

SP's



AN SP GUIDE PUBLICATION



www.sps-aviation.com

VOL 28 ISSUE 9 • 2025

aviation

SHARP CONTENT

ANCE



SPECIAL
ISSUE
93RD
ANNIVERSARY OF
INDIAN
AIR FORCE

EXCLUSIVE

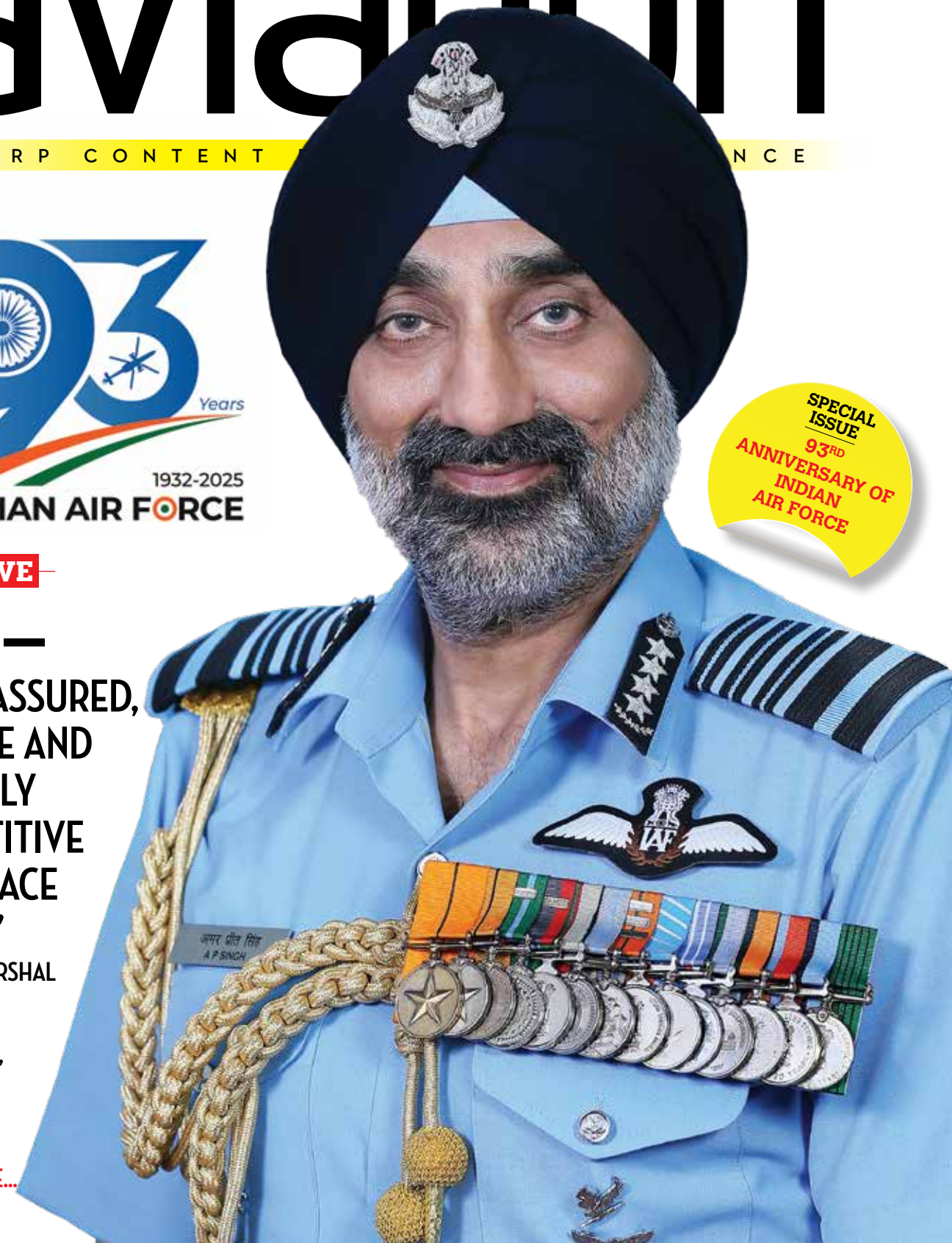
**“IAF –
A SELF-ASSURED,
CAPABLE AND
GLOBALLY
COMPETITIVE
AEROSPACE
POWER”**

AIR CHIEF MARSHAL
A.P. SINGH,
CHIEF OF THE
AIR STAFF, IAF,

PAGE 4

RNI NUMBER: DELENG/2008/24199

MUCH MORE...



C-390 MILLENNIUM

UNBEATABLE COMBINATION FOR INDIA

UNRIVALLED MOBILITY. OUTSTANDING PERFORMANCE TRULY MULTI-MISSION.

Embraer and Mahindra Group are joining forces to offer the Indian Air Force the best global solution for its MTA (Medium Transport Aircraft) program – the C-390 Millennium. This new generation aircraft offers an unbeatable combination of unrivalled mobility, outstanding performance, operational flexibility and low lifecycle costs in a single platform. Three countries are currently operating the C-390 Millennium: Brazil, Portugal and Hungary, with the aircraft achieving a 93% mission capability rate. Embraer have a strong track record fostering partnerships in this part of the world – 45+ Embraer jets currently operate in India covering the Defense, Commercial and Executive Aviation sectors.

#C390UnbeatableCombination
c390mta.com



EMBRAER

CHALLENGE.
CREATE.
OUTPERFORM.

PUBLISHER AND EDITOR-IN-CHIEF

Jayant Baranwal

CONSULTING & CONTRIBUTING EDITOR

Manish Kumar Jha

CONTRIBUTORS

India:

Air Marshal Anil Chopra (Retd)
Group Captain Joseph Noronha (Retd)
Swaati Ketkar

Europe: Alan Peaford

CHAIRMAN & MANAGING DIRECTOR

Jayant Baranwal

EXECUTIVE VICE PRESIDENT

Rohit Goel

SR. EXECUTIVE - NEW INITIATIVES

Sarthak Baranwal

MANAGER - HR & ADMIN

Bharti Sharma

DEPUTY MANAGER - CIRCULATION

Rimpy Nischal

GROUP RESEARCH ASSOCIATE

Survi Massey

DESIGN

Holistic Directions: Jayant Baranwal

Sr. Designer: Vimlesh Kumar Yadav,

Designer: Sonu Singh Bisht

GROUP DIRECTOR - SALES & MARKETING

Neetu Dhulia

DIRECTOR - SALES

Rajeev Chugh

SP'S WEBSITES

Sr Web Developer: Shailendra Prakash Ashish

Web Developer: Ugrashen Vishwakarma

© SP Guide Publications, 2025

Subscription/Circulation

Annual Inland: ₹2,400 • Foreign: US\$320

E-mail: subscribe@spguidepublications.com

subscribe@sps-aviation.com

LETTER TO EDITOR

editor@sps-aviation.com; expert@sps-aviation.com

For Advertising details, contact:

neetu@spguidepublications.com

rajeev.chugh@spguidepublications.com

SP GUIDE PUBLICATIONS PVT LTD

A-133 Arjun Nagar, (Opposite Defence Colony)

New Delhi 110003, India.

Tel: +91 (11) 40042498, 40793308

E-mail: info@spguidepublications.com

Representative Office

MOSCOW, RUSSIA

LAGUK Co., Ltd., (Yuri Laskin)

Krasnokholmskaya, Nab.

11/15, app. 132, Moscow 115172, Russia.

Tel: +7 (495) 911 2762

Fax: +7 (495) 912 1260

MEMBER / PARTNER OF



SP GUIDE PUBLICATIONS

WWW.SPGUIDEPUBLICATIONS.COM

TABLE OF CONTENTS

SP's aviation

SHARP CONTENT FOR SHARP AUDIENCE

VOL. 28 ISSUE 9 • 2025

COVER IMAGE

Air Chief Marshal A.P. Singh is steering the IAF's transformation into a formidable global aerospace power, driving the integration of next-generation technologies including autonomous systems, AI, quantum computing, unmanned platforms, and hypersonic weapons, across its operational and strategic spectrum.

(Cover Photo: Indian Air Force)

COVER DESIGN BY: SP's Team



IAF SPECIAL

3 CAS Message

Air Chief Marshal A.P. Singh
Chief of the Air Staff,
Indian Air Force

4 EXCLUSIVE

CAS Interview
Air Chief Marshal A.P. Singh
Chief of the Air Staff,
Indian Air Force

9 Operations

Indian Air Force –
Post Operation Sindoor

12 IAF Modernisation

IAF – Target '42 Squadrons'



15 Helicopters

Chariots of the Battlefield:
Combat Helicopters



OEM

19 Embraer

From Brazil to Bharat: Embraer's
Commitment to India's Air Power

REGULAR DEPARTMENTS

2 From Editor-in-Chief

21 Hall of Fame

The IAF's MiG-21: Farewell to a
Legend

24 NewsDigest & Appointments





It is always a pleasure to meet Air Chief Marshal A.P. Singh. Besides being a thorough professional and a proven leader, his pleasing personality, demeanour and accessibility makes him stand out. Never bothering to be politically correct, he speaks from his heart, for the benefit of the Air Force, the Citizens and the Country. I am sure that under his tutelage, the IAF will continue to rise and shine!

THE 93RD INDIAN AIR FORCE ANNIVERSARY SPECIAL OF SP's Aviation presents a sweeping narrative of the Indian Air Force's transformation into a technologically empowered, self-reliant aerospace force. The edition's lead interview — an exhaustive conversation with Air Chief Marshal A.P. Singh, Chief of the Air Staff, offers an incisive look into the IAF's strategic direction, postures, and future trajectory.

In this interaction, Air Chief Marshal Singh reflects on the operational lessons of Operation Sindoor, which he describes as a precise, intelligence-led campaign that validated India's capacity for rapid, integrated, and proportionate response. He emphasises that the IAF's focus today extends beyond traditional air dominance to "multi-domain readiness" — a synergy of air, space, and cyber capabilities. ACM Singh highlights the importance of indigenous development, pointing to platforms such as the LCA Tejas Mk-1A and Mk-2, the upcoming Advanced Medium Combat Aircraft (AMCA), Akash NG, Uttam AESA radar, and indigenous AEW&C systems. These programmes, he notes, are not just hardware projects but "national enablers" of sovereign capability.

