PAF CENTRES OF EXECELLENCE

AIR POWER CENTRE OF EXCELLENCE
AIR DEFENCE CENTRE OF EXCELLENCE
UNMANNED AERIAL SYSTEM CENTRE OF EXCELLENCE
AIR MOBILITY CENTRE OF EXCELLENCE

PAKISTAN AIR FORCE

SECOND to NONE

Winter, 2023-24

SPECIAL EDITION

PAF NASTP ALPHA RAWALPINDI
AEROSPACE CAMPUS OF PAKISTAN

AEROSPACE CAMPUS, CYBER IT & AI CAMPUS
PRIVATE SECTOR CAMPUS
EASA B1B2 CERTIFICATION

AEROSPACE DESIGN & INNOVATION CENTRE (ADIC) KAMRA

NATIONAL AEROSPACE CLUSTER OF PAKISTAN

PAKISTAN'S NEXT GENERATION FIGHTER AIRCRAFT (PFX)
PAF FLIGHT TEST CENTRE, SOLAR PARK &
AVIATION & AEROSPACE CAMPUS OF AIR UNIVERSITY

PAF NASTP DELTA LAHORE

SIGNATURE IT HUB OF NASTP
NATIONAL INSITITUTE OF INFO TECH (NIIT)
NATIONAL CENTRE FOR ANIMATION & GAMING

PACA

PAF AIRWORTHINESS CERTIFICATION AUTHORITY

PAF CYBER COMMAND

PAF SPACE COMMAND

PAF NASTP SILICON KARACHI

NATIONAL SILICON HUB OF PAKISTAN
SIMULATOR AR&VR

PAF NASTP KHARIAN

NATIONAL IT PARK & AIR UNIVERSITY CAMPUS

MULTINATIONAL EXERCISE INDUS SHIELD-2023

SHOWCASING MULTI DOMAIN
FULL SPECTRUM OPERATIONS

JINNAH CENTRE FOR CHARACTER & LEADERSHIP

FORGING STRONG
LEADERS IN THE SKIES

UNMANNED SENTINELS TB2/AKINCI TEAMING

PAKISTAN'S UAV REVOLUTION

ANATOLIAN EAGLE-2023

INTERNATIONAL FLIGHT
TACTICAL EXERCISE

WWW.SECONDTONONE.COM.PK

Editor-in-Chief
Air Cdre
Irfan Sabir, SI (M) (Retd)

Editor
S. Khalil

Managing Editor
Muhammad Khan

Research Officer
Adil Mustafa

Marketing Manager
Faisal Nadeem

Design Head
Mobin Munir

Contact Us

051- 950 6551
051- 950 7751
chiefeditor@secondtonone.com.pk
www.secondtonone.com.pk

Advertising & Subscription

0310 4808022
0315 3121123

EDITORIAL TEAM

from the

EDITOR-IN-CHIEF

With the financial after-effects of Covid finally manifesting, the entire world is thrown into a tumultuous storm of financial uncertainty and downfall. Pakistan is no exception. Additionally, ever shrinking fiscal space of Pakistan's' economy had its further compelling effects on forces' budgeting requirements but the mettle of any organization and its men are truly tested in such adverse conditions. Pakistan Air Force has always found ways to not only adapt but thrive in such dire periods. A major factor in this resilience is the force's leadership. PAF has had the fortune to be led by men who are not only exceptional leaders, but also masters of air warfare. The last few years are the perfect example. Judicious decisions from Air Chief Marshal Zaheer Ahmad Babar Sidhu have ensured that PAF constantly improves its capacity across all areas. The perfect example of this constant drive is Project Phoenix. The brainchild of the Air Chief, the initiative has been designed to hone character and leadership skills, instilling qualities that transcend the cockpit, fostering leaders who lead with character and integrity.

Another tenet of this up-gradation is technology prowess. The PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park (PAF NASTP) is a prime example. The cutting-edge facility promises to propel Pakistan into the future, where aerospace technology breakthroughs will bolster national defence and scientific capabilities. The facility is also poised to delve into space exploration, fortify our digital defences, and accelerate AI-driven innovations. The decision to move Centre for Artificial Intelligence and Computing (CENTAIC) under PAF NASTP also ensured that the two bodies would operate together to mutually boost each other's capabilities. Another institution that has proven its mettle in a short amount of time is the Air Power Centre of Excellence (ACE). With the recent formation and integration of the Air Battle Management School (ABMS), ACE has become an integral part of uplifting PAF's warriors.

PAF's relentless pursuit of innovation extends to UAV technology. Advancements in UAV technology have led to their adoption in diverse roles, gradually replacing traditional pilots in tasks such as reconnaissance, remote sensing, and autonomous cargo delivery, ushering in a new era of unmanned aviation. Fortunately, PAF has become the regional trailblazer in inducting state-of-the-art UAV systems, collaborating with allies while also nurturing indigenous UAV development. Starting from Senior Cadet decades ago, the arsenal now contains formidable birds like the Akinci, TB2, CH-4 and Wing Loong II. Prudent induction has played a strong hand in these inductions. In the same vein, as PAF is increasing its technological prowess, potential threats must be catered to, as well. PAF's C2 systems have also undergone a major upgrade, from cutting-edge sensors to mobile Command Centres; PAF's C2 systems are now capable of facing any adversary head on. On that note, we must also acknowledge that PAF's induction strategies, particularly in recent years, showcasing the force's dedication to constantly integrating modern aircraft and cutting-edge technology. The journey so far has only been made possible owing to powerful collaboration with our allies. A powerful example of this collaboration is the Anatolian Eagle 2023 Air Exercise and participation in Shaheen Series exercises. Like always, the PAF team won countless hearts with their performances. In the same spirit, PAF's own indigenous Indus Shield exercise showcased the commitment to readiness and preparedness. This large-scale military drill involved complex aerial manoeuvres, live-fire exercises, and coordinated responses, serving as a testament to PAF's dedication to building rapport with its allies and enhancing its combat capabilities.

Operational excellence must extend beyond the skies. One apt example is the recently developed indigenous capability of repairing the C-130 fleet, which previously incurred a heavy cost, both in terms of time and money. Another mechanism out into place by PAF to ensure peak operational capacity is the formation of PAF Airworthiness Certification Authority (PACA). Having successfully completed over 200 certification projects and issued more than 1,250 Airworthiness Approvals, PACA has maintained a flawless track record, with no in-flight incidents associated with these approvals.

There are tales which touch the soul. Then, there are others which tickle the soul. One such tale is of Air Defence Controller Air Cdre Farooq Haider. Using his wit and quickness of mind, he pulled off a seemingly impossible feat. As we celebrate the ingenuity of our personnel, we also remember the sacrifice given by the contemplative young ace, Rashid Minhas. His choice of death over allowing the enemy to hijack a PAF aircraft remains etched in our collective memory. Another slice of history that we shall delve into is our study of the Indo-China conflict which has long posed a threat to regional stability.

In light of the recent progress, it cannot be denied that PAF is soaring towards a future as a next-generation air force, marked by its relentless pursuit of cutting-edge technologies, visionary leadership, and a commitment to overcoming its historical cracks and blind spots. With a steadfast focus on modernization, adaptability, and resilience, the PAF is poised to defend Pakistan's skies with unwavering readiness and superiority. The future beckons with possibilities, and PAF remains committed to shaping it with excellence. Thank you for joining us on this transformative journey.

Happy Reading!

Air Cdre Irfan Sabir, SI (M) (Retd)
Editor-in-Chief
Chiefeditor@secondtonone.com.pk

CONTENTS

Page Photo: Awais Lali

DEFENCE MINISTER VISITS AIR HEADQUARTERS

On 04 January 2023, Defence Minister of Pakistan, Khawaja Muhammad Asif, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force during his visit to Air Headquarters, Islamabad. Matters pertaining to evolving geo-strategic environment and regional security situation were discussed during the meeting.

The Defence Minister lauded the matchless professionalism of PAF and stated that the government would utilize all its resources to modernize Pakistan Air Force to ensure an impregnable defence of the country. He admired the revamping of training by PAF to produce well- equipped and skilful work force to cope up with ever-changing challenges of aerial defence and national security. He also lauded the exceptional response of Pakistan Air Force during the rescue and rehabilitation of flood victims in the aftermath of recent deluge in the country. The Air Chief briefed the visiting dignitary about various ongoing projects being carried out by Pakistan Air Force with special focus on modernization and development of indigenous capabilities. Chief of the Air Staff also briefed the Defence Minister about his vision of PAF's National Aerospace Science & Technology Park (PAF NASTP) project and highlighted that the mega project was aimed at fostering collaborative research, development and innovation in the domains of aviation, space, IT, cyber and computing to ensure social, economic, technological and scientific benefits for Pakistan.

COMMANDER U.S. AIR FORCES CENTRAL COMMAND CALLS ON AIR CHIEF

On 23 January 2023, Lieutenant General Alexus Grynkewich, Commander of Ninth Air Force (U.S. Air Forces Central Command), called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. During the meeting, matters pertaining to regional security situation, enhanced bilateral and defence cooperation were discussed.

The visiting dignitary lauded the professionalism of PAF personnel and the exceptional progress made by Pakistan Air Force over the years, especially through indigenization. He also appreciated Pakistan's efforts in promoting regional peace and vowed to enhance cooperation in various fields. The AFCENT Commander offered heartfelt condolences to the people of Pakistan over the loss of life amidst devastation caused by floods and appreciated the efforts put in by Pakistan Air Force for relief and rehabilitation of the flood victims.

The Air Chief highlighted that both the countries enjoy cordial relations and reiterated his resolve to further enhance the existing bilateral cooperation between the two strategic partners. Chief of the Air Staff also shared his vision of modernizing PAF to meet the evolving security and geo-political challenges. The Air Chief further said, "Pakistan values its strong diplomatic, economic and defence relations with United States of America which are based on convergence on all important issues relating to regional peace, security and stability".

AIR CHIEF AWARDS HI (M) TO DG BOMETEC ON BEHALF OF GOVERNMENT OF PAKISTAN

On 16 February 2023, On behalf of Government of Pakistan, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force conferred Hilal-i-Imtiaz (Military) upon General Fan Jianjun, Director General Bureau of Military Equipment Technical Cooperation (BOMETEC), People's Republic of China, during his visit to Air Headquarters, Islamabad. The award was conferred in recognition of his efforts in enhancing bilateral military relations and the pivotal role played by General Fan in PAF's capability enhancement thus ensuring regional balance of power.

The visiting dignitary called on the Air Chief in his office. During the meeting several key areas of mutual interest along with regional developments were discussed. Chief of the Air Staff shared broad contours of his vision and PAF's modernization drive to further augment current operational capability necessitated in contemporary warfare especially in Artificial Intelligence, Cyber and Space domains. He also briefed the visiting dignitary about various ongoing projects for PAF's Operational Construct in line with the emerging trends.

The Air Chief also highlighted that both the countries enjoyed historic and unprecedented strategic partnership and reiterated his resolve to further enhance the existing bilateral ties in military to military cooperation and training domains between PAF and PLAAF. CAS further said, "Pakistan values its strong diplomatic, economic, defence relationship and time-tested friendship with China which are based on convergence on all important issues relating to regional peace, security and stability".

COMMANDER BAHRAIN NATIONAL GUARD CALLS ON AIR CHIEF

On 14 March 2023, Commander Bahrain National Guard, General Shaikh Mohammed Bin Isa Bin Salman Al Khalifa called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force during his visit to Air Headquarters, Islamabad. During the meeting, several key areas of mutual interest along with regional developments were discussed.

On his arrival, a smartly turned out contingent of Pakistan Air Force presented General Shaikh Mohammed Bin Isa Bin Salman Al Khalifa the guard of honour. Later the visiting dignitary was introduced to the Principal Staff Officers. He also laid floral wreath on the martyrs' monument.

Chief of the Air Staff shared broad contours of PAF's modernization plan of smart acquisitions from allied countries, upgradation of infrastructure and revamping of training. The Air Chief highlighted that both the countries enjoy long lasting religious and historic relationships which were manifested through unprecedented strategic partnership. He also reiterated his resolve to further enhance the existing bilateral ties in military to military cooperation, strategic alliance and the training domain. CAS further said, "Pakistan values its strong diplomatic, economic and defence relationship with Bahrain which is based on convergence on all important issues relating to regional peace, security and stability".

FOUNDERS' DAY HELD AT PAF COLLEGE SARGODHA

On 22 March 2023, The Annual Founders' Day 2023 was held at Pakistan Air Force College, Sargodha. Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, was the chief guest at the occasion.

In his address, the chief guest said, "PAF College Sargodha has a proud history and rich legacy, since its establishment in the year 1953. The college had been a nursery of hardcore professionals, infused with high values of integrity, sincerity, serving before self, devotion to duty and had produced the most acclaimed air warriors of PAF". He advised students to be mindful of the responsibilities that rested on their shoulders and that they must take pride in the magnificent profession they aspired to join. The Air Chief further said that the dynamic and volatile traditional environment of national security demanded a well-trained future technical force which could withstand this tech-intensive environment and the College had already realigned training spectrum to make it possible. He also congratulated the parents on the success of their wards and commended the faculty members for doing an excellent job.

The chief guest gave away prizes to the winning houses. The Chigwell Shield for sports was won by Iqbal House. General Service Training Cup for co-curricular activities was won by Alam House, while Chief of the Air Staff Academics trophy was won by Munir House. Iqbal House lifted the coveted Quaid-e-Azam Shield for being overall Champion House of the Year. Earlier, Air Vice Marshal (Retd) Asif Maqsood, Principal PAF College, Sargodha presented annual report of the college.

AMBASSADOR OF ISLAMIC REPUBLIC OF IRAN CALLS ON AIR CHIEF

On 05 April 2023, Ambassador of the Islamic Republic of Iran, H.E Mr Seyed Mohammad Ali Hosseini, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The meeting was focused on areas of mutual interest and regional developments.

During the meeting, Chief of the Air Staff shared broad contours of PAF's modernization plan which included smart acquisitions from allied countries, upgradation of infrastructure and revamping of training. The Air Chief reiterated his unwavering commitment to enhancing the existing bilateral ties in military-to-military cooperation and the training domain. He also emphasized that Pakistan valued its strong diplomatic, economic and defence relationship with Iran which was based on convergence on all important issues relating to regional peace, security and stability.

The Iranian Ambassador lauded the exceptional progress made by Pakistan Air Force through indigenization and expressed his admiration for the professionalism of PAF personnel. He pledged to play his role in further improving the existing bilateral military ties in various fields of training, emerging technologies and mutual cooperation in the aviation industry.

GRADUATION CEREMONY HELD AT PAF ACADEMY ASGHAR KHAN

On 28 April 2023, The Graduation Ceremony of 147th GD (P), 93rd Engineering, 103rd Air Defence, 24th Admin and Special Duties, 7th (Bravo) Logistics and 129th Combat Support Courses was held at PAF Academy Asghar Khan. Prime Minister of Pakistan Muhammad Shehbaz Sharif was the chief guest on the occasion. Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force was also in presence.

While addressing the graduating cadets, the chief guest said, "You have joined Pakistan Air Force with a sacred resolve of defending the aerial frontiers of Pakistan. Today, you are becoming officers of this elite military organization, whose mission is challenging as well as exciting. You must develop yourself to uphold the finest traditions of dynamic leadership imbued with courage, professional excellence, integrity and self-respect." The Prime Minister highlighted that under the visionary and dynamic leadership of Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, PAF had made remarkable progress, most notably in the domains of Artificial Intelligence, Cyber, Space and Niche Technologies. He further asserted, "We are fully aware of the atrocities being committed against the innocent people of Indian Illegally Occupied Jammu & Kashmir and Palestine. We will continue to extend our all out moral, political and diplomatic support at international forums for their just & indigenous struggle for freedom."

AMBASSADOR OF UNITED ARAB EMIRATES CALLS ON AIR CHIEF

On 18 May 2023, The Ambassador of United Arab Emirates, H.E. Mr. Hamad Obaid Al-Zaabi, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The meeting was focused on areas of mutual interest and regional developments.

During the meeting, Chief of the Air Staff shared his vision of modernizing PAF encompassing smart acquisitions from allied countries, upgradation of infrastructure and revitalization of operational and training domains. The Air Chief emphasized the longstanding religious, cultural, and historical bond between Pakistan and United Arab Emirates which was exemplified through the robust bilateral relations. He also reiterated his unwavering commitment to enhancing the existing ties in military-to-military cooperation, strategic alliance and the training domain. Highlighting the bond of brotherhood between the two nations, the Air Chief said that Pakistan valued its strong diplomatic, economic and defence relationship with UAE which is based on convergence on all important issues relating to regional peace, security and stability.

The Ambassador of UAE lauded the exceptional progress made by Pakistan Air Force especially through indigenization and expressed his admiration for the professionalism of PAF personnel. He also pledged to play his role in further improving the existing bilateral military ties at all levels and expressed his desire to consolidate cooperation in various fields including training, emerging technologies and mutual cooperation in the aviation industry.

FOREIGN MINISTER OF PAKISTAN CALLS ON AIR CHIEF

On 25 May 2023, Foreign Minister of Pakistan, Mr Bilawal Bhutto Zardari, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force during his visit to Air Headquarters, Islamabad. Matters pertaining to evolving geo-strategic environment and regional security situation were discussed during the meeting.

Air Chief briefed the visiting dignitary about various ongoing projects being carried out by Pakistan Air Force with special focus on the modernization and development of indigenous capabilities. Chief of the Air Staff also briefed the Foreign Minister about his vision of PAF's National Aerospace Science & Technology Park project and highlighted that the mega project was aimed at fostering collaborative research, development and innovation in the domains of aviation, space, IT, cyber and computing to accrue maximum social, economic, technological and scientific dividends for Pakistan.

The Foreign Minister lauded the matchless professionalism of PAF personnel and stated that the government would utilize all its resources to modernize Pakistan Air Force in order to ensure an impregnable aerial defence of the country. Paying tribute to the PAF Shuhada, the Foreign Minister said, "The nation is grateful to all martyrs of Pakistan Air Force who sacrificed their lives while fighting valiantly in order to foil the nefarious ambitions of our enemy." He also admired the PAF leadership for the revamping of training in order to produce a well-equipped and skilful workforce, to cope with the evolving dynamics of aviation industry and the challenges faced by national security.

AMBASSADOR OF REPUBLIC OF UZBEKISTAN CALLS ON AIR CHIEF

On 01 June 2023, The Ambassador of Republic of Uzbekistan, H.E. Mr. Aybek Arif Usmanov, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The meeting was focused on areas of mutual interest and regional developments.

During the meeting, Chief of the Air Staff shared his pragmatic policy decisions aimed at modernizing Pakistan Air Force through smart acquisition of niche technologies, upgradation of infrastructure and revitalization of operational and training domains. The Air Chief emphasized the longstanding religious, cultural and historical bond between Pakistan and Uzbekistan which was exemplified through robust bilateral relations. He also reiterated his unwavering commitment to enhancing the existing ties in realms of military-to-military cooperation and training. Highlighting the bond of brotherhood between the two nations, the Air Chief said "Pakistan values its strong diplomatic, economic and defence relationship with Uzbekistan which is based on convergence on all important issues relating to regional peace, security and stability."

The Ambassador of Uzbekistan expressed his admiration for the exceptional progress made by Pakistan Air Force, particularly in the area of indigenization and lauded the professionalism of PAF personnel. He pledged to play his role in further improving the existing bilateral ties at all levels and expressed his desire to consolidate cooperation in various fields including training, emerging technologies and mutual cooperation in the aviation industry.

The meeting between the Chief of the Air Staff and the Ambassador of Uzbekistan was a testament of the deep-rooted friendship and unwavering commitment between the two nations to work towards a peaceful and stable region.

COMMANDER IRAN NAVY CALLS ON AIR CHIEF

On 19 June 2023, Rear Admiral Shahram Irani, Commander of Islamic Republic of Iran Navy called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The meeting was focused on areas of mutual interest and regional developments.

During the meeting, Chief of the Air Staff highlighted that the advancement in space, electronic warfare, cyber and niche technologies coupled with artificial intelligence had profoundly affected the traditional environment of national security. He briefed the visiting dignitary about various ongoing projects being carried out by Pakistan Air Force with special focus on modernization and development of indigenous capabilities. The Air Chief also emphasized that Pakistan and Iran enjoyed longstanding religious, cultural and historical bonds which were manifested through strong ties between both the countries.

Rear Admiral Shahram Irani, Commander of Islamic Republic of Iran Navy commended the professionalism of PAF personnel and the exceptional progress made by Pakistan Air Force on its path to modernization. He also appreciated Pakistan's continuous efforts for regional stability and pledged to play his role for further improvement in military-to-military ties especially in the domains of operations, training and aviation industry.

The meeting between Chief of the Air Staff and Commander of Islamic Republic of Iran Navy was testimony of the deep-rooted friendship and unwavering commitment between the two nations to work towards a peaceful and stable region.

COMMANDER TURKISH AIR FORCE VISITS AHQ

On 22 June 2023, A delegation led by General Atilla Gulan, Commander Turkish Air Force, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. During the meeting, several key areas of mutual interest along with regional developments were discussed.

On his arrival, a smartly turned out contingent of Pakistan Air Force presented General Atilla Gulan the guard of honour. He also laid floral wreath on the martyrs' monument. Later, the visiting dignitary was introduced to the Principal Staff Officers.

During the meeting, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, shared broad contours of PAF's modernization plan of smart acquisitions from allied countries, upgradation of infrastructure and revamping of training. Air Chief highlighted that both the countries enjoy long-standing religious and historic relationship which was manifested through unprecedented strategic partnership. He also reiterated his resolve to further enhance the existing bilateral ties in military-to-military cooperation, strategic alliance and the training domain. The Air Chief further said, "Pakistan values its strong diplomatic, economic and defence relationship with Türkiye which is based on convergence on all important issues relating to regional peace, security and stability. The two brotherly countries have never left each other stranded in times of need and Pakistan Air Force will remain committed to providing training and capacity-building assistance to the Turkish Air Force." The Air Chief further remarked that PAF pilots were playing an active role in training Turkish aircrew on a variety of aircraft, including trainers and fighters.

ADVISOR TO THE PRESIDENT OF AZERBAIJAN CALLS ON AIR CHIEF

On 06 July 2023, A high level defence delegation headed by Mr. Khalid Ahadov, Advisor to the President of Azerbaijan, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The meeting underscored discussion on several key areas of mutual interest and regional developments.

During the meeting, Chief of the Air Staff shared his vision of modernizing PAF's capabilities to achieve operational excellence in air, space and cyber domains. The Air Chief emphasized the longstanding religious, cultural and historical bonds between Pakistan and Azerbaijan, which were exemplified through robust bilateral relations. He also reiterated his resolve to further enhance the existing bilateral ties in military-to-military cooperation and the training domain. Chief of the Air Staff further said, "Pakistan values its strong diplomatic and defence relationship with Azerbaijan which is based on convergence on all important issues relating to regional peace, security and stability."

The Advisor to the President of Azerbaijan lauded the historic and exemplary professionalism demonstrated by the personnel of Pakistan Air Force and praised the PAF's notable progress in developing a thriving domestic capability in the aviation industry. The visiting dignitary reaffirmed that Pakistan and Azerbaijan enjoy deep rooted cordial relations and wished to further enhance the existing bilateral ties between the two brotherly countries.

AMBASSADOR OF KINGDOM OF SAUDI ARABIA CALLS ON AIR CHIEF

On 11 July 2023, The Ambassador of the Kingdom of Saudi Arabia, H.E. Mr. Nawaf Saeed Al-Malakiy, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The meeting was focused on areas of mutual interest and regional developments.

During the meeting, Chief of the Air Staff shared his pragmatic policy decisions aimed at modernizing PAF through smart acquisition of niche technologies, upgradation of infrastructure and revitalization of operational and training domains. The Air Chief highlighted that Saudi Arabia being the center of the Muslim world and a significant strategic partner had longstanding religious, cultural and historical bond with Pakistan which was exemplified through robust bilateral relations. He also reiterated his unwavering commitment to enhancing the existing ties in realms of military-to-military cooperation and training. Highlighting the bond of brotherhood between the two nations, the Air Chief said, "Pakistan values its strong diplomatic, economic and defence relationship with Saudi Arabia which is based on convergence on all important issues relating to regional peace, security and stability."

The Ambassador of the Kingdom of Saudi Arabia expressed his admiration for the exceptional progress made by Pakistan Air Force, particularly in the area of indigenization and lauded the professionalism of PAF personnel. He also pledged to play his role in further improving the existing bilateral ties at all levels and expressed his desire to consolidate cooperation in various fields including training, emerging technologies and mutual cooperation in the aviation industry. The meeting between the Chief of the Air Staff and the Ambassador of Saudi Arabia was testimony to the strong commitment of both nations to further enhance their strategic partnership through continued dialogue and collaboration.

FINANCE MINISTER OF PAKISTAN CALLS ON AIR CHIEF

On 17 July 2023, Finance Minister of Pakistan, Mr Muhammad Ishaq Dar, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force during his visit to Air Headquarters, Islamabad today. Matters pertaining to evolving geo-economic environment and regional security situation were discussed during the meeting.

The Air Chief briefed the visiting dignitary about various ongoing projects being carried out by Pakistan Air Force with special focus on modernization and development of indigenous capabilities. Chief of the Air Staff briefed the Finance Minister about PAF's National Aerospace Science & Technology Park project and highlighted that the mega project is aimed at fostering collaborative research, development and innovation in the domains of aviation, space, IT, cyber & computing in order to accrue maximum economic, technological and scientific dividends for Pakistan. The Air Chief also praised the pragmatic policies and initiatives of the government to lead the economy towards growth and stability.

The Finance Minister lauded the matchless professionalism of PAF personnel and stated that the government would utilize all its resources to modernize Pakistan Air Force in order to ensure an impregnable aerial defence of the country. He also shared broad contours of the economic policies being implemented by the government to pave the way for a prosperous and financially stable country. The visiting dignitary expressed his full confidence in the operational preparedness of Pakistan Air Force and admired the PAF leadership for producing well-equipped and skillful air warriors, who are fully capable to cope up with ever-changing challenges of aerial defence and national security.

AIR CHIEF HOLDS KEY MEETINGS DURING HIS VISIT TO CHINA

On 30 July 2023, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force called on various dignitaries during his visit to China. In these meetings, the Air Chief called on Chinese Defence Minister and State Councilor General Li Shangfu, People's Liberation Army Air Force Commander General Chang Dingqiu, Chief of Equipment Development Department General Xu Xueqiang and Director General Bureau of Military Equipment and Technical Cooperation (Bometec) Major General Fan Jianjun. During the meetings matters pertaining to mutual interest and regional security situation were discussed. The dignitaries also expanded the evolving geo-political environment and regional developments having significant implications for both the countries. During this historical engagement between the highest level military leadership of the two nations, Chief of the Air Staff said that Pakistan valued its strong diplomatic and defence ties with China which were based on convergence on all important issues related to regional peace and security while reiterating strong strategic partnership in the face of shared challenges.

A smartly turned out contingent presented guard of honor to Chief of the Air Staff, Pakistan Air Force on his arrival at the PLAAF Headquarters, Beijing, China. The PLAAF Commander expressed his admiration for the professionalism of the Pakistan Air Force personnel and praised the remarkable progress made by the Pakistan Air Force through indigenization. The Air Chief reiterated his unwavering commitment to enhancing the existing bilateral ties in military-to-military cooperation, strategic alliance and the training domain.

CHIEF OF STAFF OF THE SULTAN'S ARMED FORCES OF OMAN VISITS AIR HEADQUARTERS

On 07 August 2023, Vice Admiral Abdullah Bin Khamis-Al-Raisi, Chief of Staff of the Sultan's Armed Forces of Oman, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. During the meeting, key areas of mutual interest, geo political environment and regional developments were discussed.

Chief of the Air Staff briefed the visiting dignitary on the overall framework of PAF's modernization drive through smart procurements, induction of niche technologies and revamping of training in line with contemporary trends. The Air Chief reiterated his sound determination to further elevate the existing ties in areas of military cooperation and training especially in the domains of cyber, electronic warfare, space and computing. Chief of the Air Staff emphasized, "Pakistan highly regards its robust diplomatic, economic and defence ties with the brotherly country Oman which are based on the strong foundation of alignment on all significant matters concerning regional peace, security and stability." Air Chief Marshal Zaheer Ahmed Baber Sidhu also highlighted that both the countries had always supported each other in testing times and Pakistan Air Force was dedicated to continuing provision of training and support for the Royal Air Force of Oman." Chief of the Air Staff reiterated the need to focus on shared training goals in order to address future warfare challenges and reinvigorate the training domain between the two Air Forces.

U.S. AMBASSADOR CALLS ON AIR CHIEF

On 17 August 2023, U.S. Ambassador to Pakistan H.E. Mr. Donald Blome called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The discussion underscored matters pertaining to geo political environment leading to emerging regional security challenges, augmenting the already fortified bilateral ties and fostering collaborative endeavours within the realms of defence and aviation.

The Air Chief accentuated the cordial relations that exist between the two nations while emphasizing his steadfast determination to elevate the existing synergistic partnership between the two key allies. Chief of the Air Staff further said, "Pakistan deeply values its robust diplomatic, economic and defence ties with the United States of America which are firmly rooted in mutual consensus concerning all important matters pertaining to regional peace, security and stability."

During the meeting, the visiting envoy extolled the commendable level of professionalism of Pakistan Air Force personnel and acknowledged the remarkable strides made by PAF through indigenization under the current leadership. Recognizing the importance of rigorous and comprehensive training, he assured to play his role to address the gaps in the training domain to ensure that PAF personnel received the highest quality training, enabling them to meet the evolving challenges of modern warfare. The US Ambassador also expressed his admiration for Pakistan's unwavering commitment to facilitate regional peace and stability.

"MILITARY DIPLOMACY AT ITS BEST" CAS ATTENDS GRADUATION AND FLAG DETACHMENT CEREMONY AT TURKISH AIR FORCE ACADEMY AS GUEST OF HONOUR

On 01 September 2023, Consequent to a special invitation by the Turkish Presidency, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force made a landmark visit to Turkiye to attend the prestigious Graduation and Flag Detachment Ceremony, as Guest of Honour, which was held at Turkish Air Force Academy.

The Graduation and Flag Detachment Ceremony, held at the Turkish Air Force Academy, is a moment of immense pride and accomplishment for the graduating cadets, as they mark the culmination of their rigorous training and embark on their journey as officers of the Turkish Air Force.

The Air Chief expressed his gratitude to the Turkish President, H.E Mr. Recep Tayyip Erdoğan, for extending such a warm invitation and reaffirmed Pakistan Air Force's commitment to fostering a robust partnership with the Turkish Air Force. He also emphasized the shared values and aspirations that form the foundation of the deep-rooted friendship between Pakistan and Turkiye. Chief of the Air Staff expressed his unwavering commitment to enhance the existing bilateral ties in military-to-military cooperation with Turkiye especially in the field of defence production, two way sharing of technology and the joint development of fifth generation fighter aircraft. He also reiterated his resolve to further deepen the strong bond of friendship that unites the two nations in the face of shared challenges and wished to explore further avenues of collaboration in the defence and aviation sector.

BRITISH HIGH COMMISSIONER CALLS ON AIR CHIEF

On 07 September 2023, H.E. Ms. Jane Marriott, British High Commissioner to Pakistan, met with Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, in a highly significant meeting held at Air Headquarters. The discussion focused on key areas of mutual interest, with a special emphasis on the contemporary geo-political situation and emerging regional security challenges. High ranking military dignitaries from British Armed Forces were also present during the meeting.

The Air Chief accentuated the cordial relations between the two nations while emphasizing his steadfast determination to elevate the existing synergistic partnership between the two key allies. He briefed the British High Commissioner on the PAF's ongoing modernization efforts and highlighted the significant progress made in recent years. Chief of the Air Staff also reiterated PAF's commitment to developing indigenous solutions to meet its operational requirements. Highlighting the historic partnership between the two nations, the Air Chief further said, "The existing global security scenario coupled with the evolving dynamics of air warfare calls for an enhanced partnership between Pakistan and the United Kingdom. Both the countries share strong strategic and historical bonds, firmly rooted in mutual consensus on all important issues of regional peace and stability."

The visiting dignitary commended Pakistan Air Force for its dedication to modernization and its focus on indigenization under the current leadership. Recognizing the achievements of Pakistan Air Force and the latest advancements in training and infrastructure development, the High Commissioner expressed admiration for PAF's efforts in enhancing its defence capabilities.

SINO-PAK JOINT AIR EXERCISE SHAHEEN-X COMMENCES IN NORTHWEST CHINA

On 05 September 2023, The Sino-Pak joint annual air exercise Shaheen-X commenced in the Jiuquan and Yinchuan cities of Northwest China. PAF's lead fighter aircraft J-10 C and JF-17 participated in the exercise along with air and ground crew.

