CHALLENGES OF AIR POWER

ARUP RAHA

INTRODUCTION

I would like to thank the Director General, Centre for Air Power Studies (CAPS), for providing me the opportunity to be amongst such fine proponents of aerospace power, and share my thoughts on a subject which remains at the forefront of all academic dialogue on air power. The subject "Challenges of Air Power" is indeed intriguing, since air operations have, within a short period of 110 years, evolved to an extent that no modern military operations are imaginable without application of air power, and peace-time operations become difficult to execute without this vital component. Over the last 82 years, the Indian Air Force (IAF) too, has taken shape and evolved into one of the finest air forces of the world, something that would not have been possible without the exemplary leadership of our first Indian Air Chief, Air Marshal Subroto Mukerjee.

REMEMBERING A LEGEND

For the Indian Air Force, April 1, 1954, was a memorable day. Exactly 21 years after the raising of its first flight, one of its founder members, Air Marshal Subroto Mukerjee OBE, took over as the commander-in-chief of the Indian Air Force. On the same day, the president awarded the Presidential Colours

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Air Chief Marshal **Arup Raha** PVSM, AVSM, VM, ADC, is the Chief of the Air Staff, Indian Air Force.

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to our air force. The immediate task of restructuring and reequipping the IAF with newer aircraft and equipment fell upon Air Marshal Mukerjee. During his tenure, the Indian Air Force inducted a variety of state-of-the-art aircraft like the Dassault Mystere, Hawker Hunter, Canberra and the legendary Gnat. He laid great emphasis on planning and development of human resources, a legacy that continues since then. It was his vision and foresight which has indeed placed the IAF where it is today.

SECURITY CHALLENGES AND SPECTRUM OF CONFLICT

Before I talk about the subject *per se*, I would like to share some views on how aerospace power has evolved to become central to the conduct of any military operation, especially in the last 20 years. These changes have been accelerated since 9/11, after which there has been an increasing convergence on the ideas that global security and economic interests are indeed shaping the views of countries on many national and international issues. Besides the threats emanating from the traditional state vs. state engagements, threats to the security of a nation could also be posed by non-state actors. The spectrum of conflict could range from an asymmetric one to one of high intensity, and even with a nuclear backdrop. To prevent escalation beyond a certain level and to gain maximum advantage in a limited timeframe, military engagements would necessitate a calibrated and swift response. Aerospace power becomes the most appropriate instrument in addressing these security threats.

EFFICACY OF AEROSPACE POWER IN CONTEMPORARY CONFLICTS

All recent conflicts have witnessed the decisive contribution of air power in shaping their outcome. During the Second Lebanon War in 2006, air attacks degraded the capabilities of Hezbollah. North Atlantic Treaty Organisation (NATO) air strikes in 2011 enabled opposition forces to overthrow the regime of Muammar Gaddafi with minimal foreign ground offensive. Similarly, intervention by the French Air Force in Mali in 2013 provided speed and surprise to reduce the offensive momentum of the militants and gave sufficient lead-time for the ground forces to deploy in Central Mali,

thus, restoring government control with minimum boots on the ground. More recently, the ongoing US and French air strikes in **Syria** and **Iraq** against the Islamic State decisively prove that air power has the ability to halt an offensive and set back the best prepared plans of the adversary with time critical targeting.

The effects-based capability of air power platforms and systems has not been lost even on non-state actors. Such non-state actors, too, have slowly graduated from Man Portable Air Defence Missiles (MANPADS) in the Eighties to surface-to-air missiles, as demonstrated in the downing of the Malaysian airliner in Ukraine earlier this year. The recent effort by Islamic State militants to train and fly fighter aircraft is an indication of further transition of non-state actors in the aerospace domain.

THE CHALLENGES OF AIR POWER

The envisaged threats to national security and the conflict spectrum pose a number of challenges that make efficient application of air power more complex. The impact of asymmetry at the operational level for both state and non-state actors is likely to increase. Unconventional warfare would continue to disrupt traditional power projection capabilities, and crises in the future would be more unpredictable, both in nature and timing, affording very little warning to the leadership to respond. Over and above these would be the transitions due to rapidly evolving technology. Since aerospace technologies require considerable time to fructify, their impact on actual outcome from the design table to operationalisation may be significantly more than expected. Therefore, despite the advantages of responsiveness, precision and flexibility, aerospace power faces the challenge of **remaining contextual**, technologically.

The methods of gathering and disseminating intelligence would enhance the availability of information to the war-fighter and the commander. To prevent an information overload, the air force commander will have to greatly rely on inputs from artificial intelligence-based decision support systems. Availability of these systems would affect the degree of transparency and effective utilisation of the intelligence being gathered.

