions include active and passive measures to deny, defend, disperse and deceive the enemy in order to enhance safety and survivability of our equipment, infrastructure and personnel.

  - **Combat Control Measures**. These are measures taken immediately after any air or ground attack and include all actions that facilitate prompt reporting and assessment of damage, casualties, presence of any threat and unexploded munitions. It also includes rescue, first aid and transfer of casualties to hospitals, fire fighting and clearance of debris. All associated measures to control and contain the damage are included here.

  - **Combat Restorative Measures**. These consist of measures taken after any attack to restore and resume operations as swiftly as possible. Aircraft operating

surfaces and all vital combat support services are of critical importance for swift re-commencement of air operations. 'Control' and 'Restorative' measures are interlinked and must be undertaken simultaneously. These may need redeployment of combat assets and support equipment between bases or reserve locations.

- **Techno-Logistics**. Aerospace power must be underpinned by sound and round the clock techno-logistics to ensure the highest serviceability and availability of aircraft and equipment during operations. Efficient and resilient techno-logistics ensures high sortie generation rates, shortest mission turnaround time, accelerated repairs and servicing, weapon readiness and distribution and recovery of damage aircraft/equipment. Air operations demand a high serviceability and availability of robust communication and combat support data networks. Ensuring highest serviceability and availability of all support equipment, radio and navigation aids, signals equipment with swift repair and recovery facilities, laboratories, weapon, FOL spares and equipment supply chains, road/rail/air bridging are vital to support and sustain aerospace power.

- **Administration and Human Resource Management**. Administration includes all activities that are necessary to enable the IAF to operate effectively and efficiently in war. Robust, responsive and round the clock administration has an immense role in sustaining operations and also has a positive influence on morale. They include maintenance of air field and aircraft operating surfaces, all airfield and base support assets and infrastructure, messing facilities, accommodation, security and policing, medical support, fire fighting, accounting and work services. Human Resource management is the bedrock of a strong air force. HR policies directly impact the morale and efficiency of air warriors in particular and the air force as a whole. Sound HR and an adaptive administration act as a force-multiplier and enhance combat efficiency.

- **Training**. IAF operates high technology equipment and assets that require a high level of training and skill sustenance. Training process has twin objectives of developing individual professional skills to carry out designated operational functions and tasks efficiently, as well as imparting Professional Military Education to develop the knowledge required to undertake command and staff responsibilities. The end-state is to nurture a future ready competent, cohesive, and resilient combat team capable of applying aerospace power to achieve IAF objectives effectively.

- **Op Testing and Evaluation**. Technology and doctrine are dynamic processes and must necessarily adapt to change lest they become obsolete and lose their relevance. Self reliance in testing and flight evaluation ensures that new weapon systems acquired by the country meet the requirements of the IAF.

Pillars of Air Strategy

Battlespaces have expanded beyond the traditional land, maritime and air domains. Multi Domain Operations are an intrinsic part of warfare. Multi Domain Operations supplement conventional means while acting as a catalyst to achieve the desired end state. There are certain capabilities and operations which are all pervasive and continuous, irrespective of the type of air operations being executed. Exploitation of these capabilities is a pre-requisite for air strategy as well as in application of airpower and can be termed as Pillars of Air Strategy. In addition to Cyber Warfare, Information Warfare (IW), Electronic Warfare (EW), Techno-Logistics, Administration, HRM and Training, few other Pillars of Air Strategy are:-

- **Battlespace Transparency**. Intelligence gathering, surveillance and reconnaissance of enemy disposition and intent are prerequisite to all military campaigns. Aerospace assets conduct these activities as a continuous process, spanning the entire spectrum of conflict. The success of air operations hinge on the ability to monitor the enemy and read his intentions; to process and convert information to useful intelligence, and to retain situational awareness in a dynamic environment. Battlespace transparency is increasingly dependent on space based assets.

● **Networking**. A robust, secure and reliable network, both for data and communication, is a basic requirement for prosecuting air operations. This would facilitate integrated employment of forces for a joint military aim, enhance battlefield transparency, reduce sensor to shooter time, increase shared awareness and reduce fratricide. Network centric operations could significantly enhance combat capability and mission effectiveness.