People's Liberation Army Air Force and Pakistan Air Force had been conducting Shaheen joint exercises since 2011 which are being hosted by both countries on an alternate basis. Shaheen exercise aims to enhance the aerial combat practices, operational readiness, promoting interoperability and creating synergy amongst the participating strategic and time-tested allies in the region. Moreover, incorporation of features like hybrid warfare, cyberspace and computing in this air exercise would augment Pakistan Air Force's effectiveness in the dynamic and evolving landscape of modern warfare.

PAF'S SIMULTANEOUS PARTICIPATION IN TWO INTERNATIONAL AIR EXERCISES SHAHEEN-X & BRIGHT STAR

On 15 September 2023, Pakistan Air Force conducted two large scale flying exercises from two different locations across the globe, marking a significant milestone in its commitment to enhancing its aerial prowess and strengthening international cooperation. The participation included PAF's J-10 C and JF-17 lead fighter aircraft, combat pilots, air defence controllers and technical ground crew, who were actively engaged in the Shaheen-X bilateral Air Exercise hosted by the People's Liberation Army Air Force in China, as well as the Bright Star Air Exercise held in Egypt. The successful induction and operationalization of the J-10C fighter jets in PAF's fighter fleet and their participation in an international exercise in an unprecedented short span of time was a remarkable achievement. The feat had been achieved in lines with modernization plan of Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, premised on smart inductions and focused indegenization.

THE AMBASSADOR OF THE REPUBLIC OF AZERBAIJAN CALLS ON AIR CHIEF

On 13 September 2023, The Ambassador of the Republic of Azerbaijan, H.E Mr. Khazar Farhadov, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The meeting covered a wide array of topics, including matters of mutual interest, regional developments and the evolving geopolitical landscape.

Amidst the discussions, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, shared his strategic vision for Pakistan Air Force and reiterated his unwavering commitment to modernize its capabilities across the realms of air, space, cyber and electronic warfare.The discussion primarily focused on the areas of joint operational training and comprehensive cooperation in cross-domain, multi-spectrum operations.

Emphasizing the historical friendship between the two nations, the Air Chief stated, "The relationship between Pakistan and Azerbaijan has a myriad of reasons, deeply rooted in mutual experiences, enduring religious, cultural and historical bonds, all underpinned by a shared commitment to regional peace, security and stability." Chief of the Air Staff reaffirmed his steadfast determination to further enhance the existing inter-military cooperation between the two sides, particularly in the fields of training and defence aviation.

CHAIRMAN JOINT CHIEFS OF STAFF COMMITTEE VISITS PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY PARK

On 03 October 2023, Chairman Joint Chiefs of Staff Committee, General Sahir Shamshad Mirza, visited the PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park (PAF NASTP), a strategic project led by Pakistan Air Force. The visit aimed to highlight the significance of this cutting-edge initiative and its potential to revolutionize the national landscape in the fields of aerospace, cyber and computing. On his arrival at the PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park, the distinguished guest was warmly received by Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force. Principal Staff Officers along with high level civil and military officials also present at the occasion. During his visit, the Chairman Joint Chiefs of Staff Committee was given a firsthand glimpse of the state-of-the-art infrastructure, research and development centers, and innovation hubs dedicated to emerging and disruptive technologies. The Air Chief elaborated on the park's vision to become one of the world's premier Aerospace, Cyber, and Computing clusters, fostering an environment of cutting-edge design, research and development. Speaking at the occasion, Chief of the Air Staff highlighted that PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park under the patronage and support of the Government of Pakistan has evolved in a short span of time through comprehensive planning, focused efforts and mutual collaboration. He extended his appreciation to General Sahir Shamshad Mirza, Chairman Joint Chiefs of Staff Committee, and General Syed Asim Munir, Chief of Army Staff, for their invaluable cooperation, collaboration, and personal commitment, which played a pivotal role in bringing the true essence of the PAF NASTP concept to fruition. Chairman Joint Chiefs of Staff Committee termed PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park as a project of national and strategic significance that would reap multi-dimensional benefits for the country. He emphasized that the PAF NASTP project was poised to catalyze technological progress and enhance our national self-reliance. General Sahir Shamshad Mirza praised the efforts of Pakistan Air Force and its skilled personnel in the achievement of this unprecedented milestone in record time. He also admired the dynamic leadership of the Air Chief, whose firm resolve and relentless efforts paved the way for the project to be completed at an unprecedented pace. The PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park is all set to serve as a hub for collaboration between academia, industry, and the armed forces in the pursuit of technological advancements. By leveraging the expertise and resources of the Pakistan Air Force, the project aims to drive innovation, nurture talent, and facilitate the development of indigenous aerospace capabilities. The visit of the Chairman Joint Chiefs of Staff Committee to the PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park marked a significant milestone in Pakistan's pursuit of excellence in the aerospace, cyber, and computing domains. It showcased the country's commitment to harnessing cutting-edge technologies, fostering research and development, and positioning itself at the forefront of technological innovation.

CHIEF OF STAFF QATAR ARMED FORCES VISITS AIR HEADQUARTERS

A high level delegation, led by Lieutenant General (Pilot) Salem Hamad Eqail Al-Nabet, Chief of Staff, Qatar Armed Forces, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force at Air Headquarters, Islamabad.

During the meeting, evolving regional security and geo-strategic environment, avenues of defence cooperation in the field of technology sharing and development alongside key areas of mutual interest were discussed. During the meeting, Chief of the Air Staff shared broad contours of his vision concerning PAF's modernization drive to further augment current operational capability necessitated in contemporary hybrid warfare especially in Artificial Intelligence, Niche technologies, Cyber and Space domains. He also discussed about various ongoing projects of Pakistan Air Force's operational construct, force goals and plans for the force structure with a keen focus on future warfare. Appreciating the participation of Qatar Air Force contingent in Exercise Indus Shield at an operational air base of PAF, the Air Chief highlighted that both the countries enjoy historic and unprecedented brotherly relations and reiterated his resolve to further enhance the existing bilateral ties in military to military cooperation and training domains.

The Chief of Staff, Qatar Armed Forces, praised the professionalism of Pakistan Air Force personnel and the exceptional progress made by PAF over the years, especially through indigenization. He also appreciated the dynamic efforts of Air Chief Marshal Zaheer Ahmed Baber Sidhu in steering PAF towards modernization.

COMMANDER HUNGARIAN AIR FORCE CALLS ON AIR CHIEF

On 17 October 2023, Brigadier General József Koller, Commander Hungarian Air Force, along with his delegation called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, during his visit to Air Headquarters Islamabad. The first-ever visit by the Hungarian Air Chief to Pakistan marks a significant milestone in the bilateral relations between the two countries and a new opening in Air Force to Air Force relations. The historic event highlights the growing cooperation and friendship between Pakistan and Hungary, particularly in the realm of defence industry and military partnership. The meeting emphasized the exchange of insight and sharing of ideas to explore potential areas of joint collaboration particularly in the domains of military technology and training programs. Memorandum of Understanding (MoU) between Pakistan Air Force and Hungarian Air Force is expected to be finalized in the near future, outlining a framework for Pakistan Air Force to provide basic and tactical level training to Hungarian Air Force pilots.
During the meeting, Chief of the Air Staff provided a comprehensive insight into Pakistan Air Force's operational construct, force goals and its endeavors for the force structure with a keen focus on future warfare. He emphasized on the significance of the robust diplomatic and defence ties between Pakistan and Hungary which are built upon shared perspectives on critical matters related to regional peace, security and stability.

The Hungarian Air Chief expressed his admiration for the professionalism of PAF personnel and praised the remarkable progress made by Pakistan Air Force through indigenization. Brigadier General József Koller, expressed his unwavering resolve to enhance the existing bilateral ties in military-to-military cooperation and the training domain.

COMMANDER TURKISH AIR FORCE VISITS AIR HEADQUARTERS

On 18 October 2023, A delegation led by General Ziya Cemal Kadioğlu, Commander Turkish Air Force, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. The meeting covered a wide array of matters related to geo-strategic situation, progress of current joint ventures and exploration of further avenues of collaboration in the aviation industry. The discussion also involved an exchange of insight from both dignitaries on the operational training of their respective air forces in the backdrop of PAF's on-going mega aerial exercise, Indus Shield 2023 which is being witnessed by dignitaries from around the globe. Both the commanders also agreed to explore further avenues of bilateral cooperation including collaboration for joint production of military hardware with special focus on unmanned aerial platforms.

During the meeting, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, shared the framework of PAF's comprehensive modernization strategy involving procurements of technological equipment from allied countries, bolstering critical infrastructure and a comprehensive restructuring of its training set-up, in order to address contemporary air warfare challenges. The Air Chief highlighted that both the brotherly countries enjoy long-standing religious and historic ties which are manifested through unprecedented strategic partnership.

General Ziya Cemal Kadioğlu, Commander Turkish Air Force, who is on his maiden visit to Pakistan, commended the professionalism of Pakistan Air Force and acknowledged its rising indigenous capacity in the aviation industry. The visiting dignitary further affirmed that the on-going exercise Indus Shield hosted by PAF, would be a way forward to further consolidate the existing bond of brotherhood and military ties between the two countries.

COMMANDER OF THE AIR FORCE & AIR DEFENCE OF UAE VISITS AIR HEADQUARTERS

On 26 October 2023, A high level delegation, led by Major General Staff Pilot Ibrahim Nasser Mohamed Al-Alawi, Commander of the Air Force & Air Defence of the United Arab Emirates, called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force at Air Headquarters, Islamabad. The meeting covered a wide array of matters pertaining to geo-strategic environment, regional security and the aspect of exploring new avenues to enhance bilateral defence cooperation.

During the meeting, Chief of the Air Staff shared broad contours of PAF's modernization drive aimed at augmenting current operational capability in the domains of Cyber, Space, Artificial Intelligence, Electronic Warfare and Niche technologies. He also highlighted various ongoing projects of Pakistan Air Force's operational construct, force goals and plans for the force structure with a keen focus on future warfare. Appreciating the participation of UAE Air Force contingent in PAF's multi-national Exercise Indus Shield, the Air Chief highlighted that both the countries enjoy unprecedented brotherly relations and reiterated his resolve to further enhance the existing bilateral ties in military to military cooperation, joint exercises and training domains.

The Commander of the Air Force & Air Defence of the United Arab Emirates conveyed his deep appreciation for the remarkable advancements achieved by Pakistan Air Force in the realm of indigenous capabilities and commended the professionalism of PAF personnel. Both sides concurred to further optimize the existing military ties between the two countries with a specific focus on advanced tactical training, emerging technologies and strengthening operational competencies.

INDUCTION AND OPERATIONALIZATION CEREMONY HELD AT AN OPERATIONAL AIR BASE OF PAKISTAN AIR FORCE

On 02 January 2024, An Induction and Operationalization Ceremony was held at an operational base of Pakistan Air Force. General Syed Asim Munir, Chief of Army Staff, attended the distinguished ceremony as the Chief Guest. Upon his arrival at the base, Chief of Army Staff was received by Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force. The ceremony showcased the newly inducted weapon systems and defence assets of PAF.

Upon his arrival, a smartly turned-out contingent of Pakistan Air Force presented Guard of Honour to Chief of Army Staff, General Syed Asim Munir.

During his speech, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, provided an overview of the latest inductions in the PAF's arsenal comprising of J-10C fighter jets, air mobility platforms of C-130 H, Airbus-319, Boeing 737, Piper M-600 and BKA-350i aircraft. The Air Chief remarked that the latest inductions of modern Radars, Unmanned Aerial Systems like Bayraktar Akinci, Tb2 and Shahpar-II along with Swarm Drones, Loitering munition capabilities and Long Range Vectors have significantly bolstered the aerial defence capabilities of the country. He further said that the foundation for acquiring the J-31 Stealth Fighter aircraft has already been laid which is all set to become part of the PAF's fleet in the near future. The Air Chief also highlighted the dynamic initiatives of PAF leadership aimed at cultivating cutting-edge human resource, revamping of training and fostering of indigenous capabilities in order to address the contemporary warfare challenges. Providing an insight into the newly established state-of-the-art infrastructure, Chief of the Air Staff said that Center of Excellence for Unmanned Aerial Systems, Center of Excellence for Air Mobility & Aviation Safety, College of Air Defence and reinvigoration of Air Power Centre of Excellence has been achieved in order to stay abreast with the evolving challenges. The Air Chief also discussed the salient features of PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park, a project of paramount strategic importance operating under the umbrella of SIFC, and termed it a game changer in the technological and economic growth of Pakistan.

Emphasizing the PAF's commitment to incorporating niche technologies through fast paced strategic inductions from friendly countries and various indigenous initiatives, Chief of the Air Staff highlighted the organization's vision to evolve into a potent Next Generation Air Force. He emphasized the progress achieved by Pakistan Air Force in the emerging domains of Cyber and Space, demonstrating the commitment of PAF leadership to ensuring an impregnable defence of the country. The Air Chief also expressed gratitude to the Chief of Army Staff for his steadfast support in PAF's modernization drive.

General Syed Asim Munir in his speech commended the dynamic leadership of Air Chief Marshal Zaheer Ahmed Baber Sidhu and lauded the operational preparedness of Pakistan Air Force in incorporating state-of-the-art weapon systems, substantially contributing in ensuring the balance of power in the region. While emphasizing the significance of indigenization and human resource development, the Chief of Army Staff wholeheartedly endorsed PAF's dedication to technological advancements and operational excellence, reassuring that the Armed Forces of Pakistan are fully prepared to thwart any aggression.

Pakistan Air Force is all set to acquire J-31 Stealth Next Generation Fighter Aircraft (NGFA) on its inventory 'announced by Air Chief Marshal Zaheer Ahmed Baber Sidhu, NI(M) Chief of the Air Staff, Pakistan Air Force on 2nd of January 2024 during Induction and Operationalization Ceremony held at an operational air base of Pakistan Air Force

PAF *Induction and Operationalization* CEREMONY

INAUGURATION CEREMONY OF PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY PARK, SILICON HELD AT KARACHI

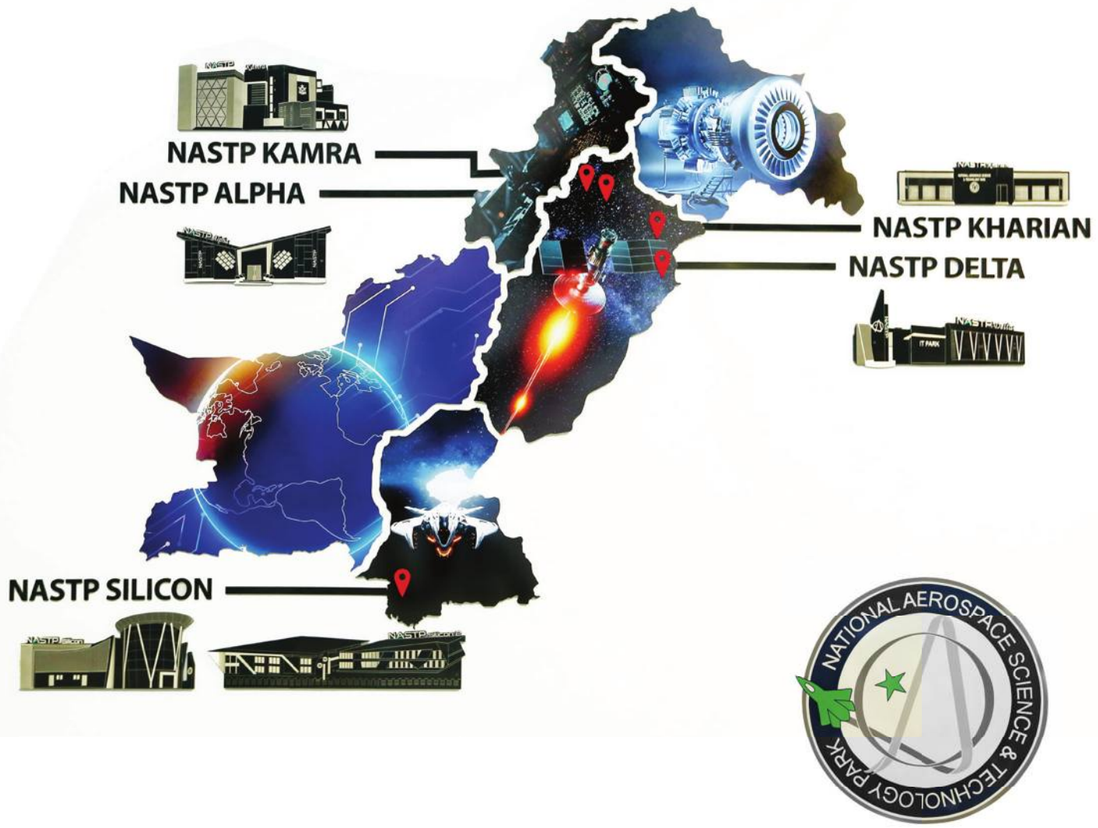
On 11 January 2024, The inauguration ceremony of the second chapter of PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park, PAF NASTP Silicon was held at Karachi, today. General Syed Asim Munir, Chief of Army Staff, was the Chief Guest at the occasion. On his arrival at the venue, he was received by Air Chief Marshal, Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force. High level civil and military officials were also present at the occasion.

While expressing his views at the occasion the Air Chief said, "PAF NASTP Silicon houses primary design, R&D facilities in Simulator, Augmented & Virtual Reality, Robotics, Space, Wireless Communication Systems, Cyber, Software Development and Artificial Intelligence domains." He further highlighted that PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park, under the patronage and support of the Government of Pakistan, has evolved in a very short span through comprehensive planning, focused efforts and mutual collaboration. He also shared his overall vision for PAF NASTP to become one of the best Aerospace, Cyber & IT Clusters in the world and transform national landscape with design, R&D and innovation centers for emerging and disruptive technologies to foster research, innovation and development in aviation, space, IT and cyber technologies to accrue maximum social, economic, security and scientific dividends for the country. Chief of the Air Staff reiterated that the project would provide real implementation and manifestation of Triple Helix Model at the national level by bringing in aerospace science and technology parks under the umbrella of Special Investment Facilitation Council. He also expressed his gratitude to General Syed Asim Munir, Chief of the Army Staff, for his cooperation and personal involvement which enabled true manifestation of the vision behind PAF NASTP.

In his address at the ceremony, Chief of Army Staff, termed PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park a project of national and strategic significance. He asserted that the project would yield manifold benefits for the country since it would spur technological progress and foster self-reliance by offering a platform for the nation's youth and future generations. The Chief Guest praised the efforts of Pakistan Air Force and its skilled personnel in the achievement of yet another milestone of PAF NASTP Silicon. He lauded the dynamic leadership of Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, whose firm resolve and relentless efforts have ensured the completion of the project at an unprecedented pace.

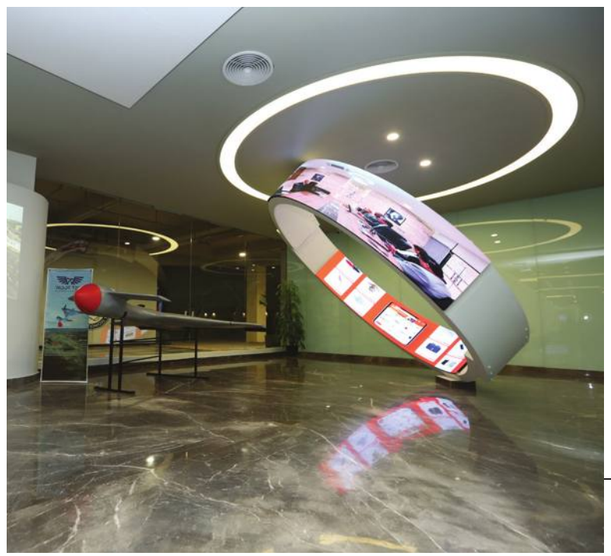
PAF NASTP Silicon is set to emerge as a coveted tech hub for Aerospace, Cyber, IT, Computing, Fintech, and Training companies, owing to its proximity with some of the largest public and private industrial setups. The project stands as a landmark achievement of Pakistan's Armed Forces in bolstering the nation's independent economy and is expected to catalyze unparalleled technological advancements within the country.

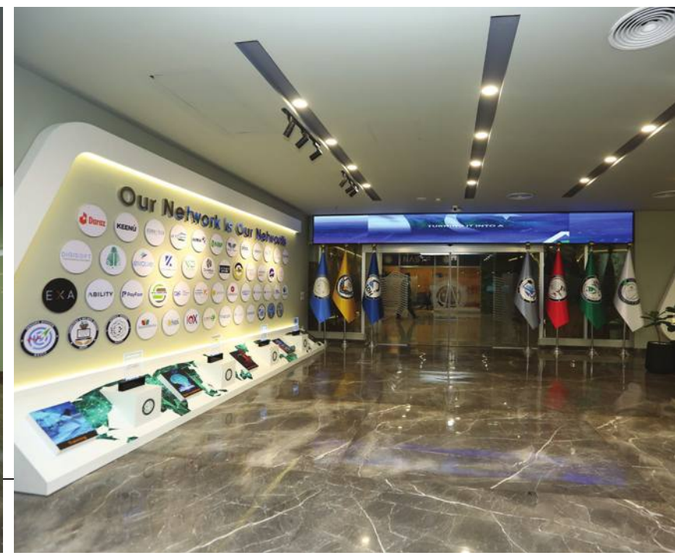
[PAF News] BULLETIN



PAF NASTP SILICON

Inauguration Ceremony





National Aerospace Science & Technology Park (PAF NASTP)

by AVM Liaqat Ullah Niazi

Flagship national aerospace cluster of Pakistan at Kamra along with three major regional techno parks at Rawalpindi, Lahore and Karachi and one small city level IT Park at Kharian have been accomplished within 2 ½ years of unimaginable short period of time.

National Aerospace Cluster of Pakistan PAF NASTP Kamra

The flagship National Aerospace Cluster of Pakistan at Kamra comprises Aerospace Design & Innovation Center (ADIC) which is one of the largest aerospace design center in the region. ADIC will be the strategic enabler of national fighter program called PFX that has been very closely supervised by the CAS in last two years to ensure pragmatic plan is formulated. Four buildings with sufficient space for more than 50 small to medium size design R&D companies have been added to accommodate private sector companies. Complete with residential campus and 2 MW Solar Park, collocated with the National Aerospace City Kamra (NACK), first ever Aviation and Aerospace Campus of the Air University, PAC, PAF Base Minhas, PAF Flight Test Center, PAF NASTP Kamra is poised to grow as one of the largest aerospace clusters in the region. PAF NASTP Kamra is located at the gateway to CPEC and 45 minutes' drive from the Islamabad Int'l Airport, making it ideally suited for the connectivity across the country as well as with China and Middle Eastern countries.

PAF NASTP Alpha Rawalpindi

PAF NASTP Alpha has three main campuses

Aerospace Campus has seven major Aerospace Technology Divisions including **Aircraft Systems** (Manned, Unmanned, Loitering Munition, Micro Jet Engines), **Space Systems** (Micro and Nano Sats), **Sensors** (GBES, AESA, GPSAR), **EW Systems** (RWR, Anti-Drone Systems), **Visions Systems** (C2 Systems & Simulators), **Advanced Systems** (Robotics and EOD Systems), and **ACAST & Avionics** (Software Defined Radio, Link 17). Center for Aerospace & Security Studies (CASS) is the resident Think Tank Instt of PAF NASTP Alpha for Policy Formulation and Advocacy. Center for Artificial Intelligence & Computing (CENTAIC) is also part of Aerospace Campus.

Cyber, IT & AI Campus has four technology divisions including **Cyber & Info Assurance** (Cyber R&D, CTI, Cyber

Range), **IT & Computing** (HPC, Data Center, NOC, CSOC, Cloud Computing & ICT), **Software Dev** (PALMS, CBTs, ERP) and **AI & Big Data Analytics** (DSTs, Object Detection). National Center for Cyber Security (NCCS) is also part of thus Campus.

Private Sector Campus has PAF NASTP Corporate HQs, Training Division (EASA B1B2 Training Instt called NIVT), Certification Division (CCTL for electronics and avionics certification, PACA for aerospace systems air worthiness certification), Incubation Division (NICAT with 50 Cohorts & Siber Koza with 25 Cohorts), Co-working Spaces (Daftar Khwan), more than 80 private aerospace & IT companies and Int'l Enclave with 25 Companies.

PAF NASTP Delta Lahore

PAF NASTP Delta has contracted a number of companies which have started their operations. Signature IT Institute called PAF NASTP Instt of IT (NIIT) is the degree awarding affiliated college of AU to educate, train and graduate industry ready HR. Center for Aerospace & Security Studies

(CASS) is the resident Think Tank Instt of PAF NASTP Alpha for Policy Formulation and Advocacy. PAF NASTP Delta is predominantly IT Hub of PAF NASTP. PITB and PAF NASTP have partnered to bring Incubation and Co-working in PAF NASTP Delta whereas PAF NASTP and MoIT have partnered to establish National Center for Animation & Gaming in PAF NASTP Delta.

PAF NASTP Silicon Karachi

PAF NASTP Silicon has contracted more than a number of companies which have started their operations. Silicon has established joint training center in partnership with Ashrei Tech Academy and co-working spaces with the private brand the Hives. PAF NASTP Silicon is being extended to the PAF Museum side as well to add more spaces for the IT & Aerospace Companies. Current addition comprises four buildings with space for more than 50 small to medium size companies. Silicon is also home to one of the most significant Technology Divisions of PAF NASTP i.e. Simulator AR&VR.

PAF NASTP Kharian

PAF NASTP Kharian is an IT Park along with the degree awarding affiliated Campus of the Air University. Current capacity has space for more than 25 small to medium size companies. PAF NASTP have also partnered with PITB to bring Incubation and Co-working to Kharian IT Park.

PAF NASTP Partnership with STZA

Strategic partnership with STZA has been accomplished at unprecedented pace. Rawalpindi, Lahore and Karachi techno parks have been declared STZs and PAF NASTP has signed the Zone Developer License Agreement with STZA as the first ever competent authority to achieve this in country.

PAF NASTP

INAUGURATION REPORT

by Editorial Team

Pakistan joins growing countries interested in increasing their capabilities in Aerospace, AI and Cyber Security for military and peaceful gains.

"More and more countries are showing growing interest in increasing their capabilities in aerospace and especially the role of artificial intelligence in cyber security. They are in a race to achieve dominance in international relations. As they call AI the new nuclear power, many nations, including Pakistan, are aspiring to have it and excel with its dual usage, civilian and military. The Air Chief of Pakistan Air Force, Zaheer Ahmed Baber, has repeatedly described AI, as a disruptive technology, which he believes would affect nearly all aspects of national security, including diplomacy, intelligence, and defense. This report sheds light on progresses made in the realm of AI technologies, aerospace and cyber security."

The Prime Minister of Islamic Republic Pakistan Mian Muhammad Shahbaz Sharif inaugurated the PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park (PAF NASTP) on 04 August, 2023. PAF NASTP is an establishment that fosters design, R&D, and innovation, to put Pakistan on the path to become one of the best aerospace, cyber and information technology clusters in the world.

Chief of the Air Staff, Air Chief Marshal Zaheer Ahmed Baber Sidhu NI(M) received the Prime Minister of Pakistan on his arrival at the Nur Khan Air Base. General Syed Asim Munir, Chief of Army Staff NI(M), federal ministers, and high-level civil and military officials were also present on the occasion.

A comprehensive brief was given by the Chief Project Director and CEO PAF NASTP Air Cdre Dr Liaquat Ullah Iqbal. He addressed the historical development of PAF's organic capabilities in the Aerospace, Cyber, IT and AI domains.

It was highlighted that the planning and development of PAF NASTP is being carried out under the guidance and direction of the Chief of the Air Staff. Updates & operationalization of various techno parks across Pakistan under PAF NASTP were also discussed. After the address, the park was formally inaugurated by the Prime Minister of Pakistan.

Speaking as chief guest, PM Shahbaz Sharif described the initiative being spearheaded by the Chief of the Air Staff Pakistan Air Force, as a project of strategic national importance. It holds a great promise for Pakistan and valuable partners like Turkiye and China, fostering technological advancements and enhancing defense capabilities.

He further emphasized that "PAF NASTP is a highly promising project that will leverage the collective wisdom and contribute to kick-start Pakistan's economy bringing it on a fast track towards progress," as he inaugurated the first chapter of PAF NASTP called PAF NASTP Alpha at Rawalpindi near PAF Base Nur Khan. The project is equipped with state-of-the-art design, innovation, research and development centers which will provide ample opportunities for foreign investment in the country.

The highlight of the event was the inclusion of leading Turkish technology and defense industry companies including Baykar, Turkish Aerospace Industry (TAI) and Crypttech, established in PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park (PAF NASTP) which have all recently signed cooperation agreements. These companies have established joint Design and R&D Centers within PAF NASTP Alpha to undertake collaborative projects with the PAF NASTP Technology Divisions in the Aerospace, Cyber, IT and AI domains. The August house was informed that PAF NASTP under the patronage and support of the Special Investment Facilitation Council (SIFC) will enable the information technology sector as one of the key domains for the economic revival initiative.

In his remarks, the Chief of the Air Staff expressed his gratitude to COAS General Syed Asim Munir for his support since assumption of the office.

The Air Chief said, "We live in a challenging time in the wake of

Top: Innovation was always a necessity if Pakistan had to be global - PM Shehbaz Sharif announces the PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park open.

Bottom: When they have better information, they will make better decisions: Air Chief Marshal Zaheer Ahmed Baber, informs counterparts from sister organizations.

ever evolving global and regional environment, where the world is in a transition. With the induction of new disruptive technologies, the scenario of warfare has taken a new turn involving new dimensions and Pakistan has to catch up."

He said that the pace of advancing technologies in the contemporary world continued to alter the character of warfare rapidly. Such drastic changes had profoundly affected the traditional concepts of national security and defence, with economy as the prime focus.

"To address these challenges, the leadership of the country had, for the first time envisioned the establishment of the Special Investment Facilitation Council (SIFC), a platform to bridge the gaps in the national framework and boost the economy, to create desired linkages and opportunities to in order to bring foreign direct investment into Pakistan"

He expressed his gratitude to the PM and the Army Chief for supporting the PAF NASTP concept. "PAF NASTP is a major milestone, with tremendous potential. PAF NASTP prime focus is development of state of the art design centers and linkages to achieve design level capabilities and become an OEM, alongside growth of the Aerospace & IT Industry by supporting the private sector and support highly talented youth in the design, R&D as well as startup endeavours by establishing state of the art vertical incubators for Aerospace and IT industries."

Elaborating on different phases of the project, CAS, PAF informed guests regarding various under-development techno parks and design centers, including the first of its kind Aerospace Design & Innovation Center (ADIC), to come up in the region in a 2-3 months time frame.

1: AI, cyber security and aerospace have become part of our lives. It should not be a surprise that the government along with its partners, is injecting money into these technologies for both civilian and military uses.

2: The PAF acknowledges support of PM Shehbaz Sharif for his government's support.

3: On the same page for national security.

Left: Living in a rapdily changing world where pace of change is increasing-Turkey and Pakistan, sign agreements for a more sustainable future in aviation.

"The magnitude, diversity and national significance of PAF NASTP is unprecedented in the history of Pakistan. This mega enterprise will strengthen local industries and contribute significantly to the national economy," he said.

Highlighting the core objectives, the Air Chief said that PAF NASTP held great potential to offer new opportunities for collaboration with elements of the PAF NASTP ecosystem. The project possessed the potential to transform the national landscape with design, research and development. Highlighting the defined parameters of PAF NASTP for ease of doing business, the Air Chief said that gateways had opened for collaboration with friendly countries to develop meaningful partnerships through Special Technology Zones (STZ) status. He expressed his gratitude for his team for the untiring efforts to make PAF NASTP operational in a short span of time.

PAF NASTP will foster research, development and innovation in the fields of aviation, space, cyber, IT, AI and computing to ensure social, economic, technological and scientific dividends for Pakistan and its valuable partners. The project will serve as a 'bulwark' to boost the independent economy alongside flourishing the unprecedented technological advancements in the country.

Left: PAF NASTP takes pride in providing top decision makers with actionable and reliable intelligence about events happening around them.

Center: War fighters cannot afford to be in a position where they have to decide and just do not have the information available to them.

Bottom: At PAF NASTP, new tech is going to change lives in ways one can hardly imagine, Air Boss, Zaheer Ahmed Baber Sidhu, NI(M), informs his guest General Syed Asim Munir Ahmed Shah NI(M).

REVOLUTIONARY ARENA

in Space AI and Cyber Security

"We live in a unique time in history from a technological perspective. The smallest of innovations are playing significant roles in the ecosystem. Artificial Intelligence (AI) is no longer a figment of our imagination. It is here, transforming our world in ways we can barely comprehend. It is an extraordinary journey. When you think aerospace, you think airplanes, but it's actually more than that. Pakistan cannot sit and watch when other countries become dominant technological forces in the world. Pakistan has strategic adversaries who are rapidly surpassing it and have already surpassed the country in a lot of areas. But that was before the PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park (PAF NASTP) came in. At PAF NASTP, tech companies and academia, under the patronage of the Pakistan Air Force are building things that the government did not yet believe were possible."