The CAS further outlines efforts to integrate AI, quantum computing, unmanned systems, and hypersonic weapons into the Air Force's doctrine and planning. The IAF, he explains, is evolving into a "tech-driven and network-centric force," ensuring interoperability with the Army and Navy through the Integrated Capability Development Plan (ICDP). He also discusses modernisation of refuelling, AEW&C, and UAV fleets, alongside plans for space-based surveillance and the future Defence Space Command. His vision underlines a confident Air Force balancing strategic autonomy, rapid adaptability, and global competitiveness in a complex security environment.

In the feature "Indian Air Force – Post Operation Sindoor", Air Marshal R.G.K. Kapoor (Retd) provides a detailed assessment of the operation that reshaped India's aerial warfare doctrine. Air Marshal Kapoor analyses how Sindoor demonstrated calibrated use of air power, precision targeting, and seamless

joint planning — all while maintaining escalation control. He calls for institutionalising the lessons learned into the IAF's training and operational framework, with particular emphasis on jointness, networked situational awareness, and decision superiority enabled by digital warfare systems.

Manish Kumar Jha's in-depth feature "IAF – Target '42 Squadrons'" delves into the IAF's most pressing challenge — achieving the sanctioned 42-squadron strength amidst attrition and delays. He evaluates the production roadmap of Tejas Mk-1A, progress on Tejas Mk-2 and AMCA, and bottlenecks in engine technology and industrial scalability. The article argues that meeting the squadron target demands a robust public-private partnership ecosystem, export-oriented manufacturing, and greater predictability in procurement cycles.

In another analytical piece, Air Marshal Anil Khosla (Retd) writes "Chariots of the Battlefield – Combat Helicopters," exploring the evolving role of Attack and Armed Helicopters like the Apache, Rudra, and LCH Prachand helicopters. He describes them as the "aerial armoured punch" of the modern battlefield and emphasises their role in future warfare with manned-unmanned teaming, networked firepower, and precision strikes.

Overall, this anniversary issue stands as both a tribute to the IAF's 93-year legacy and a forward-looking chronicle of its technological resurgence — portraying an Air Force poised for dominance in the air and beyond. Hope you will enjoy reading this issue of *SP's Aviation*. Welcome aboard and we wish you safe landings!


JAYANT BARANWAL
PUBLISHER & EDITOR-IN-CHIEF

Owned, published and printed by Jayant Baranwal, printed at Kala Jyothi Process Pvt Ltd and published at A-133, Arjun Nagar (Opposite Defence Colony), New Delhi 110003, India. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, photocopying, recording, electronic, or otherwise without prior written permission of the Publishers.

 @SPsAviation

FOLLOW US ON

 facebook

SPPublications

[IAF SPECIAL]



AIR CHIEF MARSHAL A.P. SINGH
PVSM AVSM

I extend my appreciation to the SP Guide Publications on the release of the special edition of SP's Aviation, to commemorate the 93rd anniversary of the Indian Air Force.

The Air Force day is an occasion to honour our proud legacy and reaffirm our resolve to safeguard the nation's skies. Through Op Sindoor the IAF has demonstrated its commitment, courage and capabilities; thus reinforcing the primacy of air power in modern warfare. This year also marks the poignant moment of transition from the formidable MiG-21 to the rise of indigenous strength through the LCA Tejas; carrying forward the torch of excellence and ushering in a new era of Atmanirbhar Bharat. As we forge ahead, the IAF remains resolute in its quest for excellence, harnessing cutting-edge technologies to dominate the multi-domain battlespace. This unwavering commitment perfectly encapsulates this year's theme: **Infalible, Impervious and Precise**.

Since its founding in 1964, SP Guide Publications has remained a benchmark in military journalism, earning respect for insightful analysis and high editorial standards, making it an invaluable resource for the defence community.

On behalf of the Indian Air Force, I would like to congratulate the team at SP Guide Publications and wish them continued success in their future endeavours.

Jai Hind!



AIR CHIEF MARSHAL
CHIEF OF THE AIR STAFF
INDIAN AIR FORCE

EXCLUSIVE

AIR CHIEF MARSHAL
A.P. SINGH,
CHIEF OF THE AIR STAFF,
INDIAN AIR FORCE

PHOTOGRAPH: INDIAN AIR FORCE

“IAF — A SELF-ASSURED, CAPABLE AND GLOBALLY COMPETITIVE AEROSPACE POWER”

On the occasion of the 93rd Indian Air Force Day, Air Chief Marshal A.P. Singh, Chief of the Air Staff, engaged in an in-depth conversation with Jayant Baranwal, Editor-in-Chief of *SP's Aviation*, and shared his insights on specific issues concerning the Indian Air Force

SP's Aviation (SP's): Operation Sindoor was led by the IAF. What are the takeaways from these Operations in terms of modernisation and capability enhancement of the IAF?

Chief of the Air Staff (CAS): Operation Sindoor reaffirmed the decisive role of air power as both the primary responder and a strategic deterrent. The operation highlighted the unique advantages of air power like strategic reach, rapid response, operational tempo, the ability to precisely control escalation and achieve desired effects while minimising collateral damage. In modern warfare, it is air power that offers the broadest spectrum of options, ranging from subtle deterrence to decisive victory.

Another key takeaway is the critical importance of escalation management. Intelligent, calibrated and precise employment of air power has demonstrated that air operations can be executed effectively without triggering uncontrolled escalation. This approach has allowed us to respond decisively to provocations while operating under the nuclear umbrella, reinforcing strategic stability.

Operation Sindoor also showcased the synergy between offensive and defensive capabilities. Advanced precision weapons and state-of-the-art strike systems restricted adversary operational freedom, while counter-drone systems effectively neutralised incoming threats.

Modern conflicts have highlighted the importance of capacity along with capability, especially in protracted war scenarios. Achieving self-reliance is the key to fight and win the modern wars. Our military aerospace ecosystem is evolving with purpose and confidence, and moving steadily towards global standards. Strengthening indigenous systems remains central to the endeavour, ensuring resilience and self-reliance. With sustained emphasis on quality, innovation and scale we are well poised to realise the true spirit of Atmanirbhar Bharat - a self-assured, capable and globally competitive aero-

space power. Indigenous platforms, weapons and sensor systems provide not only operational independence but also the flexibility to rapidly adapt and modify capabilities as per evolving threats. Initiatives like the LCA, AMCA, Akash systems and other indigenous programmes ensure that the IAF can sustain operations without over-reliance on external sources, strengthening both strategic autonomy and national security.

Looking ahead, the nature of warfare will be transformed by disruptive technologies such as autonomous systems, artificial intelligence, quantum computing, unmanned platforms and hypersonic weapons. To maintain our operational edge, the IAF is committed to integrating these technologies into our war fighting domains.

Achieving this requires a 'Whole of Nation Approach,' where the military, industry, academia, and government collaborate to ensure that the IAF remains at the forefront of technological adoption and future readiness.

SP's: Given the time lines of Tejas Mk-1A, Mk-2 and the AMCA inductions, with possible further delays, do you think there is a requirement to immediately progress the MRFA programme? Will it be done under the 'Make in India' initiative?

CAS: The Indian Air Force has consistently aimed to balance operational readiness with the nation's long-term goal of self-reliance in defence technology. Our focus remains on progressive indigenisation initiatives that enhance operational capability while strengthening India's defence industrial ecosystem.

We are on the verge of inducting the LCA Mk-1A, with deliveries beginning shortly, and an additional 97 aircraft have been contracted. While some delays have occurred due to design and engine supply challenges, these are being addressed through close coordination with all stakeholders. Looking ahead, the IAF is closely collaborat-

“In modern warfare, it is air power that offers the broadest spectrum of options, ranging from subtle deterrence to decisive victory”



UNDER THE LEADERSHIP OF ACM A.P. SINGH, DURING OPERATION SINDOOR, IAF REAFFIRMED THE DECISIVE ROLE OF AIR POWER WITH PERFECT EXECUTION OF INTELLIGENT, CALIBRATED AND PRECISE AIR OPERATIONS

ing with the DRDO on the LCA Mk-2 and the 5th Generation Advanced Medium Combat Aircraft (AMCA). The LCA Mk-2 is expected to achieve operational clearance by December 2027, while the AMCA, sanctioned with an allocation of ₹15,803 crore, plans to see its first prototype by September 2027, maiden flight by September 2028, and full certification by 2034. AMCA is being developed through a true public-private partnership, with multiple Indian defence companies actively participating alongside DRDO's Aeronautical Development Agency. Together, these platforms will significantly enhance India's air dominance capabilities in the medium to long term.

In parallel, the MRFA programme is being pursued to meet immediate operational requirements. This programme is aligned with the 'Make in India' initiative, emphasising maximising indigenous content, technology transfer, and establishing local manufacturing infrastructure, ensuring long-term sustainment and integration with home-grown weapons systems. In essence, MRFA serves as a bridge between immediate operational needs and our future indigenous fighter capabilities, ensuring that the IAF remains both capable today and self-reliant tomorrow.

Combat enablers such as flight refuelling aircraft and AEW&C platforms are essential for extending reach, persistence, and operational flexibility, and therefore remain very high on our modernisation and capability development priorities

SP's: There is a definite need for more force multipliers in the IAF like the Refuellers, AWACS, UCAVs, etc. What are IAF's plans for their acquisitions and inductions?

CAS: Combat enablers like FRAs and AEW&C platforms are crucial for enhancing the IAF's operational flexibility and remain very high on our priority.

The Indian Air Force has made notable headway in strengthening its force-multiplying capabilities, particularly in the area of air-to-air refuelling. A contract has already been concluded for the wet lease of a Flight Refuelling Aircraft (FRA), which will be jointly utilised by the IAF and the Indian Navy for training purposes. We expect this aircraft to become operational within this year, significantly enhancing our training and operational readiness.

In parallel, the IAF is also processing a case for the procurement of six additional FRAs to meet long-term operational requirements. The responses to our Request for Proposal (RFP) are presently under evaluation. Combat enablers such as flight refuelling aircraft and AEW&C platforms are essential for extending reach, persistence, and operational flexibility, and therefore remain very high on our modernisation and capability development priorities.