AIR STRATEGY

BATTLESPACE TRANSPARENCY

NETWORKING

CYBER AND INFORMATION WARFARE

ELECTRONIC WARFARE

TECHNO-LOGISTICS

ADMINISTRATION AND HUMAN RESOURCE MANAGEMENT
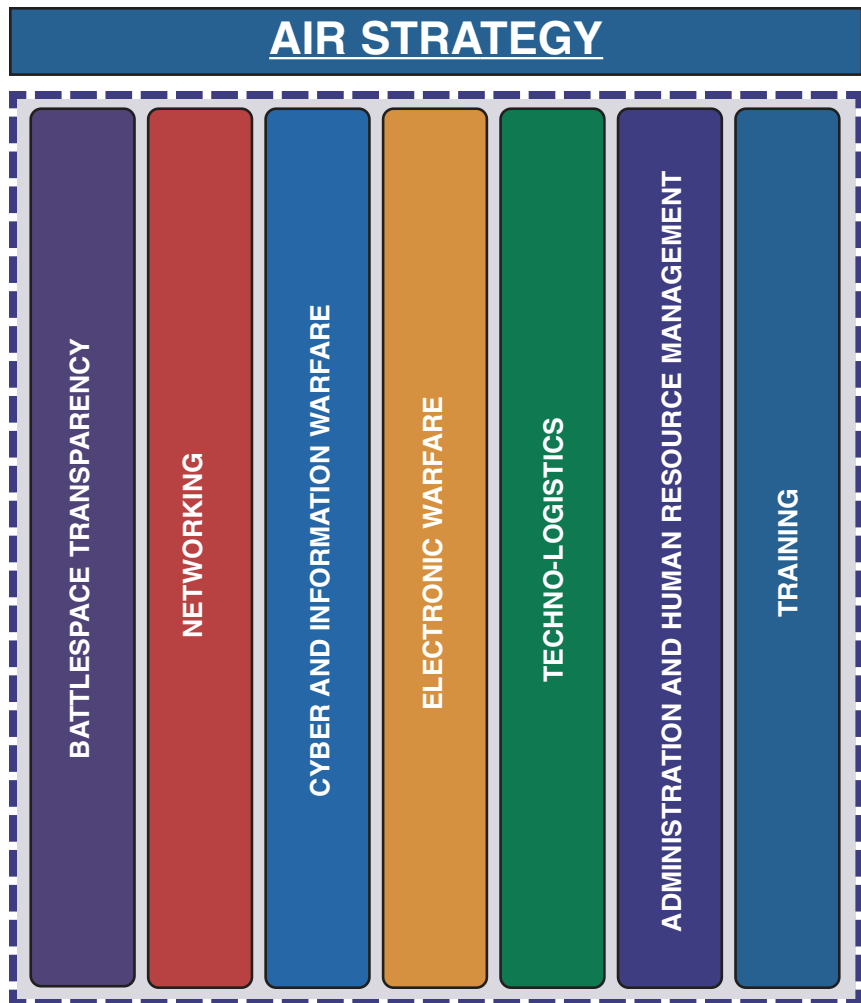
TRAINING

Fig. 18: Pillars of Air Strategy

Air warriors carrying out Maintenance Activities at Night

PC-7 (Mk II): Learning to Fly

Chinook during HADR Mission

C-130J carrying out Para Drop

CHAPTER-6

AEROSPACE POWER IN THE INDIAN CONTEXT

"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 (Retd)

National Aspirations and Challenges

National security is a vital and integral component of India's overall growth and development. India has emerged as a stable and growing economy with a significant stake and influence in the global arena. As the nation pursues uninterrupted socio-economic development and growth towards 'Yogakshema' of its citizens, 'Raksha' is imperative.

The ever evolving national, global and regional challenges have varying impact on India's security. Geopolitical re-balancing, increased assertiveness by emerging powers, regional instabilities, and the expansion of radicalism are but some of the present day manifestations. The perennial friction on the Northern and Western borders; state sponsored terrorism; left wing extremism; all underscore the magnitude of external as well as internal threats. A broad regional scan indicates growing security challenges which impact our political, economic and security interests in the Indian Ocean Region (IOR) spanning from West Asia to Southeast Asia and the larger Indo-Pacific construct.