S. Khalil

Since its inception roughly a year ago, the Space Division, under PAF NASTP, had designed, developed and exported the Flyaway antenna that was already fitted on a spacecraft hovering several kilometres above earth for testing. "It is the first Made in Pakistan piece of equipment in space. The team in the Satellite Laboratory of the Space Division developed it in record time," said Sqn Ldr Muhammad Atif, who is AD Spacecraft Development Division, PAF NASTP.

A part from military purposes, the Flyaway as well as the ManPak antennas, which the Space Division was further improving, also had commercial utilization - during natural disasters such as floods. "When all other networks of communication are affected and down, these portable antennas can be disassembled, packed, transported to any remote location and redeployed to transfer data uninterrupted and resume communications through satellite," Sqn Ldr Muhammad Atif said, while highlighting its export potential, after testing it for commercial and military standards.

Pioneers in space technology for the PAF, the Space Division, was simultaneously working on various projects, in the three purposes built Sat Comm Development lab, Spacecraft Development lab and Global Navigation and Satellite (GNS) systems Lab.

"In the spacecraft development lab, we are in the final phases of designing and putting together 16 Communication Cubesat? Planned to be launched in January 2024. It is in collaboration with Istanbul Technical University. The launch will enhance PAF capabilities using indigenously acquired resources," the official said, also pointing towards a model of a Mars rover, developed in collaboration with local universities under the research and development (R&D) initiative.

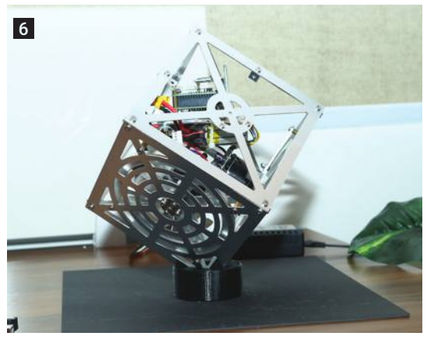
Similarly, at the GNS lab, as one team worked on meteorological equipment, the other ensured its good health and security.
It is not going to get slower from here on end. The potential of what this country can build was nothing short of massive. The PAF was in a wonderful business. To understand how Pakistan was fast becoming to be known as a startup nation, the Second to None team visited the state-of-the-art PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park (PAF NASTP), Nur Khan Air Force Base Chaklala and spoke to the officers in-charge.

Title Photo: The future is here and it is mind boggling.

Left Page Inlet: Alpha techno-square becoming operational in the shortest possible time is a significant achievement.

Bottom Inlet: This cyber complex is said to be the largest infrastructure project in Pakistan's history of information technology.

(All Photos Cft Tech G. Abbas).



"The first thing that worries our leaders is the survival of the country. That requires a military that is going to defend against states with much bigger armed forces and more resources. The only way to do that is with superior motivation and better technologies," said CEO PAF NASTP Air Cdre Dr Liaqat Ullah Iqbal.

"What we have at PAF NASTP is an integrated facility where there is everything innovators require to go from napkin sketch to a fully developed hardware and software product that is going out the door and even overseas," the official said.

Teamwork and creativity topped the mood when designing the giant PAF NASTP Alpha complex at the Nur Khan Air Force Base. It was a space designed to boost productivity and also workforce satisfaction. This could be seen with giant screens showing videos of the cosmos, a nod to one of the company's newest assets, some oversized white boards plastered to walls full of creative ideas, offices arranged in work spaces of eight to ten and more for effective sharing and deliberating on concepts. One could see workstations decorated with models of rovers and satellite paraphernalia, and models of 5th generation fighter jets that helped in serious productivity. While the employees were there to work, the establishment did not want them to feel that way - with spaces to kick back and enjoy games of table tennis. Promoting and inspiring creativity paid off and that's how many of the lab projects at PAF NASTP were dreamt.

Expanding on the PAF NASTP Mission, Dr Liaquat Ullah Iqbal elaborated that the concept of the project had been crystalized under the guidance of CAS PAF over the last four years. "The aim is to foster collaborative research, development and innovation in the fields of Aviation, Space, Cyber and Computing to ensure social, economic, technological and scientific benefits for Pakistan and our partners."

Role of CAS PAF in project of strategic national importance - PAF NASTP

Visionary leadership of the Pakistan Air Force had traditionally delivered to the country far beyond the call of duty. Their numerous examples were topped by giants like Air Marshal Asghar Khan who resurrected Pakistan Air Force to become one of the finest in the world despite being resource strapped, smaller in size and shorter historical build up. Air Marshal Nur Khan took over the reins of PAF from his predecessor to take it to the next level of excellence and win the 1965 War against a far bigger adversary.
Following in the footsteps of two greats and other visionary predecessors who later followed, the current Air Chief, Marshal Zaheer Ahmed Baber Sidhu, gave his overall vision upon assumption of the office of the Chief of the Air Staff Pakistan Air Force. Two distinct parts of the vision included modernization of the Pakistan Air Force to attain operational capability commensurate with regional buildup and growth of PAF's organic research and development (R&D) capabilities in aerospace, cyber, IT and AI domains.

1: It used to be fantasy.

2: PAF NASTP Alpha Park at Nur Khan air force base.

3: Digitization is radically changing entire industries and society as a whole is opening up to new opportunities.

4: As reliance on space technology grows, PAF is set to launch satellite antennas and vehicles.

5: Super technologies are the mobility of tomorrow.

6: At PAF NASTP, new technologies will change lives in ways you can hardly imagine.

7: GPS is part of our lives - It should not be surprising that the PAF is injecting money into this technology for both civilian and military uses. That money is about to pay off with latest developments in GPS with more accurate and stronger signals.

This write-up focuses on the second part of the vision.

In order to achieve growth of PAF's organic R&D capabilities in aerospace, cyber, IT and AI domains, PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Parks was conceived as a project of strategic national importance. Key milestones of the project were achieved in record time including but not limited to the formulation of comprehensive Concept Document of PAF NASTP comprising eight volumes.

It also included formulation of comprehensive Technology Development Roadmap 2022-2030, detailed procedure manuals for major domains, Admin, Security, Finance, Legal, Human Resource Management, Audits and M&E, formulation of PC-1s and approvals under Public Sector Development Program (PSDP) and lastly formulation and revisions of major national policies including National Aviation Policy, Science and Technology Policy, AI Policy, Cyber Security Policy and Cloud First Policy, to name a few.

Launch of PAF NASTP

Current PAF leadership directed a renewed approach upon assumption of the office to achieve the design level capability, critically required to become original equipment manufacturer (OEM) of major systems and technologies in the Aerospace and IT domains.

Formulation of comprehensive concept documents, detailed procedures, and comprehensive procedures and manuals formulations in all of the relevant domains had been undertaken. These were in line with the PAF NASTP Vision to make it one of the best Aerospace, Cyber IT, AI and Computing Clusters in the world and transform the national landscape with design, R&D and innovation centers for emerging and disruptive technologies.

Development of PAF NASTP Techno Parks underwent an eight step process starting from approval of BoD to initiate new techno-park at a given location.

Rollout Plan

PAF NASTP planning and development had been undertaken with a number of considerations. The "PAF NASTP Rollout Plan December 2023" had also been finalized based on due considerations such as Regional Techno Parks in Rawalpindi, Karachi and Lahore, National Aerospace Cluster of Pakistan Kamra, University Level Techno Parks in all campuses of the Air University, and City Level Techno Parks in Kharian, Sargodha, Karachi.

The Special Technology Zone Authority (STZA) was established by the GoP by an act of Parliament in 2021. STZA was mandated to establish and facilitate establishment of Special Technology

Zones (STZs) through Public Sector as well as Public Private Partnerships and as private ventures by local and foreign private investors.

Industrial collaborations with local and foreign partners, technical management of own divisions and commercialization of mature and marketable products / services was the real essence of PAF NASTP. Meanwhile, there were a number of private sector companies working in the aerospace, IT, AI, Cyber domain and contributing not only to the defense sector but had also gained international outreach. Taking a complete stock of all these companies was important to know the strengths and areas of excellence within the country.

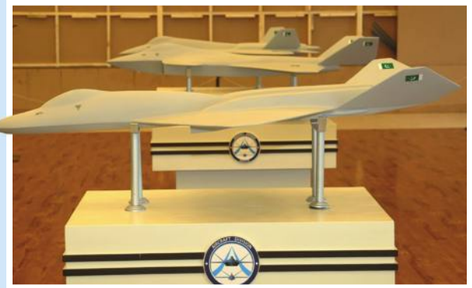
Having firmly laid the foundation of PAF NASTP in terms of governance and management, concept and policy formulation, GoP approvals, major seed funding, inclusion in national development programs like PSDP, CAS PAF provided unmatchable support in design, development and operationalization of PAF NASTP at various levels in the country. As a result, the overall national structure of PAF NASTP had been crystallized at three levels, National level being the highest to be established as Aerospace Cluster of Pakistan (ACP) at Kamra, said CEO PAF NASTP, Air Cdre, Dr Liaqat Ullah Iqbal.

"The regional level was the second highest in the provincial capitals or major selected cities and thirdly, followed by University Techno Parks as well as Software Technology Parks in small cities/remote locations," he explained.

According to the official, the essence of techno parks was to establish eco-systems of design, R&D and innovation through linkages among the constituent residents and partners, University Techno Parks as well as Software Technology Parks in small cities/remote locations. These would be interconnected through links under the guidance and oversight of local as well as regional leadership.

Similarly, all of the regional centers would be interconnected through linkages under the guidance and oversight by their respective management as well as the overall guidance and oversight by the national level aerospace cluster.

"PAF NASTP evolved from a project conceived originally to be established at Kamra only due to the large presence of national aerospace industry in the form of Pakistan Aeronautical Complex to national level enterprise. It targeted every nook and corner of the country in an extremely structured and systematic way. Given the growth and breadth of the original concept as well as physical manifestation, PAF NASTP can no longer be treated as a project. Instead, the management considers using the PAF NASTP programme to be a more accurate depiction of the status and evolved/refined concept of PAF NASTP," Dr Liaqat Ullah Iqbal maintained.



Top: Home of research and development.

Center: Pakistan develop creativity to compensate for its lack of resources.

Bottom: Fast becoming Pakistan's Silicon Valley.

Right Page Bottom: At PAF NASTP, companies rely on knowledge gathered by people serving in Pakistan's different civilian and military fields.

Total of ten parks including National level Aerospace Cluster of Pakistan (ACP) at Kamra, three regional HQs at Rawalpindi, Karachi and Lahore and six city and university level techno parks had been planned at various AU campuses, Sargodha, Mianwali, Alam Abad, Kharian, Karachi and Nowshera.

Having carefully nurtured PAF NASTP through all of its phases of manifestation, CAS PAF decided to formally announce the coming of age for PAF NASTP on 20 October, 2022, during the inaugural address of Global Strategic Threat and Response (GSTAR) Conference organized by CASS. The ceremony was graced by the President of Pakistan Dr Arif Alvi with the following statement, "Ladies and Gentlemen, today for the first time I am publicly announcing formal inauguration of our flagship project PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park, commonly known as PAF NASTP. The project aims to establish an Aerospace Cluster and Aviation Design and Innovation Center (ADIC) at Kamra."

According to retired Air Cdr Abdul Basit, who was looking after industrial collaboration for PAF NASTP, explained the purpose was developing alliances with industry especially for defence reasons. More than 75 companies related to AI, Aerospace, Information Technology and Cyber Security were housed in PAF NASTP Alpha, besides housing international companies from Turkey and China.

Already designing software for PAF, Abdul Basit gave the examples of solutions for computer-based training for its transport aircraft wings, which would have cost millions of dollars abroad. "PAF NASTP is partnering with Leos, an Electro Optics company making a feasible study to provide PAF with foreign object detection (FOD) tools on runways. Our Simulator Division has two confirmed orders from Iraq and Azerbaijan, to develop Super Mushak simulators," Abdul Basit said, highlighting provision of services not just for PAF and sister organisations, but also for local and international markets.

Besides catering to the Civil Aviation Authority (CAA) that had expressed the need for a bird repellent system which was under development at PAF NASTP, Abdul Basit mentioned the Killer Drone drone project, which had utility for army and sister security agencies produced in collaboration with the private sector.

However, another major hallmark was the collaboration between PAF NASTP Pakistan and FlyOn Aero Italy.

It presented an exceptional opportunity for young Pakistanis to access world-class education, training, and certification, Abdul Basit said. "This collaboration ensures that students receive top-notch instruction, exposure to industry, best practices, and a globally recognized qualification that will open doors to a prosperous and fulfilling career in aviation. By choosing to enrol in the EASA certified B1/B2 program, young individuals in Pakistan can embark on a journey that not only shapes their personal and professional growth but also contributes to the advancement of the nation's aviation sector. Graduates can earn upwards of $12, 000, anywhere in the world," Abdul Basit said optimistically.

Eco system and enabling environment with Karachi and Lahore chapters also coming up.

Projects include radars for army and collaborations with Navy.

The program was European Union Aviation Safety Agency (EASA) certified and globally recognized training program for individuals aspiring to build a career in aircraft maintenance engineering. "This recognition offers young Pakistanis the opportunity to work not only in their home country but also in aviation hubs around the globe. It offers industry-relevant expertise, diverse career pathways EASA-certified graduates can pursue various career paths, including roles as aircraft maintenance engineers, technical supervisors, quality control inspectors, and even managerial positions within the aviation sector. It also promises job stability, gateway to aviation innovation and contribution to national growth,"

Abdul Basit elaborated.

The Aircraft Division ALPHA 7, had been completely remodeled for Turkish company Baykar, to suit requirements such as production, assembly and testing. Staffs were under training in Turkey, which would be ready by the time Baykar came in.

"Baykar comes in with roughly 40 people and would increase strength to 100 in a year depending on how the company grows. PAF is training 100 staff members and also intends to increase strength to 2, 000. Labs for producing equipment and putting them together in the assembly line, space for functional tests, everything will be ready by August," said Programme Director Unmanned Systems Air Cmdr Imran Anwar.

PAF NASTP Alpha was good for a visit as an insight into what the future may hold. At PAF NASTP, things moved really quickly. There were ideas one day and then a prototype of it a few days later. Like every other company, developers had sketches, ideas and all the innovations they wanted to work on. The difference at PAF NASTP was that they did not have to take those sketches to the government and ask them to help them. "If they believe it's the right thing that is needed by the industry they will make it happen, regardless of whether people believe it is possible or not, " said REHMAN, who is Project Director Technology Founding CTO PAF NASTP and has led the programme from the beginning.
The official said that PAF organic R&D had matured over the last 40 years, to a level where practical systems were working on fighter aircrafts and radars in the infield. It made sense to elevate to the next stage.

"We have developed incredible linkages with ministries, such as the Planning Commission, Defence, National Food Security, and Information Technology to mention some. MoUs with academic institutions have been signed. Biggest initiative was bringing on board private firms. He gave the example of the Rs2 billion project, "Green AI", a consortium of three organisations, PAF NASTP, Arid Agriculture University, and Pakistan Council for Science and Industrial Research (PCSIR), which would be developing biofertilizers, soil microbes, and nano fertilisers etc. Arid University was bringing in domain knowledge of agriculture, and managing smart farms, monitored by drones, the official explained.

"With populations booming and

climate change threatening crops, we need solutions. Enter AI. Its algorithms can analyse crop data and automate irrigation and

even predict yields, bringing us closer to solving growing demands of food," said Air Cdr Rehman.
Planners maintained that PAF NASTP had the potential to make incredible differences in the world. It was important to make sure that decision makers had information at their fingertips. "It's going to be monumental, what we're able to do and the impact we have on the world," Rehman said.
In the last one year there has been tremendous evolution in cyber security and AI. Systems were fully safe and covered from every angle. PAF NASTP was ready to conduct a need based companies maturity survey to identify system vulnerabilities for financial institutions such as banks and government departments that handled sensitive data, providing solutions to protect from cyber-attacks.

Top: CAS PAF, Discussing avenues of Progress in Aerospace, Cyber, AI and Computing with his PAF NASTP Research Engineers.

Bottom: Focusing on three main areas - Aerospace, Information Technology and Cyber Security.

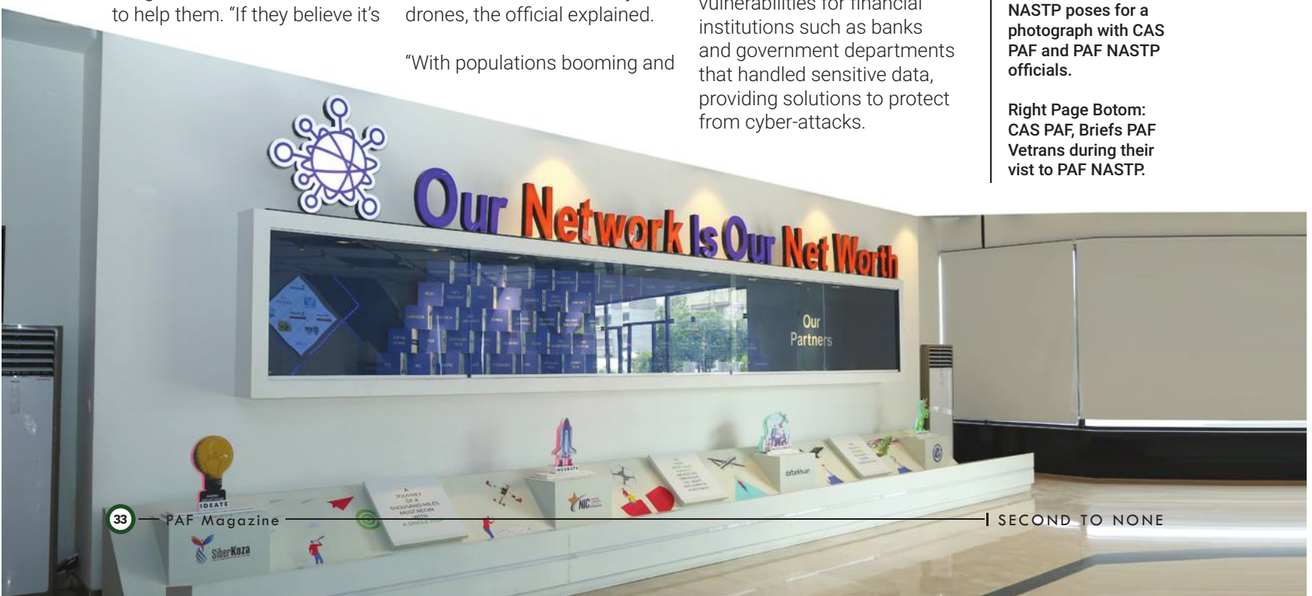
Right Page Top Left: Innovation that's sweeping across PAF NASTP Pakistan's Flyaway and Manpack antenna's that are already in space.

Right Page Top Right: Mars Rover: It's a goal Pakistan is on the path to achieving.

Right Page Center: PAF, the patron of aerospace.

Right Page center: CJCSC visits PAF NASTP poses for a photograph with CAS PAF and PAF NASTP officials.

Right Page Botom: CAS PAF, Briefs PAF Vetrans during their vist to PAF NASTP.



At PAF NASTP, technology brought about a world that only seemed possible in science fiction films. The gears of this future were already turning and they were powered by artificial intelligence inventions that were fascinating and poised to change the world as we knew it.

There were a number of private sector companies working in the aerospace, IT, AI, Cyber domain and contributing not only to the defence sector but had also gained international outreach. Taking a complete stock of all these companies was important to know the strengths and areas of excellence within the country. Data was collected by ITC Department from across the country by engaging different national forums like PAF NASTP tenants, different chambers of commerce and industry, Defense Export Promotion Organization (DEPO), DGMP, DGDP, MoIT, PSEB, PITB etc. As a result, more than 550 companies were identified, working in different domains of defence, aerospace, IT and tech industry.

Therefore, the overall management structure had been envisaged to be directly reporting to the Chief of the Air Staff Pakistan Air Force to continually and regularly receive guidance and direction to manage complexity and diversity of PAF NASTP.

"As we reach for the stars, AI is our compass helping us strengthen communications, deal with food insecurity and building defence products with the best people from the technology industry, working on defence problems in the right way to bring change very quickly and make impacts at low costs now instead of ten years later and get left behind," said Air Cdr Rehan.

CENTAIC'S TRANSFORMATION UNDER PAF NASTP

A BEACON OF PROGRESS IN AI AND BIG DATA ANALYTICS

"In the realm of Artificial Intelilgence and Big Data Analytics, CENTAIC stands as a pioneering force, evolving under PAF NASTP's umbrella. Established in 2020, it grew into a hub for innovation, bridging academia, industry and government. This narrative unravels its transformative journey, marked by growth, collaboration and a commitment to shaping Pakistan's AI future."

S. Khalil

On a rapidly evolving world driven by technology, the Centre for Artificial Intelligence and Computing (CENTAIC) has emerged as a pioneering force in the realm of AI and Big Data Analytics. Established on August 26, 2020, CENTAIC has steadily grown into a dynamic hub for research and development, fostering innovation and contributing to the synergy between academia, industry, and government. This story unravels CENTAIC's journey, its pivotal shift under the PAF NATIONAL AEROSPACE SCIENCE AND TECHNOLOGY Park (PAF NASTP), in order to shape the future of emerging technologies including AI in Pakistan.

Formal Shifting of CENTAIC under the Ambit of PAF NASTP

CENTAIC's journey took a significant leap forward when it found a new home under the wings of the aspired Tech Division for Artificial Intelligence and Big Data Analytics (AIBDA). This pivotal shift was formalized on July 14, 2021, following a directive from the Chief of the Air Staff (CAS) Air Marshal Zaheer Ahmed Babar. The move was necessitated by the institution's need for a substantial pool of trained personnel in the niche field of AI, a requirement that extended beyond the capabilities of the Pakistan Air Force (PAF) alone. Additionally, the financing needed for hiring accomplished AI developers was not feasible solely through the PAF's resources.

The solution was found in the triple-helix model, a framework that fostered strong collaboration between academia, industry, and government. PAF NASTP's emergence provided the ideal platform for this model to thrive, ensuring that CENTAIC had the resources and support required for its growth and development.

Growth as a Technical Division under PAF NASTP

Following its incorporation into PAF NASTP, CENTAIC not only became a gateway for hosting migrating PAF units but also expanded its role under the technical development roadmap (TDR). This roadmap included becoming an integral part of an Aerospace Science and Technology Park, positioning CENTAIC as a hub for collective growth and an enthusiastic host for PAF NASTP activities. As CENTAIC continued to serve as an organic unit of the PAF for operational projects, it evolved into a thriving institution with state-of-the-art facilities, including an auditorium, conference room, labs, classrooms, and a library. A notable addition was the Expo that showcased the journey of AI from its inception in 1957, to its recent global breakthrough, known as the AI spring.

Operational Commitments and Dividends for Key Capabilities of PAF

CENTAIC's primary focus was on projects that optimized PAF operations, enhancing the Observe, Orient, Decide, Act (OODA) loop. All projects underwent a rigorous approval process, ensuring that best practices were maintained. The institution had delivered prototypes and was expanding its research areas to explore algorithms from corporate and open source environments. The goal was to contribute not only to national defense but also to the broader national economy and humanitarian efforts.

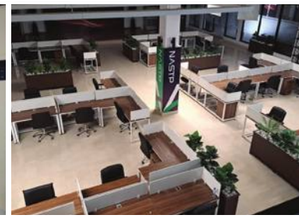
Import Substitution in Defense Sector Projects Vs Revenue via Corporate Products

CENTAIC's AI projects designed for PAF operations will play a crucial role in import substitution, reducing reliance on foreign technology. Simultaneously, AI and Big Data Analytics as a Technical Division of PAF NASTP had the potential to develop marketable products

Left: At CENTAIC innovation meets intelligence- Exploring the AI revolution.

Center: CAS PAF Briefing CJCSC on CENTAIC Development under PAF NASTP during his visit.

Bottom: Snapshots of CENTAIC gallery depicting pixels of possibility and code of creativity.



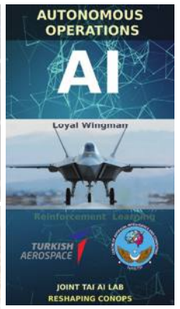
in collaboration with companies in the Alpha Techno-Square. The institution had established a robust training programme and offered internships to fresh graduates, fostering the development of AI talent in Pakistan.

Composition of CENTAIC

Before joining PAF NASTP, CENTAIC faced challenges in obtaining a formal establishment order. However, with the support of PAF NASTP, the institution now operated with a streamlined structure. CENTAIC comprised a dedicated team from various branches of the PAF, headed by an Air Commodore fighter pilot (GDP branch). The institution groomed top graduates from renowned institutions in Pakistan, providing them with mentors who were subject matter experts (SMEs) in the field of AI. CENTAIC had three key directorates such as the Directorate of AI Ops & Analytics, which was headed by Air Commodore Dr Salman Aslam, who was a PAF Engg Officer and a distinguished graduate from the USAFA and Georgia Institute of Technology, USA. This directorate focused on projects that optimized PAF operations and reduced cognitive workload.

The Directorate of Computer Vision & Natural Language Processing (NLP), was steered by PAF Engg Officer, Air Commodore Dr. Syed Irteza, who was also a graduate from Georgia Institute of Technology. This directorate focused on projects related to object recognition in satellite imagery and natural language processing for speech transcription. Similarly, two Directorates of IT Support and Compute for Big Data were responsible for supporting high-performance computing requirements.

Photo Collage: From bytes to brilliance the team at CENTAIC that visualizes the AI journey.



International Academic Footprint

CENTAIC's expertise extended beyond national borders, with its subject matter experts participated in international events and conferences. These collaborations had attracted expressions of interest from various national institutes, highlighting the institution's growing international influence. Under the mandate of AIBDA, its SMEs had international representation at Bahrain in November, 2022 to attend conference for artificial intelligence (AI) usage in VR for flying training, active participation in IDEAS, 2022, seminar under the HEC council of NCAI.

Industrial Collaboration – Potential for Joint Ventures

Collaboration with Turkish delegations during the 6th Joint Working Group meeting opened new doors for CENTAIC. Potential joint ventures were discussed, including the establishment of a Joint TAI AI Lab (JTAL) at CENTAIC, focusing on reinforcement learning in AI for autonomous operations of aerial platforms. These collaborations held immense potential for rapid mutual development in the field of AI. In continued on-line collaboration, specific interest was expressed in Reinforcement Learning in AI that could aid in Autonomous Operations of aerial platforms in emerging warfare involving highly contested future battlespace posing risk to human lives.

Futuristic Foray

CENTAIC, under PAF NASTP-AIBDA, was poised for significant growth and innovation. Detailed plans for year-wise expansion and investment areas were in place. Today, the institution is well-positioned to generate a wide array of AI-related products in collaboration with emerging PAF NASTP chapters across Pakistan such as at Kamra, Karachi, Lahore and Kharian. International collaborations through Joint AI Lab (JTAL) along with growth of NGFA framework can provide a platform for continued evolution of AI products according to emerging challenges. A robust AI governance framework ensures ethical and responsible AI usage, contributing to national security and various sectors of the economy. CENTAIC is committed to harnessing the full potential of artificial intelligence in shaping a brighter future for Pakistan and beyond.

Top: Intelligence at a glance: AI's visual narrative.

Left: Unveiling the future - AI's transformative power in a single click.

Bottom: Top IT experts come together to craft a future for Green AI, intelligent agiculture.

CENTAIC's journey from its provisional establishment to becoming a powerhouse in AI and Big Data Analytics is a testament to its dedication, innovation, and its role in advancing Pakistan's technological landscape. Its partnership with PAF NASTP has not only fueled its growth but has also opened up new avenues for international collaboration and joint ventures. As the institution continues to evolve, it remains dedicated to the responsible and ethical use of AI, contributing to national security and the betterment of society as a whole. The transformational technology can justify its usage by contribution to improve processes in industry for poverty alleviation, food security and advance forecasting for disaster management. It can provide relief to humanity in the form of healthcare imaging diagnostics, combinatorial algorithms for prevention of common diseases / pandemic spread. Research platforms provided by PAF NASTP can join hands with national Govt and Academia to aspire effective Helix model to harness the true potential of Artificial Intelligence.

Flight of the Phoenix

Forging Strong Leaders in the Skies

"Possessing good character is of paramount importance for officers in any military branch. This holds especially true for PAF, a force which has always upheld its commitment to being men of exceptional character. This virtue goes beyond just following orders; it forms the bedrock of PAF service and leadership and the search to better this aspect is always being sought out. The latest result of these efforts is the advent of Project Phoenix, a set of significant upgrades to its training regime. The innovative approach recognizes that producing exceptional leaders requires more than just technical expertise. Trainees now undergo comprehensive character-building exercises and leadership training modules that instil essential values such as integrity, resilience, and accountability. These upgrades aim to produce not only highly skilled aviators but also individuals who can lead with distinction and make critical decisions under pressure."

by Muhammad Khan

Men who live in the skies must first learn how to fly. The Pakistan Air Force has consistently maintained a strong emphasis on training its personnel, a cornerstone of its operational excellence. Recognizing that well-trained airmen are the backbone of any successful air force, PAF has invested significantly in cutting-edge training facilities and programs. From the initial stages of recruitment to advanced combat and technical training, the PAF ensures that its men receive comprehensive and rigorous instruction. This commitment to training not only enhances the individual skills and professionalism of its personnel but also elevates the overall operational capabilities of the Pakistan Air Force, making it a formidable force ready to defend its nation's skies.

Air Chief Marshal Zaheer Ahmed Baber Sidhu has been a driving force behind the modernization and enhancement of training programs within the Pakistan Air Force, prioritizing this aspect right from the beginning of his tenure. Under his leadership, the PAF has witnessed significant upgrades in all facets of training, leveraging the latest technology and strategic partnerships to provide world-class instruction to its personnel. Air Chief Baber Sidhu's vision includes not only strengthening the core combat skills but also incorporating cutting-edge simulations, cyber warfare training, and drone technology integration, reflecting the evolving nature of modern aerial warfare. His unwavering commitment has led to 'Project Phoenix', a transformative initiative in officers' training in alignment with the Next Generation Training Programme (NGTP). The primary objective of Project Phoenix is to nurture and empower "Leaders of Character and Competence" who are equipped to confront the challenges and realities of the 21st century. This endeavour encompasses a continuous assessment of contemporary training needs, the identification of deficiencies in the current training apparatus, and the implementation of a comprehensive strategy that touches upon crucial domains such as curriculum, human resources, and the training environments.

The editorial team of Second to None decided to learn about the advancements from the people at the helm of it all, the men at PAF Academy Asghar Khan. The journey started early in the morning with a few cups of strong coffee. As the bustling traffic of the metropolitan was gradually replaced by serene, quiet landscapes, the exact same sensation was could be felt internally. It was a pleasant two-hour drive before we reached Risalpur and

Title Page: The Falcon's Hearth - The iconic monument pays homage to cadets and instructors who died during training, and the martyrs of 65 and 71.

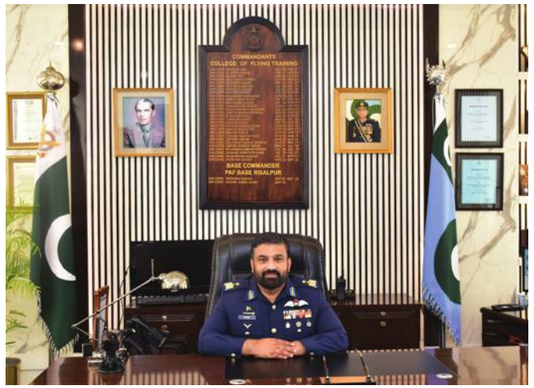
Top Right Above: Prime Minister Mian Muhammad Shehbaz Sharif during Graduation Ceremony of PAF Academy Asghar Khan.

Top Right Bellow: CAS PAF visiting PAFAA.

Right Inlets:
Picture Above: Air Marshal Zulfiqar Ahmad Qureshi HI(M), DCAS(Training), PAF.

Picture Below: AVM Ghazanfar Latif SI(M), SB(T) AOC PAF Academy Asghar Khan.

Chief of the Air Staff Air Chief Marshal Zaheer Ahmed Baber Sidhu, NI(M) Envisioned the Project Phoenix with vision statement below which marks the establishment of Jinnah Centre of Character & Leadership (JCCL).



were greeted by the trademark blue Land Cruiser which took us through the gate. After the necessary security checks, we finally entered the land which holds a special place in the hearts of thousands of cadets who have gone through it. It was a strange atmosphere. The base was a rare combination of being very active yet mellow, overall. The occupants walked at a slow pace but every single one of them knew exactly where they were going and for what purpose. It was intriguing.