The Gulf War heralded the advent of the media into the battlefield. A ubiquitous media and a highly connected world would pose greater demands on the manner in which military operations are conducted. Each action of the armed forces would need to be justifiable and in conformity with the laws of armed conflict, even within our own country.

Air operations would be characterised by preemptive strikes, reduced response time, enhanced shock effect, and precise and decisive intervention. The challenge needs to be understood in the overall context of aerospace power and its components. This includes both the tangible and less tangible aspects. The tangible aspects in the form of operational capability are afforded by the various combat platforms, support systems and networks that are mostly driven by cutting edge technology. The less tangible elements which have a bearing on the effectiveness of air power are doctrine, concepts of operations, training, leadership, and experience.

AIR DEFENCE

Air defence is a primary task of any aerospace power. Events like 9/11, 26/11, MH 370 and MH 317 have added new paradigms to the dynamic air environment. Proliferation of **remotely piloted vehicles, ballistic and cruise missiles and space-based platforms** has added new **complexities to planning and execution** of air defence operations. In addition, **adventure activities, sub-conventional aerial threats** in the form of **micro or miniature aerial vehicles and air policing requirements along the border** and even in urban areas, are some contemporary issues that have led to the evolution of the concept of 'aviation security.' This is now considered a **responsibility of not only the armed forces, but the civilian stakeholders as well**.

The envisaged increase in the density of civil air traffic and the need to economise operations portends a need to flexibly manage the air space; and yet ensure that the air defence is foolproof. The need of the hour therefore, is to adapt to this change and ensure that military as well as civil air traffic operates to its full potential without hindrance. Thus, the future necessitates that the **air defence assets** are completely **networked, integrated and centralised** through the command and control chain of the nation.

HADR: Air forces are increasingly being called upon to assist in Humanitarian Assistance and Disaster Relief (HADR) operations. The quick response and ability to transcend terrain make air power the most suitable platform for providing timely relief and succour to the populace. Air power has contributed immensely in strengthening the resolve of the government during natural disasters.

TECHNOLOGY

Air power is driven by technological innovations that span the entire spectrum of its operations. The technology we invest in today should be as widely employable as possible because of the long lead times required to realise its full potential. Some of the technologies that would affect aerospace applications are related to **space, airborne sensors, artificial intelligence, composites, advanced aero-engine and airframe designs, sensor fused weapons, missile technologies and networked operations**. Air power needs to leverage the plethora of technologies available so that it can orchestrate its use in a manner that makes the sum bigger than the parts.

The exactness of the application of air power, which has become its signature and the primary reason for its **preference as a force of first choice and a tool of political deterrence**, is more efficiently achieved through the appropriate application of space-based enablers. The development of space technologies includes near real-time global communications, persistent global surveillance, extremely accurate position and navigation information, ballistic missile warning and intercept, meteorology and search and rescue. **Cheaper access** has enabled air forces to leverage the orbital mechanics for deployment of **conventional weapons in space**.

Sensor fusion offers **dynamic and high fidelity situational awareness** to the war-fighter and **compresses the decision loop** through intelligent application of technology to aerospace power. Long range suborbital flights of both aircraft and missiles would become a common feature with employment of scramjet technology.

Future developments in the field of **artificial intelligence, robotics and nanotechnology** will dramatically change the manner in which information

is gathered, processed and acted upon. Information and Communication Technology (ICT) will remain critically important, influencing people's lives with innovations such as cloud computing and Augmented Realities (AR), etc. These will enable users to seek and utilise information as and when desired, globally, 24x7.

Budgetary Allocation: An all pervasive aspect is the availability of funds for developing and maintaining aerospace capabilities. Aviation is an inherently **resource-intensive capability**, within which military air power is at the higher end of the resource spectrum. There is a need for **allocation of the necessary resources** to generating air power, even during long periods of comparative peace. This is crucial because the lead time required to acquire and generate air power is considerably long. Within this ambit, the armed forces in general and the air force in particular need enhanced allocations towards defence budgets.

Indigenisation of Aerospace Industry: Traditionally, India has been reliant on imported technologies to meet its military aviation requirements. To be able to address the demands of the future security environment, our armed forces need to become self-reliant where military hardware is concerned. The current procurement policy provides **adequate opportunities to private industry to play a key role in energising the Indian aerospace industry. The burgeoning demands of civil and military aviation requirements need to be leveraged not only by the Tier I vendors** but must be absorbed by Tier II, III and IV vendors, as well.