Airborne Early Warning and Control (AEW&C) systems are a vital component of modern air power, and the Indian Air Force recognises the need to strengthen this capability in adequate numbers. To bridge the gap, we are pursuing multiple projects that will substantially enhance our airborne surveillance and command network in the coming years.

The AEW&C Mk-IA programme, based on the Embraer-145 platform, is being developed by the Centre for Airborne Systems (CABS) under the aegis of DRDO. Six such aircraft are planned for induction, each equipped with significantly upgraded radar ranges and advanced Mission System Avionics. These improvements will greatly enhance our ability to detect, track and manage air operations across a wide battle space.

The AEW&C Mk-II programme represents a major leap forward in indigenous capability. The design and development are being spearheaded by CABS, DRDO, under the 'Make in India' initiative. The Mk-II system will feature next-generation sensors, advanced electronic warfare suites, and extended endurance, offering far superior performance compared to earlier variants. Development of the mission systems is progressing well at DRDO, while contracts for structural modifications are being finalised with AIESL and ADS, Spain.

Additionally, the IAF is also progressing plans to induct state-of-the-art Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) aircraft. These platforms, incorporating indigenous sensor technologies, will further enhance our situational awareness and provide critical capabilities for joint operations.

The Indian Air Force has made significant progress in strengthening its Unmanned Aerial System (UAS) capabilities, recognising the critical role these platforms play in modern air operations. A major milestone was the finalisation of the contract for 31 MQ-9B Sky/Sea Guardian RPAs on October 15, 2024. These systems will significantly enhance the IAF's surveillance and reconnaissance capabilities, with eight systems earmarked for direct operational deployment of IAF.

We are also pursuing a comprehensive upgrade of our existing RPA fleet, including India's Heron UAVs, to add combat capabilities. These enhancements will enable extended range operations, improved performance in diverse environments, and the ability to carry weapons. This will significantly expand the operational utility of these platforms.

Additionally, the IAF is actively involved in the Remotely Piloted Strike Aircraft (RPSA) project, developed by the DRDO. Once operational, this system will introduce a new dimension to our offensive capabilities, providing precision strike options with strategic flexibility. Complementing these efforts, the IAF is progressing with the induction of HAROP loitering munitions, extended-range loiter munitions and manoeuvrable expendable aerial targets. Collectively, these systems will provide a decisive edge in both, surveillance and combat scenarios, ensuring readiness for the evolving spectrum of threats.

Collectively, these initiatives reflect our commitment towards building a robust, networked, and self-reliant airborne surveillance, an unmanned architecture for the future.

SP's: Recently, there are talks about the need for Strategic Bombers in the IAF. What is your opinion on their requirements and the role they will play?

CAS: In today's rapidly evolving security landscape, our sphere of operations is expanding to address emerging threats and growing capabilities of our potential adversaries. As we look beyond our national borders and into the Indian Ocean Region, it is clear that our air power must be projected further and more effectively. Strategic bombers offer a unique capability to strike targets at long ranges with precision, allowing us to exploit time-critical windows of opportunity. We have seen the effective use of bombers by the US Air Force in recent operations, and we believe they have a role to play in our own operational canvas. In line with the government's vision for India's role in the Indian Ocean Region, as outlined in the SAGAR concept, we are moving towards a more outward-oriented approach. As a 'Preferred Security Partner' and 'First Responder', we must recognise the need for the IAF to take a more active role in power projection and offensive strike capability across the IOR. Strategic bombers are currently being evaluated as part of our future modernisation roadmap.

These platforms offer deeper reach and fortified deterrence for our nation, and we believe they have a vital role to play in our efforts to protect India's interests.

SP's: Future wars are moving towards Tech-enabled operations. How do you plan to keep the IAF personnel informed, educated and trained on these fast moving critical technologies?

CAS: As the aerospace domain rapidly evolves, the IAF recognises the imperative to equip our personnel with the knowledge and skills required to remain future-ready. Modern air operations increasingly rely on agile, autonomous and digitised high-technology platforms, demanding a multidisciplinary and forward-looking training approach.

To address this, we have identified specialised technological courses at premier institutes in India and abroad, focusing on areas such as Artificial Intelligence, Machine Learning, Nanoscience and Technology, Additive Manufacturing, Robotics, Mechatronics, Cyber Technology and Quantum Technologies. Our personnel are also continuously updated on global developments in aerospace and defence technologies.

Several initiatives have been undertaken to institutionalise this learning. The IAF has established a Weapon Systems School for specialised training on aerial and surface weapon platforms, remote aerial systems and intelligence operations. The Faculty of Space Studies at the College of Air Warfare has been transformed into a Centre of Excellence and a tri-services Nodal Training Centre, catering to emerging space-based operational requirements.

We actively encourage our personnel to contribute through service papers, participate in conferences and seminars, and pursue long and short-term courses through MoUs with universities and research institutions. Our training syllabus is regularly reviewed and updated to incorporate new technologies and evolving operational concepts.

The Indian Air Force has made significant progress in strengthening its Unmanned Aerial System (UAS) capabilities, recognising the critical role these platforms play in modern air operations



EXTREMELY POPULAR AMONGST THE AIR WARRIORS, THE IAF CHIEF, IS KNOWN AND RESPECTED FOR HIS OUTGOING, FRANK AND HONEST PERSONALITY AND PROFESSIONALISM

I am proud to say that the IAF is proactively embracing these challenges. By fostering a culture of continuous learning, innovation, and adaptability, we are ensuring that our personnel are fully prepared to operate in the technology-driven battlefields of the future.

SP's: India just made a successful foray back into Space after over 4 decades. What is your perspective on how 'Space' will be crucial in the future and enhancing our Space based capabilities? What is the progress on the setting of a 'Space Command'?

CAS: The IAF has always played a lead role in the Gaganyaan programme, overseeing astronaut selection and training, including physical conditioning, flying, aero-medical preparation and crew recovery operations. Space has become a decisive domain in modern military operations, providing critical capabilities in communication, navigation, intelligence and surveillance. Recent conflicts have showcased the importance of Beyond-Line-of-Sight operations, highlighting that space-based assets offer a strategic advantage as the ultimate high ground. Recognising this, the Indian Air Force has adapted its operational doctrine to integrate space applications, acknowledging the fundamental role space plays in future warfare.

Space has become a decisive domain in modern military operations, providing critical capabilities in communication, navigation, intelligence and surveillance

To meet the growing operational demand, the Defence Space Agency (DSA) has been established as a tri-services organisation, serving as a key enabler for the space requirements of all three services. The establishment of a dedicated Space Command is underway, with the Defence Space Agency (DSA) laying the groundwork for India's military space capabilities.

The space domain has evolved from a supporting function to a core enabler of air operations. Navigation, communications and precision targeting are increasingly dependent on resilient space-based systems. The Government's approval of the SBS-III programme in 2023, aimed at launching 52 military satellites by 2029 under the DSA, will ensure India maintains access to critical space assets even in contested environments.

Complementary initiatives such as the SAMOOHA ELINT constellation, and the 29 technology challenges assigned to the IAF under the 75 Mission Defence Space Challenges, are driving innovation in space docking, on-orbit maintenance and advanced communication systems.

Through these concerted efforts, India is establishing a robust and resilient military space capability, positioning the IAF to operate effectively in the new frontier of space-enabled warfare. **SP**

INDIAN AIR FORCE – POST OPERATION SINDOOR

Operation Sindoor highlighted the evolving nature of modern warfare, underlining the need for doctrinal shifts and operational reforms. The focus now lies on integrating new technologies, strengthening joint capabilities, and adapting strategies to ensure readiness for future multi-domain challenges.

By AIR MARSHAL R.G.K. KAPOOR (RETD)



OPERATION SINDOOR DEMONSTRATED THE NEED TO CATER TO HIGH-INTENSITY MULTI-DOMAIN OPERATIONS

ILLUSTRATION: IAF/SPS TEAM

THE INDIAN AIR FORCE CELEBRATED ITS 93RD ANNIVERSARY on October 8, 2025, indeed a momentous occasion, especially in the backdrop of the stupendous success of Operation Sindoor. Swift, 88-hour operation once again underscored the importance of air power in today's uncertain environment of shifting alliances, surging nationalism, hybrid and grey zone warfare and most importantly, no war no peace situation, as it exists in

the Indian subcontinent. Operation Sindoor started as a counter-terror operation which rapidly expanded into conventional employment of air power, forcing Pakistani capitulation.

In a dynamic and uncertain landscape, India will rely heavily on the IAF to achieve national and security objectives while dealing with varied threats. While ensuring sovereignty of airspace, deterrence, nation building, and air diplomacy are peace-

time functions, it is the wartime actions and experiences that provide insight into doctrinal, strategic and operational aspects. Operation Sindoor has raised some doctrinal and operational priorities for the IAF.

Operations Sindoor was primarily a joint operation led by air power, delivering a stronger response than Balakot. The operation evolved into a calibrated response growing in intensity after every counter by Pakistan. If this is any indication, future response to any act of terror supported by Pakistan is likely to be fiercer. The strategy of deterrence by punishment requires the IAF and other services to jointly plan a response much larger in scope. This multi-domain integrated approach necessitates integration of all five domains along with the sixth domain of information warfare, an area that needs review. This calls for accelerated integration of networks and strengthening space and cyber domains, and integration of manned and unmanned resources of the three services. Improvements in datalinks and common communication and software protocols need to be developed to ensure real-time synergy for cross-domain operations. A joint planning and coordination center at the apex level is imperative.

Multi-domain operations enable the development of kill web, a step above the kill chain, which is linear in nature and can be disrupted using cyber, electronic warfare or kinetic kill options against any link in the chain. Kill web provides redundancy and responsiveness against possible enemy disruptions, thus enhancing kill probability in air combat. Kill web uses assets in all domains, land, sea, air, space and cyber to identify the most efficient path to engage the target, thereby compressing sensor to shooter time. It involves a higher degree of AI infusion and automation. Absence of a single point of failure increases the probability of success and reduces vulnerability from enemy action. True multi-domain operations, including kill web, would demand multi-domain sensors and diverse shooters integrated by a secure and redundant network.