After freshening up, we were taken to our first stop, the office of the Air Officer Commanding PAF Academy Asghar Khan, AVM Ghazanfar Latif. A pleasant, cordial man with a relaxed yet competent air. It was now apparent where the aforementioned atmosphere of the base originated from. In his office, lounging on sofas and munching on delicious appetizers, we were given our first insight on the immense changes that have been made in the last couple of years.

"Every single individual present in the first address of the CAS knew what his priorities were. And exactly like those before him, he wasn't a man of words only, he immediately took action. The policies that have emerged in his time has brought us much farther than we were before. As is true on everything, the world is advancing exponentially. Most trainings and curriculums become obsolete after a year or two, replaced with a better, more relevant version. Its about time PAF catches up. This was the first spark that gave birth to Project Phoenix. The entire training paradigm of PAF was rejuvenated, using tangible, effective frameworks. These practices have been implemented at every level of the force and we're already seeing the results." AVM Ghazanfar explains.

After some more elaboration, he got up from the sofa and went to a window of

Top Left: CAS PAF during his visit to PAFAA being briefed on the new and upcoming projects at the Academy.

Top Right: Base Cdr Risalpur Academy Air Cdre Kashif Jamal. The man behind implementation of CAS vision.

Bottom: Passing-out Cadets marching out abreast Falcons' Hearth.

Right Page Top Left: Air Cdre Shabbir Ahmed, Conducting Rigorous Sessions with military training wing instructors.

Right Page Top Right: Air Cdre Shabbir Ahmed, an ace pilot and one of the most renowned philanthropist of the nation, is now president of JCCL. The main source of inspiration.

Right Page Center Left: The Honour Council - The room where all who have done some transgression must go through a trail, complete with defence and prosecution.

Right Page Center Right: Air Cdre Salman Mahmood, the Deputy President of JCCL.

Right Page Bottom: The Heart of it All - The newly constructed JCCL, the base of operations for Project Phoenix.

his office. From the window, there was an expansive view of the Academy. There was new heavy machinery at work at several locations in the Academy, with construction workers present everywhere.

"And its not just in theory. According the vision of Project Phoenix, we're upgrading our facilities, as well, making the infrastructure match the ambitious goals that we have set for ourselves." He told us proudly.

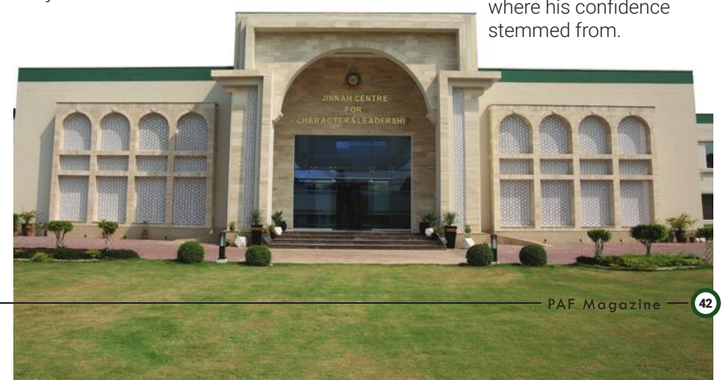
We then walked to the office of Base Commander PAF Academy Asghar Khan Air Commodore Kashif Jamal.

He is the man who is on the frontlines of Project Phoenix. His humility is refreshing for a man of his calibre and dedication. With several high-level degrees, both national and international and a wealth of training experience across various platforms, Air Cdre Kashif is an exceedingly grounded man. He seems like a man of few words. That is, until you get him started on his current project. Then, the transformation from a quiet man to an excited, enthusiastic expert who cannot stop himself from exuding information is fascinating. He was the one who has given Project Phoenix its present form. Involved at every level of the program, it was obvious he is the perfect man for the job.

"As far as vision goes, everything stems from the vision of the man leading the force. I still remember the first address of the Air Chief. His emphasis was on value-based training for the entire force. I felt an intense wave of inspiration. If only I had known that I would play a part in the transformation that he foreshadowed. I truly believe that the work that I am doing here is the most purposeful of my entire career.

I can tell you, without a doubt that the leaders that will be produced in the new program will be like no other batch that PAF has seen before."

A tall claim, by any measure. However, as he started breaking down the program, it was obvious where his confidence stemmed from.



Left: A batch of young cadets go through one of the many tests of endurance that they'll have to overcome in the course through Route Marches.

Left Center: PAF prides itself in its ample induction of female cadets, all of whom have consistently made the force proud with no gender bias.

Left Center: Wading through murky waters, literally and metaphorically which boosts team work.

Left Bottom Left: Paragliding is one of the ingredient which boost self confidence.

Bottom Right: Female cadets hone their skills on sports field.

Bottom: Academy Headquarters displaying Vision & Core Values required to be instilled among all future leaders.

"One of the most important aspects of Project Phoenix is the emphasis on training 'Leaders of character and competence'. It is a simple approach but effective. The CAS is aware of the complex and disturbing evolution of warfare. The world has moved forward. Tech has advanced at a rate that whoever doesn't constantly keep up with it, it leaves him behind. In our younger days, air warfare used to be simple. An aircraft would fly, detect another and there would be a dogfight. Whover wins, wins. It was extremely simple. Now, warfare has evolved. It has gotten extremely complex. For example, even when two nations are in a state of co-operation, there could still be an underlying conflict between them. This is just a small example of the kind of warfare that 5th Generation warfare entails.

To tackle such a complex environment, PAF officers need to be cognitively aware at an another level.

This was the main reason for the conception of Project Phoenix.

There was a review of the entire training regime of PAF and gaps were carefully identified. The next step was devising strategies to improve trainings across crucial domains such as curriculum, human resources, and the training environment at the Pakistan Air Force Academy (PAFAA). Major steps have been taken to elevate the overall training standards of the PAF, including the recruitment of highly qualified PhD faculty at PAFAA.

One of the most important changes made to the courses is the duration. The duration of the course is now 4 years, instead of the 2 that it used to be. There were several reasons for this change. The first one of obvious. The subjects and areas of studies have increased manifold. There's just so much more to cover now as compared to even a decade ago. In order to be a good leader and officer, one needs to study subjects like artificial intelligence, operational research and so on. Subjects of such nature were given very little attention previously. We have rectified that. This, of course, requires much more time.

The second reason is aligning the course with the rest of the world. We used to have a two-year degree named Aviation Sciences. There's no such degree in the world. Which made it much harder for graduates to continue their studies abroad because the degree had no recognition? Now, in line with the vision of the CAS, the title has been changed to Aviation Management, which is the usual and accepted title of a course of this nature all over the world. We are also in talks with international bodies to recognize the degree and the process will be complete, hopefully. This will mean that our officers will be able to pursue further studies in institutions all over the world, a door that was closed on them before." He explained.

Air Cdre Kashif takes a pause and turns around in his chair a bit. The wooden board directly behind him has a list of his predecessors. He gives the list a contemplative look.

"I have never thought for a second that my training, or more importantly, my trainers didn't give me everything they had. I got the best of the best. However, I know for a fact that this is exactly what they would have wanted, for us to improve on their work, to carry forward their legacy of producing the best officers possible for the nation."

Air Cdre Kashif then takes us for a tour of the Academy and walks us through the upgrades that are underway. We travel in a dark blue Land Cruiser 94 model, which was surprisingly well-maintained for a vehicle that has been on the road that long. Air Cdre Kashif kept breaking down the new program. He explained how the Phoenix project has the PITO model at its roots. PITO is a framework which starts from the personal skills, then the Inter-personal skills, then it teaches you how to operate in a team and finally how to be an asset at an organizational level. Let's break this concept down a bit.

Personal Skills (P) is where you hone your individual prowess. Whether you're training to be a pilot, ground crew, or any other role, you're expected to excel in your specific skill set. For pilots, it's all about finding yourself, setting personal goals, perfecting those flying manoeuvres and acing those mission-critical tasks.

Interpersonal Skills (I) teach you how to communicate clearly and efficiently, whether you're talking to your fellow crew members or coordinating with other branches of the military or allied forces.

Teamwork (T) is the heartbeat of air force operations. Whether you're in the cockpit with your fellow crew members or on the ground collaborating to maintain and prep aircraft, teamwork is everything. Training in this realm focuses on building trust, cohesion, and collaboration among your team members.

Organizational Skills (O) come last but are crucial. Organizational skills training delves into leadership development – because in the air force, you're not just a team member; you're also potentially a leader responsible for making those crucial strategic decisions.

Center: A skill that changed very little over centuries, archery still remains an essential tool to train your eye and body coordination.

Bottom: Tent pegging is a cavalry sport of ancient origin, and is one of only ten equestrian disciplines essentially used to instill moter skills.

"In the new curriculum, you start with personal skills in the first term and as you progress through your training, you go through each stage, studying organizational skills in the last terms. It's a complete package, with each stage being a prerequisite of the next one," explains Air Cdre Kashif. The team was then given a tour of the facilities being upgraded throughout the base. We started with the pool, with its crystal clear water and impressive length. Next was the gym. As Air Cdre Kashif gave us a rundown of the new additions, he explained the new paradigm around fitness for the new cadets.

"I have personally conducted a lot of research around the mental development of cadets. One thing stands out, which is crucial in the early days of training - physical. Physical fitness. It has been proven time and again that the performance of cadets, in the present and the future, has a deep connection with physical fitness. And we also know that the cadet who gets used to being

fit at this age will never be able to go back to a lazy life. Our instructors told us something that made me very proud recently. A female cadet was able to pull off 46 push-ups in under a minute. Now, that is impressive. And the competition helps, too!"

Air Cdre Kashif stood in front of a mirror, saw his reflection, sized himself up and made a face. "I've been coming here, too, it's about time I stop slacking off", he said jokingly. "The good part is that we now have a curriculum for fitness, its not random. Cadets need to fulfil basic milestones of fitness and it's a part of their formal training."

When asked about how the selectors ensure that everybody has a fair chance to enter the force, he smiled.

"I'd like to explain that with another memory that made me very happy. When I was an instructor in the Academy, I had a cadet come up to me after his first flight. He couldn't stop beaming! I asked him what he had on his mind. He was a bit bashful at first but then, confided what was making him so happy. He told me that before flying the plane, he hadn't even ridden a bicycle! Can you imagine?! So, yes, I can happily say the selection process is open to all. The tests are digital, there's almost zero human involvement. Recently, we are getting a high number of female cadets, all of whom are performing excellently. We also have quotas for Baluchistan, Gilgit Baltistan and other remote areas."

We were then taken to hub of Project Phoenix, the Jinnah Centre for Character and Leadership. Pakistan's first Character and Leadership Centre, the body is a central/ key component of the Air Chief's development strategy. This premium centre of excellence not only offers institutionalized character and leadership development training for PAFAA trainees, it also provides a sustainable ecosystem for the entire spectrum of training in PAF. JCCL is built on the belief that living a life embedded in PAF's core values is the path to leadership of character and competence – putting integrity to practice, striving for excellence, and lifting others through teamwork.

We are greeted by Deputy President of JCCL, Air Cdre Salman Mahmood. A tall, soft-spoken individual with sagacious, greying hair, he had an aura of a man who had complete control of whatever assignment he had committed to. He gave us a tour of the centre while further explaining Project Phoenix to the team.

In the lobby, we were greeted by a dynamic in lay in the centre of the lobby. It was the visage of a whirling Dervish, with a flaming torch in one hand and a sword in the other. He is surrounded by ten stars. As explained by Air Cdre Salman Mahmood, this emblem is the perfect embodiment of Project Phoenix. It contains a deep, fascinating philosophy. The whirling Dervish is inspired by Rumi's visage of man of character, the same image conjured up by Allama Iqbal in his archetype of 'Mard-e-Momin'. The Dervish whirls, in his eternal dance of an ideal life, the torch in his left hand, a beacon of enlightenment and a sword in his right, depicting

unrelenting might. The ten stars that sway with him represent the ten attributes that are the crux of Project Phoenix. These attributes are:

1. **Character**
2. **Warrior Ethos**
3. **Transcendence and Temperance**
4. **Time Management and Discipline**
5. **Team Work**
6. **Mental Agility**
7. **Effective Communication**
8. **Mental Robustness**
9. **Social Intelligence**
10. **Organizational Safety Management**

"One of the most important facets of the program is training the trainer. Previously, there was no such program. The trainers were hired based on their technical prowess and that is usually what they passed on to the trainees. Now, with Project Phoenix, the first courses that we started were all 'Train the Trainer' courses. It was decided that since every instructor was involved in the courses, thus the

Top Inlets: A beautiful Library housing Jinnah Corner at JCCL provides good material for reading and research work.

Bottom Left: The emblem of Project Phoenix, a whirling Dervish with a sword in one hand and a torch in the other, surrounded by 10 starts.

Right Page Center: CAS PAF being briefed on JCCL during his visit to PAFAA.

Right Page Center Inlet: A proud smile at a job well done - The Air Chief stands proudly as the JCCL is praised by the Prime Minister and the Defence Minister.

Right Page Bottom: Entrance and lobby of JCCL building depicting JCCL emblem on the floor tiles.

equal onus should be placed on everybody. The basic tenet of the program lies in the ten attributes that we have already discussed. These attributes must be infused in all aspects of training. The trainers must act as role models to the cadets and, through their teaching and behaviour, ensure every cadet has the prescribed traits. It is so intricate that the instructors not only does he have to identify which trait needs to be infused in which lecture, he also needs to identify how to infuse the trait in the respective lecture," said Air Cdre Salman Mahmood.

The JCCL was well-equipped for the task. Our first stop was state-of-the-art labs with rapid internet connections, which are used to do 360-degree assessment of the trainees, every 6 months, monitoring their progress through the program, amongst other tasks. The library on the second is well-equipped with books on a number of topics and a Jinnah Corner, with dozens of books on leadership and character. There were different research labs which were used to find ways to continuously improve the program. There was also an Honour Council, a room dedicated to conduct trials of trainees who have been charged of misconduct. The quote 'I shall not lie, cheat or steal. Furthermore, I resolve to isolate anyone amongst us, who does so. I pledge to do my duty and live honourably.' is mounted on right wall of the room, a commandment that all PAF men follow.

At the end of our tour of the impressive centre, we entered a huge conference hall. Unbeknownst to us, there was a training session underway, headed by none other than
Air Cdre Shabbir Ahmed AKA Shabbir Angel. That is when the team found that Shabbir Ahmed is the President of JCCL. The founder of Rashidabad, Alamabad and Younasabad, there are a very few who have not heard of the enigmatic life of Shabbir Angel. The fact that the body was presided over such a figure tells us not only of the importance of the body, but also predicts the future contributions that JCCL will make to the force.
The team had reached the end of the official tour. We bid our farewells and made our way to the exit. As we passed in front of the sleek Air Warrior Memorial, we were filled with strange, pleasant visions of the past glory and a hopeful, promising future. The future of PAF was in good hands, there was no doubt about that.

“Skies’ Strategic Citadel”

“Embarking from the Pakistan Air Force's heritage of excellence, the Air Power Centre of Excellence emerged in 2015, a visionary institution conceived under the guidance of Air Chief Marshal Sohail Aman. ACE epitomizes brilliance and innovation in modern aerospace, reshaping combat training systems and tactics to lead PAF's evolution in the dynamic world of air warfare, fostering international cooperation and technological advancements.” S. Khalil

Title Photo: At the pinnacle of air force innovation ACE is today a becon of exellence in modern and advanced training for the PAF and air forces of friendly countries.

Right Above: Visions of PAF air bosses is reflected in ACE the epitome of high-tech air force training.

Right Bottom: A tribute to airmen of the past and the future for their unwavering commitment to serve the nation.

In the chronicles of history, it is often the case that the humblest of beginnings lay the foundation for the grandest achievements. Such is the story of the Air Power Centre of Excellence (ACE), an institution that has emerged as a beacon of excellence in the field of modern and advanced aerial combat. From its modest origins as the Flight Leadership School at PAF Base Sargodha in 1958, ACE has grown into a global hub for cutting-edge research, training, and innovation in the realm of air warfare.

A Legacy of Professional Mastery

The Pakistan Air Force (PAF) has long been renowned for its commitment to excellence and its rigorous training standards. With a legacy of professional mastery that spans decades, PAF’s reputation in the world of air forces is second to none. It was this legacy that served as the fertile ground for the inception of ACE in 2015.

Under his visionary leadership, Air Chief Marshal Sohail Aman, the former Chief of the Air Staff, set the wheels in motion. He laid the foundations for what would become a formidable institution to address PAF’s training, evaluation, and research requirements in the dynamic and ever-evolving world of air warfare. Under the guidance of Air Chief Marshal Zaheer Ahmed Baber Sidhu, ACE expanded its horizons and ventured into groundbreaking initiatives that have garnered international recognition. ACE now stands as a symbol of brilliance and innovation in the field of modern aerospace advancement.

The Role and Tasks of ACE

Since its inception, ACE has never looked back. Its primary role is to revamp and modernize the combat training systems of the PAF. This monumental task ensured exposure to combat crew of all seniority levels, offering them a taste of contemporary multi-domain airpower scenarios at both national and international levels. ACE’s mandate also included the development of tactics and counter-tactics through realistic threat replication, validating the employment concepts of kinetic and non-kinetic capabilities in a joint environment. It has enabled forging critical user

linkages with academia and industry, and sharing valuable lessons with allied air forces through the conduct of live and synthetic international exercises. Furthermore, ACE played a crucial role in standardizing publications for PAF Combat Squadrons, ensuring that knowledge was disseminated effectively.

ACE's Schools Excellence

To achieve its mission, ACE operates distinct sub-facilities, each dedicated to a specific aspect of airpower excellence. In the ever-changing landscape of air warfare, readiness for the unexpected is paramount. The Air Warfare School (AWS) focuses on training combat leadership at junior and mid-level tiers through national and international exercises, specialist training, and interoperability with friendly air forces. International exercises like ACEs Meet and Indus Shield showcased ACE's global reach and commitment to fostering international cooperation.

Likewise, the Tactics Development School (TDS) played a pivotal role in enhancing standardization among PAF combat and combat support systems. It delved into the fields of employment, equipment induction, and war plans, ensuring that PAF maintains a competitive edge. TDS also housed a treasure trove of knowledge in the form of in-depth studies, reports, and publications on air combat strategies and innovations, which benefit air forces worldwide.

In the realm of airpower excellence, where innovation and evolution were paramount, Air Chief Marshal Zaheer Ahmed Baber Sidhu, then Deputy Chief of the Air Staff (Air Defence) conceived an institution as a response to the ever-growing complexity of modern aerial warfare – the Air Battle Management School (ABMS). ABMS responded to the complexity of modern aerial warfare by enhancing operational capability and orchestrating synergy in the employment of kinetic and non-kinetic assets under a centralized command and control architecture. Air Battle Directors, Air Battle Managers and Area Air Defence commanders, from fledgling practitioners to seasoned leaders, converge here to leverage themselves from the intricacies of modern aerial warfare. At ABMS, junior and mid-level air combat crew trained for a spectrum of air operations, fostering interdisciplinary collaboration among sister services.

Top: 'ABOR' Air Boss Ops Room. Every facility at ACE is designed for warriors, who learn the art of commanding the skies.

Bottom: ACE Auditorium where strategy meets cutting-edge tech.

Right Pag Top Left: Unraveling the future of aerial warfare in one high-tech institute.

Right Page Top Right: Forging excellence in every warrior - CCS under ACE shapes the future of air warfare.

Right Page Center: CCS under ACE is where innovation takes flight.

Right Page Bottom: State of the art ACE auditorium at par with international standards.

In a world where the threats constantly evolves, No 48 Electronic Warfare Wing (EWW), played a pivotal role in keeping a vigilant eye on emerging threats. It was more than just a watchtower. It was the hub of electronic warfare activities, ensuring the synergetic employment of electronic warfare assets to enhance national combat potential. EWW maintained and updated threat libraries, especially for Electronic Support assets, for subsequent Mission Data Files (MDFs) Programming for Airborne Self Protection Jammers (ASPJs), collating electronic intelligence (ELINT), communication intelligence (COMINT), and imagery intelligence to keep PAF ahead of potential adversaries.

In line with the Chief of the Air Staff, Air Chief Marshal Zaheer Ahmed Baber Sidhu's vision, ACE was enriched with Electronic Warfare Squadron (EWS). The EWS supported electromagnetic spectrum operations, training exercises, and the

validation of employment concepts for future electronic warfare inductions. It integrated PAF's scattered airborne and terrestrial electronic warfare assets, generating a Recognized Electromagnetic Picture (REMP) for the denial of enemy ISR and Position Navigation and Timing (PNT) services.

State-of-the-Art Training Aids

To ensure efficient and cost-effective training, PAF ACE possesses state-of-the-art training aids and facilities that rival the best in the world. The Joint Strategic Simulation Centre (JSSC), aided in training combat crew and battle staff in a modern and centralized next-generation Synthetic Training Environment (STE). It elevated the inductees' skills from tactical brilliance to strategic mastery, immersing them in the complexities of Multi-Domain Operations (MDOs) and strategic war gaming. JSSC offered a unique synthetic training solution for all components of airpower in multiple domains, promoting international connectivity and large-scale exercises. The heart of JSSC was a fusion of components, each with a unique purpose, all under one roof. The Computer Generated Forces (CGF) tier was the epicenter of virtual warfare. The Command and Control tier (acting as Joint Air Operations Centre) generated threat assessments and response strategies with mathematical precision. The mini- Flight Tactical Simulators (FTS) and pseudo-pilot stations provided the illusion of a cockpit, while, the Tactical Battle View provided commanders with a real-time glimpse into the simulated environment of the battlefield, transforming data into a visual panorama.

Meanwhile, Red and Blue forces operated in separate planning rooms, plotting strategies that would soon unfold in the virtual theater. The JSSC was a testament to the fusion of human intellect and cutting-edge technology, where the transition from planning to action was seamless, and the outcome was determined not on the battlefield, but within the labyrinthine pathways of data and simulation. In summary, the facility offered unique synthetic training solution to integrate all components of Airpower in multiple domains including offensive, defensive, attack operations, ISR, UAS, EMSO, cyber, and space, quality training for all tiers of 'Combat Crew and Battle-Staff', economized Virtual Training Solution' with round the clock availability and customized and highly flexible training scenarios. It offered effective real-time battle tracking and comprehensive after-action analyses. It also provided emulation of surface forces including SAMs, LRVs, Artillery, Armor, Infantry and Naval Assets (Surface / Sub-surface / CVBG) and connectivity at international and national level for conducting virtual large-scale exercises such as Virtual Flag.

Left: From theory to precision - At the Tactics Development School air force strategy finds its edge.

Center: In the crucible of strategy and skill, future aces take flight at the Air Warfare School.

Bottom: Air Power Centre for Excellence is where minds soar higher than fighter jets.

Right Page top Left: PAF crafts tomorrow's guardians of the sky with knowledge and strategy at COMTAS.

Right Page Bottom Left: ACE is the epitome of high-tech air force training for the air and air deffence crews.

Right Page: Blue and Red Forces are designated seprate mission centers for there operations.

At the heart of AWS was the Air Boss Ops Room (ABOR) - the command center where the intricate choreography of aerial operations came to life. It provided a near-realistic training environment for Multi-Domain Operations (MDOs) and ensured the integration and execution of tactical and operational scenarios.

The facility comprised of an elaborate Command and Control firmware with requisite number of Common Operating Picture (COP) based control stations. For ease of Air Boss operations and smooth conduct of training exercises, ABOR was bifurcated in two sections; based on two- force concept - Offensive and Defensive force. Through ABOR, the Air Boss was now integrated with the overall mission ATO cycle ensuring safety and realistic mission flow while drawing meaningful lesson.

In backdrop of modern battle-space, ACE had also adorned itself with Cyber Operations Room (CybOR). In the modern battle-space, this facility allowed synergetic kinetic and non-kinetic operations. It generated cross-domain effects in

operational exercises, training PAF and friendly forces on emerging cyber security threats, besides aiding in the development of a cyber-capable Air Force.

Training Solutions

ACE offers a comprehensive array of training solutions to meet the demands of the hyperactive and dynamic modern air combat environment. These solutions encompassed leadership training, air battle management training, phase build-up training, SAM evasive training, ground-based air defense systems employment training, ISR training, counter-terrorism training, and joint terminal attack controller training.

Beyond the Final Chapter

The story of ACE was one of adaptability, innovation, and unwavering commitment to air power. It had inspired air forces worldwide to seek training and collaboration with the Pakistan Air Force. In the skies above Sargodha, ACE stood tall as the forge where the future of air power was being shaped. It's a future that embraced the unknown, adapted to the unpredictable, and never stopped striving for excellence.

One of the most iconic chapters in ACE's history was its crucial role in "Operation Swift Retort," a testament to PAF's unwavering commitment and readiness to respond to emerging threats with precision and valor. ACE orchestrated a technology-intensive exercise that showcased a comprehensive and synergetic training environment, addressing multiple domains and offering innovative solutions. With ACE's continued dedication to excellence, the Pakistan Air Force remains at the forefront of modern aerospace advancement.

UNMANNED SENTINELS

Pakistan's UAV Revolution

"The Pakistan Air Force has made significant strides in enhancing its Unmanned Aerial Vehicle (UAV) capabilities in recent years. With the development and acquisition of various state-of-the-art UAVs, PAF has bolstered its intelligence, surveillance, and reconnaissance (ISR) capabilities. These UAVs provide real-time data and situational awareness, making them invaluable for border security, counterterrorism operations, and monitoring remote areas. Additionally, the PAF's UAV program has the potential to further expand and innovate, contributing to Pakistan's defence and security needs while also exploring opportunities for export and collaboration with other nations in the ever-evolving field of unmanned aerial systems."

by Air Cdre (R) Irfan Sabir, SI(M)

Title Photo: PAF's state-of-the art Akinci UAV, biding its time till the next mission.

Top Right: CAS PAF inaugurating the plaque of Center of Excellence for Unmanned Ariel Systems during his visit to PAF Base Murid.

Right: The serpent-like Bayraktar TB2, a MALE UAV, always ready to strike.

(All Photos
Cpl Tech M.Waqas).

Armed drones are in high demand worldwide, thanks to their numerous strategic, technical, and economic advantages over manned aircraft. Their operational benefits include safeguarding military personnel, as drones can be remotely operated far away from the conflict zone. Additionally, these unmanned aerial vehicles (UAVs) excel at conducting prolonged surveillance missions over target locations. Moreover, armed drones offer exceptional responsiveness, with their missiles traveling at supersonic speeds to strike targets within seconds of being launched.

The economic appeal of drones is also evident, as they prove more cost-effective than other alternatives. A standard Predator drone costs just $4.5 million, a fraction of the price of an F-35 at $159 million, an F-22 at $377 million, or a B-2 at nearly $2 billion. Notably, the training of drone operators is also far more budget-friendly, with expenses amounting to only a tenth of those required to train traditional combat pilots. This financial advantage led a 2009 U.S. Air Force report to declare unmanned drones as "the wisest use of tax dollars." This sentiment has reverberated beyond the United States, as major Western aerospace

companies have invested more in the development of new UAVs/Drones as well as unmanned combat aircraft.

History:

The importance of unmanned aerial vehicles (UAVs) in the modern battle space is widely recognized in our times. Pakistan is no exception. The advent of UAVs in Pakistan can be traced back to the 1970s when the country began exploring the potential of unmanned aerial technology. The first step towards developing an indigenous UAV started in the late 1980s and continued throughout the 1990s. These small endeavours, although not having big budgets or widespread support, persevered for years owing to the efforts of the dedicated pioneers behind them.

Just after the world celebrated the end of the second millennium, PAF leaped forward into a similar transformative phase. Under the patronage of JSHQs the then CAS Air Chief Marshal Musaf Ali Mir highlighted the importance of drones technology that would propel the military into a new era. He enlightened the participants about the potential of UAVs. A man of a few but imperative words, his views always carried weight. His predictions and demands were backed by officials from other services. Specifically, the proposal revolved around the integration of four dedicated UAV flights. Presidential approval was also sought for the establishment of four cutting-edge Unmanned Aerial Vehicle (UAV) Strategic Squadrons. All present listened and the reasons given for the induction of UAVs on an official level made all the sense in the world. In the end, the Air Chief Marshal Mushaf Ali Mir along with his colleagues were able to secure approvals.

As soon as PAF received approvals, the planning phase started at full throttle. The top brass got together to create a roadmap for the integration of UAVs into PAF. Officially titled 'Project Vision', the endeavour was initiated under the leadership of late Air Commodore Shigri. One of the first inductees into Project Vision was Wing Commander Shahid Salim (Retd). He describes the earliest days of the program as seen from the eyes of a young officer.

Top: State of the art Akinchi UCAV of PAF parked proudly at one of the PAF Base. Base Cdr Air Cdre Fayyaz being briefed about it's operational capabilities.

Top Left Inlet: The Bayraktar TB2 has revolutionized PAF's ISR operations capabilities, seen here from the rear.

Top Right Inlet: The Custodians - Wg Cdr Daniyal (left), Gp Cpt Faisal (Middle) and Sqn Ldr Emad (right) stand proudly in their kingdom

Right Page Top: Indigenously built Burrak UAV by NESCOM.

Right Page Bottom: CAS PAF visits PAF Murid to inaugurate Unmanned Aerial System COE.

"I still remember, it was the start of April 2003. I was in Peshawar at the time. I was called in and informed that I was to join the UAV Squadron. I felt a wave of excitement. It was obvious that we were going to be a part of something big. Initially, it was just me and Sqn Ldr Masood who were chosen. For all administrative purposes, we were with EW Ops and our assignment was with Project Vision, headed by Shigri Sahib. We moved to Islamabad. Masood would pick me up early in the morning and we'd go to E9 Park. The first time we saw the bird we were supposed to master was really something. Its name was Senior Cadet. It may not seem like much now but back then, it was state-of-the-art tech for us. It could fly at a speed of 100kph, staying in the air for more than 20 minutes at a time. That's pretty much where the advanced tech ended, though. Our days with Senior Cadet usually compromised of standing in the park, under the shade of the trees, trying to get a grip on the spry UAV. We really did not have much in the way of infrastructure in the beginning. But then, I started bringing in chairs from my house and Masood would get something to eat. After we had mastered the Senior Cadet, we were given the Half Scale Trainer, or HST, as we called it. HST was much more advanced than the Senior Cadet. For the first time, we could see the real potential of UAVs in the battlefield." Narrated Wg Cdr Shahid Saleem.

Focused on honing the crucial take-off and landing skills, HST employed a command receiver-based avionics system. With a length of 9.4 ft and a wingspan of 11.7 ft, HST flew at a speed of 120 kph, remaining airborne for 1.5 hours within a visual range. Its counterpart is the Full-Scale Trainer (FST), a comprehensive trainer UAV built around the Jasoos II Airframe. A trainer UAV for B+, it proudly stood at 14 ft in length, with a wingspan of 16.1 ft. Flying at a speed of 130 kph, the FST transversed the skies for 4 to 5 hours within visual range.

"After some trials, we took the HST to Murid. Seeing the complexity of

HST, we were assigned a small team of technicians. Soon after, the orders came for us to move to Murid for good. This was the initial stages of the group that would go on to form the 786 UAV Sqn. The next breakthrough was the induction of Bravo+, which was fitted with a camera and several other sensors. Another upgrade we got was the assignment of a control room. We had the honour of giving a couple of demonstrations to Air Chief Marshal Kaleem Saadat. He seemed satisfied with our progress, which of course, helped the program immensely. We got commissioned an ADA hut near Chakwal city, which was made everything much easier. It also had a small hangar, which we used to house the birds. Years flew by..." Wg Cdr Shahid remembers fondly. "Before I knew it, I was OC of the first UAV squadron, the 786 Squadron. It was one hell of a journey, I'll tell you that!"

First kills

As history unfolds its tapestry, certain chapters often remain tucked away from the limelight. It was February 2008 when the menacing grip of the Taliban tightened around the Kohat-Peshawar tunnel, presenting a grave threat to regional security. Swiftly responding to the crisis, No 786 UAV Squadron was deployed to Peshawar to provide support to our boots on the ground. Enhancing their operational capabilities, a secondary Ground Control Station (GCS) was strategically positioned in Cherat to maximize their impact. At the heart of the squadron's strategic prowess was the highly advanced B+ UAV. These unassuming aerial vehicles were tasked with surveying the occupied tunnel and provide the Pakistan Army with real-time intelligence. Armed with critical data, the Pakistan Army devised a tactful and strategic plan to

Left: CAS PAF interacting with aircrew of unmanned aerial systems COE during his visit to PAF Base Murid.

Center: The Veteran - Shahpar-II is a MALE UAV which has proven its might in several counter-insurgency operations.