Adversaries have adopted grey zone tactics by employing cyber, information and economic means as instruments of statecraft. These challenges constitute a widened spectrum of conflict, from relative peace marked by sub conventional attacks, escalating to low intensity conflicts and finally total war. The nation is faced with challenges that require adaptive strategies. We need to be proficient in conduct of warfare in Land, Air, Maritime, Space, Cyber, EW and IW domains simultaneously at the

Strategic, Operational and Tactical levels. India's military therefore must build multi-domain capabilities and capacities that deter potential aggressors from hindering India's pursuit of its legitimate aspirations and goals.

Military Power and National Security

Military power is one of the most versatile, flexible, and adaptable instrument of security available to the nation. It provides the necessary matrix of options to the political leadership in order to accomplish National goals. Military power may be used individually or in synergy with other instruments of national power (Diplomatic, Economic, Information, etc), as driven by national interests. While the primary task of our armed forces is defence of our nation, it also has significant capabilities that contribute to nation building, fostering peace and stability, assistance in times of national crises, natural disasters and calamities, and other areas deemed necessary in the larger national interest. The military, therefore, contributes to the robustness of India's comprehensive national power in more ways than one.

Harnessing Aerospace Power for National Security

India remains steadfast as a nation with no extra-territorial ambitions. In the interests of preserving its territorial integrity and sovereignty, it must possess potent instruments of national power, capable of deterring conflict, maintaining peace and winning wars. Aerospace power fulfils all these needs both individually and jointly with other military instruments. The contribution of Indian aerospace power in the service of the nation has been amply demonstrated ever since Indian Air Force's first flight came into being on 08 Oct 1932.

World over, aerospace power with its intrinsic characteristics of speed, elevation and reach offers a wide range of strategic options to a nation. It enables exploitation of the overarching third dimension, a domain above geography and surface friction. Aerospace power enables capitalising of the vertical to counter the adversary and facilitate application of our military capabilities. Aerospace power can conduct parallel and inter-dependent operations simultaneously across all domains. This

enables the prosecution of individual or joint air/surface/maritime operations towards achieving national military objectives.

Aerospace power, in a classic sense is aptly defined as the total ability of a nation to assert its will through the medium of air. It includes both military and civil aviation, existing and potential. With increasing use of space in military applications, it logically expands the term Airpower to Aerospace power with the need to defend and address the space borne assets as well as their associated ground based infrastructure. The strength of India's aerospace power primarily lies with the IAF. The capabilities of air arms of the other services, civil aviation and nations space agencies contribute to this strength. Aerospace capabilities, related research and development, along with its associated military industrial capabilities serve as a national force multiplier.

IAF in the National Security Matrix

Understanding the place of Aerospace power in the national security matrix is not only an imperative for its air warriors and military practitioner, but also essential for policy makers and members of the national security establishment. Since all citizens are equal stake holders of national security, it is important for them to understand aerospace power's contribution to it.

Uninhibited by geography, terrain and surface friction, aerospace power exploits the vertical dimension to strike the enemy's military power, attack its leadership, command and control centres, and other critical strengths and vulnerabilities. IAF by defeating the enemy's air power, establishes control of the air so as to permit effective employment of all facets of air and surface power.

During the 1971 Indo-Pak war in East Pakistan, IAF established air supremacy thus enabling unconstrained offensive military operations by land, air and sea. Relentless air strikes over military targets in Dacca and the rocket attack over the Government house that forced Governor's resignation, contributed to the strategic outcome in the form of an unconditional surrender of the Pakistan Army. The IAF was instrumental in enabling surface forces to prosecute their operations unhindered by the enemy air. On the Western front, favourable air situation established

by the IAF allowed offensive air operations against enemy's armoured thrusts and provided close air support to the Indian Army in its land operations. IAF's Counter Air Operations against the PAF airfields and air assets forced PAF to pull back. This enabled full freedom for offensive air operations in the depths of Pakistan's hinterland.