DOCTRINAL EVOLUTION

The effective role played by air power has stemmed from a combination of technological advancements, doctrinal precepts, training and focussed leadership. Contemporary conflicts have drawn the attention of air power theorists and practitioners to the more tactical aspects of a conflict rather than a long-term view. From a long-term strategic analysis, it is apparent that the fundamentals of warfare, as opposed to the tactics and responses in specific conflicts, have not changed.

National strategy, political will and the decision-making apparatus would guide the outcome of events in conflict situations. There would be a propensity for asymmetric/irregular warfare due to the escalating costs of total and / or limited wars. Only a rapid response by harnessing the capabilities of all combat and combat support elements, including space and cyber space, would resolve a conflict swiftly. Synergy amongst the stakeholders, both civil and military, would result in success in future military operations. Under clear directions from the leadership, future conflicts and crises would need to be addressed jointly by the armed forces. Being an enabler of surface operations, it is imperative that application of aerospace power and its limitations are both understood by all personnel.

DEVELOPING HUMAN RESOURCES

The **advancements** in the aerospace technologies will bring the domain of knowledge, and its sharing, to the forefront. The **war for talent** will continue and it is unlikely that the rising demand for these intellectuals would get satisfied, thus, creating a talent mismatch as an important challenge for any developing aerospace power.

In future, air warriors should be expected to exploit onboard systems, avoid situational and information overload and respond appropriately under varied circumstances. While the cognitive domain assists in appreciating and responding to situations promptly, higher levels of mental strength would be required to sustain the 24x7 military operations.

Well trained and motivated air warriors are the backbone of the IAF. It is important to prepare them to absorb the high-end technology of the IAF's modernisation process in the shortest possible time. The IAF's vision "People First - Mission Always" aptly puts the focus on our people. Our training pattern evolves to address skill enhancement needs to leverage the potential of human resources and truly transform our air power.

STRATEGIC TRANSFORMATION OF IAF

We foresee a leaner IAF with technologically advanced platforms including aircraft, Surface-to-Air Guided Weapons (SAGWs), Remotely Piloted

Aircraft (RPA), Unmanned Combat Aerial Vehicles (UCAVs) as well as sensors and weapons all networked into one composite system exploiting the space and cyber space mediums.

- Multi-role combat platforms, along with force enhancers like the Fuel Refuelling Aircraft (FRA) and Airborne Warning and Control System (AWACS), would enable the IAF to prosecute air operations in parallel at all levels and across the spectrum of conflict. The flexibility and weapon carrying capability of these platforms enables them to switch roles in mid-air from counter-air to counter-surface.
- Induction of C-130 J and C-17 aircraft has given the IAF the strategic air- lift capability to augment /move forces from one front to the other to provide dynamism to the surface campaign.
- Induction of a variety of rotary-wing platforms from utility to airlift to attack helicopters has enhanced the options for their deployment for surgical strikes against Centres of Gravity (CsOG), insertion / extrication of troops, Spl Ops -- Special Heli-Borne Operations (SHBO), airborne assault, medical evacuation and HADR, even in marginal weather conditions.
- The IAF is in the process of replacing its legacy SAGW units with modern systems like the Medium Range Surface-to-Air Missiles (MRSAM), Akash, SPYDER, Very Short Range Air Defence Systems (VSHORADS) and Close-in Weapon System (CIWS) which would transform our capability in defending the Vital Areas/Vital Points (VAs/VPs).
- A large number of modern radars are being procured to provide multi-tier, multi-layer gap-free radar cover. All these would be networked to provide a composite picture of the air space and enhance situational awareness.
- The IAF is procuring various types of specialist weapons to target the adversaries' ground forces and destroy, degrade and delay them well before they reach the Tactical Battle Area (TBA). Our Intelligence, Surveillance, and Reconnaissance (ISR) assets provide adequate capability to detect the adversaries' attempts to induct ground forces into battle. We would be able to interdict them in an appropriate timeframe.

CONCLUSION

The inherent characteristics of aerospace power make it a highly valuable tool of conflict resolution and statecraft and, undoubtedly, will continue to play a decisive role in the future. Irrespective of the nature of warfare and the type of adversary, aerospace power will be required to achieve a range of effects with discrimination, proportionality and accuracy. It will be on this benchmark that the capability and relevance of aerospace power to national security will be judged. The challenges to air power are many, but they have to be overcome to create reliability and confidence in its abilities. As the vanguard of aerospace power in the nation, the IAF would continue to mature and transform itself into a potent strategic force, technologically at par with the most modern air forces of the world.

Jaihind!