Bottom: The Italian Falco in flight - One of the first UAVs to be inducted into PAF, it still serves the force vigilantly.

recapture the Kohat-Peshawar tunnel. Their combined efforts culminated in a victory that marked a pivotal turning point in the battle against the encroaching Taliban forces.

Birds of Pakistan

The editorial team of Second to None was invited to Murid Base for a visit. We left early in the morning, setting out from E9. It was hazy, idle morning; perfect to transverse the sprawling landscapes that one passes on the way to Murid. It didn't take us long to get there and very soon, we were being greeted by Base Commander Air Cdre Syed Fayyaz Mehboob and OC Flying Gp Cpt Faisal Saleem. Regular readers of the magazine, we were quickly ushered into a cozy office where our hosts gave us a warm welcome. It was Air Cdre Syed Fayyaz Mehboob who gave us a backdrop of the operation.

"I believe UAVs are the next step in the evolution of aircraft. And if you ask me, it's just the start. In today's world, UAVs have become very relevant. It's simple – the birds can perform tasks that are risky for humans… surveillance, reconnaissance, and even strike missions, you name it." Air Cdre Syed Fayyaz Mehboob explained. Next, OC Flying Gp Cpt Faisal Saleem gave his thoughts on the matter.

"The Air Force has known the importance of UAVs for a while now and fortunately, jumped into the foray at the right time. For us at Murid, UAVs have become a crucial part of the game. These high-tech mini-aircraft provided us with impressive capabilities in intelligence gathering, border surveillance, and monitoring areas that we can't access easily. Plus, they can stay in the air for longer periods. We've also used them in rescue efforts and other unconventional roles, they're just so versatile!" He said.

After some more holistic discussions about UAVs, we were led out of the office to experience what we had been waiting for, the tour of the base and visiting each of the UAVs Sqns in Murid. Gp Cpt Faisal Saleem led us to our first stop, the Bravo+. The old horse still stood proud, its two-tone blue markings fresh and glistening.

"This was one of the first. Inducted in 2004. For us, Bravo was the bird which made PAF's UAV game serious. It could fly up to a speed of 130 kph, which was quite a feat at the time. And it did that while carrying a payload of 20 kgs. Pilots that have flown the bird have taken it to heights of 10, 000 ft. It was also our first UAV with camera capabilities." Gp Cpt Faisal Saleem told us.

The next stop was the Falco UAV. With bowed wings and a snub nose, the UAV's silhouette stands out from a distance. Designed and produced by Selex Galileo of Italy, Falco emerged as a tactical UAV. We were joined by OC 62 UAS Sqn Wg Cdr Muhammad Tanvir Ul Haq Sajid, the fastidious man overseeing the Falco systems in Murid.

"We ran successful factory acceptance tests in 2007 and the Falco led to Pakistan's first UAV production System. The first locally manufactured Falco took flight in August 2009, in Kamra. Although the current variant cannot carry weapons, that will change with the development of the Falco Evo variant which will be equipped with guided missiles and bombs." The excitement in his voice was evident.

Next, we were handed over to Wg Cdr Syed Naveed Abbas, OC 61 UAV Sqn. He is in charge of Burraq, the brainchild of PAF and NESCOM. Looking like a torpedo with wings, its intimidating frame meant business. "This beauty took its first flight in 2009," Said Wg Cdr Syed Naveed Abbas, playfully smacking the wing of the bird. "It can be armed with laser-guided air-to-surface missiles, catering to specific mission requirements with unparalleled precision."
We were then joined by OC 60 UAV Sqn Wg Cdr Muhammad Zubair Sheikh, who introduced us to Shahpar-I.
The UAV is a creation of Global Industrial & Defence Solutions (GIDS) in collaboration with NESCOM and AWC. Wg Cdr Zubair gave us a brief intro "The Shahpar really shows its potential in real-time reconnaissance and surveillance, monitoring and target acquisition. It has also proven valuable in situational awareness and disaster management missions. Shahpar-I has proved its prowess time and again."
Its successor, Shahpar–II, falls under the reign of OC 66 UAS Sqn Wg Cdr Usman Taufiq. "Shahpar–II is another of our best Medium Altitude Long Endurance (MALE) UAVs. It's equipped with autonomous take-off and landing capabilities and SATCOM. It has proven itself in both day and night surveillance missions. We were also impressed with its performance in wartime and counter-insurgency operations." The Wg Cdr explained proudly.

Type of UAVs

Format	Mechanism	Example
Fixed-wing UAVs:	Fixed wings, similar to traditional airplanes.	General Atomics MQ-9 Reaper
Rotary-wing UAVs	Multiple rotors for lift and propulsion.	The DJI Phantom and Mavics
Hybrid UAVs:	Combines the characteristics of fixed-wing and rotary-wing UAVs. They can take off and land like a helicopter, but can transition to a fixed-wing configuration.	Krossblade SkyProwler 2
Single-rotor UAVs:	Uses a single rotor for lift and propulsion	Boeing Insitu ScanEagle
Flapping-wing UAVs:	Use a mechanism similar to the wings of birds.	BionicFlyingFox
Airship UAVs	Use a lighter-than-air gas, such as helium and are powered by electric motors or internal combustion engines.	High Altitude Airship (HAA) Lockheed Martin
Tethered UAVs	Powered by electric motors and are connected to a ground-based power source by a tether.	Elistair Orion 2

Intermediate Development Phase

Under the leadership of Air Chief Marshal Zaheer Ahmed Baber Sidhu, PAF entered a new era of accelerated innovation and breakthroughs. With various well-thought-out paradigms being implemented across the force, UAV technology was advancing exponentially. The new inductions that had been made possible with Air Chief Marshal Zaheer Ahmed Baber Sidhu's vision included TB2 and Akinci, along with the Wing Loong 2 and Ch-4.

We were accompanied by OC 64 CUAS Sqn Wg Cdr Agha Danyal to see Bayraktar TB2. From a distance, it looked like a sleek, flattened snake, ready to strike. Its triangular tail was another distinguishing feature. Manufactured by Baykar, the Medium Altitude Long Endurance (MALE) UAV was another formidable addition to the PAF arsenal.

"When we first handled it, we were pleasantly surprised by its versatility

Above: The complex monitoring and control systems of the UAVs at Base.

Left: Drone pilots have to go through intensive training to operate the highly-advanced UAVs in PAF's arsenal.

and advanced features. With its state-of-the-art design and extended endurance, it has proven itself repeatedly in intelligence and surveillance missions. It has revolutionized PAF's ISR operations capabilities, owing to the high-resolution imagery it transmits. This means minimal collateral damage." explained Wg Cdr Agha.

The second fruit of our alliance with Turkey was the Akinci drone. Last but not the least, the Akinci drone was a game-changer in the Pakistan Air Force's (PAF) Unmanned Combat Aerial Vehicle (UCAV) arsenal. Designed and manufactured by Baykar, this HALE UCAV had extended endurance and advanced avionics. It serves as a force multiplier, augmenting the PAF's operational capabilities in various domains. The Akinci provided the PAF with situational awareness, real-time monitoring and tracking of potential threats in complex environments. Its higher payload capacity allowed for a wide range of mission profiles. Currently, Akinci comes under the command of OC 65 MR UAS Sqn Wg Cdr Hamid Qayyum Bhatti.

The team was then handed over to OC Flying Gp Cpt Faisal Saleem. A person who knew his birds inside out, he explained that the next two UAVs we were on our way to see were a class of their own. These were the fruits of the alliance between China and Pakistan. We entered a slick, spotless hangar. Smack in the middle of the hangar stood two sleek, poised animals. Self-confident in their capabilities, it was obvious they meant business. These were the Chang Hong-4 (CH-4) and Wing Loong 2. Gp Cpt Faisal Saleem began his technical exposition.

"The CH-4 is also known as Rainbow-4. As you can see, the design is state-of-the-art… a high-wing monoplane configuration, twin-boom tail, a fixed tricycle landing gear. The structure is robust. It can fly even in harsh environments. It's equipped to carry electro-optical and infrared (EO/IR) cameras, synthetic aperture radar (SAR), and electronic intelligence (ELINT) systems. These give us real-time surveillance and intelligence gathering capabilities. The UCAV's endurance enables prolonged airborne missions that cover vast areas and provide us with real-time data.

The CH-4 is remotely piloted by a ground control station, which communicates with the drone using line-of-sight data links," he explained. We then move to Wing Loong 2, which had an equally impressive silhouette.

Top: Ready to Strike - The Bayraktar TB2 poised for take-off.

Bottom: Fully loaded Winglong-II stands ready to strike at any hour of the day or night.

Right Page Top: Combat ready CH-4 holding short of take-off point at one of the PAF Base.

Right Page Bottom Left: Attack Drone Raider-III YIHA can be utilized at a short notice to attack any target including radars.

Right Page Bottom Right: Akinchi UCAV

"The Wing Loong 2 is a medium-altitude, long-endurance unmanned aerial vehicle. It has an endurance of up to 20 hours and a maximum operational range of over 2,000 kilometres. It can fly at high altitudes and has a maximum take-off weight of around 4,200 kilograms. We have successful fitted it with multiple forms of munitions, including air-to-surface missiles and precision-guided bombs, making it a potent platform for engaging ground targets. The drone possesses impressive surveillance and reconnaissance capabilities, which allows us to monitor complex operational environments. The drone's precision strike capabilities are remarkable. This means minimal collateral damage, which is always a priority."

Gp Cpt Faisal Saleem interjected that two new innovative models had been implemented at PAF Base Murid.

The first was 'Smart Induction'. The new approach integrated advanced UAVs and UCAVs into the operational framework, optimizing performance, interoperability, and utilization of these cutting-edge platforms. All forthcoming drones shall sync in perfectly with on-going base operations. The second was a more holistic 'UAV Mindset', which involved fostering innovation and strategic thinking. Another facet was the comprehensive training programs which would equip PAF personnel to operate and maintain these advanced UAV platforms, creating a new generation of experts.

Future vision of UAS in PAF

After we had seen all the UAVs present in Murid, we were ushered once again to the office Base Commander Air Cdre Syed Fayyaz Mehboob. As the shadows grew longer and we ignored how late it was getting, we talked at length about the future of UAVs in Pakistan. To summarize, in the ever-evolving landscape of aerial warfare, Pakistan's Air Force (PAF) had emerged as a trailblazer, harnessing the potential of Unmanned Aerial Vehicles (UAVs) to fortify its defence capabilities.

Under the leadership of Air Chief Marshal Zaheer Ahmed Baber Sidhu, this statement had never been truer. With a visionary approach and eye for innovation, Air Chief Marshal Zaheer Ahmed Baber Sidhu ensured that the PAF spearheaded advancements in UAV technology. These UAVs were no longer confined to ISR duties but stood as force multipliers in Counter-Terrorism (CT) operations, Low-Intensity Conflict Environments (LFEs), Manned-Unmanned Teaming (MUM-T), and Suppression of Enemy Air Defences (SEAD).

Electronic Order of Battle: These advanced UAVs, equipped with sophisticated sensors, delivered crucial intelligence on enemy electronic systems such as radars and communication networks.

Suppression of Enemy Air Defences (SEAD): UAS played a vital role in targeting and neutralizing enemy air defence systems with precision strikes. With the introduction of strategic UAS, the PAF gained the ability to carry out strategic strikes from stand-off ranges.

Air-to-Air Operations: UAVs operate at high altitudes and speeds, demonstrating their autonomy through artificial intelligence algorithms. The induction of Akinci had positioned the PAF as the sole Air Force in the region with strategic UAS capability, allowing them to expand UAS roles from tactical to strategic levels.

Manned-Unmanned Teaming (MUM-T): By combining the strengths of manned aircraft with unmanned platforms, PAF aimed to gain higher situational awareness, enhanced coordination, and improved capabilities.

Stealth Operations: Stealth UAVs, designed with low radar signatures, offered significant advantages in long-endurance reconnaissance and surveillance missions. PAF was also exploring the acquisition of HALE class stealth UAS with strike capabilities.

Network-Centric Operations - A Comprehensive Vision

PAF's foresight encompassed network-centric operations, where data fusion and exploitation lay at the core of efficient decision-making. The establishment of the National ISR and Integrated Air Operations Cell (NIIAOC) at Air Headquarters was a part of this model.

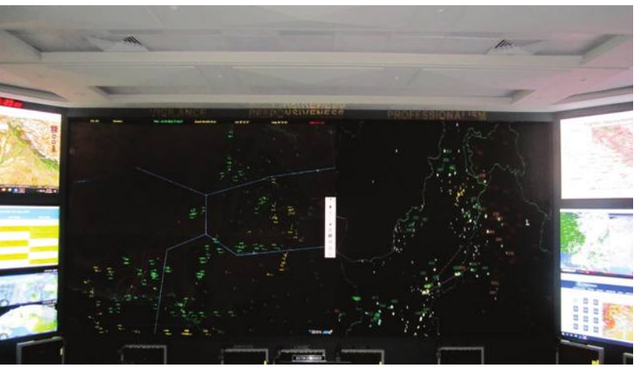
The future of UAV integration in PAF is poised for greatness, with advancements in technology, networking, and strategic planning converging to reshape the landscape of aerial operations. As the skies bear witness to PAF's visionary approach, the integration of UAVs becomes the fulcrum of unparalleled military capabilities, safeguarding Pakistan's airspace with unmatched efficiency and precision.

PAF'S Central Nervous System

Unveiling the Enhancement of C2 Systems

"In the fast-evolving world of aviation, where precision and coordination are paramount, the role of Command and Control (C2) systems cannot be overstated. These intricate networks serve as the unseen architects of aerial operations, orchestrating the movements of aircraft, monitoring airspace, and ensuring effective communication. In this article, we delve into the heart of PAF's C2 systems, exploring their evolution, significance, and the transformation they have recently gone through in the past few years. From military air forces to civilian air traffic management, PAF's C2 systems is a critical linchpin, and we're about to take you on a journey through its complex world which recently underwent a revolution."

by Muhammad Khan



Left: PAF's C2 systems provide a real-time image of all airborne activities from across the border.

Right Page Bottom: CAS PAF During his visit to Air Defense Centre of Excellence at PAFAA.

In the early hours of the morning on February 26, 2019, as the sun was yet to pierce the horizon, Pakistan's Air Defence Operations Centre (ADOC) sprang to life. It was a day that would test the mettle of the nation's defenders in the skies. Little did they know that their unwavering resolve would soon grant them a special place in the hearts of their countrymen.

High above, the radar screens in the ADOC displayed a blip, swiftly followed by another. The radars, PAF's all-seeing eyes in the skies, had detected the intrusion of Indian fighter jets into Pakistani airspace. As the Indian jets crossed the Line of Control, Pakistan's AOC was a hub of activity. The air defenders knew that they had to act swiftly, decisively, and with an unwavering commitment to protect their homeland. Information from multiple GMCCs, GRADs and other bodies flooded the ADOC and was quickly accumulated into a single package which would give an accurate picture of the scenario. Within minutes, the deliberation was complete and the orders for the air warriors to scramble was given. On the other side, the same readiness was maintained. The pilots were in the air within 5 minutes of the call, an impressive feat within itself.

The radar operators in the ADOC meticulously tracked the movement of the Indian aircraft, constantly feeding critical data to their counterparts in the cockpits of Pakistani fighters. This synchronized dance between technology and human skill was the very essence of their training, a testament to the well-developed systems that allowed such a swift and effective response. Finally, Pakistan's fighter pilots engaged their Indian counterparts. The world watched as these brave individuals executed their mission with precision and restraint, exemplifying the professionalism of the Pakistani Air Force forcing intruders to call off their mission and drop their loads on uninhabited location and ran away.

The next day in the broad light Pakistan Air Force response was generated which was later known to the world as Swift Retort. In the midst of this high-stakes encounter, the Pakistani ADOC continued to play its pivotal role. It was the eye in the sky that guided the nation's defenders, ensuring that they remained one step ahead of their adversaries. The radar screens continued to display the ebb and flow of the battle, defence systems constantly scanning the horizon and the situation, sensors active and broadcasting data across all platforms involved in taking crucial decisions in split seconds. All this and more happened behind the curtains, an unappreciated but crucial part of any operation.

As the day wore on, the world would come to know of the downing of two Indian jets and six bombs purposely dropped next to important military installations, a moment that would

be etched in the annals of history. Amidst the headlines and geopolitical reverberations, it was the pilot's and the faces on the front that was given credit, which was well-earned. However, very little was spoken of the ADOC personnel and the precision of their sensors and systems, without whom, this victory would not have been possible. However, this is the nature of the ADOC and its sister bodies, to operate in the background, gather intel and create a swift and effective response to win the day.

Command And Control

Enter any Air Defence Operations Centre (ADOC) of PAF, and you'll be face-to-face with similar sights. With the rhythm of jet engines in the backdrop, the inside of an ADOC is a place of quiet but tangible power and calculated precision. To understand the vital role it plays, one must step into this world of radar screens, hushed conversations, and unwavering dedication.

One would be surprised at the high degree of activity he would see. Operators clad in military uniforms move with purpose; their eyes locked onto screens displaying a mosaic of data from GMCCs, civilian aviation bodies, radars and several other bodies that constantly sending in data to the ADOC. It is clear that these centres are the nerve centres of PAF's air operations, where decisions carried the weight of national security.

The heart of PAF's Air Defence are its radar systems. As soon as enter an ADOC, you're greeted by a bank of screens, each representing a radar station. These radars are our sentinels across the nation. They continuously scan the skies, monitoring every aircraft, every blip, every movement. They provide us with a real-time picture of what's happening in the nation's skies at any given second. These radars, positioned strategically across Pakistan's vast expanse, are the first line of defence. They scan the skies with an unblinking eye, ensuring that no intruder goes unnoticed. The data they provide is relayed instantly to the ADOC, where it is meticulously analysed and acted upon. But ADOC goes far beyond mere surveillance. It's a place of coordination and communication. It's where intelligence meets strategy, where raw data is transformed into actionable insights. The men of ADOC are not just passively watching, they're constantly orchestrating. When a threat is detected, it's these men who that decide how to respond.
Behind the radar screens and communication equipment are the dedicated men and women who operate them. Their training is rigorous, and their commitment unwavering. These experts work in back-to-back shifts, ensuring that the ADOC is operational 24/7, 365 days a year. They are experts in their field, capable of handling high-pressure situations. Their attention to detail is unmatched, and their ability to make split-second decisions can be the difference between life and death in the air. As you venture into their world, you can't help but feel a deep appreciation for the men and women who work tirelessly behind the scenes to ensure the safety and security of Pakistan's skies. Their story is one of great importance but is rarely told, a story that unfolds silently but resolutely, behind the scenes, every single day.

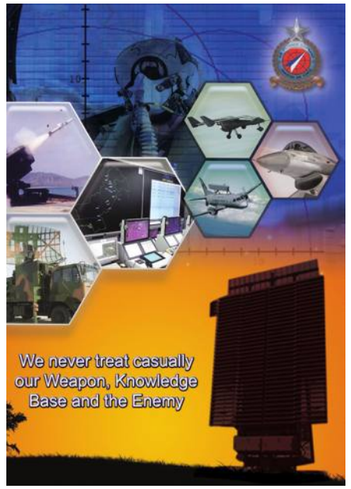
The Air Operations Centre (AOC) in the Pakistan Air Force (PAF) is a critical element of its Command and Control infrastructure. The AOC is responsible for planning, coordinating, and executing air operations, and it plays a central role in the PAF's ability to defend Pakistan's airspace and protect its national interests. Some of the roles and functions that lie under the AOC involve:

Strategic Planning

The AOC is responsible for developing strategic plans for air operations, including mission objectives, target identification, and resource allocation. This planning process involves assessing potential threats and determining how best to use PAF assets to achieve mission success.

Surveillance and Reconnaissance

The AOC maintains a comprehensive picture of the airspace over Pakistan and its neighbouring regions. This includes monitoring radar and other sensor data to detect any potential threats or unauthorized intrusions into Pakistani airspace. Surveillance and reconnaissance assets, such as aircraft and ground-based radar systems and various other bodies, feed critical information packets constantly to the AOC.



Air Traffic Management

The AOC manages and controls the flow of PAF aircraft, ensuring safe and efficient operations within Pakistani airspace. This involves coordinating the movements of military and civil aircraft to prevent collisions and conflicts while facilitating mission execution.

Combat Operations

During combat operations or exercises, the AOC provides command and control for PAF fighter aircraft, bombers, and other assets. It directs these assets to their targets, coordinates with ground forces or other branches of the military, and ensures that missions are executed according to plan.

Communication and Data Sharing Effective communication is vital within the AOC and between the AOC and various units throughout the PAF. The AOC relies on advanced communication systems to exchange information, issue orders, and maintain situational awareness.

Resource Allocation

Above: Men Who Never afford to lose their focus even for a second from C2 Domain.

Left 1: It would be hard to guess how important the role of this operation center is by mere appearance.

Left 2: The Legacy Continues - A new batch of experts listen attentively to their instructor.

Left 3: Owing to the literal sky-high stakes, mistakes or oversights are never an option.

Left 4: A view from Air deffence operation center.

Left 5: A Banner placed at ADOC depecting their Power of Lagacy

Left Page Bottom Left: A Graphic Depiction of Air Deffence Command.

Left Page Bottom Right: Another Banner Depicting Air Defence Comand Operational Domain.

The AOC allocates resources, including aircraft, munitions, and personnel, to support various missions and operations. This involves prioritizing and optimizing resource utilization based on mission requirements.

Threat Assessment

The AOC continually assesses threats within its operational area, tracking the movements of potential adversaries and making decisions to protect Pakistani airspace and interests. It also develops strategies to counter potential threats.

Situational Awareness

Maintaining a real-time and accurate picture of the operational environment is crucial. The AOC gathers and analyses data from various sources to provide decision-makers with situational awareness, enabling them to make informed decisions quickly.

Joint and Allied Operations

In cases where PAF operations involve coordination with other branches of the military or allied forces, the AOC plays a central role in ensuring effective cooperation and integration of assets.

Cybersecurity

Given the increasing importance of cyber operations, AOCs in modern air forces also have a role in protecting their own networks and information systems from cyber threats.

The specific structure and capabilities of the PAF's AOC may vary based on its operational needs, available technology, and resources. Still, it serves as a critical nerve centre for the PAF's air operations, ensuring the effectiveness and success of missions and the defence of Pakistan's airspace.

Changing Winds

Like every other sphere in the world, aviation technology is constantly changing, as well. With the advent of stealth technology, ballistic missiles, UAVs and various other new advancements, PAF has made incessant efforts to keep itself abreast with the latest systems. This is not only true for the aircraft and other weapon systems but also for other areas. But as we gaze into the future, the very landscape of air battle is shifting beneath our feet, promising more profound changes. Emerging Disruptive Technologies (EDT) are the driving force behind this transformation, offering greater precision, unprecedented speed, and an autonomy that will reshape the very essence of air power. The integration of Artificial Intelligence (AI), Unmanned Aerial Vehicles (UAVs), Low Observable Technology, and the advent of Hypersonic weapons heralds a new dawn in aerial warfare. These innovations promise to make air power even more assertive, and the skies more fiercely contested.

While the PAF has always stood as a formidable guardian of Pakistan's airspace, it was not impervious to the existence of cracks and blind spots within its operational framework. The shifting geopolitical landscape and emerging threats demanded an urgent response, inspiring a relentless pursuit of training excellence and technological advancement. In the face of these rapid changes, the Pakistan Air Force (PAF) recognizes the imperative for a paradigm shift. The character of war is evolving, and PAF must evolve with it. No longer can it remain a conventional air force in the traditional sense. It must rise to the challenge of countering threats not only in the skies but also in the vast expanse of space. PAF has embarked on a journey of

transformation that will see it take a lead role in multi-domain operations, working in synergy with other armed forces and government agencies, including SUPARCO, AWC, and SPD. The future demands a balanced mix of armed forces capable of operating across multiple domains, and PAF is prepared to lead the way.

Charting a Course for the Future

To successfully transition into a futuristic air force, PAF needs a comprehensive roadmap that takes into account fiscal constraints and the nation's needs. In line with the vision of Chief of Air Staff Zaheer Ahmad Babar Sidhu, PAF has identified key principles that will guide the transformation of its Air Defence. Multi Domain Operability, Indigenization, Integration, Automation, and Resilience are the cornerstones upon which the future of PAF's Air Defence will be built. These principles represent the true north that will guide PAF through the uncharted territories of tomorrow's air battles.

State-of-the-art C2 Centres

The heart of PAF's operational capabilities, the Command and Control (C2) system, is also undergoing a revolution. The goal is clear: enhanced situational awareness, rapid response, and seamless interoperability. These upgrades are not just about technology; they are about ensuring timely and correct decision-making by commanders, especially in moments of crisis.

At the top of the C2 hierarchy, the Air Defence Operations Centre (ADOC) and Command Operations Centre (COC) are witnessing a transformation. Previously limited in their capability to display vital information, these centres are now undergoing a systematic overhaul. The integration of artificial intelligence-based applications into the Common Operating Picture (COP), along with several other upgrades, is poised to be a game-changer.

The Command Operations Centre (COC), the nerve centre for all Air Operations related to the execution of War Plans and Contingencies, is also receiving a significant upgrade. The newly developed National Aerospace Science & Technology Park (PAF NASTP) has taken up the responsibility of designing and constructing a fortified C2 centre. This facility will be equipped with all the essential components required for contingency handling, ensuring quick assessments of developing situations and rapid C2 responses in times of crisis.

As the future of Air Operations leans increasingly on Command and Control Centres, adaptability

Top Right: In the Center of it all - An active Radar Station Coverd with a Radar dome to protect from weathering effects.

Top Right: The MCOC-I allows Rapid Mobility with reduced foot print, a fine addition to the inventory.

Bottom: PAF's C2 Sensors have been erected in the most distant of areas, to ensure maximum coverage.

Left Page Top: The Bayraktar TB2 UAV, an impressive addition to PAF's arsenal ready for action.

Left Page Bottom: The ZDK-03 AWACS & Saab 2000 Erieye AEW&C, acting as the airborne eyes of C2 centres.

and mobility are crucial. Recognizing the importance of C2 Centres and their vulnerability in hostile scenarios, PAF has launched the Next Gen Mobile Mission Control Centre (NG-MMCC). This advanced facility boasts secure plug-and-play data/voice networking, network security, and resilience. Its integration of AI-based Decision Support Tools (DSTs) and rapid mobility with reduced footprints promises enhanced operational effectiveness. Talking about DSTs, one of the most important aspects of the upgradation process is the integration of Artificial Intelligence. The development of AI-Based Decision Support Tools (DSTs) is well underway at CENTAIC.

Sensors and Shooters

The 2nd May incident in Abbottabad served as a wake-up call for the Air Force, highlighting a plethora of red flags on strategic and capability levels. Action was taken immediately to rectify the situation. At the centre of this upgradation was the enhancement of PAF's sensor grid.

As part of the Air Defence modernization program known as PADS-2020, PAF inducted state-of-the-art Multi-Role Radars (MRRs) into its arsenal. Among these were the TPS-77 MRR and YLC-18A radars, each a marvel of modern technology. These sophisticated instruments were not just a technical achievement; they opened up new vistas of operational flexibility. PAF's visibility across its frontiers, especially in challenging terrains like valleys, received a substantial boost, granting valuable reaction time. The detection of an Indian BrahMos missile misfire highlighted PAF's newfound capabilities. These MRRs proved their mettle by operating flawlessly in diverse environments, countering threats ranging from low-RCS (Unmanned Aircraft Systems, missiles, and low RCS aircraft) to high-speed hypersonic missiles and slower-moving targets like drones and balloons.

Center Left: The Spada 2000 is an all-weather, day and night, low-to-medium altitude air defence system (LOMADS).

Bottom Left: The Light Wave Radar Rapid Deployment Unit offers mobility without compromising on competence.

Bottom: The TPS-77 MRR gets its name from the fact that it is configurable for both long and medium range 3D detection.

Right Page Top Left: YLC-8E radar capable of detecting stealthier and small RCS flying objects at extended ranges.

Right Page Center: HQ-9B/E capable of intercepting Fighter Aircraft, Cruise Missile and Theatre Ballistic Missile at different altitudes.

Right PAge Bottom: YLC-18A Radar induction has greatly enhanced PAF trans-frontier visibility especially in valleys giving more reaction time, the radar is capable of detecting supersonic missiles as well.

Adding another layer to its defence, PAF welcomed a cutting-edge UHF 3D radar. This radar system incorporated advanced two-dimensional digital active phase array radar technology, further enhancing its capabilities. But what truly set it apart were its robust anti-jamming features, providing PAF with the ability to operate even in dense Electronic Attack (EA) environments. With this induction, PAF acquired an extended range for detecting stealthy and small RCS (Radar Cross-Section) flying objects. In an era where stealth technology poses a significant threat, this radar system offered a crucial advantage.
The importance of High-Mobility Artillery Rocket Systems (HIMADS) cannot be forgotten in the current era. After careful study and evaluation, PAF finalized the HQ-9B/E system, signing the necessary contracts. This versatile system is designed to intercept Fighter Aircraft, Cruise Missiles, and Theatre Ballistic Missiles at various altitudes. What sets it apart is its ability to engage multiple targets simultaneously, making it an invaluable asset for both theatre defence and point defence. In an era where threats can come from multiple directions simultaneously, such capabilities are paramount.

Such upgrades cost a hefty amount of capital. With the nation strapped for finances like it is now, any induction can be a strain. That the reason PAF always strives for indigenous development of new assets.

Collaborating with institutions like PAF NASTP (National Aerospace Science & Technology Park) and AWC (Air Weapon Complex), alongside other defence production units, PAF is actively involved in the development of VHF and Low-Level Radars. One such indigenous low-level radar system has already achieved major milestones and is currently in the evaluation phase. This strategic move aims to reduce dependence on foreign sources for sensor procurement and maintenance, ensuring operational autonomy.

Training

Chief of Air Staff Zaheer Babar Sidhu has given unrelenting emphasis on the importance of upgrading the PAF training regimes. This vision is the driving force behind the heavy modifications made to the training programs of all aviation and PAF programs across the nation.

Inductees of the Command and Control training programs are no exception. At the heart of this transformation stands the Air Battle Management School, a cutting-edge facility aligned with the aspirations of the Chief of the Air Staff. Nestled within the PAF Air Power Centre of Excellence, ABMS has emerged as a crucible for honing the skills of combat crew in a dynamic operational environment. Here, airmen and airwomen delve into the intricacies of air space management, the intricate art of deploying Ground-Based Air Defence Systems (GBADS) and various other crucial skills. But what sets ABMS apart is its fusion of live exercises with state-of-the-art simulations. It's a one-stop-shop for training solutions catering not only to the PAF but also to tri-services and allied forces.

Within the ABMS, the Joint Strategic Simulation Centre (JSSC) is a division designed to provide PAF combat crew with a high-tech playground for honing their skills. It's a world of synthetic training that replicates contemporary warfare scenarios, fostering joint exercises involving PAF, tri-services, and allied countries' officers. Envisioned by the CAS himself, JSSC serves as the nexus for training combat crew and battle-staff in modern, centralized next-generation systems for effective offensive and defensive multi-domain Command and Control operations. This capability has found its place in numerous national and international exercises, amplifying the live segment of air force employment.

Similarly, the College of Air Defence (CAD) is also a testament to PAF's commitment to providing centralized, modernized, and institutionalized basic and system training. Nestled within the Pakistan Air Force Academy (PAFAA), CAD boasts state-of-the-art facilities catering to cadets, Under Training Officers (UTOs), and Air Defence (AD) Officers. CAD comprises three distinguished

Top and Bottom: College of Air Defence has been established at PAFAA for provisioning of Centralized, Modernized & Institutionalized Basic / System Training while utilizing state-of the-art facilities for Cadets, UTOs & AD Officers under one roof to PAF.

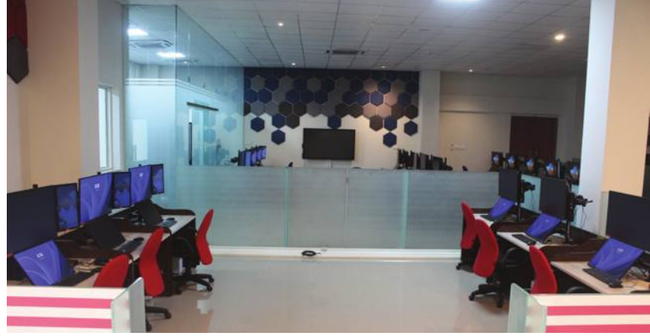
Right Page: AFISTE (Air Force Integrated Syntenic Training Environment) has been established for entire PAF which would transform PAF synthetic Training outlook leading up to LVC is (Live Virtual Construct).