The ability of IAF to rapidly project military force and assist statecraft has become increasingly evident post-independence. The swift air operation undertaken at short notice by the IAF during Operation Cactus in 1989 to air land Indian forces at Male in Maldives was crucial in foiling the coup, and subsequent restoration of the Maldives government. In 2020, the rapid build-up of forces in Eastern Ladakh after the Galwan clash between Indian and Chinese troops, was made possible by the strategic airlift capability of the IAF. Simultaneously, the swift combat air capability build up in the region displayed the nation's offensive intent. It was a firm strategic communication to the adversary about readiness and intent.

India is facing expanded security challenges as Hybrid Warfare has blurred the lines between war and politics, combatants and civilians. Simply put, Hybrid Warfare makes the spectrum of war nebulous as it is a war in which one of the major participants is not a State but rather a violent non-state actor or non-state actor sponsored by a State. Political initiatives, diplomatic parleys, and socio- economic action would be synergised with military action when necessary, to combat this wide range of threats.

Diplomacy remains the first option for both power projection and conflict resolution. Military power provides the deterrence and coercive capability to wield national foreign policy effectively. It reinforces diplomacy, enabling it to communicate its credibility and intent during negotiations. Different elements of military power offer a range of capabilities for diplomatic leverage as and when necessary.

IAF's active participation in international air as well as other military exercises over the last two decades stands testimony to its contribution to foster diplomacy.

IAF has contributed in training Air Forces of friendly foreign countries in activities ranging from flying training to air defence support organisations. It has been the nation's first responder to HADR situations in India's immediate neighbourhood as well as across continents and has

participated in building up joint HADR capabilities with other countries. The large number of HADR missions for swift airlift of COVID-19 vaccines to friendly countries by IAF aircraft, has helped enhance the soft power image of the country. Active role in transcontinental contingencies such as those requiring mass evacuation of Indian diaspora and people of other nationalities from conflict zone, has seen the IAF at the forefront of the country's national interest and foreign policy.

IAF has taken part in trans-oceanic bilateral and multilateral exercises displaying its reach and capability. It has also been a consistent and significant contributor to UN peacekeeping operations. There are numerous other aspects like participation in international air shows within and outside India, air displays, military tattoos, training exchanges etc, that strengthen diplomacy. The inescapable linkages between aerospace power and diplomacy are in line with the government's vision for Security and Growth for All in the Region (SAGAR) strategy. India's strategic industrial and economic assets are located both in the main land and in the seas. IAF AD and offensive capabilities in both domains enhances the security of our economic interest.

Hon'ble Prime Minister of India, in his speech at the Shangri-La dialogue in 2018, while referring in a wider context on the importance of the Indo Pacific region, committed to, "promote a democratic and rules based international order, in which all nations, small and large, thrive as equal and sovereign. We will work with others to keep our seas, space, and airways free and open. We should all have equal access as a right under international law to the use of common spaces on sea and in the air." He clearly articulated the importance of the aerospace domain and its strategic salience in India's geopolitical and security construct.

Today IAF's strategic aerial envelope of influence has expanded across large continental and maritime spaces to be able to project aerospace power in India's sphere of interest. These could be in close synergy with other services or independently from bases in our mainland and island territories or in close cooperation with friendly foreign countries. The IAF is capable of serving and furthering India's national interests in the IOR as envisaged by the Prime Minister. The IAF's significant strategic capabilities will be reinforced with aerospace power capacity development in our island territories on both sides of the peninsula. Increase in strategic

capacity will further enhance the ability of aerospace power to secure and safeguard India's growing influence and strategic interest in the region.

Nation Building

Nation building in a geographically large, ethnically varied and culturally diverse country like India necessitates its citizens to come together towards collective achievement of national aims and objectives. This complex process is based on three important pillars of governance, development and security. The armed forces have a vital role to play in supporting governance and contributing to development and security. With India's growing economic and geopolitical importance, airpower will have a significant role in India's rise in stature. Having steadfastly contributed to secure our nation and for the betterment of our citizens, it will be increasingly called upon to contribute even more in the years to come.

India's 'soft power' is a powerful instrument of its statecraft towards furtherance of national objectives, nation building and its geo-political stature. IAF's significant contribution in all its non-kinetic and soft power roles will continuously need to grow with India's rise.