Operation Sindoor highlighted the importance of real-time ISR based on multiple sensors. All intelligence inputs from space-based surveillance to SIGINT, electronic warfare, cyber and HUMINT available from multiple agencies need to be processed in near real time for effective dynamic targeting since fleeting opportunities need to be capitalised. Fusing all these myriad inputs is imperative to achieve the desired effects.

The operation once again proved the utility of unmanned systems. Loitering munitions and Kamikaze drones played an important role. There is growing reliance on these systems; however, a balance between manned and unmanned systems should be achieved, considering the survivability of both manned and unmanned systems in contested airspace, especially against integrated layered air defence. Enhanced effects are possible by expanding long-range strikes using unmanned and expendable assets, to expose enemy air defence, which could be addressed by manned or unmanned long-range strike. Increasing reach of unmanned systems calls for hardening and dispersing our own manned assets even in depth.

Long-range weapons are inescapable in heavily defended airspace. Both air-to-air and air-to-ground weapons need to be

developed and integrated to outrange the air-to-air and surface-to-air capability of the enemy. Development of modular, low-cost weapons that can be rapidly manufactured during a time of crisis will go a long way in saving precious resources and easing peacetime procurement requirements. Dedicated UCAV units must be created with doctrines for autonomous ISR, swarming strike packages, and attritable loitering munitions to provide massed effects without proportionate risk to pilots, especially against heavily defended targets and those out of range of air-to-ground weapons.

IAF is likely to field about 30-32 fighter squadrons in the 2030 timeframe against 25-26 squadrons if PAF and an equivalent of 50 PLAAF squadrons. This force structure would remain grossly inadequate to meet the ensuing threat. IAF is believed to be reviewing whether the presently approved 42.5 fighter squadrons are adequate to meet future threats. Manned-unmanned teaming options allow cost-effective solutions in achieving outcomes from the overall force structure. Operational philosophies and doctrinal changes needed in this endeavour could be reviewed.

Air Defence (AD) performed brilliantly during the operation. Integration of AD systems of IAF and Indian Army provided an impregnable defence against stand-off weapons, drones and missiles. Indigenous capability demonstrated the ability to integrate legacy and modern AD systems in a seamless architecture. Pakistan announced the formation of the Army Rocket Force Command, which is likely to be equipped with conventional ballistic and cruise missiles. China, on the other hand, has a large inventory of drones, conventional cruise and ballistic missiles. Air Defence will have to be scaled up for emerging threats. Existing resources, networks, integration and Command and control will have to be looked afresh to successfully implement Mission Sudarshan Chakra. Sensor-to-shooter time must be reduced from minutes to seconds at the tactical level while dealing with drone and missile threats. Dynamic Rules of Engagement (RoE)

must be developed to ensure a proactive and uncompromising response. Review human-in-loop and human-on-loop boundaries in consonance with automation and infusion of AI into the decision support matrix.

Offensive and defensive multi-domain operations will have to be supported by integrating AI/ ML for command and control and decision support. Growing cyber/ EW threats demand accelerated development of quantum computing and quantum sensing solutions. Additionally, command nodes, datalinks and satellite communications need hardening. Plans must cater for operations in GNSS and RF denied environments.

Operation Sindoor demonstrated maturity in tri-service operations with inputs from both cyber and space domains. The synergy developed in recent years needs to be taken forward in the form of permanently manned joint operational planning cells for accelerated decision-making during crises. Formulation of a joint targeting plan would bring in greater efficiency in desired effects and optimal weapon to target matching to avoid duplication of effort. Operational plans must cater for mixed packages of manned and unmanned platforms.

Information warfare and narrative building were observed as a weak area during Operation Sindoor. Information warfare must be an integral part of campaign planning



IN FUTURE, OFFENSIVE AND DEFENSIVE MULTI-DOMAIN OPERATIONS WILL HAVE TO BE SUPPORTED BY INTEGRATING AI/ ML AND ACCELERATED DEVELOPMENT OF QUANTUM COMPUTING AND QUANTUM SENSING SOLUTIONS

Joint operations demand tri-service wargaming for multi-domain operations, factoring space and cyber effects. Building AI-enabled wargaming modules and holding regular whole-of-government tabletop exercises, including narrative building, would enhance operational readiness and decision-making in an environment of decentralised execution. Shaping of internal and international opinion is important in a world dominated by real-time inputs from social media and electronic media. Understanding of international affairs, diplomacy, political and information dimensions of punitive action or operations is important for the team dealing with information operations. Information warfare and narrative building were observed as a weak area during Operation Sindoor. Information warfare must be an integral part of campaign planning.

Operation Sindoor demonstrated the need to cater to high-intensity multi-domain operations. Shifting alliances and complex global supply chains are likely to pose major challenges, especially for the imported equipment. IAF should work out a list of critical items that could be potential show stoppers for indigenisation in mission mode. Establishment of Joint Logistics Nodes is a welcome step; however, this needs to be expanded to achieve the ultimate goal in

supply chain management. The operation brought out the importance of long-range weapons and surface-to-air missiles. These will be needed in large numbers, and so their scaling and stocking could be reviewed. Integration of indigenous weapons on all platforms needs to be pursued.

Operation Sindoor was a stupendous success. It demonstrated maturity in joint warfare. Revolution in drone warfare, cyber and growing effects of space on warfare are impacting the character of how wars will be conducted in the future. To achieve cross-domain effects in multi-domain operations, desired effects need to be weighed against capabilities in each domain. A balance between unmanned and manned systems for offensive operations needs to be evolved at the strategic level. The success of Operation Sindoor has certainly forced our adversaries to rethink their doctrine and operational philosophy. Increasing reliance on drones and missiles for non-contact multi-domain operations demands that IAF review some of its doctrinal percepts and operational philosophies for deterrence and integrated effect-based operations and scalable unmanned capabilities to maximise effects with manned-unmanned philosophy with increased reliance on AI/ML to ensure IAF remains ahead of future threats. **SP**

This multi-domain integrated approach necessitates accelerated integration of networks and strengthening space and cyber domains, and integration of manned and unmanned resources of the three services



IAF AIMS TO SHORE UP THEIR NUMBER OF FIGHTER AIRCRAFT WITH THE COMPLETE DELIVERY OF LCA TEJAS MK-1A AND MK-2 ORDERS IN THE MEDIUM TERM

IAF – TARGET '42 SQUADRONS'

While the IAF's roadmap through Tejas Mk-1A / Mk-2, MRFA, and AMCA is conceptually sound, blending indigenous development with foreign procurement to manage risk and speed, the implementation may drag beyond the timeline. What is to be done?

By MANISH KUMAR JHA

THE QUESTION OF THE INDIAN AIR FORCE (IAF)'S FIGHTER strength is wildly debated for the reason which is very obvious, even as we all begin to talk of unmanned systems in the skies taking wings and shapes. One of the key elements is the sanctity of the planning, capability roadmap, which puts the fighters at the core of its war fighting strategy. That works for all advanced militaries, including India, on the horizon, without exception.

The authorised combat squadron strength of the IAF has long been pegged at 42 squadrons to credibly meet two-front war requirements (Pakistan in the west, China in the north & northeast). While this is an estimate based on the prevalent situations, the need of the hour is to deliberate on a strength of greater than 42.

Currently, the IAF's active strength is estimated at around 30–31 squadrons, depending on how "combat capable/fully operational" is defined. Now, after decommissioning of IAF's workhorse—the MiG-21, it will stand at 29, totalling 464-522 fighters. This is about 250 short of the requirements of 42 squadrons.

Moreover, the IAF and the Ministry of Defence (MoD) have recognised that simply reaching 42 may not be sufficient in the long term. Some sources suggest that, in light of adversaries' modernisation and force multipliers (drones, missiles, 5th-Gen/stealth, space & cyber backup), a higher number may be required. For comparison sake, China's People's Liberation Army Air Force (PLAAF) operates more than 2,000 fighter aircraft, while Pakistan Air Force has approximately 500 fighter aircraft.



(ABOVE) PARLIAMENTARY STANDING COMMITTEE ON DEFENCE VISITING HAL FACILITIES MANUFACTURING TEJAS AIRCRAFT; (RIGHT) MANISH JHA AT THE LATEST HAL LCA FACTORY TO RAMP UP PRODUCTION OF THE AIRCRAFT



Thus, the roadmap involves both retiring old platforms and inducting a mix of indigenous and Foreign/Make-in-India fighters to ramp up strength over time. So, what is the roadmap for such a complex mix of fighters and their multiple programmes for multiple roles in the IAF?

RECENT APPROVALS & HIGH-LEVEL COMMITTEES

The Cabinet Committee on Security (CCS) approved the Advanced Medium Combat Aircraft (AMCA) project in March 2024, sanctioning full-scale engineering design & development of five prototypes plus a structural test specimen. As of now, the timeline looks like - Design work concluded in 2023, five prototypes are planned, with rollout starting in late 2026 to early 2027. The first flight is expected by 2028–29, certification by 2032, and IAF induction by 2034–35.

A Memorandum of Understanding (MoU) between GE and HAL to co-produce or license produce GE F414 engines has been signed; this is relevant for Mk-2 and AMCA. At the same time, MoD's AMCA execution model, cleared in May 2025, has shifted from a HAL-led SPV to a public-private partnership (PPP). The roadmap for AMCA will have Indian private entities-individually or in joint ventures, to lead development and production.

Parliamentary Standing Committee on Defence has repeatedly drawn attention to the decline in squadron strength and urged faster augmentation via Tejas, MRFA, etc.

ENGINE ISSUES AND PRODUCTION BOTTLENECKS

The discussion on fighters now hinges

rather more on Engine supply delays, as these are among the most critical technical and industrial risks in the roadmap. Moreover, the fighter programme and engine developments are linked to the extent that it has reverberated in the larger canvas of geopolitics and bilateral ties.

The F404-IN20 (for LCA Tejas Mk-1A) deliveries from GE have been delayed, affecting HAL's ability to produce the Mk-1A on the planned schedule. HAL has been trying to utilise reserve engines or those from earlier variants to build structures and carry out test and integration tasks.