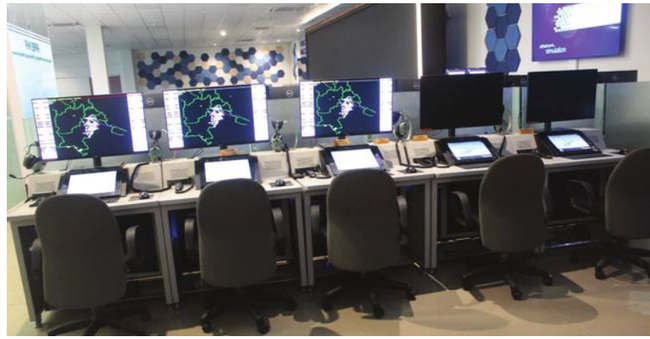
schools: the Air Defence Training School (ADTS), the School of Air Defence Operations (SADO), and the Air Defence Systems School (ADSS). It is also home to a state-of-the-art, fully indigenous Joint Strategic Simulation Centre. Notably, this centre doesn't just fulfil basic training needs but also acts as a strategic simulator for complex joint-services-level exercises.

The training regimes has recently had another major boost in their effectiveness with the addition of Air Force Integrated Synthetic Training Environment (AFISTE) in their trainings. This entirely indigenous simulation system revolutionizes PAF's synthetic training, propelling it towards Live, Virtual, Constructive (LVC) training. The system is a networked marvel, even allowing the training of combat crew from remote locations.

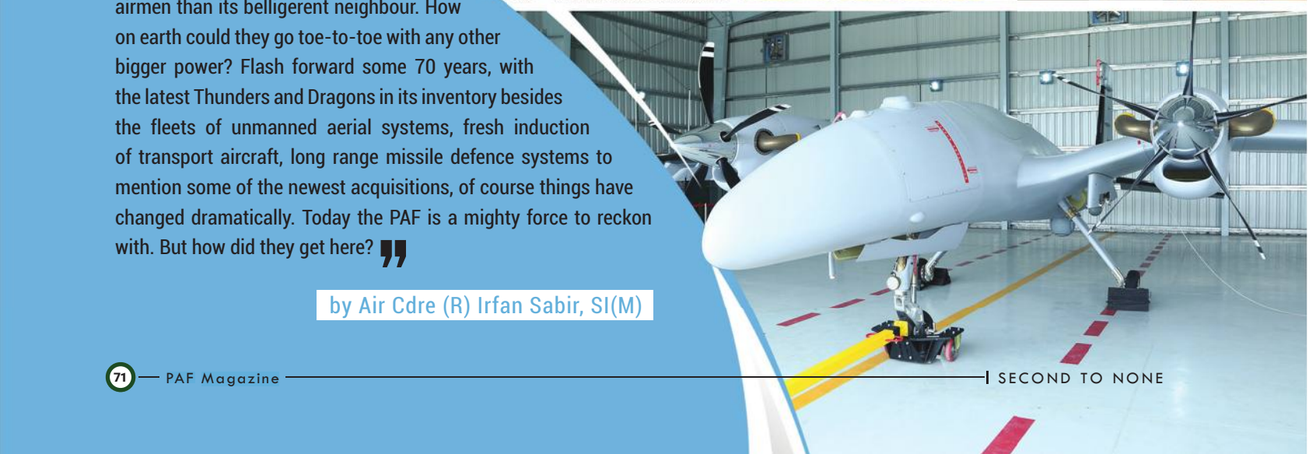
A Skyward Journey into the Future

In conclusion, PAF's modernization efforts aren't confined to equipment and tactics alone. They encompass an equally vital aspect—training. The emphasis is on elevating situational awareness, enhancing decision-making agility, and optimizing the coordinated use of various weapon systems through a network-centric command and control system. Integrated radars, early warning systems, advanced communication networks—they are all woven into this transformative tapestry. This convergence ensures an unparalleled understanding of airspace, timely threat detection, and a rapid response mechanism. But the most intriguing element is the infusion of artificial intelligence and machine learning into air defence systems, empowering predictive capabilities and proactive responses.





UNDER NO ONE'S THUMB



"When the PAF started out it had little more than some mainly obsolete planes and fewer airmen than its belligerent neighbour. How on earth could they go toe-to-toe with any other bigger power? Flash forward some 70 years, with the latest Thunders and Dragons in its inventory besides the fleets of unmanned aerial systems, fresh induction of transport aircraft, long range missile defence systems to mention some of the newest acquisitions, of course things have changed dramatically. Today the PAF is a mighty force to reckon with. But how did they get here?"

by Air Cdre (R) Irfan Sabir, SI(M)

Recent conflicts has demonstrated that the character of war had changed rapidly. Devastating effects on conventional forces through drone applications, electronic and cyber capabilities, augmentations by AI application had been well established in recent Azerbaijan-Armenia and Ukraine–Russia wars. Under the current evolving character of warfare, PAF felt the need to take stock of its operational capabilities. Staying fully cognizant of the situation, the CAS tasked all branches to undertake a capability gap analysis in 2021. After identifying critical deficiency areas in all domains and after sorting out a carefully crafted financial plan under constrained fiscal space, he gave his vision of smart and cutting-edge Inductions to fill capability gaps in all vital domains. The induction plan comprised following cardinals, such as the acquisition of only high-end technology, so that it could effectively serve PAF for at least the next decade and a half. It also included timely inductions, to quickly mitigate operational deficiency, low operating and life cycle support cost and lastly, downloading of technology to support indigenous production.

"As far as the evolution of military technologies is concerned, our 20th Century experience was not ideal. Policies based on exceptionalism have affected the international process of sharing of knowledge and technologies, integration of defence industries and global supply chain and the access to advanced weapons systems. This myopic approach has negatively affected regional stability and has led to dangerous, irresponsible and provocative strategic behaviour, particularly in South Asia," the Air Chief maintained.

He has argued that Lethal Autonomous Weapons Systems such as UCAVs and Loitering Munitions, along with hypersonic missiles and space militarization had transformational effects on the nature, character, complexity and speed of warfare, adding, "This in turn significantly affects strategic decision-making system and process, battle-space and information management and the entire philosophy of military training and leadership."

Air Chief Marshal Zaheer Ahmed Baber Sidhu, maintained that these technological advancements has forced a critical review of traditional strategic thought and major paradigms of defence and strategic studies and led to the evolution of new concepts in strategic affairs such as Smart Power, Sharp Power, Hybrid warfare, Grey Zone and Non-Contact Warfare.

All Branches of PAF had worked in close coordination to efficiently materialize the induction plan through a two-prong strategy i.e. high-end technology procurements from foreign sources and inductions from local industry to fully support indigenization and self-reliance as per the guidelines of Worthy CAS vision.

During FY 2021-22 and FY 22-23, an unprecedented number of high value systems had been contracted, which would augment PAF's warfighting potential manifold. Several of these systems had been successfully operationalized already, whereas few were scheduled to be delivered within the current calendar year.

Under the command of the current Chief of Pakistan Air Force Air Chief Marshal Zaheer Ahmad Babar, Pakistan Air Force has come a long way, making its presence felt across the top end. Under his resolve, the PAF high command endeavoured to become more enterprising and dynamic, considered unstoppable, acting with precision, speed and communication, taking the enemy by surprise. All this had been the consequence of sound planning and some luck.

Speaking at the GSTAR 2022 event, CAS, PAF, Air Chief Marshal Zaheer Ahmad Babar said, "The safety, dignity and prosperity of our nation in all its manifestations are the ultimate purpose of Pakistan's national security. Pakistan Air Force is making an omni-role, substantive and lasting contribution towards all these important national security objectives." Since being in office, his team had critically analysed the challenges, identified the deficiencies and embarked upon prompt action to bridge the gaps in short term alongside clearly defined objectives for transitioning PAF into Next Gen Air Force. "Virtually no area has remained untouched," Zaheer Ahmad Babar assured his countrymen.

Title Page: Military applications where artificial intelligence will stress its existence of the coming years in combat platforms.

Right: ACM Zaheer Ahmed Baber Sidhu, CAS PAF inspects the third batch of J-10 CE at an operational Base.

Top: ACM Zaheer Ahmed Baber Sidhu, CAS PAF posing for a photograph along with the operators of J-10CE during the arrival of its 3rd Batch.

Bottom: Target selection requires accurate intel - now much of this responsibility is borne by drones Akinci & TBII UAS becoming vivid in military life line.

Right Page Top: CAS PAF Welcoming the aircrew who ferried the 3rd batch of J-10CE at an operational Base.

Right Page Center: PAF all set to receive Belgian Air Force C-130H.

Right Page Bottom Left: Flying higher and smoother than previous planes Beechcraft King Air 350i joins the fleet.

Right Page Bottom Right: Piper M-600 a sense of pride in the air force providing economical air mobility platform.

However, it has not been an easy journey. In these times of financial crisis and foreign currency scarcity, the Air Chief was faced with a new set of challenges. All kinds of procurements were only possible through effective management of the Operational & Maintenance (O&M) expenditure. An extensive fat from operations was removed through microscopic scrutiny and curtailment without losing the combat prowess. Systems with high O&M costs were retired and operations were enhanced on the platforms with low O&M costs. Force augmentation efforts were used to increase the effects of the same sorties without increasing operating costs significantly. It was a true demonstration of an out of the box approach in crucial situations. A strange fact was that, last two years, probably, were financially the most troubled year for PAF in its history. Nonetheless, the last two years witnessed the most acquisitions by PAF as the air boss decided to turn things around, setting a tone for a far advanced air force.

J-10CE

Following restrictions by the US on American weapons platforms to Pakistan, the PAF became unable to obtain the type of advanced jets such as the notorious F-16. The air force had turned to creating highly advanced fighters themselves such as the JF-17 Thunder and aimed to acquire higher performance fighters with the assistance of the Chinese. It was in these discussions that the J-10 had its origins. The aircraft is equipped with latest avionics / EW suite and state of the art AESA radar complemented by PL-15 BVRAAM. Moreover, operationalization of PL-10E high off-bore IIR missile with IRSTS & HMD combination has opened a new paradigm for PAF in terms to WVR air to air combat. Like any modern aircraft it also has an Encrypted secure data link. The capability list of the aircraft is endless and sensitive in nature too. J-10C along with its latest avionic suit and PL-15 long-range BVR has restored the balance in favour of PAF again which was lost due to Rafael & Meteor combination. With this one quick procurement , IAF's dream of gaining qualitative superiority was neutralized before it saw the light of the day.

"The impact of emerging technologies is profound in terms of nature, global in terms of scale and strategic in terms of effects. It simultaneously influences the political, social, cultural, economic and military domains. This has created new challenges for the traditional military structures, cultures, services and processes at all levels," the Air Chief aptly said adding, "The advent and advancement of new technologies such as Artificial Intelligence and Machine Learning are now affecting almost all aspects of human life and global environment."

In the last two years, the PAF had come up from some place to first place in the region. This was the task achieved by the will and energy of the entire force. Endeavouring to develop a new way of war, the PAF embarked on utilizing fully digital and advanced technologies. Inducting drones was the answer to navigate emerging complex challenges and shoot at the enemy from a long way away.

The Scourge: TB2 UAS

Drones had been the missing pieces in PAF's strategy to boost its strength. Pictures of modern wars were significantly different from what we are used to seeing in historical movies and documentaries. Massive infantry attacks under the shelter of tanks and artillery are still necessary for military operations. However, most modern forces are trying to use weapons systems that can be controlled remotely and cause maximum damage to the enemy without endangering people's lives. One example of such a weapon is the frightening TB2 UAS. This is a reconnaissance combat drone and can be used for spying and for destroying specific targets. As recent times saw a resurgence of terrorist activities in the countries after a lull of about five years, to counter the resurging threat PAF was required to provide persistent ISR and CT capability in the troubled areas. Providing the effort of manned systems similar to what was done in Ops Zarb e Azb was cost prohibitive given the fiscal challenges faced by the PAF. Consequently, swift procurement of battle tested TB2 UAS was initiated. In record time the UAS were flying in Pakistani skies. These along with other UAS systems provided a cost-effective way of creating the required effects in the CT domain.

Akinci UAS

For persistent presence in the battle field for ISR and ES, PAF historically relied on the manned platforms like DA-20, RT-33, RB-57s etc. However, these systems had limited persistence while being vulnerable. Due to the lack of targeting capabilities, they did not reduce the sensor-shooter chain. With the capabilities to wreak havoc with pinpoint accuracy, the procurement of the Akinci MALE UAS system filled this gap for PAF. A real warrior in the sky, with outstanding artificial intelligence technology, robust, agile and combat ready, the ISR capability ranged from Long range SAR, multi-band ES and HD EO/IR payload coupled with long range weapon capability and long endurance. The Akinci UAS provided PAF a faster

OODA at the eastern border as well as in the CT campaign.

Air Mobility Platforms

Maintaining a dependable AM fleet was extremely crucial for the desired force agility of PAF in light of the threat of long range SOWs. With the ageing C-130 fleet, PAF was reaching a critical state. Therefore, preservation of the existing fleet and procurement of additional aircraft became essential. Additional C-130 H were procured from the Belgian Air Force to augment the fleet. In order to preserve this crucial air lift capability, some low-cost aircraft were procured to reduce short haul and passenger movement. Aircraft like AB-319, Bki-350 and M-600 Piper aircraft with their extremely low operations and maintenance (O&M) cost took off a lot of burden from the PAF's C-130 fleet while reducing the overall O&M budget. In addition, AB-319 also provided a capability of long-range Air Ambulance for international HADR situations. The platform immediately after induction became handy in the evacuation of Pakistanis stranded in Sudan.

Beechcraft King Air 350i

In the occupancy logistical category, PAF's ageing Y-12 and expensive to operate CASA fleet warranted replacement with suitable modern yet lowest operating cost platforms having capability to operate in length and breadth of Pakistan including Northern areas. Trying to build in a short time what would defend the nation, Beechcraft King Air 350i was selected. This high performance low operating cost aircraft suited such operations. These aircraft were equipped with a glass cockpit fitted with Proline Fusion Avionics and could fly at an altitude of 35,000 feet and up to a range of over 1,800 NM. All trainings had been concluded and aircraft were fully operational in PAF.

Piper M-600

To offset low occupancy air mobility requirements, Piper M-600 were contracted. The aircraft had high-performance parameters and possessed one of the lowest operating costs. It was also equipped with a glass cockpit and the latest Garmin-3000 avionics package. All aircraft were inducted into operations. The timing of these upgrades had been timely at the very least.

Phenom-100

PAF has been operating a highly popular and commercially successful aircraft, Embraer's Phenom 100 since long. However, in early 2021, additional Phenom 100 aircraft were added to the fleet at an extremely low cost. The aircraft augmented the existing fleet of PAF's light communication aircraft as it became a unit of air mobility in the PAF.

Bottom: Bombardier Global – 6000 fully operational carrying out air mobility operations awating SOJ mod in near future.

Bottom Left: Phenom -100 Providing VIP Air Mobility Services Day and Night.

Bottom Right: Providing transportability with comfort and reach a welcome addition Airbus A-319 .

Bombardier Global – 6000

Everything envisioned materially has increased PAF capabilities significantly enhancing deterrence to a belligerent neighbour. Induction of SOJ platforms was a long standing PAF force goals requirement. In this regard, cooperation with Turkish Aerospace Industries' was being pursued. For this purpose, a pre-owned Bombardier Global - 6000, had been acquired and is currently fully operational carrying out air mobility operations. In near future, the platform would be inducted for EW Suite retrofit in Turkey.

Airbus A-319

To cater for extended range variable load carriage capability requirements of PAF, an Airbus A-319 aircraft had also been acquired. The platform is capable of conducting operations in combi-configuration for EMS, passengers, cargo missions, and also has prospects of future employment in advanced roles. AirBus 319 offered global reach stretching up to Far Eastern, European and South African countries at highly reduced operational cost. The aircraft had arrived and was operational in PAF inventory. Additionally, medevac modification on the aircraft was also underway. After completion the aircraft would be available for swift medevac service not just to PAF but to any agency as per requirements of Government of Pakistan.

Boeing 737

In addition to the acquisition of the Airbus for PAF, Shaheen foundation had recently inducted its first Boeing 737 freighter for undertaking commercial operations in a bid to build its own cargo fleet subsequently.

The acquisitions of military enhancements were just the latest pieces of a revival and renewal of commitment to aerial supremacy. These were real achievements, a sign that the contest for influence was not going all India's way. Missiles were also at the centre of the plan.

HQ-9B HiMAD

Top: Water Canon Salute to the new Boeing 737 as a new air mobility platfoam.

Center: HQ-9B HiMAD is among the many symbols of strength in the PAF.

Right: Should they ever dare, the EADS PAF has the right air defence reply.

Considered to enhance the country's air defence network, Pakistan required a long range missile system that could intercept various threats such as air to ground missiles, helicopters and aircraft, UAVs, beyond visual range (BVR) missiles and guided bombs besides other tactical missiles. This was necessary to create an effective A2AD environment in our skies and to maintain Air Superiority in the DCA role. The HiMAD became essential, Pakistan's first long range surface to air capability. Its persistence and range provided extraordinary flexibility to the air commander. While these systems were not alternative to manned aircraft doing DCA, however, they effectively complement the role. Hence, the first battery of HQ-9B from China was ordered and was likely to be delivered soon. Contracts for additional batteries are in progress. These systems were nearly as effective as the famous S-400 systems.

EADS

In today's increasingly modern and complex warfare, with multiple threats and arenas, sophisticated weapons and sensors have become critical acquisitions, enhancing essential capabilities for the multi-dimensional battlefield. Long range weapons and BVRs are highly dependent upon the electronic sensors. An intelligent way to neutralize these is to disrupt these Electronic Sensors thus hampering the Sensor-Shooter chain or the weapon guidance itself through Electronic Attack. In the same context PAF procured Electronic Air Defense Systems from China providing persistent ES as well as EA capability in the desired AoR. This capability ensures battlefield domination and mission success by overwhelming the enemy's sensors and presenting the enemy with the wrong target.

The scale and significance of the new acquisitions and the response by the PAF showed its strength and determination to keep the skies above Pakistan impenetrable. The PAF made immediate and major investment in advanced radars as it realigned its defence needs to deal with the rising challenging strategic circumstances.

Left: Low observable stealthy and hipersonic missiles can't go undetected through YLC-8E high mobility radar.

Bottom: YLC-18 High Mobility Medium Range Low Altitude 3D Radar fully integrated into PAF Air Defence Systems.

Right Page Top: A TPS 77MRR, State-of-the-art Active Phased Array technology radar fully integrated & deployed in Pakistan.

Right Page Bottom: Fully restored and upgraded TPS43 forms the backbone of PAF Air Defence.

Radars

They called radars an airplane's worst enemy. Long range jam resistant multi-role radars are an important operational requirement in these times of an electronically intense battlefield. Now classic low level or high level radars may not be cost effective and may not provide the required dividends. Therefore, YLC-18 and TPS-77 MRR were procured to overhaul the vintage Air Defense system of PAF. After PADS 77 in 1977, this was the largest rehab of the PAFs Air Defense system. In order to detect low observable platforms like small UAVs and stealth aircraft Chinese YLS-8E radars were contracted and were likely to be delivered soon.

Air Defence

The Air Defence domain had been another important focus of the CAS. In contemporary warfare, strong air defense with availability of Anti Access area denial (A2AD) weapons could effectively deter an enemy's offensive. However, during critical gap analysis, this area was severely found wanting. Therefore, CAS declared it as a special focus area two years ago. After colossal efforts by all stakeholders, PAF filled this gap.

YLC-8E

Low observable stealthy platforms and hypersonic missiles posed a serious threat to aerial defence. Thus, acquisition of modern radars with Brahmos class stealth detection capability became an operational priority for PAF. A number of options were evaluated and year-long in-country trials were carried out of two Chinese origin radars. After a thorough evaluation process, the YLC-8E Mobile Radar System with integration into PAF AD Network, related trainings and assured spares support had been contracted.

TPS 77 MRR

The acquisition of TPS77 MRR, was a serious signal that Pakistan was sombre about its security. To augment the existing coverage in Low / medium level Air Defence Ground Environment, different options were explored and US made TPS -77 MRR was selected for induction in PAF. TPS-77 MRR is a state-of-the-art radar with Active Phased Array Technology, software designed architecture, capability to detect TBM and enhanced ECCM capability. All radars had been delivered, deployed, operational and integrated within the PAF network successfully.

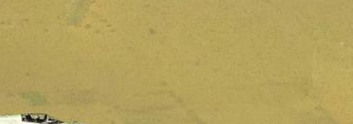
TPS 43G

In order to ensure seamless coverage in the high-level regime, contracts for upgrade and life extension of legacy TPS-43G radars were signed with US based original equipment manufacturer (OEM). After the upgrade, performance of these radars had been restored to original parameters along with enhanced ECCM features.

The threat may not be of invasion but of major conflicts that threatened Pakistan's national interests. That included everything from instability on the eastern border with India, to incursions into Pakistan's economic interests along the western borders with Afghanistan.

The enemy was no longer the uncontested leader in the region. There was no scaling back on enhancing military capabilities. Security in the region remained critical as ever to Pakistan. The air force was getting that balance right. PAF's commitment to defend the nation was iron clad.

INDUS SHIELD
Forging the Future



by PAF ACE Team | Air Cdre Syed Nabeel Masood

Sqn Ldr Jawad Tahir & Sqn Ldr Ahsan Rehman

In the heart of chaos, where the clash of steel meets the cries of the valiant, where the very earth trembles under the weight of impending battle, therein lies the theatre of war. It is a relentless stage where destinies are forged with every thunderous beat of the war drums while the fate of nations, hangs in the balance. Warfare is the only constant in human history, with continuous escalation between tribes, nations and empires. The tools of war have evolved from muskets to missiles, from spears to hypersonic missiles and from hand to hand combat to space-based warfare. Yet harnessing these capabilities still entails the major caveat of training the necessary human resource; capable of exploiting the full potential offered by this changing character of war and utilizing it synergistically.

Modern warfare demands seamless collaboration across all domains and peripheral 'good to have' competencies such as Cyber-attack, Space exploitation and the control of the Electromagnetic spectrum have become core domains on whom the fate of the battle hangs. Therefore, as the core domains were redefined, there remained a strong need to bridge the gap between PAF's existing capabilities and moving towards Next Generation Airforce parameters. Pakistan's founding father Quaid e Azam Muhammed Ali Jinnah said *'A country without a strong air force is at the mercy of any aggressor. Pakistan must build up, its air force quickly. It must be an efficient air force. Second to None.'* To remain Second to None, PAF's rapid modernization campaign has bridged the gap with a renewed approach to procurements and quickly integrated the latest acquisitions to achieve the desired employment philosophy. The ever-evolving battlespace provides a unique problem set of integrating all assets synergistically towards a common goal and the solution to this problem was manifested in the form of Exercise Indus Shield, 2023. The exercise was conducted at PAF Air Power Centre of Excellence from 7th – 24th October 2023 and saw the participation of 14 countries including Fighter Squadrons from the Kingdom of Saudi Arabia and Republic of Türkiye.

The exercise was conducted to maximize the warfighting potential of own and friendly forces in the full spectrum of air operations through synergistic employment of multi-domain capabilities in an integrated training environment. Exercise Indus Shield offered a unique employment of extended range BVR (Beyond Visual Range) employment in an EA degraded environment, UAS (Unmand Aerial System) employment in Manned – Unmanned Teaming (MUM-T) and ISR roles and offensive against Integrated Air Defense Systems (IADS) through sustained SEAD (Supression of Enemy Air Deffence) campaigns. The exercise saw the employment of J-10C, JF-17 Blk-III and F-16 Block-52 fighters from PAF, with and against RSAF F-15SA and TuRAF F-16s. These state-of-the-art fighters complemented by Long Range BVRs and HIMADS took the fight to the enemy at ranges far beyond previously conceived. Thus, giving a unique opportunity for simulation of the latest BVRs in a Blue Vs Red scenario in a contested degraded operating environment. The exercise provided a holistic curriculum coupled with scenario-based realistic Air Tasking Orders (ATO) with an embedded air campaign construct. The scenario provided a platform to employ proven and tested technologies, the most current tactics and near-realistic training under a dense electromagnetic operational environment. Exercise Indus Shield additionally offered certain value additions that are matchless in comparison to any other international exercise. The size, complexity and tactical aids available in the ACE training area, offer a simulated training environment that is hard to match. At the center of the area lies the Electronic Warfare Test and Training Range (EWTTR) and Air to Surface Weapon Ranges which house numerous SAMs and air defence assets. This coupled with surface level till unlimited altitude availability, full radar coverage and mapped out flat terrain allowing nap of the earth makes the ACE training area unique in multiple facets. Additionally, the Joint Strategic Simulation Centre (JSSC) at PAF ACE offers the capacity to translate the science of war in a data-intensive environment with customized models, highly flexible virtual training scenarios and real-time battle tracking. It offers quality training for all tiers of 'Combat Crew' as its open architecture affords flexible integration and inter-operability of all modern warfighting elements. JSSC also facilitates campaign analyses through comprehensive after-action replay and analysis software. A Concerted Academic Training was conducted in a block-building manner and complemented through discussions on tactical subjects while incorporating a technology-infused curriculum. Thus, laying a solid foundation for enhancing cross-domain knowledge. The exercise consists of 2 parts namely, Applied and Synthetic Training Phase. The Applied Phase consisted of the Al-Miraj Phase simulating low-intensity conflict which seamlessly transitioned into conventional war in the form of the Grand Slam Phase. The Al-Miraj Phase was conducted to train

Top: Indus Shield is more than just training for pilots. Entire squadrons from 14 counties came to Pakistan. Air Deffence Controlers, Ground crews, maintenance teams and support personnel perform assistance in real world conditions. At this particular occasion PAF veterans are also invited to attend and witness the exercise.

Bottom: On the surface, the airforce may seem like solo acts performed by pilots, but it's a concerto accompanied by an orchestra-participating crew from 14 countries pose for a picture.

the exercise participants in a DACT (Dissimilar Air Combat Training) Environment for refining tactics against contemporary threats while promoting mutual learning. The phase contours included Mix Bag Combat in multi-bogey scenarios whereby blue force was tasked to execute DCA (Defensive Counter Air) alongside Counter Terrorism Ops training through the availability of diverse topography including urban, mountainous and desert terrains and culminated in live weapon deliveries at Air to Surface Weapons range. Red Air flown by the Aggressor Squadron gradually increased the level of difficulty imposed upon Blue Air through the integration of next-generation missiles and sensor fusion as the Phase progressed to punish any errors by Blue Land. The Grand Slam Phase was conducted in the last week of the exercise and was designed to enhance the combat potential of exercise participants through Large Force Employment (LFE) tactics in a contested environment. This phase was designed to consolidate the inter-operability amongst combat and combat support assets and involved offensive and defensive counter-air and counter-land operations supplemented by multi-domain assets. The standout attribute of the exercise remained the application of Electromagnetic Spectrum Operations (EMSO), cyber and space-based operations in support of the air campaign. Blue LFE in Grand Slam saw the employment of J-10s, F-15s and JF-17 Blk3 in the Sweep role utilizing multiple AESA capable platforms to disrupt and destroy Red Defensive Counter Air response. Akinci UAS alongside F-16s were utilized for close support to ground forces while JF-17 conducted Suppression of Enemy Air Defence (SEAD). Emerging domains were integrated to mitigate contemporary training voids, create a qualifying environment and provide the most realistic replication of the modern battlespace while employing SCAR, Fighter Integrated Transport Operations (FITOPS) and counter SAM maneuvering missions were conducted using EWTTR (Electronic Warfare Test and Training Range). The exposure gained through these role-specific force application exercises provided the real-world skill sets necessary to achieve the commander's intent when and where required.

The Synthetic Training Phase titled 'Virtual Shield' offered a Live Virtual Construct (LVC) LFE exercise conducted in the JSSC. Exercise Virtual Shield constituted of a multitude of tactical scenarios including Counter Terror (CT), Close Support (CS) and Time Sensitive Targeting (TST) to generate a virtual solution to realistic tactical problems, to war game, the outcome and cost-effectively generate valid lessons. Emerging disruptive and niche technologies such as SWARM technology, loitering munitions and killer drones were employed during the Virtual Exercise to generate desired effects. Additionally, sensor-driven battlefield transparency at PAF ACE enhanced the situational awareness of the Air Battle Managers (ABM) to undertake informed decision-making and shape the battlefield. Air Boss Ops Room (ABOR) enabled live monitoring of the exercises thus ensuring safety and realistic scenario generation through real-time kill elimination. These operations were run by an efficient team of ABMs aided by a Range Training Officer (RTO), Cyber coordinator, ISR and EMSO officer under an Air Boss. PAF remains fully cognizant of the importance of cyberspace to use information-enabled command structures and combat capabilities to build information security across a wide array of domains.

Exercise Indus Shield therefore saw the utilization of next-generation technological innovations such as Electromagnetic domination and cross-domain cyber-attack in support of air operations whereby the Cyber Ops Room (CYBOR) was utilized to degrade the adversary's response through cyber-attack. Space which influences the outcome of all military operations through the availability of capabilities such as SATCOM, PNT (Positioning, Navigation, Timing) services and space based ISR was utilized to augment the Find, Fix, Track, Target, Engage and Assess (F2T2EA) dynamic targeting cycle. These cross domain capabilities were integrated under a network of system of systems to give a unified battle space awareness reducing the all important matrix of time for real time decision making.

Eternal vigilance is the cost of freedom and training our manpower to undertake multi-domain operations in a time-compressed environment against a contiguous, near peer adversary requires value-based character and leadership

Left: PAF's Dragons: Bird crafted with absolute enhanced capabilities.

Bottom: It is an exercise that takes adroitness, killer instincts, nerves of steel and panache. Royal Saudi Air Force F-15s Ready for action while PAF J-10CE Takes off.

skills that ensure integrity, discipline and teamwork in wartime. The thought resulted in the creation of PAF ACE as a hotbed of PAF's tactical employment where the combat crew is groomed into seasoned weapon system specialists. In its proud history, ACE has welcomed hundreds of international participants and conducted numerous international exercises such as Aces Meet, Shaheen and Falcon Talon to formulate tactical cohesion through the conduct of Composite Air Operations against conventional and sub-conventional threats. Revamped training curriculum and the frequent conduct of national and international exercises enhance the tactical acumen of PAF's combat crew while sharpening their ability to get the job done as and when required. PAF ACE offers a platform that combines the sum total of all PAF endeavors in providing Information Ascendancy, Unparalleled Battlefield Transparency and Augmented Situational Awareness which translates into Superior Decision-making during Offensive and Defensive Multi-Domain Command & Control Operations. This ensures the superiority of the tactical orientation of PAF combat crew in any foreseeable future conflict. The facilities available at ACE Mess offered the most conducive stay for the Exercise Participants who utilized their leisure time by engaging in the plethora of available extra-curricular and entertainment activities. Participants from RSAF and TuRAF participated regularly in Futsal matches alongside Horse Riding alongside long hours at the gym to keep

Top: His leadership skills and ability to inspire will rarely be called into question. A PAF F-16 Block-52+ clearing runway after a successful mission.

Center: Finding Fire - For a Turkish F-16 pilot winning will be the final result.

Bottom: Some heroes have capes ours have wings-Group shot of representatives of friendly air forces.

up their G-tolerance. During the exercise, participants also visited the historic sites in Lahore such as Minar-e-Pakistan, Badshahi Mosque and Lahore Fort and got a greater sense of Pakistani culture and hospitality. The visitors thoroughly enjoyed the visit to the Wagah border where they got a chance to visit the traditional Flag lowering ceremony amidst the surge of patriotic fervour exhibited by the local crowds. The participants also joined the celebration on the international night with great panache, which included stage performances depicting Pakistani cultural heritage along with delicious Pakistani food.

The future conflict will require automation and information ascendancy through agility in Artificial Intelligence (AI), autonomy, cyber domain and space. Seamless air power employment will require net-centricity and a Common Operating Picture (COP) between the sensor and the shooter for a coherent and cohesive response. The advancements in a wide array of full-spectrum warfighting capabilities which when augmented by synthetic training ecosystems ensures that the Pakistan Air Force never goes into battle unprepared and always upholds the sacred trust placed on it by the nation. This operational

Left Inlets: Designed to hone and test the skills of its operational crew Air Boss narrows it down for sister organizations.CAS PAF Briefs COAS and CJCSC about the Exercise Indus Shield aims and objectives.

Bottom: Indus Shield was a frightening display of firepower that could break the will of any adversary.

Right Page Top: CAS PAF welcomes and briefs PAF veterans to the exercise Indus Shield

Right Page Inlet Right: A mass brief in progress at PAF ACE during Excercise Indus Shield.

Right Page Inlets Center 1: Pilots practing misson on simulator to make it through crystallization process.

Right Page Inlet Center 2: Continually developing skills and refining approach during exercise Indus Shield.

Right Page Bottom: PAF discovered the immense importance of holding regular joint international exercises to enhance interoperability. Group of participats with COAS and CAS during the exercise.

model while providing an integrated system of systems experience also economizes the use of futuristic technologies keeping the mind the cost of maintaining a cutting-edge Air Force.