IAF and Jointness

Aerospace power may not win a war on its own, however no war can be won without it. In every war fought since independence, IAF has played a pivotal role towards achievement of national objective. IAF's rich operational history is a robust legacy of jointness. From over 24000 hours flown towards Army cooperation in the Burma campaign to the significant role in Kargil conflict that boasts of the highest recorded altitude of effective aerospace power employment in the world.

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 objective. This necessitates an intimate understanding of the core competencies, capabilities and limitations of each Service by the other two. In the words of Air Commodore Jasjit Singh, "The issue has not been about the need to provide support to the army

and navy but what would be the best way of doing so while exploiting the various attributes of aerospace power."

Aerospace power can best be exploited jointly with other components of military, but independently in tandem with diplomatic efforts and other elements of Comprehensive National Power. Aerospace power offers wide options for joint operations towards a comprehensive military strategy for a common national goal. It is aerospace power that enables land and naval forces to undertake sustained operations beyond their physical operating mediums, leading to the increasingly accepted perception that aerospace power is the lynchpin of joint operations.

Evacuation of Indian Citizens from
Iran during COVID-19 Outbreak

Transportation of Oxygen in
Critical Times during Pandemic

Providing Succour and Relief

Supporting Infrastructure
Development in Remote Areas

CHAPTER-7

PREPARING FOR THE FUTURE: A ROAD MAP

"The battlespace is going to be cluttered, congested, contested and complex. Primarily what it amounts to is to be able to reimagine, reinvent, rededicate and retrain ourselves for future conflicts."

-Air Chief Marshal VR Chaudhari, CAS Indian Air Force

Future Ready Indian Aerospace Power

Aerospace power is a rapidly evolving and dynamic instrument of military power and statecraft. It is inherently reliant on technology and there is requirement to maintain a balance between obsolescence and ever evolving niche technology. A dynamic geopolitical environment and increasing global challenges necessitate flexible capacity and capability enhancement processes to enable the Indian Air force to maintain a competitive edge over its adversaries. While processes do currently exist, it may be relevant to revisit them. Concepts and procedures along witheducation and training are needed to develop IAF into a flexible, agile and future ready source of national power.

Capacity enhancement processes encompass the quantitative processes of Force Planning and Force Structuring. Capability enhancement processes include the qualitative processes of Force Development and Force Sustenance. These would enable the capacities for achieving strategic goals. Force, in this context, applies to organic equipment, firepower and manpower.

Capacity Enhancement

- **Force Planning**. Capacity building commences with a Force planning process that is a rational and objective mechanism to arrive at force requirements to meet National Security Objectives. The broad process that is used for force planning and arriving at force requirements include:-

    - Future Scenario building and threat analysis.

    - Strategy formulation and testing.

    - Initial identification and projection of 'threat based' quantitative force requirements to meet strategic goals. They are also referred as 'threat based and demanded' force requirements (assuming no risks and constraints).

    - Identification of future risks and constraints.

    - Application of future constraints and risks to arrive at moderated force requirements also referred as 'threat based and supplied' force requirements.

    - Catering for moderated capacity through TTP (tactics, techniques, procedures) to meet strategic objectives.

- **Force Structuring**. Post planning, force structuring is undertaken as a component of military capability building/ development. Force structuring deals with the 'type' and 'structure' of the IAF and is a long-term process that requires keeping pace with the dynamics of inductions, upgradations and prevailing geopolitical environment. It is a dynamic process that constantly analyses and projects current as well as future requirements. The process of force structuring involves:-

    - Resource prioritisation and distribution of planned inductions.

    - Resource right sizing and restructuring of existing resources for improved teeth-to-tail ratio and economy of effort.

- Right person, right equipment and right weapon for the job.

Capability Enhancement

- **Force Development**. It is the actual process of procurement, induction, and operationalisation of equipment along with accretion and training of manpower leading to overall capability enhancement. The bedrock of force development is the doctrine, and the process is the culmination of force planning and force structuring. It must cater for bridging the gap between current and future capability and involves:-

    - **Technology Induction**. Technology induction should be planned through acquisitions/procurement/ leasing. These may be sourced from within country (either from the public or private sector) or from foreign entities by virtue of established procurement processes. The shift to 'Atmanirbharta' or self-reliance is a step in the right direction to achieve long term modernisation goals of dynamic and flexible IAF, along with promoting economic goals where IAF development would be linked to national prosperity.