Another key issue is the engine standardisation/dependency: For future projects (LCA Tejas Mk-2, AMCA), dependence on GE engines (F414) continues to raise strategic risk. Indigenisation/technology transfer is planned, but it will take time.

Not to sidestep the production capacity at HAL, which is ramped up but yet to gear up, among other issues, including the major one as mentioned earlier. HAL must ramp up manufacturing lines (structure, avionics integration, assembly) to meet the increasing load: delivering 83 Mk-1A, then 97 more, Mk-2, AMCA, plus supporting maintenance, upgrades for existing fleets. Delays in components, supply chain disruptions, and skilled workforce constraints are non-trivial.

Even as planes' structures are built, certification of avionics, radar, weapons, and EW systems under operational conditions takes time. Weapon trial delays can hold up operational induction. HAL has stated that deliveries of the first two Mk1A may be contingent on completing weapon trials.

The IAF is at a pivotal point as the gap between authorised vs actual squadrons is hurting preparedness, especially as strategic threats in India's neighbourhood grow



IAF SPECIAL

KEY ACQUISITION & INDIGENOUS DEVELOPMENT PROGRAMMES			
Here are the Major Pillars of IAF's Future Force Structure:			
Programme	Role & Timeline	Approximate Squadrons Planned / Units	Status & Key Issues
Tejas Mk-1 / Mk-1A	Light Combat Aircraft (LCA) Mk-1 is current; Mk-1A is an upgraded variant: better avionics, radar, weapons, and maintainability. Intended to fill in the medium-term gap as older aircraft retire.	Initial order of 83 Mk-1A (2021) plus a follow-on order of 97 more in recent signature, totalling 180 units of Mk-1 / Mk-1A.	Delays: Engine supply (GE F404-IN20) has been a major bottleneck. Production capacity (HAL) has to be ramped; Mk-1A deliveries originally scheduled to begin earlier (2024), but first deliveries are now expected in end 2025.
Tejas Mk-2	More capable version; greater payload, range, more powerful engine (GE F414). Serves as a bridge between Mk-1 / Mk-1A and AMCA.	IAF plans to induct several squadrons of Mk-2 (numbers vary) as Mk-1A orders are completed.	Development is underway; engine supply, certification, and weapon integration will be key challenges. HAL & DRDO need to maintain timelines.
MRFA (Multi-Role Fighter Aircraft)	Foreign/off-the-shelf / Make in India aircraft to augment the fleet in the short to medium term to make up for the capability/quantity gap. RFI / tendering to acquire ~114 aircraft.	114 aircraft is the MoD / IAF's target. These will help prevent the squadron strength from dipping too low as older aircraft retire.	Progress has been slow. RFI was issued, and multiple contenders responded. But formal RFP / contract finalisation has been delayed, in part due to shifting priorities, emphasis on indigenous programmes, and engine / industrial base constraints.
AMCA (Advanced Medium Combat Aircraft)	A fifth-generation stealth-capable twin-engine aircraft, with internal weapons bays, stealth features, conformal antenna, etc. Two phases: Mk-1 (with off-the-shelf/licensed engine such as GE F414) and later Mk-2 with a more powerful/indigenous engine.	The plan is for multiple squadrons (often cited as ~7 squadrons) over a long horizon (post-2030s) once prototypes, testing, and production ramp up.	Approved by the Cabinet Committee on Security (CCS) in March 2024. Challenges: engine availability, stealth material supply, and industrial / test infrastructure for 5GEN aircraft. Also, timelines are long (prototype rollout ~2026, first flight after that). Full squadron induction expected well after the prototype/testing phases.

Chart compiled by Manish Kumar Jha

NEW PERSPECTIVE: LONG-TERM PLANS

Putting together the pieces, here is how the IAF / MoD appear to be structuring their force development in the next 10-20 years: It's about the short/medium-term (next 5 years or so) roadmap.

Firstly, as per the well-talked-about plan, IAF aims to receive the complete delivery of LCA Tejas Mk-1A orders (83 + 97) to shore up numbers and replace retiring older aircraft (MiG-21, MiG-27, Jaguar, etc).

Simultaneously, accelerate the MRFA programme. While the MRFA is again laid out on the premises of 'make in India', which it must, without any faltering, the initial acquisition of foreign/off-the-shelf fighters can fill the gaps. Again, while indigenous MRFA programmes begin to take shape, phased induction is expected.

Increase HAL's production capacity (structure, assembly, test facilities) and remedy supply chain and engine import challenges. Tighten timelines, minimise cost and delay.

NEXT IS MEDIUM TO LONG TERM (BEYOND 5-TO 10 YEARS).

This is built upon the Induction of LCA Tejas Mk-2 (once its development and testing are complete) in numbers to enhance payload/range capabilities.

The induction of AMCA - As per the reports, the prototypes will fly by 2026-27, but operational squadrons likely in the 2030s. The stealth fighter is essential for deep penetration, strategic tasks.

BEYOND THE CURRENT AUTHORISED STRENGTH

Considering the projected retirement of older squadrons and the pace of induction, IAF may need to aim for more than 42

squadrons to maintain a margin, especially if conflict scenarios stretch across two or more fronts. Some sources suggest that once the schedule of inductions and retirements is even, 50 squadrons or more might be the target.

The IAF is at a pivotal point as the gap between authorised vs actual squadrons is hurting preparedness, especially as strategic threats in India's neighbourhood grow.

While the roadmap through LCA Tejas Mk-1A / Mk-2, MRFA, and AMCA is conceptually sound, blending indigenous development with foreign procurement to manage risk and speed, the implementation may drag beyond the timeline.

Here, the execution challenge is real in terms of engine supply, production bottlenecks, certification, and industrial readiness must be addressed urgently. Delays not only delay force levels but also drive operational vulnerabilities.

Realising 42 squadrons is necessary but possibly not a sufficient condition; the IAF should build in a buffer beyond 42, especially for high-intensity / multi-front conflict scenarios.

The most important aspect is the continuous oversight (from CCS, defence-procurement committees, standing committees of Parliament), transparency in schedule adherence, and capability build-up of the domestic aero-industry (both public and private) will be decisive. [SP](#)

Manish Kumar Jha is a Consulting & Contributing Editor for SP's Aviation, SP's Land Forces and SP's Naval Forces and a security expert. He writes on national security, military technology, strategic affairs & policies.



IAF SPECIAL



THE INDUCTION OF APACHE HELICOPTERS IN THE INDIAN AIR FORCE HAS ENHANCED PRECISION STRIKES AND NIGHT-FIGHTING CAPABILITIES, MODERNISING INDIA'S AERIAL COMBAT EFFECTIVENESS

CHARIOTS OF THE BATTLEFIELD — COMBAT HELICOPTERS

As warfare enters the era of multi-domain operations, combat helicopters are evolving with artificial intelligence, stealth, and manned-unmanned teaming, ensuring they remain relevant and strategically decisive in the battles of the future

By AIR MARSHAL ANIL KHOSLA (RETD)

COMBAT HELICOPTERS HAVE BECOME VITAL ASSETS in modern warfare, revolutionising military operations with their versatility, agility, and firepower. They provide critical capability across a wide range of combat scenarios. Their ability to hover, manoeuvre in complex terrains, and operate at low altitudes allows them to engage targets with unmatched precision, often in environments inaccessible to fixed-wing aircraft. Combat helicopters enhance battlefield dominance, while their real-time intelligence-gathering capabilities bolster situational

awareness. In asymmetric warfare, they counter insurgent threats by delivering swift, targeted strikes. However, vulnerabilities to advanced anti-aircraft systems pose a challenge. As militaries integrate unmanned systems and network-centric warfare, combat helicopters continue to evolve, incorporating cutting-edge technologies to maintain their strategic relevance. Their adaptability and lethality ensure they remain a cornerstone of modern military doctrine, shaping the dynamics of contemporary battlefields.

PHOTOGRAPH: BOEING / JIN / X



MAIN ROLES OF COMBAT HELICOPTERS

Helicopters have revolutionised modern warfare, offering unparalleled mobility, versatility, and firepower. Their adaptability allows them to serve in various roles, ensuring operational success in dynamic combat environments. In combat, attack helicopters have redefined battlefield tactics. Their agility and firepower make them indispensable for suppressing threats. Modern technological advancements have further enhanced the capabilities of combat helicopters. Night vision systems, stealth features, and advanced avionics allow them to operate effectively in diverse conditions, from deserts to dense urban landscapes. Their roles include:

- **Armed Reconnaissance:** Scouting enemy positions with advanced optics, providing targeting data.
- **Suppression/Destruction of Enemy Air Defences (SEAD/DEAD):** Neutralising enemy radar and surface-to-air missile sites with precision weapons to create safe corridors.
- **Air Interdiction:** Disrupting enemy logistics, troop movements, and supply lines by striking behind enemy lines.
- **Escort Operations:** Shielding utility helicopters during assault or insertion missions, suppressing enemy air defences and ground fire.
- **Counter-Insurgency & Counter-Terrorism:** Executing precision strikes in mountainous and jungle terrains, supporting rapid insertion/extraction and surgical attacks against insurgents or terrorists.
- **Battlefield Air Support (CAS):** Delivering direct firepower (rockets, cannons, guided missiles) to support ground troops in battle, targeting enemy infantry, bunkers, armoured vehicles, and fortifications.
- **Anti-Tank/Anti-Armour Operations:** Attack helicopters equipped with anti-tank guided missiles (ATGMs) are crucial for countering enemy armour in high-intensity conflicts.
- **Combat Search and Rescue (CSAR):** Extracting downed aircrew or trapped soldiers from hostile zones under fire, often providing covering fire with advanced sensor support.
- **High-Altitude Operations:** Operate in low-oxygen environments at high altitudes, ensuring mobility and firepower in the toughest terrains.
- **Urban Warfare Support:** Offering precision and agility for fire support, hard-target destruction, and support to fast-moving urban operations in close quarters.

DIFFERENCE BETWEEN ATTACK AND ARMED HELICOPTERS

These two terms are often used interchangeably, but they refer to distinct categories based on design, purpose, and combat capabilities. Attack helicopters are specialised platforms built for offensive combat, whereas armed helicopters are modified utility helicopters equipped with weapons for secondary combat roles. Understanding their differences is key to appreciating their roles.