Amidst the blue skies, the borders are blurred amidst the roar of jet engines and the only thing that remains in the mind of the Pilot is the mission, the target or the asset being protected. This forges a unique tapestry of brotherhood and camaraderie amongst the participants who come from diverse nationalities and backgrounds yet are united during the Exercise under a common Indus Coalition. The aim of International Exercises such as Indus Shield remains the building of friendships and creating bonds across geopolitical lines through mutual learning and sharing of experiences. PAF continues to forge its destiny as it braces for the future and looks forward to welcoming our brothers again in the Exercise Indus Shield 2024 so that we may further strengthen the bonds of friendship between the participating nations and forever remain as brothers in arms.

INDUS SHIELD
Operations & Culture
GOES HAND IN GLOVE

ANATOLIAN EAGLE-2023

A View from Konya

> "Anatolian Eagle is always an exciting exercise that the Turkish Air Force is keen to promote, not just to NATO but to other international allies like Jordan, Qatar, United Arab Emirates and of course the Pakistan Air Force. It gives all sides an opportunity to share their experiences, and the PAF with its high level of alert and capabilities, is always an air force that other participants are keen to talk to."
>
> Alan Warnes

The Pakistan Air Force has been the biggest foreign supporter of Turkey's Anatolian Eagle. Since its first attendance in 2004, the PAF has attended the event nearly every year, always with JF-17 Thunders and F-16A/B or F-16A/B MLUs, from a variety of units. This year, however, we saw No 5 Falcons Sqn send five of their F-16C/Ds (two dual-seat Ds and three Cs) to Konya (TuAF's 3rd Main Jet Base) on what was its debut appearance.

Gaining experience

Based at Jacobabad-Shahbaz Air Base, the unit operates arguably the most lethal aircraft in the PAF inventory. So, it's quite remarkable that the Falcons, the PAF's oldest fighter unit, has been operating arguably the PAF's most potent fighter since 2010. Obviously the multirole unit has had more pressing matters to deal with until now.

Heading up the detachment was Air Commodore Asad Khan whose role was to ensure everything ran smoothly, while the unit's OC, Wg Cdr Ahmad Sami, looked after the flying side with his executive officers. The PAF managed to use Anatolian Eagle to bed down their less-experienced pilots in the art of tactical flying as a coalition force.

"It's a great experience for them," Air Cdre Asad told the author on the edge of the exercise ramp, adding: "Participating at any international forum whether it be AE or Red Flag, provides an opportunity to interact with personnel from other nations, from the west and the east. You get an opportunity to work with different professionals from all tiers. This gives young pilots, who had previously only operated in a domestic environment, a chance to operate in an international scale. That's a great take-away. Everyone has these learning opportunities and even if you learn one new thing, it's worth it! There's a lot going on during every mission and sortie."

Title Photo: PAF Fighting Falcon roles down the tarmac at the Anatollian Eagle 2023, where you see plenty of familiar shapes from Participating Airforces.

Top: Once you know the aircraft, you can never mistake her for anything but a McDonald Douglas F-4 - the Phantom of Vietnam War. The Phantom has been a mainstay of Turkish Air Force.

Left Page Top: Fix that wing design in your mind's eye - A Euro Fighter, Qatar Air Force, with forward set tail fins gets airborne during the Anatolian Eagle exercise.

Left Page Bottom: A United Arab Emirates (UAE) Air Force Fighting Falcon Block-60 is a technological step up from its predecessors.

Love to learn

The men of PAF love to learn, that's one of the force's strengths and this trait paid its dividends during Operation Swift Retort in February 2019, when it bloodied the nose of its arch-rival the Indian Air Force, when it shot down a MiG-21 Bison and captured the pilot Wg Cdr Abhinandan 'Nandu' Varthaman. No such proof on the Su-30MKI that was reportedly shot down and which India still disputes. The Indian Air Force is trying to learn from mistakes, by participating in more international exercises in France, Greece, UK and in India with the USA.

On the missions at Anatolian Eagle, the Air Cdre said: "Generally we are flying air-to-air, sweep, or air-to-ground. We are a multirole squadron so we can put our skills to anything. We just do what White Cell [the planners] ask us to do and give it our all."

Top: One of the three 5 Sqn F-16Cs present, departs the Konya runway. (Photo: Alan Warnes)

Top Left: PAF Aviators Called On their Expertise.

Top Right: A family that becomes tail blazers in the skies.

Right: Hopes and dreams of Pakistan rest with these aerial warriors.

During the exercise, the participating nations can fulfil any roles, and if there is a desire by any of the nations to work in any specific roles they can do it. "There was never an occasion, when we asked for a specific role - we went along with the planners requirements." Several PAF personnel played the role of a mission commander in the exercise - a wonderful opportunity to lead an international Blue Air sortie.

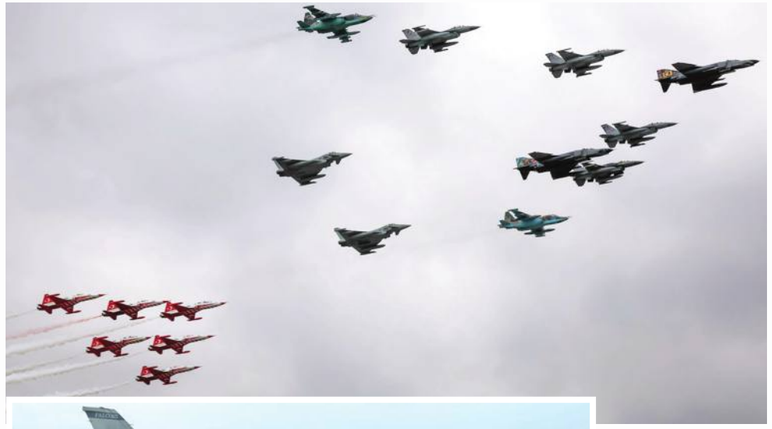
The Air Cdre was reluctant to discuss the specific weapons that the 'Falcons' F-16C/Ds were simulating, but he did say "the aircraft was flown with its full set of capabilities."

Time to tango

In addition to the DB 110 reconnaissance pod and Sniper targeting pod, the 18 jets – made up of 12 single-seat Cs and six dual seat Ds, can be equipped with Enhanced Paveway II, Paveway III, JDAM and AIM-120 AMRAAMs. However, none of these systems were to be seen at Anatolian Eagle, only an Air Combat Manoeuvring Instrumentation (ACMI) pod on the right wing. These pods allow the aircraft to be trackedby personnel watching the air war unfold, over the vast ACMI range, and showing the drama on the large Anatolian Eagle screens in the White Force building and subsequent debriefs, it ensures there are no arguments as to whether someone was shot down or not!

Among the 80 personnel that were involved in the 5 Sqn detachment was the first female F-16 Block 52 pilot, Flt Lt Eisha, who has flown both the JF-17 Thunder and the F-16A/B Block 15s.

For the OC 5 Sqn, Wg Cdr Ahmad Sami, this was his first international exercise while leading the unit, although he had participated in other domestic exercises. The Wg Cdr had flown at AE in 2012, with No 9 Sqn 'Griffins'. Last year, 5 Sqn attended the Saudi Spears of Victory exercise, which included an international field including the hosts, Saudi Arabia, as well as the RAF, US and Greece. Aside from the RAF, it meant they were working with air forces that never appeared at Anatolian Eagle, thus sharpening the point of the PAF's combat spear.



Panel 1: PAF arrival

The PAF was among the first international partners to arrive this year, on April 25. They flew from their home base Shahbaz, made a night stop before landing at Konya. In the past, F-16s and JF-17s have required an additional stop, but with their conformal fuel tanks, the Block 52+ can carry an extra 450 gallons of fuel. No 5 Squadron flew three single-seat F-16Cs and two dual-seat F-16Ds.

Top: Jets that continue to serve in front line capacities in Turkish Air Force converge for a flypast on the popular joint exercises at Konya. Turkish Air Force Northrop F-5 aerobatics team provide an escort.

Left: Pride and professionalism characteristic of the PAF, as it continues to project power.

Bottom: Air superiority is a decisive factor in a successful aerial war and the first requirement for air superiority is control of the air. Air Forces of the world converge for Anatolian Eagle.

Panel 2: Oldest PAF fighter squadron

No 5 Sqn is the oldest fighter squadron in the PAF, having been formed at PAF Base Peshawar on August 15, 1947 with eight Hawker Tempest Mk IIs. It entered the Mirage era on March 8, 1968, when the squadron was the first to be re-equipped with the Dassault Mirages – the IIIEP version, By the time of its conversion to the F-16 Block 52 in 2010 the unit had more variants of the delta-winged fighter than any other unit – continuing its tradition of being multi-role. They included the Mirage IIIEA, IIIDA, IIIEP, IIIRP and VDR.

Panel 3: AE debut back in 2004

The PAF made their debut at AE in 2004, when No 9 'Griffins' Sqn deployed with five F-16A/Bs based at PAF Base Mushaf. The 'Griffins' led by Wing Commander Jawad Saeed, who rose to Air Marshal and retired from the PAF two years ago, headed up 14 pilots and 63 personnel.

Much of what the Wg Cdr told me back then is relevant today: "Anatolian Eagle provided the PAF with a great chance to see how well we could operate with other air forces. We found we were not out of place – we knew our strengths and weaknesses before we arrived and go away happy with our performances." Another senior officer from another air force added, "They made a lot of friends here, they went about their business very professionally."

That still rings true today. Wherever the PAF goes, they make friends – whether it is international aerospace shows like Farnborough, Paris, Dubai and Zhuhai marketing the JF-17 Thunder or at exercises in China, Turkey, Saudi Arabia and UAE.

> "Anatolian Eagle provided the PAF with a great chance to see how well we could operate with other air forces. We found we were not out of place – we knew our strengths and weaknesses before we arrived and go away happy with our performances". Wing Commander Jawad Saeed

Above: One of the best names in demonstration flying, the "Turkish Stars" in their F-5 Northrop Grumman have the record of attracting the most spectators to their event.

Left: This kind of strenuous warfare exercise calls in for some close air support from the friendly Qatari Air Force, which dedicates its Euro Fighters for Anatolian Eagle.

Bottom Left: Some of the best are still in the business - A Su-25 readies to get airborne at Konya Air Force base, Turkey.

Bottom Right: Can't wait to show their stuff in a high performance aircraft as PAF aviators bring their A game to Anatolian Eagle.

Top: Head to Head - Turkish Fighting Falcon flies past a PAF counterpart at slamming speed.

Left:A versatile performer of the UAE air force - Amongst its capabilities are joint air/ground operations.

Bottom: The Turkish F-16 is armed with the only language a ruthless enemy understands.

FLIGHT TACTICAL EXERCISE "ANATOLIAN EAGLE-2023" KICKS OFF IN KONYA, TURKIYE

On 03 May 2023, The opening ceremony of Anatolian Eagle 2023, International Flight Tactical Exercise was held in Konya, Turky. Pakistan Air Force contingent, consisting of F-16 fighter jets along with the air and ground crew is also amongst the exercise participants.

Anatolian Eagle is an annual exercise which is being hosted by the Turkish Air Force. The exercise is one of the largest and most complex joint air force exercises in the world which aims at promoting interoperability between participating nations while providing an opportunity for shared learning. The exercise mimics a realistic aerial war and provides a real-time opportunity for the participating Air Forces to test their operational readiness. Other than Pakistan and Turkiye, Air Forces of five other countries, including Azerbaijan, Qatar, Saudi Arabia, United Arab Emirates and the United Kingdom are participating in the seventh consecutive edition of the exercise.

Top: The flying, handling qualities of PAF F-16s are staggering - utterly beautiful.

Left: Experts at becoming experts some of the most advanced air forces wear team jackets at exercise Anatolian Eagle.

Bottom: Master of the Sky: Sloping sides and sharp angles gives PAF Block 52 a striking appearance.

Left: PAF Aircraft with fighters of different countries participating in the International Flight Tactical Exercise Anatolian Eagle, 2023 held at Konya, Turkey.

Bottom Center: Made for Each Other - A strike air craft that covered itself in glory.

Bottom: Their Stories Will Live On Into The Future - PAF contingent share lighter moments with comrades of brethren air forces.

PAF CONTINGENT LANDS BACK AFTER SUCCESSFUL PARTICIPATION IN EXERCISE ANATOLIAN EAGLE 2023.

On 16 May, 2023: The contingent of Pakistan Air Force landed back at an operational air base of PAF after successful participation in International Flight Tactical Exercise Anatolian Eagle-2023 held at Konya, Turkey.

Air Marshal Irfan Ahmad, Deputy Chief of the Air Staff (Projects), Pakistan Air Force, witnessed the closing ceremony of the exercise and appreciated the efforts of PAF contingent for making the exercise a great success. He also lauded the PAF air & ground crew for smooth and professional conduct of this significant exercise which was aimed at validating interoperability in the face of realistic contemporary air combat scenarios. While interacting with the combat crew he said, "The existing global security scenario coupled with the evolving dynamics of air warfare calls for an enhanced partnership between Pakistan and friendly countries. International and regional strategic situation is undergoing profound changes with growing complexity in security environment and such exercises provide an opportunity to enhance interoperability in the face of shared challenges".

Deputy Chief of the Air Staff (Projects) congratulated the Turkish Air Force on the culmination of yet another successful international air exercise. He added that both the air forces have a long history of enviable cordial relations and hoped that the exercise would certainly enable combat crew of both the air forces to learn from mutual experiences in addition to promoting inter-operability.
During exercise Anatolian Eagle-2023, the adroit PAF pilots upheld their mastery and legacy of professionalism amongst the aircrew of the seven participating air forces including Turkey, Azerbaijan, Qatar, Saudi Arabia, United Arab Emirates and the United Kingdom. The successful participation of the PAF air and ground crew in the multinational air exercise is testament to the sound foothold of operational training of PAF personnel in line with the latest developments in aerial warfare.

Story of VERSATILITY AND INNOVATION

"Today, nearly two dozen Pakistan Air Force C-130 transport aircraft crisscross the skies above us. It's one of the best aircraft in history and its life span is exceptional - almost forever. But what is the explanation behind this record of longevity? One of the secrets of its stunning performance is the heavy checks it undergoes at the 130 Air Engineering Depot, Nur Khan Air Force Base. Intensive inspections, gigantic technical appraisals the Hercules is submitted to, during which the transport plane is completely stripped down and overhauled by taking out all its systems, and returning the Hercules to full working condition - it all happens in the hangars at No 130 AED. Delays in overhauling a Hercules are out of the question."

by S.Khalil

This C-130 will be submitted to thousands of hours of work, structural inspection and updating equipment at the AED 130 workshop.

The PAF's primary transport is the C-130. Over its 50 years' service history, the C-130 has proven itself capable of carrying impressive amounts of loads including airframes and engines of JF-17 aircraft from China. Operations tend to run swiftly and smoothly when it comes to the Hercules. PAF has worked through the years to modernize the cargo plane in essentially every way. But like all aircraft, they are subject to damage. Severe weather, unforeseen accidents, plus distress of everyday operations all take their toll on these powerful machines. Aircraft structural repair plays vital role for these planes to sustain. To keep the PAF's fleet of C-130s airborne, the 130 AED, keeps them serviced well and are run on strict schedules for repair and maintenance work.

"AED is where all of PAF's C-130s come to be stripped down, refurbished, repainted and rebuilt, when it's time for some heavy-duty maintenance. It's one of the most fascinating facilities," said Gp Capt Azhar Mahmood, who is OC 130 Air Engineering Depot, PAF, at the Nur Khan Air Base.

On a warm Friday morning in May, the Second to None team had the chance to see in person what it took to keep the C-130s flying, and meet the engineers and technicians, whose job it was to look deep into the structural components of decades old airplanes. There was constant flow of activity in one of the two Air Engineering Depot (AED) hangers. Several dozens of specialists in the work of totally dismantling the monster, had stripped a Hercules Tail No 4148, of its wings and the vertical stabilizer. Thousands of round trips and flight hours in the air had left their mark on this beast.

The technicians knew it better than anyone. It was a monumental surgical operation, carried out by engineers and technicians, always strictly according to the rules, high precision work, top of the range services and detailed plans.

"The Hercules is one of the largest and oldest military planes in its class. In fact, Pakistan is one of the fewer countries in the world flying B and E variants of the C-130. In most of the countries, they are museum exhibits," said Grp Capt Azhar Mahmood, who is the OC 130 Air Engineering Depot, PAF, at the Nur Khan Air Base.

As one job made way for another inside the aircraft so it did outside. Sqn Ldr, M Omer Shahid, who is the Chief Maintenance Officer of No 130 AED, PAF and his colleagues painstakingly scanned every inch of the outer skin. Even inconspicuous damage could cause serious problems. Many covers had already been removed and work continued under the shell. No one had checked here for six years. "Engineers look for slightest deformation or signs of wear. We look at everything or something will get overlooked," said Sqn Ldr Omer Shahid.

On Dock B, another colossus had been disassembled. Perched on hydraulic jacks and work platforms placed at different heights around the plane over 100 men were in action. Every detail was controlled because what looked like a scratch could have serious consequences.
For decades this Hercules, Tail No 4148 has been a critical air mobility asset allowing combat forces to be quickly deployed for training as well as humanitarian assistance to any location in the country and in the world.

"To some it may only be a scratch. For us its serious structural damage," he said Sqn Ldr, M Omer Shahid. Under the floor and running along its walls revealed an 11 to 12 kilometers long network of wiring. Cables outside of tolerance range would have to be replaced to bring the aircraft back to its normal configuration - flight command radio, fire detection cables, and so many more connections, all verified one by one. Even the fuel cells were inspected, from the inside. The engines, however, were transported to the Pakistan Aeronautical Complex (PAC) that supplied numerous parts for the C-130s, the officer explained.

Top: Its not just the wings that succumb to wear during flights. The interior too takes a beating especially on short flights compared to long hauls and is taken apart.

Left: Load and vibrations are too intense. Parts that used to be replaced completely are now being overhauled at AED.

Bottom: Walls and ceiling, everthing stripped to expose wear and tear.

Damage to the sloping longeron had compromised structural integrity of this heavy lifter. "Until five years ago, it used to be replaced with a new one. Then the AED figured it could be repaired as per publications and certified by OEM, saving massive costs on new parts," Omer Shahid elaborated.
This C-130 Tail No 4148, was inducted in December 2022 and was on 50 percent inspection. Engineers particularly scanned the bulkhead panels, an important structural component subjected to excessive corrosion and vibrations. Floor panels removed, dents, cracks, and loose rivets, were all circled with blue marker and tagged and weathering identified in the wheel wells.

One of the Sqn Ldr's colleague had a dangerous job. His workplace that day was the interior of the left wing. Where he lay, there is usually thousands of gallons of jet fuel. There are no least popular tasks and sometimes just a lot of work. Every second is used until departure.

At the AED, most rewarding is being part of something so big, to see the aircraft go from grounded to pieces to airworthiness in less than a year's time. It's rewarding and exciting, the team members of AED said.

It doesn't only take a book that tells them how to perform a task, they have to use a little brain power to put things into action, writing the book as they go. Spending every minute of every day for almost a whole year allowed ground crews to see the little bits and pieces they did not usually get to see. "It brings you closer to the aircraft. Makes you actually care about it and the crews invest so much time in it that it becomes our baby," Azhar Mahmood said.

One could feel the cutoff date getting closer and the aircraft had to be delivered. "You can feel the effervescence especially near the final days of handing over the aircraft to the pilots," said Sqn Ldr Ubaid Majid, who is Oi/C A/C Production, Sqn No 130 AED, Nur Khan Air Force Base, Chaklala.

Delays were expected when spares were not easy to get hold of. If the teams did not meet the deadline, the grounding period increased. The induction of the next aircraft depended on production of the previous aircraft, the officer explained.

In the last 12 to 15 years, there were 24, 000 entries of structural defects registered. In one corner sat a repaired engine mount. In the past, to replace it with a new one set the air force back $50, 000. A rainbow fitting, disassembled, also repaired indigenously and confidently saved the air force another $100, 000. A new workshop enabled engineers and technicians to overhaul fuel cells in house, which otherwise set the PAF back Rs5 million to Rs6 million for transportation alone, saving two sorties to Karachi.

Top: There is one particularly perilous job inspection of fuel tanks inside the wings. A specially trained crew member climbed inside to ensure there was no corrosion. It takes place in dark and cramp conditions.

Left: Service crews work on the final details. Its a great responsibility.

"Even minor faults are guaranteed to last for six years," Sqn Ldr Ubaid Majid said proudly.

For the next part of the tour, the Second to None team saw highly advanced pieces of tech at the Non-Destructive Inspection (NDI) section. And if you liked playing with microscopes as kids, you'll love this one. At the Nur Khan base scanning machines can detect cracks and irregularities in aircraft parts that are not visible to the naked eye. "Aircraft like the C-130 were built decades ago. By the time they retire it could be many years that these things are flying. So naturally parts of the aircraft are going to have damages to the structural components. With the help of these instruments technicians deep dive to see if there's any instability,

cracks or corrosion that requires to be fixed," said Sqn Ldr Ubaid Majid.

The Second to None team got to see the hands-on maintenance, the science and technology - ultrasonic devices, x-ray gizmos and magnetic testing behind fixing the old aircraft. It was like an art form, having to deal with a lot of corrosion and holes in the aircraft. "It's a new adventure every time. No repair is ever the same," said Sqn Ldr Ubaid Majid elaborating that there was almost nothing they could not make and fix at the 130 AED where the crews were trained to maintain and repair the malleable and ductile and metal. Since the induction of C-130 aircraft in Pakistan Air Force Inspection Repair as Necessary (IRAN) maintenance concept was implemented. Following the USAF experience of transformation from a conventional IRAN inspection to structurally intensive Programme Depot Maintenance (PDM) in 1979, the PAF also switched over to the new concept. This programme, besides fulfilling requirements of earlier IRAN inspection, also included extensive Non-Destructive Inspection (NDI) of critical structural areas.

Initially, PDM inspections of PAF C-130 aircraft were accomplished by sending these planes abroad, at original equipment manufacturers' authorized (OEM) facilities in Peru and Singapore. This resulted in exorbitant costs in terms of foreign exchange and also increased the grounding period of the C-130s, affecting the air transport operations of PAF. To achieve self-reliance and to avoid foreign dependence, the 130 Air Engineering Depot (AED), was established at the then PAF Base, Chaklala in 1993.

In little over two decades, the depot had completed PDM inspections of 66 aircraft including four C-130s of allied countries. The AED teams flew to Nigeria and Sri Lanka to overhaul their C-130 aircraft, in the respective countries. It's an ongoing arrangement between the air forces of these countries

Top Left: Venturing into the massive hanger that houses repairs done to this massive cargo plane.

Top Right: A unique occasion to scan this high performance monster during a precisely orchestrated job.

Left: Little by litte, the hightech cabin takes shape, which will soon be fitted with true high tech screens.

Bottom: Aircraft after overhaul is ready for Functional Check Flight (FCF).

NO 130 AED : YEAR WISE PRODUCTION DATA

Average inspection cycle 69 months

S No	Year	No of Aircarft Produced Each Year	Total Aircraft Produced
1	1993	NIL	0
2	1994	1	1
3	1995	2	3
4	1996	4	7
5	1997	NIL	7
6	1998	1	8
7	1999	3	11
8	2000	3	14
9	2001	1	15
10	2002	3	18
11	2003	1	19
12	2004	2	21
13	2005	2	23
14	2006	2	25
15	2007	1	26
16	2008	2	28
17	2009	2(01 SALF)	30
18	2010	3	33
19	2011	2	35
20	2012	3	38
21	2013	2	40
22	2014	4(01 SLAF)	44
23	2015	2	46
24	2016	3	49
25	2017	3	52
26	2018	4	56
27	2019	1	57
28	2020	3 (01 NAF)	60
29	2021	1	61
30	2022	3	64
31	2022	2 (01 NAF)	66

with the PAF. “The only C-130s flying in the Nigerian Air Force are ones overhauled by Pakistan Air Force,” said Officer Commanding (OC) 130 Air Engineering Depot, PAF Grp Capt Azhar Mahmood.

It was this attitude of tackling challenges, overcoming impediments and the demonstrated commitment to prevail despite the odds that has earned PAF the nation’s respect.

The PAF maintains that the depot has played a pivotal role in the defence of motherland by accomplishing PDM and structural repair for PAF assets and other tasks assigned by Air Headquarters from time to time in a highly professional way by keeping safety as paramount. It has evolved into a viable engineering organization of excellence for the PAF’s transport fleet and is able to mark its potential regional repair center for C-130 aircraft.

Today, the entire PAF C-130 fleet has been modified to glass cockpits or integrated avionics upgrade programme (IAUP) and are being further improved to advanced settings such as Communications Navigation Systems (CNS) 2020, following western operational requirements. These modifications were mandatory for long haul transport operations.

After 69 months of flying, costs of one PDM stand at $10 million to $12 million compared to $35 million to $40 million per year, if the aircraft was sent abroad for complete structural overhaul.

It’s been an impressive exercise. Taken apart and put back together, it’s these overhauls carried out by highly skilled engineers and technicians that PAF can provide maximum safety to its flying crews thus making C-130 one of the safest planes. These heavy checks are not only technical challenges but also recount remarkable stories of men and women united in their passion for the air force.

Outside on the tarmac of the Nur Khan air base, another C-130 was undergoing final functional check flights. Pilots verified if the fixes had been done correctly, and if not they would give feedback. But that has never happened. From the pilot’s seats electrical and hydraulic circuits were reconnected, systems rebooted, tested, radars verified one last time and unforeseen details were rechecked that could shake up schedules.

As the induction brought the PAF into the modern age, several variations and upgrades have been made over the years to the C-130s. This aircraft was used extensively and played an integral role in several dire situations. The restoration of the craft and the paint job had been carried out with precise historical accuracy and because of that an important piece of history could be viewed today in its original form. If given a chance to see these remarkable pieces of history in person, one would pause for a moment to realize and respect the impressive journeys these aircraft have taken throughout their flight times.

For the airmen at AED, these are people passionate about their work. When they have a colleague struggling with an important and delicate task, there is solidarity from other team members, who come to help, suggest solutions, and offer different ideas. They are not the kind to go looking for the spotlight. They do their jobs just fine without getting pats on the back. Of course, when something breaks down that’s when the spotlight finds them. There’s passion, pride and sense of ownership. Thanks to this know-how, collaboration between engineers and technicians, the C-130 goes on improving, pushing to make the aircraft better and the future of C-130 is constructed.

As it returned from a brief test flight, and engine tests validated, the C-130 parked on the tarmac was declared operational. It was about to begin a new life. A challenge had been met bang on time. Its next flight to Sargodha, Karachi and back to Rawalpindi, had already been scheduled.

Left: Inspection crews circle signs of wear with blue marker, centimeter by centimeter.

Left Page Top Left: Shifts working on various parts pass the baton back and forth. Parts are put under X-ray machines and neon lights to identify and cracks, invisible to the naked eye.

Left Page Top Right: Forces that are exerted on its parts are tremendous, especially the vertical stabilizer.

Left Page Center: A fully restored belly of a C-130, to its original strength.

Left Page bottom: Vigilance is maximum-The under carriage section of the aircraft is equally sensitive component of the mythical beast.

Bottom: Driving Force-The men and women who keep Pakistan Air Force flying ensure maintenance is done according to international standards.

PAF AIRWORTHINESS CERTIFICATION AUTHORITY (PACA)

Enhancing Operational Capability with Safety

by Editorial Team

Modern air power is technologically complex and resource intensive. It is therefore expensive to obtain, maintain and upgrade. Quaid-e-Azam in his famous speech in 1948, which is a source of inspiration for the PAF, emphasized the need of self-reliance. PAF vibrant R&D program is the manifestation of Quaid's vision of "Self-Reliance" to minimize dependence on OEMs. As PAF develops its indigenous products, it was important to put in a place an independent system of qualification which ensures that the indigenous developments fulfil the applicable aviation standards and global best practices to ensure safety and performance. Airworthiness certification is, therefore, an important element of R&D eco-system. PAF leadership cognizant of the fact established the *PAF Airworthiness Certification Authority (PACA) in August 2017, with the mission to "enhance operational capability with safety".*

In order to ensure that PACA is established on sound footing, a detailed study of well-established military and civil airworthiness frameworks (e.g. USA and Europe) was carried out. Based on the study, PACA formulated its organization structure, systems and processes in the form of AFOs and Airworthiness Procedures considering PAF force structure, environment, and needs.

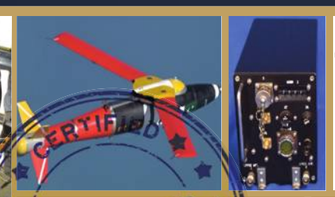
RECOGNIZED BY US NATIONAL AIRWORTHINESS COUNCIL

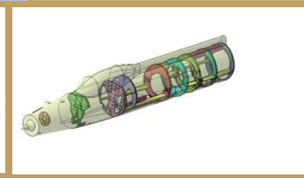
Since its establishment, PACA is undertaking airworthiness certification of all new development(s)/ indigenization tasks, integrations, modification, major repairs and life extensions on PAF aerial systems. To date, PACA has undertaken ***more than 200 certification projects*** of varying complexity on multiple aerial platforms and has issued more than ***1250 Airworthiness Approvals,*** with ***Zero in-flight Occurrence*** related to these approvals. PACA has been able to achieve this through a knowledge driven airworthiness certification process with organic capacity of its HR having subject matter knowledge and qualification in multi-disciplinary domains.

Soon after assumption of PAF command, the Worthy CAS enhanced PACA's mission statement to additionally ***"Support National Industry to achieve Aviation Quality".*** To fulfil this objective, PACA has re-located its three directorates at PAF NASTP facilities across the country. PACA in collaboration with PAF NASTP is offering airworthiness training, customized guidance and airworthiness certification services to the civil industry of Pakistan.

PACA is cognizant of the importance of global recognition/ acceptance of its structure, systems and processes used for airworthiness certification of parts/products. It is envisaged that a well reputed, internationally recognized and connected PACA would provide competitive advantage to the local industry for marketing PACA certified parts/products at the global level. In this context, PACA underwent two thorough audits of US National Airworthiness Council (NAC) experts in May '22 and Sep'23, as per well-established global framework of recognition. By the grace of Almighty, ***PACA has been Recognized by US NAC for a period of four years. Additionally, a Mechanism of Cooperation (MoC) with Turkiye in*** training and joint airworthiness certification of aerial platforms has been signed with SSB Turkiye in January, 2023. PACA has also been involved in establishment of Royal Saudi Air Force (RSAF) Airworthiness Authority. After providing training to 09 RSAF officers in Pakistan, 03 PACA officers were placed at RSAF. The RSAF and PAF team jointly have successfully established its first airworthiness directorate in 2023. PACA also has a ***Training Collaboration with DASA Australia for its capacity building,*** where a recurring slot of MS Airworthiness Engg for PAF officers in Australia is offered free of cost. A Synopsis agreement for Bilateral Collaboration and mutual recognition in airworthiness domain also exists with DGTA Malaysia.

PACA aims to unceasingly enhance its organic capacity and keep its processes and procedures updated as per the global developments to accomplish its mission of enhancing operational capability with safety, while striving to become a world class military airworthiness authority as per its stated vision.





AN UNTOLD STORY

A KILL WITHOUT A PRICE

The tale of a PAF radar controller credited with the kill of an Indian jet fighter

"In a remarkable display of ingenuity and resourcefulness, a PAF Air Defence Controller showcased exceptional out-of-the-box thinking while sitting behind his radar screen near Lahore. This gripping account highlights how his quick wits, innovative approach, and remarkable ability to adapt and improvise, led him to down an Indian Air Force jet across the border, proving that intelligence and creativity can be as mighty as any weapon on the battlefield."

by Air Commodore (R) Khalid Chishti

War is an armed conflict between two or more rival groups. It has existed since time immemorial. In the recorded history of the last 5000 years, mankind has witnessed all kinds of wars and battles of varying magnitudes and scales in different parts of the world. Wars have been waged for different reasons and motives, including competition to occupy lands, hegemonic designs, religious conflicts, and nationalism. Imperialism, racism, and slavery have also caused armed conflicts in different periods of history. During hostilities, depending on the nature of the conflict, all possible military resources are employed to inflict military, economic, and social damage on the enemy. The grand objective is to force the enemy to capitulate, thus enabling the winner or the dominating side to gain a psychological and moral advantage during the post-war negotiations. That is why everything is said to be fair in war and love, and every effort is made to cause the enemy irreparable loss through all possible means and methods as well as by exploiting every opportunity.