    - **Technology Adoption**. Operationalisation of technology through policies, publications, education, and training as well as efficient command and control structures.

- **Force Sustenance**. The process of sustenance involves all processes meant to sustain combat power over required periods in war, NWNP and peace. The broad processes are:-

    - Equipment maintenance.

    - Manpower administration.

    - Logistics management.

Transformation from Contemporary to Future Ready Force

The process of force planning, structuring, development, and sustenance may be made more dynamic and flexible through a myriad of processes such as application of better command and control structures, contemporary technology and new concepts, indigenous R&D and production, accretions, inductions and more robust operations, maintenance, logistics and cadre management tools. Some measures that must be taken and applied to transform the IAF from a 'contemporary' to a 'future ready' force are:-

- Shift from 'threat based and demanded' to 'capability demanded' force requirements. Reduce the gap between 'capability demanded' and 'capability supplied' through large scale investment in indigenous equipment and technology.

- Technology enabled tools for operations, techno-logistics and administration with enough bandwidth for future accretions including plug and play capabilities for Indian Navy and Indian Army.

- Develop in-house R&D capability through public-private partnership in niche information, communication, cyber and aviation technologies. Use capabilities gained from development of organic network as research base for future network developments towards national objectives.

- Directed PME towards enhancing strategic thought in medium level leadership and establishment of in-house think tanks for doctrine evaluation, strategy formulation and strategic communication. Regular interactions between service, military, national and international academia.

- Establishment of robust joint structures to enable right sizing joint training and operations while maintaining service specific core competencies.

Tejas: Symbol of India's Prowess in Atmanirbharta

AEW&C Netra on an ISR mission

Light Combat Helicopter Prachand: Light, Lethal, Multirole

Akash: Indigenous Surface to Air Missile

ACRONYMS AND ABBREVIATIONS

AAR	Air-to-Air Refuelling
ABM	Air Battle Manager
AD	Air Defence
AEW	Airborne Early Warning
AI	Air Interdiction
ALG	Advanced Landing Ground
AWACS	Airborne Warning and Control System
BAS	Battlefield Air Strike
C^2	Command and Control
CAO	Counter Air Operations
CAP	Combat Air Patrol
CBRN	Chemical Biological Radiological and Nuclear
CIWS	Close In Weapon System
CNP	Comprehensive National Power
COG	Centre of Gravity
COMJAM	Communication Jamming
CSFO	Counter Surface Force Operations
ELINT	Electronic Intelligence
EO	Electro Optical
EW	Electronic Warfare
FAS	Favourable Air Situation
FOL	Fuel Oil Lubricants
HADR	Humanitarian Assistance and Disaster Relief
HUMINT	Human Intelligence
IACCS	Integrated Air Command and Control System
IAD	Integrated Air Defence
IMINT	Imagery Intelligence

IOR	Indian Ocean Region
ISR	Intelligence Surveillance & Reconnaissance
IW	Information Warfare
LAC	Line of Actual Control
LRCM	Long Range Cruise Missile
MANPADS	Man Portable Air Defence Systems
MAO	Maritime Air Operations
MoD	Ministry of Defence
NEO	Non-Combat Evacuation Operations
NMO	National Military Objectives
NSS	National Security Strategy
OCAO	Offensive Counter Air Operations
ODL	Operational Data Link
OOAC	Out of Area Contingency
ORP	Operational Readiness Platform
OSINT	Open Source Intelligence
PAF	Pakistan Air Force
PME	Professional Military Education
RPA	Remotely Piloted Aircraft
SAGW	Surface to Air Guided Weapons
SAR	Search and Rescue
SATCOM	Satellite Communication
SDR	Software Defined Radio
SEAD	Suppression of Enemy AD
SIGINT	Signal Intelligence
SOP	Standard Operating Procedure
TTP	Techniques, Tactics, Procedures
UCAV	Unmanned Combat Aerial Vehicle
VA/VP	Vital Area/Vital Point