Attack Helicopters. These aircraft are purpose-built for combat, designed to engage targets on the ground and in the air. These helicopters are equipped with heavy armaments, including the 30mm/20mm guns, rockets and (Hellfire/Helina) missiles. Equipped with advanced avionics, including radar, FLIR, and night-vision systems, they excel in high-threat environments. Attack helicopters prioritise firepower and armour over utility, typically featuring a two-crew configuration (pilot and gunner) and lacking troop-carrying capacity, making them expensive and maintenance-intensive yet highly effective in combat roles.

Armed Helicopters. These are modified utility helicopters adapted for combat while retaining multi-role capabilities. Unlike attack helicopters, armed helicopters have lighter armour and simpler avionics, relying on agility rather than heavy countermeasures. Their cost-effectiveness and flexibility enable the air forces to deploy them in diverse roles; however, they are less



THE DEVELOPMENT AND INDUCTION OF ALH RUDRA INDICATES A PUSH TOWARDS INDIGENISATION

suited for high-intensity combat compared to dedicated attack platforms.

The Indian Air Force (IAF) employs both attack and armed helicopters to fulfil diverse operational needs, from precision strikes to multi-role support.

SURVIVABILITY AND VIABILITY OF COMBAT HELICOPTERS IN CONTESTED AIRSPACE

Combat helicopters remain essential in modern warfare; however, their survivability and viability in contested airspace are getting increasingly challenged due to the proliferation of advanced air defences (MANPADS and SAMs). The Russia-Ukraine War highlights these vulnerabilities. Their vulnerability lies in operations at low altitudes and speeds. MANPADS account for significant losses, which are compounded by GPS jamming and small arms fire in urban or mountainous terrain.

Countermeasures to enhance survivability include infrared suppressors, laser-based systems such as Northrop Grum-



man's CIRCUM, and armoured fuselages. Stealth features, such as radar-absorbent materials, enhance evasion but add weight and complexity to the design. Manned-Unmanned Teaming (MUM-T) with drones for reconnaissance and strikes reduces exposure, while AI-driven sensor fusion improves threat detection.

Tactically, helicopters require a favourable environment with suppression of enemy air defence systems. Additionally, robust protection and air cover are necessary. Short-duration sorties, night operations, terrain masking and nape of the earth flying profile further mitigate risks; however, poor tactical discipline can prove fatal.

Ultimately, helicopters remain indispensable for specific missions but demand thorough planning, multi-layered defences, and joint force integration. Without radical innovation, their role might evolve from being the primary attackers to supporting roles in multi-domain operations. This change



LCH PRACHAND, AN INDIGENOUS ATTACK HELICOPTER DEVELOPED WITH STEALTH FEATURES

necessitates balancing their unique capabilities with the challenging and often dangerous realities of contested airspace.

COMBAT HELICOPTER IN THE IAF

India's fleet has evolved from legacy Soviet Mi-24/35 Hind helicopters to modern systems, including the Boeing AH-64E Apache and indigenous helicopters such as the HAL Light Combat Helicopter (LCH) Prachand and Rudra. While Apache, Prachand, and Hind fall into the attack helicopter category, Rudra and Mi-17 are armed helicopters.

AH-64E Apache. Cutting-edge imported attack helicopters, with advanced sensors, Hellfire missiles, Stinger AAM, and 360° radar, used in offensive strike, BAS, anti-armour, escort, and SEAD roles.

HAL LCH (Prachand). Indigenous aircraft with stealth features, good high-altitude performance, networked avionics, and advanced survivability. Used in Anti-armour, SEAD, CSAR, and SHBO escort roles.

Mi-24/Mi-35. Russian heavily armoured gunship, a legacy system with diminishing use and soon to be phased out, used for troop lift, heavy attack, BAS, and COIN.

HAL Rudra. Weaponised ALH Dhruvs with Integrated EW, EO sensors, Mistral AAM, Helina ATGM, used for multirole missions like recce, troop transport, anti-tank, BAS, COIN, and escort

Mi-17. A versatile Russian-origin helicopter, primarily for transport but occasionally armed for combat roles. The Mi-17V-5 variant can be equipped with rocket pods, machine guns, and anti-tank missiles for light attack missions. Used in counter insurgency operations and disaster relief, these helicopters support troop transport and casualty evacuation, while also providing fire support.

FORCE STRUCTURING AND CAPABILITY ENHANCEMENT

Combat helicopters are pivotal to flexible air combat across diverse terrains, from deserts to the mountains. The Indian Air Force inducted 22 Boeing AH-64E Apache attack helicopters in 2019 to replace its ageing fleet of 15 Mi-24/Mi-35 gunships, acquired from Russia in the 1980s and 1990s. The Apache's induction enhanced precision strikes and night-fighting capabilities, modernising India's aerial combat effectiveness.

In the Indian context, combat helicopters play a critical role in high-altitude operations, particularly in the Himalayan regions along the borders with China and Pakistan. Operating at altitudes above 15,000 feet, such as in Ladakh or Arunachal Pradesh, presents unique challenges due to the thin air, extreme weather conditions, and rugged terrain. The Light Combat Helicopter (LCH) Prachand was developed in response to lessons learnt from the 1999 Kargil War. It is uniquely capable of operating at 20,000 feet with a full weapon load, making it critical for high-altitude warfare in regions such as Siachen and Ladakh. These helicopters remain vital for deterrence, rapid

response, and maintaining operational superiority in India's high-altitude battlefields. They are being inducted by both the Indian Air Force and the Indian Army.

The Indian Multi-Role Helicopter (IMRH), a 12.5-tonne twin-engine platform being developed by Hindustan Aeronautics Limited (HAL), is conceived as a versatile replacement for the ageing Mi-17 fleet. The IMRH reportedly would excel in high-altitude operations, troop transport for up to 24 personnel, combat search and rescue, evacuation, and under-slung cargo carriage of 5 tonnes. Its advanced avionics, automatic flight controls, and modular mission systems would enable seamless adaptation to utility, armed, and Special Forces roles, enhancing the IAF's tactical battlefield operational capability.

The development and induction of ALH Rudra, LCH Prachand, and IMRH in the future indicates a push towards indigenisation, aiming for self-reliance, addressing challenges in scaling production, and reducing import dependency. All these platforms also enhance the high-altitude operation capability.



THE FUTURE OF COMBAT HELICOPTERS IN FAST-EVOLVING AERIAL WARFARE HINGES ON THEIR ABILITY TO ADAPT TO RAPIDLY ADVANCING TECHNOLOGIES AND EMERGING THREATS

FUTURE TRAJECTORY OF COMBAT HELICOPTERS

The future of combat helicopters in fast-evolving aerial warfare hinges on their ability to adapt to rapidly advancing technologies, shifting battlefield dynamics, and emerging threats. As militaries worldwide integrate artificial intelligence (AI), unmanned systems, and network-centric warfare, combat helicopters and future platforms must evolve to remain relevant. Their traditional strengths, versatility, precision, and manoeuvrability in complex terrains will be augmented by cutting-edge innovations to counter increasingly sophisticated adversaries.

One significant trend is the integration of AI and autonomy. Future combat helicopters may operate in tandem with unmanned aerial vehicles (UAVs) through manned-unmanned teaming (MUM-T). This would allow helicopters to control drones for reconnaissance, targeting, or electronic warfare, reducing risks to human pilots. AI-driven systems will enhance situational awareness by processing vast amounts of sensor data in real-time, enabling faster decision-making in dynamic combat zones. For instance, advanced targeting systems could autonomously identify and prioritise threats, improving response times.

Another critical evolution is in stealth and survivability. Modern air defences, including surface-to-air missiles (SAMs) and directed-energy weapons, pose significant threats. To counter these, next-generation helicopters would have to incorporate low-observable designs, advanced electronic countermeasures, and adaptive camouflage. Upgraded propulsion sys-

tems, such as hybrid-electric engines, promise greater speed, range, and fuel efficiency, enabling operations in contested environments. Additionally, modular designs will allow rapid upgrades of avionics, weapons, and sensors, keeping pace with technological advancements without requiring entirely new platforms.

Cyber and communication security will also play a pivotal role. As helicopters become nodes in networked battlefields, protecting their systems from cyber-attacks is paramount. Robust encryption and resilient communication links will ensure operational integrity.

CONCLUSION

Combat helicopters remain crucial in modern warfare, offering exceptional versatility, accuracy, and mobility to control various battle zones. They perform critical functions such as delivering precise strikes, deploying troops quickly, and supporting reconnaissance, air interdiction, and counterinsurgency missions. Although they face threats from advanced air defences, innovations such as AI, stealth, and Manned-Unmanned Teaming (MUM-T) enhance their survivability and performance. In India, platforms such as the Apache, ALH Rudra, LCH Prachand, and the emerging IMRH highlight a move toward indigenisation and high-altitude capability. As warfare advances, combat helicopters will incorporate state-of-the-art technologies to maintain their importance in multi-domain operations. [SP](#)

Combat helicopters remain essential in modern warfare; however, their survivability and viability in contested airspace are getting increasingly challenged due to the proliferation of advanced air defences



SANKALP SHRIVASTAVA



EMBRAER C-390 AT DISPLAY DURING AERO INDIA 2025 HELD IN BENGALURU EARLY THIS YEAR

FROM BRAZIL TO BHARAT: EMBRAER'S COMMITMENT TO INDIA'S AIR POWER

Currently, nearly 50 Embraer aircraft — spanning 11 different types — operate in India across defense, commercial, and business aviation sectors. All are supported by Embraer's established service and support network in the country

By **SANKALP SHRIVASTAVA**,
HEAD OF EMBRAER DEFENSE & SECURITY, INDIA

BRAZIL CELEBRATED ITS National Day on September 7 and the occasion was not only a moment of pride for the nation but also a reminder of the growing bonds between Brazil and India — two dynamic economies with shared aspirations for innovation, security, and sustainable growth. These ties have been strengthened through high-level dialogues and state visits where defense cooperation emerged as a key area of mutual interest.

For Embraer, Brazil's flagship aerospace and defense company, this partnership holds immense promise. As India prepares to mark its Air Force Day on October 8, Embraer is reaffirming its commitment to supporting India's long-term vision for defense modernization, strategic self-reliance, and operational excellence.

Currently, nearly 50 Embraer aircraft — spanning 11 different types — operate in India across defense, commercial, and business aviation sectors. All are supported by Embraer's established service and support network in the country. Embraer's C-390 Millennium, the latest aircraft in Embraer's portfolio and one of the world's most advanced military transport aircraft could open a new chapter for Embraer in India as we seek to sink our roots further in the country.

A PROVEN PLATFORM FOR A MODERN AIR FORCE

The C-390 Millennium is redefining the medium-lift, multi-mission transport segment. Designed for versatility, it can carry 26 tons of payload, fly faster (470 knots) and farther than other aircraft in its class, and is fully capable & certified for operations from unpaved or temporary runways — making it an ideal choice for India's diverse terrain, from the high-altitude Himalayan airfields to coastal and desert regions.

Already in service with the Brazilian Air Force since 2019 (Entry into Service) and selected by nations such as Portugal, Hungary, the Netherlands, Austria, South Korea, Czech Republic, Sweden, Slovakia and most recently Lithuania, the C-390 has achieved a 93% mission capability rate and over 99% mission completion rate — a testament to its reliability and mission readiness. This aircraft has superseded expectations and has already clocked in more than 20,000 flight hours in just six years since entry into service.

Its modular architecture allows for rapid reconfiguration for a wide range of missions: cargo and troop transport, medical evacuation, firefighting, search and rescue, humanitarian assistance, and the aircraft can also be configured for air-to-air refueling, both as a tanker and as a receiver.

At Aero India 2025, the C-390 Millennium drew strong interest from the



EMBRAER IS LOOKING TO BE A LONG-TERM PARTNER TO INDIA ACROSS SECTORS AND HAS PROPOSED C-390 MILLENNIUM FOR IAF'S MTA PROGRAMME

defense community, reflecting the growing interest for multi-role platforms that can not only enhance operational flexibility and readiness, but also come with a great value for money.

In 2024, Embraer signed a Memorandum of Understanding (MoU) with Mahindra Defence Systems to jointly evaluate opportunities for the Indian Air Force's Medium Transport Aircraft (MTA) program. This collaboration is not just about delivering an aircraft — it's about co-developing capabilities in line with India's 'Atmanirbhar Bharat' vision, fostering technology

transfer, and building local expertise — considering India as the hub for local manufacturing and service of the C-390 aircraft, in the region.

56 YEARS OF INNOVATION — A SHARED FUTURE WITH INDIA

August 2025 marked Embraer's 56th anniversary, a milestone in a journey defined by engineering excellence, innovation, and resilience. Over the past two decades alone, Embraer has designed, developed, and brought into service more than 20 different aircraft types across defense, commercial, and business aviation. The company continues to have a strong growth trajectory and in the second quarter of 2025, registered a US\$29.7 billion — the highest level ever recorded by the company.

In India, Embraer's legacy includes the successful collaboration with DRDO on the Netra AEW&C aircraft, based on the ERJ145 platform — a proven example of how Brazilian and Indian expertise can combine to deliver world-class solutions.

As India prepares to honor its air warriors on Air Force Day, the message is clear: the future of Brazil-India defense cooperation holds great potential. The C-390 Millennium is more than an aircraft — it is a symbol of technological ambition and a mutual commitment to safeguarding sovereignty while advancing aerospace innovation.

With its unmatched performance, operational flexibility, and proven track record, the C-390 Millennium is well-positioned to support India's modernization goals, enhance its rapid-response capabilities, and contribute to the nation's strategic readiness for decades to come.

For Embraer, the mission goes beyond delivering platforms — it's about building enduring partnerships, enabling self-reliance, and co-creating solutions that meet the evolving demands of modern defense. As the skies over India and Brazil continue to open to new opportunities, Embraer stands ready to be a trusted partner in shaping the next chapter of this strategic relationship. **SP**

As India prepares to honor its air warriors on Air Force Day and Brazil reflects on its achievements this National Day, the message is clear: the future of Brazil-India defense cooperation holds great potential

THE IAF'S MIG-21: FAREWELL TO A LEGEND



(ABOVE) ON SEPTEMBER 26, 2025, THE MIG-21 RETIRED AFTER SIX DECADES OF GLORIOUS SERVICE IN THE IAF. DEFENCE MINISTER RAJNATH SINGH ATTENDED THE DECOMMISSIONING CEREMONY OF MIG-21;

(INSET) HONOURING THE ENDURING LEGACY OF MIG-21, THE CHIEF OF THE AIR STAFF VISITED NO. 23 SQN "PANTHERS", THE LAST SQUADRON OPERATING THE LEGENDARY FIGHTER AND FLEW A FIGHTER SORTIE.



For over three decades, from the 1970s to the 2000s, the MiG-21 was the backbone of the IAF, even as more advanced jets like the Mirage 2000, the MiG-29 and the Su-30 MKI were acquired

ON OCTOBER 8, AS THE INDIAN AIR FORCE (IAF) LOOKS BACK

at its 93-year history with quiet satisfaction, one aircraft — the MiG-21 — will stand out from the rest. This fighter jet was remarkable, not just for its sheer weight of numbers, but for its amazing longevity. In fact, its 62 years of distinguished service with the IAF makes it the longest serving supersonic jet fighter in the inventory of any major Air Force of the world. For over three decades, from the 1970s to the 2000s, the MiG-21 was the backbone of the IAF, even as more advanced jets like the Mirage 2000, the MiG-29 and the Su-30 MKI were acquired. At its peak, the IAF operated 19 MiG-21 squadrons with around 400 aircraft.

The Mikoyan-Gurevich MiG-21 was designed in the Soviet Union purely as a supersonic interceptor, and armed only with air-to-air missiles, no cannon. It later morphed into a multi-

role combat aircraft with interceptor, fighter and ground strike capabilities. The Soviets wanted to fill the skies with thousands of cheap, lightweight, reliable jets. And they succeeded beyond their wildest dreams. Produced at around a third of the cost of comparable Western aircraft, capable of operating from rough airstrips, with frugal maintenance needs, yet packing a significant punch, it was grabbed by many less advanced countries. It ultimately became the most-produced supersonic jet in aviation history (11,496 aircraft) with over 60 countries having operated it during the 70 years after its first flight on June 16, 1955. China managed to reverse engineer the MiG-21 into the Chengdu J-7/F-7, building another 2,400 aircraft.

Not for nothing has the MiG-21 been called "the AK-47 of combat jets". Its simple controls, engine, avionics, and weaponry



(CLOCKWISE FROM TOP LEFT): ACQUIRED IN MARCH 1963, THE MIG-21, A LEGENDARY FIGHTER & THE FIRST SUPERSONIC AIRCRAFT IN THE IAF INVENTORY COMPLETED 60 YEARS BEFORE RETIRING. HERO OF THE 1971 WAR & UPGRADED OVER THE YEARS TO UNDERTAKE MULTIPLE COMBAT ROLES, THE AIRCRAFT SERVED THE NATION WITH DISTINCTION, LEAVING BEHIND A PROUD LEGACY.

were typical of Soviet military designs. It was smaller, faster, and nimbler than most fighters of the time. A pilot on operational readiness could get airborne in under two minutes. Thanks to its small size it was hard to spot visually. However, the shock cone in the front air intake was too small for a decent-sized radar and this made the aircraft highly dependent on ground control for effective interceptions. Its range and endurance were barely enough for a 45-minute mission. The delta wing configuration gave it excellent speed, acceleration and rate of climb, but also meant high landing speeds (around 340 km/h) and limited low-speed handling. In turning combat the aircraft bled speed rapidly. Consequently, experienced MiG-21 pilots learned to avoid turning engagements and, instead, would capitalise on the plane's excellent thrust-to-weight ratio to take the fight into the vertical plane. The addition of a tail enhanced stability and control at the extremes of the flight envelope. The armament included one GSh 23 mm gun with 200+ rounds, plus four hard points capable of carrying fuel drop tanks, or combinations of bombs, rockets and missiles, for air combat or ground strikes.

In 1963, the MiG-21 became the first supersonic fighter to enter service with the IAF, with 28 Squadron Air Force, based at Air Force Station Chandigarh. The squadron naturally called itself the "First Supersonics". As part of the deal, the Soviet Union offered India full transfer of technology and rights for local assem-

bly. Hindustan Aeronautics Limited (HAL) set up factories at Nashik (airframe), Hyderabad (avionics), and Koraput (engines) and ultimately produced 657 of the IAF's 840 MiG-21 jets in three variants: MiG-21FL, MiG-21M, and MiG-21bis. Thanks to extensive indigenisation and licence production, both production and maintenance costs were kept low, making it practicable for the IAF to maintain a large fleet for decades. Not content with simply reproducing copies of the original Soviet product, the IAF and HAL exploited the aircraft's potential to the maximum through numerous modifications. These included the incorporation of better indigenous avionics systems developed by Bharat Electronics Limited (BEL) as well as much better weapons. Some MiG-21M aircraft were equipped with a Swedish Electronic Warfare (EW) system and transformed into dedicated EW aircraft. Others were fitted with British aerial reconnaissance cameras and employed in the Photo Reconnaissance (PR) role.

The MiG-21 is the IAF's only fighter to have taken part in every operation from the 1965 conflict with Pakistan right till Operation Sindoor earlier this year. During the 1971 India-Pakistan conflict, MiG-21s played a leading role in both the western and eastern sectors. In the eastern sector, particularly, the aircraft was responsible for some highly successful steep glide bombing missions that cratered the runway at Tezgaon, the only operational Pakistan Air Force base in East Pakistan,



A DEFINING CHAPTER IN INDIA'S DEFENCE HISTORY COMES TO A CLOSE: (TOP LEFT): DEFENCE MINISTER RAJNATH SINGH ADDRESSING THE DECOMMISSIONING CEREMONY OF MIG-21 ON SEPTEMBER 26, 2025; (TOP RIGHT) THE CEREMONIAL WATER CANNON SALUTE TO THE MIG-21; (BOTTOM LEFT-RIGHT) DEFENCE MINISTER RELEASING A SPECIAL COMMEMORATIVE DAY COVER AND STAMP HONOURING THE LEGACY OF THE MIG-21.

rendering it inoperable. This gave the IAF air superiority across East Pakistan, and facilitated relatively unhindered ground, air, and naval operations for the rest of the conflict. MiG-21s also struck the Governor's House in Dhaka, even as a high-level meeting was in progress there. This convinced the Pakistani leadership that India meant business and paved the way for speedy surrender.

Unfortunately, and rather unfairly, the MiG-21 gained the nickname "Flying Coffin" due to its high number of crashes. Although precise figures are hard to get, more than 400 MiG-21s were lost in crashes that claimed over 200 lives of pilots and people on the ground. Many factors contributed to the accidents, including the old airframe, critical deficiencies of spares consequent to the breakup of the Soviet Union, bird strikes and pilot error. Pilot error accidents were largely attributable to the decades-long delay in inducting an Advanced Jet Trainer (AJT). This delay forced young and inexperienced pilots to train on the MiG-21 – a role for which the aircraft was neither designed nor suitable. Probably no other major air force sent trainee fighter pilots straight from a low subsonic aircraft like the HJT-16 Kiran to a supersonic jet fighter. How did this happen? Blame it mainly on inadequate funding and official lethargy. The IAF was left with no choice but to persist with ageing MiG-21s, long after their expiry date. Still, taking into account the sheer longevity

and numbers of the IAF's MiG-21 fleet, its safety record was not that bad in comparison with other single engine fighter jets.

It was indeed fitting that the honour of operating the ultimate MiG-21 went to the IAF – arguably the world's most experienced MiG-21 force. Around 125 MiG-21bis aircraft were upgraded to the MiG-21 Bison standard in the early 2000s. The MiG-21 Bison had a MiG-29 type bubble canopy, a superior radar, a helmet-mounted weapons sight, Vympel R-73 short-range air-to-air missiles, and beyond-visual-range, fire-and-forget missiles. Just 36 MiG-21 Bison jets of 23 Squadron "Panthers" remained on the IAF's inventory when the aircraft was officially retired on September 26, 2025. The closing ceremony was held at the Air Force Station, Chandigarh, the same base where the fighter had initially been inducted, thus marking a full circle for the IAF's first supersonic jets.

In August, after his farewell solo sortie on the MiG-21 Bison, Air Chief Marshal A.P. Singh, Chief of the Air Staff (CAS), said, "It's an amazing aircraft to fly, very agile and manoeuvrable... It will be missed by all who flew it." 'All who flew it' includes practically every IAF fighter pilot of a certain period when the MiG-21 was the go to aircraft for every conceivable combat and training role. But now, a legend of the IAF has become history. **SP**

— JOSEPH NORONHA

MILITARY

MOD SIGNS CONTRACT FOR PROCUREMENT OF 97 LCA MK1A AIRCRAFT



Ministry of Defence (MoD) signed a contract with Hindustan Aeronautics Limited (HAL) for procurement of 97 Light Combat Aircraft (LCA) Mk1A, including 68 fighters and 29 twin seaters, along with associated equipment, for Indian Air Force, at a cost of over ₹62,370 crore (excluding taxes), on September 25, 2025. The delivery of these aircraft would commence during 2027-28 and be completed over a period of six years.

The aircraft will have an indigenous content of over 64 per cent, with 67 additional items incorporated, over and above the previous LCA Mk1A contract signed in January 2021. The integration of advanced indigenously developed systems such as the UTTAM Active Electronically Scanned Array (AESA) Radar, Swayam Raksha Kavach, and control surface actuators will further strengthen the Aatmanirbharta initiatives.

SWEDEN ORDERS FOUR EMBRAER C-390 MILLENNIUM



Sweden acquired four C-390 Millennium multi-mission aircraft from Embraer. The contract also includes seven additional purchase options, paving the way for future acquisitions by other European nations. With this acquisition, Sweden becomes another NATO (North Atlantic Treaty Organization) member to join the strategic partnership already established by the Netherlands and Austria, who collectively ordered nine C-390s in 2024.

APPOINTMENTS



AIR OFFICER-IN-CHARGE PERSONNEL, INDIAN AIR FORCE

Air Marshal Hardeep Bains took over as Air Officer-in-Charge Personnel on October 1, 2025. Air Marshal Hardeep Bains was commissioned in the fighter stream of the Flying Branch of the Indian Air Force on December 19, 1987. He is a cat 'A' qualified flying instructor with over 5000 hrs of accident free flying. In a career spanning over 38 years, the Air Marshal has held various key field & staff appointments. Prior to his present appointment, he was the Commandant of National Defence College, New Delhi.



AIR OFFICER-IN-CHARGE MAINTENANCE, INDIAN AIR FORCE

Air Marshal Sanjiv Ghuratia assumed the appointment of Air Officer-in-Charge Maintenance on September 1, 2025. The Air Marshal was commissioned in the Aeronautical Engineering stream of IAF in September 1988. An electrical engineer by qualification, he has held key command and staff appointments in IAF and UN Mission abroad in his illustrious career of 37 years. He was the Senior Maintenance Staff Officer at HQ MC before assuming the appointment of Air Officer-in-charge Maintenance.

By choosing the C-390 Millennium, Sweden will enhance its operational capabilities and interoperability while benefiting from European synergies in training and lifecycle support.

CIVIL

ROLLS-ROYCE OPENS ITS LARGEST GLOBAL CAPABILITY CENTRE IN BENGALURU



Rolls-Royce has inaugurated its largest Global Capability and Innovation Centre (GCC) at Manyata Embassy Business Park in Bengaluru, further strengthening its long-term presence in India. The 700-seat facility will house digital, engineering, and enterprise service teams supporting the company's civil aerospace, defence, and power systems businesses. The new centre underscores Rolls-Royce's strategy to expand global value delivery and enhance its capability base in India. Karnataka Industries Minister M.B. Patil attended the event, highlighting Bengaluru's growing status as a global aerospace hub, along with British High Commissioner Lindy Cameron. The centre aligns with Rolls-Royce's plan to double sourcing from

India within five years and builds on its existing footprint of over 3,000 professionals and more than 1,400 engines powering Indian military platforms.

PILATUS HANDS OVER THE FIRST PC-12 PRO



Following on from the launch of the new model in spring 2025, the very first customer, Dion Weisler, recently took delivery of his brand-new aircraft and personally flew it home from Switzerland to Australia. Weisler, former CEO of HP Inc, has relied on the Most Advanced Single for many years: the PC-12 PRO is his fourth PC-12. Having previously owned a PC-12 NG and two PC-12 NGXs – his move to the PC-12 PRO is a clear sign of his long-standing confidence in the best-performing aircraft in its category.

The PC-12 PRO is the latest version of the world's best-selling single-engine turboprop in its category. Equipped with the Garmin G3000 Prime and a completely redesigned cockpit which includes five high-resolution touch screen displays, it offers state-of-the-art technology and comfort, coupled with a suite of new safety features which includes Safety Autoland. ●

Asia's largest event on Civil Aviation
(Commercial, General and Business Aviation)

WINGS INDIA 2026

28th - 31st January 2026
Begumpet Airport, Hyderabad, India

Wings India 2026 Takes Flight

POWERFUL UNVEILINGS. UNIFIED VISION.

Wings India 2026 was officially launched with a **Curtain Raiser** on **23rd May 2025** at the Taj Palace, New Delhi featuring key participation from industry leaders, embassies, and government officials.

KEY HIGHLIGHTS

THEME UNVEILED

A vision grounded in innovation, inclusion, and sustainability.

BROCHURE LAUNCH

Explore the roadmap, the players, and the possibilities.

OFFICIAL APP LAUNCH OF WINGS INDIA 2026

Schedules, speakers, networking—anytime, anywhere.

Wings India 2026 Highlights

- ✈ Exhibitions, Chalets & Static Aircraft Displays
- ✈ Inaugural Ceremony
- ✈ International Conferences & Global CEOs' Forum
- ✈ B2B / B2G Meetings
- ✈ Awards Ceremony
- ✈ Cultural Evening & Networking Dinner
- ✈ Demonstration Flights, Air Shows & Drone Shows
- ✈ Media Interactions
- ✈ Student Engagement & Competitions

Exhibitors Profile

- ✈ Aircraft and Helicopter Manufacturers
- ✈ MRO
- ✈ Skill Development
- ✈ Aircraft Interiors
- ✈ Airlines, Airline Services & Cargo
- ✈ Aircraft Engine Manufacturers
- ✈ Air Traffic Management
- ✈ AAM/Future Technologies
- ✈ Aircraft Machinery & Equipment Companies
- ✈ Space & Drones Industry

Key Growth Drivers of Indian Civil Aviation

- ✈ 3rd largest domestic aviation market globally in passenger traffic.
- ✈ 631 routes & 91 aerodromes operationalized under the UDAN scheme (as of Jan 2025)
- ✈ 148+ lakh passengers flown under UDAN, enhancing regional connectivity.
- ✈ 800+ aircraft currently operated by Indian airlines.
- ✈ Number of airports more than doubled in the last decade
- ✈ \$4 billion MRO industry projected by 2030.
- ✈ 3.6 crore DigiYatra journeys completed by Nov 2024, redefining seamless travel.

FOR STALLS AND SPONSORSHIP

Ishant Rai
M: +91-7840870556
E: ishan.ra@ficci.com

Sundeep Tiwari
M: +91-9910285279
E: wingsindia@ficci.com

CONFERENCE

Raunak Sharma
E: raunak.sharma@ficci.com

www.wings-india.co.in

SP'S MILITARY YEARBOOK

S I N C E 1 9 6 5

2023-
2024
49TH ISSUE



A Reference Bible about the Armed Forces
over Land, Sea and in the Air

GET YOUR COPIES, NOW!

E-MAIL: ORDER@SPSMILITARYYEARBOOK.COM

 +91 97119 33343;

 +91 11 40042498, +91 11 40793308

WWW.SPSMILITARYYEARBOOK.COM



CONTENTS
HEREWITH



SP GUIDE PUBLICATIONS