If we look at the effectiveness and efficacy of combat operations of Pakistan Air Force during the 1965 and 1971 wars, it will be abundantly clear that the pilots, engineers, air defence controllers, air traffic controllers, technicians and civilians of the nation's arms have always performed exceedingly well. Unfortunately, in the 1971 war, Pakistan lost its Eastern wing. In the aftermath of the lost war, many valiant warriors who had displayed unparalleled bravery and patriotism were relegated to the obscurity of unsung heroes. Generally, when we talk about victories in the air, only the heroic tales of pilots flash into our minds, because primarily it is they who go into action and inflict losses on the enemy within their own country's air space as well as inside the enemy territory. What is most amazing and riveting is the story of a war hero sitting on the ground, across the radar screen with no weapons. Yet, he destroyed neatly an enemy fighter jet.

Air Commodore Farooq Haider (R) is adored as an ace radar controller

Title Photo: IAF Gnat Aircraft.

Right Above: Group Captain Farooq Haider while commanding an Air Defence Wing.

Right Inlet: Air Commodore Farooq Haider, with the author during the interview.

Left Inlet: Air Commodore Farooq Haider's proud career of the PAF (inland & abroad) at a glance.

of the 1965 and 1971 wars. Narrating his feat of courage and professional brilliance, the famed veteran and war hero of Pakistan Air Force, Air Commodore Sajjad Haider (R) says: "Farooq Haider was one of the best Air Defence Controllers who possessed a very calm but timely judgment and commanding voice". It must be kept in mind that in the 60s and 70s, fighter jets were either without airborne radars or had very limited range. As such, the role of the ground controller to find out the enemy's position, direction, and relative distance was very critical for the combat pilots. Primarily inducted into the GD Pilot Branch, whilst undergoing training at PAF Academy, Farooq was selected for training at the US Air Force Academy. As ill luck would have it, due to heart murmurs, he was absorbed into the Air Defence branch. Air Defence officers use radar from the ground to guide fighter pilots and inform their own aircraft about the presence and location of enemy planes in a timely manner.

Flight Lieutenant at that time (later retired as Air Commodore) Farooq carried out numerous radar control missions in the 1965 war and acquitted himself as a highly reliable and proficient radar controller.

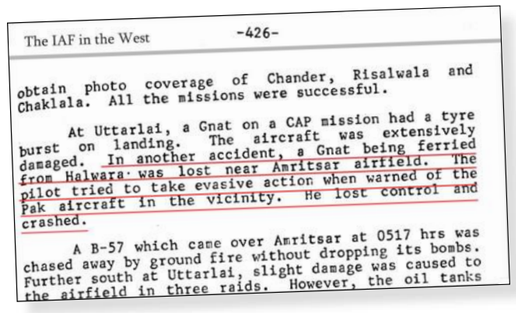
Just before the outbreak of the 1965 war, on 1st September 1965, PAF scored its first victory when Squadron Leader Sarfraz Rafiqui and Flight Lieutenant Imtiaz Bhatti shot down

Left: The victim IAF pilot.

Left Bottom: An excerpt from the Indian Air Forces war history, substantiating the kill.

Right Page Above: Group Captain (then) Farooq Haider, receiving Air Marshal Sharbat Ali Changezi.

Right Page Bottom: Geographical depiction of the kill.



The IAF in the West -426-

obtain photo coverage of Chander, Risalwala and Chaklala. All the missions were successful.

At Uttarlai, a Gnat on a CAP mission had a tyre burst on landing. The aircraft was extensively damaged. In another accident, a Gnat being ferried from Halwara was lost near Amritsar airfield. The pilot tried to take evasive action when warned of the Pak aircraft in the vicinity. He lost control and crashed.

A B-57 which came over Amritsar at 0517 hrs was chased away by ground fire without dropping its bombs. Further south at Uttarlai, slight damage was caused to the airfield in three raids. However, the oil tanks

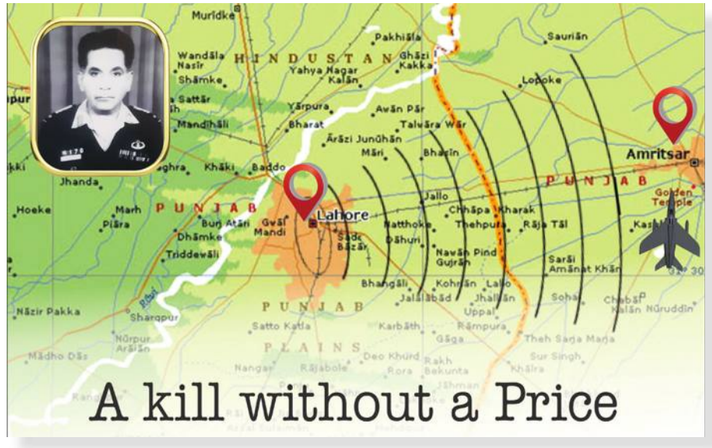
Indian Vampires, two each, in Chamb sector while these were attacking Pakistani troops. Rafiqui closed in fast and shot down two Vampires and then, like a great leader and skilled pilot, he let his No.2, Bhatti, prove his mettle and he also claimed two Vampires. All the Vampires were downed in full view of the baffled Indian troops. The IAF was hugely devastated and withdrew immediately about 130 Vampires and over 50 Ouragons from the war theatre which means 35% of IAF was grounded in a single mission. On the ground, sitting on radar scope, Farooq Haider accomplished a singular feat by vectoring timely and accurately the PAF jets to the target area.

In another pre-war mission on September 3, 1965, Squadron Leader Yousuf, strapped in an F-86, singly faced six Indian aircraft. Later, Flying Officer Abbas Mirza (retired as Air Vice Marshal) to provide support with his F-104 Starfighter. It was during the same mission that an Indian Gnat aircraft had to force-land at Pasrur (Pakistan). Flt. Lt. Farooq Haider was yet again the controller of this memorable mission.

The real axis in the 1971 war was East Pakistan. During this conflict, as a part of its defence strategy, Pakistan Air Force had to operate cautiously in order to preserve its assets and effort. This was done considering the possibility of launching a major attack against India from West Pakistan and the eventuality of providing full air support for the ground forces to succeed. It was a painful situation for the pilots and the controllers of the Pakistan Air Force in West Pakistan, who were fully poised to challenge the Indian Air Force fighter jets which were violating brazenly Pakistan's airspace. The air defence controllers in the West were confident that if allowed to intercept these intruders, they would make sure to decimate the majority of Indian aircraft. During an exclusive interview with the author, recalling his war experience fifty years ago, Air Commodore Farooq Haider (R) reminisced, "One day sitting idle on the radar scope I was feeling bored as there was nothing to do. I spotted a blip on my radar screen. This was inside the Indian border near a place called Patti on the main road south of Amritsar (India). The aircraft was heading towards Amritsar. To kill monotony, a strange idea flashed in my mind, and I decided to intercept the enemy fighter jet

without any real fighter interceptor force with me at that moment. So, I picked up the microphone and began talking to an imaginary PAF interceptor formation in the air. While communicating instructions to our fighter jets'(imaginary), I told them NOT to respond to my radio calls. I knew that my radio communication was being monitored by Indian radar controllers. To make the enemy gather from my radio transmission through interception that I had the real jet fighters in the air, I continued urging our 'fighter jets' not to respond to my instructions on the radio. I kept conveying the actual position of the enemy aircraft. I believed that when the Indian radar controllers realised that I was accurately reporting the position of the Indian jet fighter, they would trust that my interceptor force was real. Throughout this fake interception, obviously, there was no acknowledgement from our 'fighter aircraft'. In order to convince the Indian controller that my interceptors were in close proximity to their jet, I kept reminding our pilots not to acknowledge my radio calls. As soon as my 'fighter jets' closed on to the enemy jet fighter, the range became lesser and lesser and the angle of attack became favourable. The enemy aircraft was flying low level so I adjusted the altitude of 'my fighter jets'. When the range became gradually very close, I directed 'my fighter jets' to shoot the enemy and exit the area maintaining a low altitude without announcing on radio outcome of the shooting. "They" were instructed to share the result only after landing. On return of 'my fighter interceptor' I monitored the Indian jet a little north of Amritsar, close to the IAF base, located along the northern side of Amritsar city. After a while, it disappeared from my radar screen. I as well as my colleagues had no idea about this aircraft and thought it had finally landed."

For Air Defence Controllers, the most credible source to ascertain the result of a combat mission is to have their own fighter pilots reporting the outcome of a battle. It is the pilot who can see the enemy aircraft till the last moment and is in a better position to confirm whether the target aircraft was destroyed or it had managed to escape unscathed. But in this case, there was not a single Pakistan Air Force jet in the area. Even years after the end of the war, Sqn. Ldr. Farooq Haider and his comrades had no knowledge of whether the aircraft had crashed or landed safely. Three decades after the end of the conflict, the war data was officially compiled and documented in the shape of a diary called " IAF in the West." The war diary included numerous factors like air raids, aerial kills, victories, and the details of own losses in comparison with the enemy. By looking at this diary critically (examining specifically chapter 10, page 427), one can establish conclusively that the IAF Indian Gnat aircraft crashed on December 7, 1971, at the same time and place. The record states: "In another accident, a Gnat being ferried from Halwara was lost near Amritsar airfield. The pilot tried to take evasive action when warned of the Pak aircraft in the vicinity. He lost control and crashed". The only fact missing in the whole text is the falsely believed presence of Pakistan Air Force fighter jets in the area. Sqn. Ldr. Farooq Haider accomplished the rare feat of destroying the enemy aircraft, using a unique air warfare tactic: applying his extraordinary mental and professional skills. This was most incredible because never in the history of air warfare was such a prank taught or discussed in books. Slaying an enemy aircraft without engaging its own jets, without expending even a single litre of gasoline and firing a bullet is hitherto a nonpareil feat. It can be rightly described as a 'kill without a price'. Farooq Haider deserves a standing ovation for making this happen. Sadly, it took an enormously long time to find out from across the border the success of this unprecedented mission. For lack of conclusive evidence over a span of half a century, the PAF and the Nation couldn't commemorate and celebrate Farooq's marvellous achievement as it deserved.



A kill without a Price

For an honourable air defence controller infused with deep patriotic passion- the like of Farooq Haider- there is always abundant solace in being once part of an epic air campaign and being honoured (albeit inordinately late) as a war hero who contributed handsomely to PAF's tally of kills.

HAS THE LAST PILOT ALREADY BEEN BORN?

Title Photo: Depiction of future human drone taxi.

Right Inlet: Render of Boom Aviation supersonic commercial aircraft.

"In the dynamic aviation industry, giants strive to create eco-friendly, cost-effective aircraft to combat global warming. Electric propulsion, hypersonic travel, and pilotless planes are pushing boundaries. Imagine a world where the sky becomes a realm of autonomous choreography, where trust in technology meets human ingenuity. Such a vista demands an unwavering devotion to enhancing collaboration, streamlining processes, and developing advanced algorithms capable of anticipating every conceivable scenario with unwavering precision. The key question remains: will passengers embrace pilotless flights? Trust, safety concerns, and seamless air traffic control are challenges. A world with pilotless planes is possible, but rigorous testing and safety measures must earn our trust for this vision to take flight."

by Ajlal Khalid Chishti

As a young boy growing up in various Pakistan Air Force air bases, I was immersed in the world of fighter aircraft due to my father being a fighter pilot. The sheer presence of these magnificent flying machines, coupled with the bravery displayed by their pilots in their impressive gear, left an indelible mark on my impressionable mind. The idea of soaring through the skies at supersonic speeds and executing breathtaking aerobatics consumed my thoughts during those formative years. However, as I grew older, I discovered that my eyesight did not meet the required standards for fighter pilots, leading me to choose a different path as a Systems Engineer instead. Although my profession now lies in Systems and Artificial Intelligence (AI) in Australia, my passion for flying remains intact. As someone deeply passionate about aviation and an avid recreational flyer, combined with my work experience, I humbly aim to analyse and visualize the future of aviation in general.

The progression from the Wright Brothers' first flight to the utilization of jets in warfare occurred in a remarkably short span of fifty years. A mere two decades later, mankind accomplished the extraordinary feat of landing on the moon. While this pace may seem slow to aliens equipped with anti-gravity technology, for us humans, it was an astronomical achievement considering the materials and principles of physics available to us. Technological advancements have led to improved automation and computational capabilities, which greatly assist pilots in their duties. I remember as a kid how my father used to show me a rudimentary way of calculating distances for his practice bombing runs with printed charts and wooden scales having to rely on an unreliable compass to achieve mission success. Since then, both military and commercial aircraft have come a long way and are now equipped with clever and intelligent tools to assist pilots. With the abundance of processing power available on board today, pilots are assuming more monitoring roles, especially in commercial aircraft. In fact, during an average eight-hour commercial flight, the actual hands-on flying time amounts to a mere thirty to forty minutes! This prompts a serious question: Are pilots truly necessary? Would you feel comfortable embarking on a long-haul flight if no one was at the controls? The notion is undeniably unsettling.

Autonomous planes are on the brink of integration into commercial aviation due to their cost-saving and affordability potential, with airlines projected to save up to $35 billion annually by adopting pilotless aircraft. Though passenger acceptance may require time, airlines are also actively exploring hybrid and electric planes to not only reduce emissions but also enhance overall cost-efficiency in their operations.

The progress in battery technology has paved the way for the development of electric and hybrid aircraft, allowing for increased energy storage capacity and extended flight durations. In the case of electric aircraft, onboard batteries power the electric motors, eliminating the reliance on fossil fuels and significantly reducing the carbon footprint of air travel. On the other hand, hybrid aircraft combine electric and traditional fuel-powered engines, providing flexibility and an extended range. Conventional engines can serve as backup power sources or support the electric systems during high-power demand phases, such as take-off or climbing.

This hybridization strikes a balance between sustainability and practicality,

ushering in a new era of greener and more environmentally friendly aviation.

Next comes the need for speed - While supersonic aircraft have long dominated military aviation, commercial aircraft have traditionally remained subsonic, except for the remarkable Concorde which has now been decommissioned. Since then, no supersonic airliners have been in service. But the future is about to change as companies like Boom Supersonic are ushering in a new era with innovative aeronautical technologies and plans to introduce a supersonic airliner of their own by 2030! Aviation engineers and designers are working hard to overcome the difficulties of high speeds and are researching hypersonic flights as well. A hypersonic aircraft goes much faster than the speed of sound and faces complex issues like very high temperatures and pressures. It has the potential to revolutionize aviation by enabling incredibly fast travel, but there are still technical, safety, and economic challenges that need further research to overcome.

Another significant facet of aviation advancements is the rise of space tourism. It represents a remarkable milestone in the industry, enabling civilians to experience the wonders of space travel. Space tourism, once a sci-fi fantasy, is now a thrilling reality, thanks to private space companies like Virgin Galactic. With innovative spacecraft and a visionary approach, they have made space travel accessible to more people, sparking renewed interest in exploring the cosmos. Space tourism companies today offer extraordinary journeys, fulfilling personal dreams while advancing space exploration. The future of space tourism holds immense potential for discovery, growth, and expanding human horizons.

Thus far, we have discussed how in just over 100 years, aviation has made incredible progress. We went from learning to fly and then to flying faster, and farther. Aviation is a shining example of innovation and is now one of the safest and most reliable modes of transportation in the world. Currently, there are over 100,000 commercial flights happening worldwide every day, with more than 400 departures per hour! This rapid growth however coupled with increasing air traffic creates significant challenges not only for pilots but also for air traffic management systems. The continuous surge in air travel requires effective coordination, reliable infrastructure, and highly skilled professionals to ensure safe and efficient flight operations. To meet these demands, the aviation industry must continuously advance technology, implement innovative solutions, and streamline procedures to uphold safety and effectiveness even outside the cockpit.

In today's rapidly evolving world, air traffic controllers play a crucial role in guiding aircraft safely through the skies, and maintaining direct communication with pilots via radio transmissions. However, the current human-centered system is struggling to keep up with

the exponential growth of commercial air traffic, not to mention the projected expansion of unmanned and self-piloted operations. To address this challenge, an autonomous air traffic management system is imperative. Airbus, a pioneering force in the aviation industry, leads the way with cutting-edge Unmanned Traffic Management (UTM) technologies. UTM revolutionizes the integration of Unmanned Aerial Systems (UAS) with traditional aircraft, operating as a decentralized and scalable network of services. Through advanced automation and AI, UTM ensures safe airspace operations, efficient traffic flow, and compliance with aviation regulations. It enhances situational awareness, enables real-time decision-making, and fosters effective coordination between manned and unmanned aircraft, facilitated by collaboration and information sharing among stakeholders. UTM opens new possibilities for drones and unmanned aircraft in our airspace, with safety, efficiency, and collaboration at its core, shaping the future of aviation and unleashing exciting opportunities in the field of unmanned aerial systems.

In conclusion, the future of aviation is poised for remarkable advancements and transformative changes. Sustainable aviation fuels, advanced materials, and design innovations are boosting efficiency and performance in aviation. Additionally, the evolution of air traffic management systems, including the integration of unmanned traffic management, ensures safer and more efficient operations. Passengers can look forward to a revolutionized experience with enhanced cabin designs, improved in-flight entertainment, and better connectivity options. While these advancements may take time to fully materialize, the future of aviation shows great promise, aiming for greener, smarter, and more seamless air travel experiences. Moreover, the advent of autonomous commercial aircraft will offer commercial attractiveness by reducing flight crew costs, addressing pilot shortages, and providing added flexibility. The future of aviation is certainly bright and as it unfolds, one burning question soars above the rest: Has the last pilot already been born?

1: Depiction of (UTM) Unmanned Traffic Management.

2: Render of Virgin Galactic concept hypersonic commercial aircraft.

3: Depiction of concept future hybrid aircraft.

4: VTOL air commuter concept.

5: Virgin Galactic suborbital spacecraft.

Books References:

Future Flight: The Next Generation of Aircraft Technology *by William Siuru*

Free Flight: Inventing the Future of Travel *by James Fallows*

Website References:

https://unitingaviation.com/news/safety/how-will-traffic-management-change-in-the-future/

https://www.icao.int/Meetings/FutureOfAviation/Pages/default.aspx

https://www.aerotime.aero/articles/32760-aviation-short-term-future-outlook-klein

https://www.forbes.com/sites/suzannerowankelleher/2023/02/26/pilotless-autonomous-self-flying-planes/?sh=53cfcdd845ea

https://www.forbes.com/sites/suzannerowankelleher/2023/02/26/pilotless-autonomous-self-flying-planes/?sh=54e18ce845ea

Aerial Adrenaline

THE WORLD OF

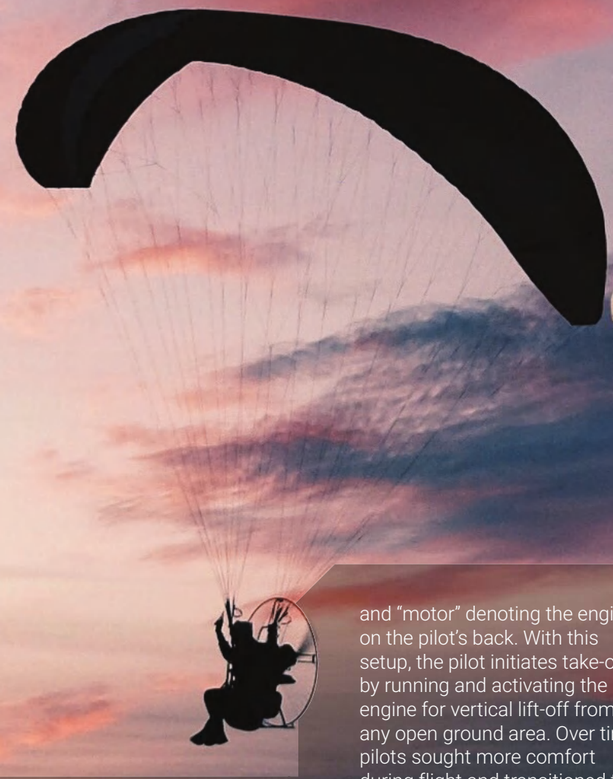
PARATRIKING, PARAGLIDING, AND PARATROOPING

"In the realm of aerial adventure, there exists a triumvirate of exhilarating experiences that defy gravity, harness the wind, and test the limits of human courage and skill. From the serene beauty of paratriking, where enthusiasts soar like modern-day hang gliders, to the heart-pounding thrill of paragliding, where individuals glide through the heavens, and finally, the adrenaline-pumping world of paratrooping, where daredevils descend from the sky with tactical precision, these three pursuits represent the apex of airborne excitement. Let's take a look at the brave souls who make the sky their playground, pushing the boundaries of adventure one breathtaking leap at a time."

by Ahmed Hammad

Paratriking, paragliding, and paratrooping – extreme sports that allow individuals to experience the sensation of flying in the sky, much like birds. Let's start by delving into paratriking. Paratriking involves using a three-wheeled car equipped with either one or two seats, depending on whether it's intended for solo flights or tandem flying. The vehicle, known as a "trike," features a large parachute that provides lift, and it is powered by a motor connected to a propeller. Imagine fulfilling your childhood dream of soaring gently into the sky, enjoying a breathtaking 360-degree view, and relishing the sights, scents, and sensations during a leisurely flight of around 20 minutes at low altitude.

This aircraft is known as a powered parachute, which combines the features of a paraglider with an engine. A paraglider is essentially a wing that a pilot wears while jumping from a height. By manipulating the wing, the pilot can steer and control its movement in any direction. The glider remains airborne due to factors like thermals or wind currents. However, unlike an airplane, a paraglider lacks an engine, which means that after take-off, it eventually descends to the ground for landing. To address this limitation, paragliding enthusiasts conceived the idea of adding an engine to their gear. This resulted in the development of foot-launched paramotors, with "para" signifying paraglider and "motor" denoting the engine on the pilot's back. With this setup, the pilot initiates take-off by running and activating the engine for vertical lift-off from any open ground area. Over time, pilots sought more comfort during flight and transitioned to sitting positions. This marked the era of paratriking, where gliders with attached canvas seats and engines were used. Some vehicles had three wheels (trikes), while others had four (quad bikes). Passengers sat on seats affixed to the vehicle, and eventually, the concept evolved to include a parachute with cells that inflate to create the parachute's shape. This parachute-equipped cart, still powered by an engine, experienced advancements such as the use of specialized aircraft engines. Notably, the Rotax 912, an Austrian-made 100-horsepower four-stroke engine, gained popularity for its ability to ascend to heights of up to 15,000 feet. This engine can bear an additional weight of about 700 lbs, accommodating the combined weight of the pilot and passenger seated in tandem. With fuel, it can fly for around 4.5 hours, covering distances determined by wind speed. Powered parachutes typically take off, cruise, and land at speeds of 30-35 miles per hour. Wind direction significantly affects travel distances, as flying against the wind reduces ground covered compared to flying with a tailwind. Remarkably, this aircraft holds records for both weight-bearing capacity and altitude, having achieved a flight at 19,700 feet, contingent on favourable conditions like wind, temperature, and humidity.



The parachute and cords require daily inspections to ensure their integrity. According to guidelines, they should not experience structural failures. The combined weight of the engine and aircraft is around 1160 lbs, while the wing's load capacity exceeds 2000 lbs, providing a substantial safety margin. The risers, connecting points between the parachute and cords, adjust according to the pilot's weight to maintain proper alignment. Passenger weight primarily affects the

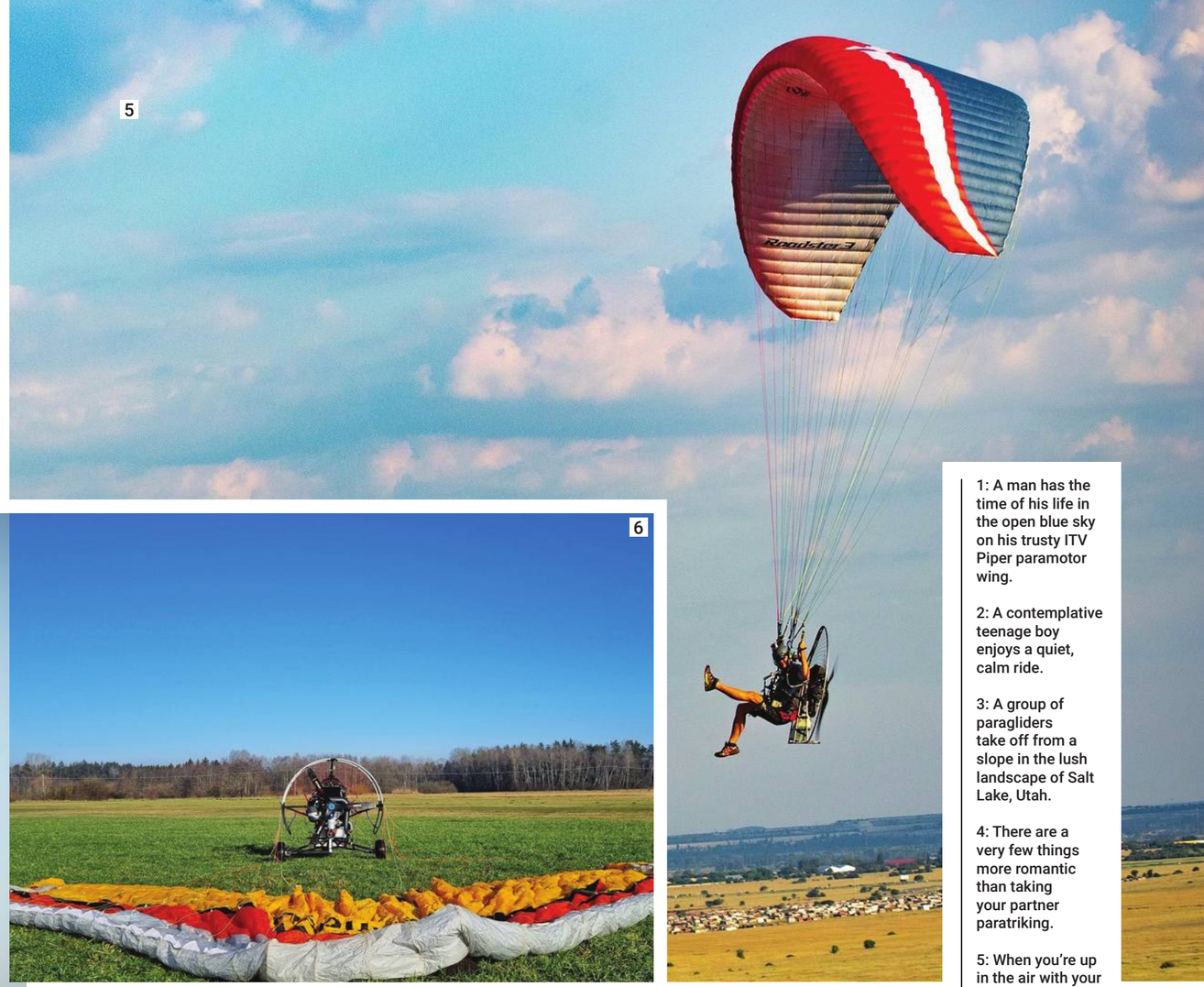
Title Photo: A man glides against a beautiful but rapidly setting sun.

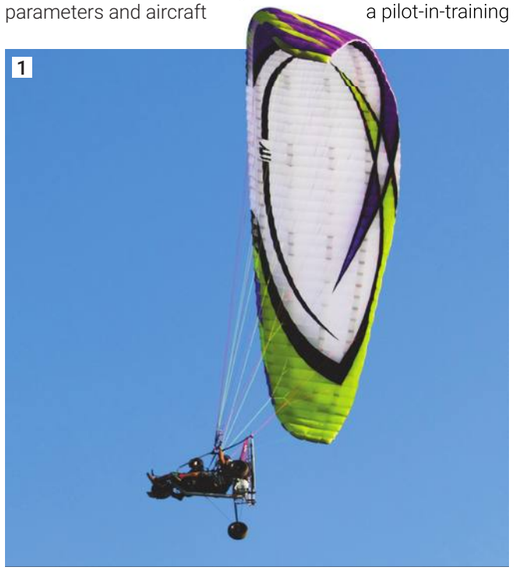
Top: Paramotors have unique, carefully-crafted wooden propellers, designed to be lightweight and effective.

Left Page Bottom: A glider soars over F9 park using a Pegasus 3, a wing which has great performance with or without a motor.

aircraft's tilt angle: reduced weight tilts the aircraft downward, while increased weight tilts it upward. Various cords, such as A's, B's, C's, D's, and even E's, connect at different points on the parachute. Braking cords attached to the rear control the aircraft and adjust the wing's camber, altering lift and direction. By manipulating these cords, pilots manage flight directions and wing performance, thus maintaining control throughout the parachute's flight.

The instrument panel in front of the pilot features an Engine Information System (EIS), displaying engine parameters and aircraft performance data, including speed, climb rate, and temperatures. By integrating a GPS, additional data can be obtained. The panel also hosts a radio, utilized for communication with the ground and other aircraft during flight. A control stick manages the front wheel, equipped with a braking system for gentle deceleration during landing. A compass indicates the aircraft's heading, while an airspeed indicator utilizes airflow to gauge speed in miles per hour. Throttle and choke controls manage engine speed and starting, respectively. Similar controls are placed at the rear, including a throttle for training purposes when a pilot-in-training occupies the front seat. For nighttime flights, landing lights and a beacon extend flying time by an hour, considering civil twilight. One of the most popular aircraft used for paratriking is the 'AirWolf', manufactured by Powrachute. Although these activities are currently a niche undertaking, there's no doubt that soon these adventures will become common and within reach of everybody. When that day comes, soaring leisurely in the sky will stop being a privilege and become a common, welcome sight for all.





1: A man has the time of his life in the open blue sky on his trusty ITV Piper paramotor wing.

2: A contemplative teenage boy enjoys a quiet, calm ride.

3: A group of paragliders take off from a slope in the lush landscape of Salt Lake, Utah.

4: There are a very few things more romantic than taking your partner paratriking.

5: When you're up in the air with your wing, all the stress and troubles stay on the ground.

6: A paratrike about to take-off in the open plains of Navarra, Spain.

7: Two paragliders fly in Tandem over Santa Pola in Alicante, surrounded by the magnificent blue waters of the Mediterranean Sea.

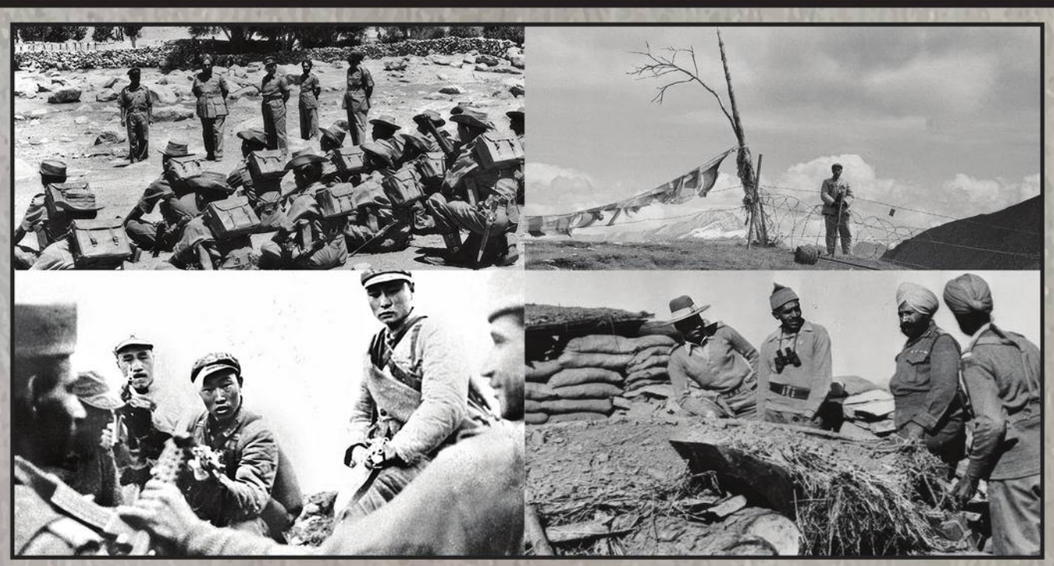
8: Excited to leave everything behind!.

THE HIMALAYAN BATTLE LINES

DECADES OLD CONFLICT BETWEEN THE TWO POWERFUL NATIONS POSE A THREAT TO REGIONAL STABILITY:

AN ANALYTICAL LOOK INTO THE LONG-WINDED COLD WAR BETWEEN THE REGIONAL POWERS

PART 2



"The 1962 Indo-China War is a frozen conflict. This mid-20th Century border war continues to define the contours of the 21st century regional security and stability atmosphere. While the conflict is concerning India and China, it is nevertheless the background which continues to exhort major and secondary effects on regional and global players."

by Air Cdre Salman Aziz (Retd)

Top: An Indian soldier stands guard over makeshift forts hastily built in Ladakh during the India-China War in 1962 (Photo: Three Lions)

Bottom: A war memorial stands at Nathu La in memory of the lives lost during the Nathu La and Cho La clashes of 1967. (Photo: Yogesh Ponkshe).

Post 1962 Military Events

Contrary to common understanding, there is more than one event in the Indo-China conflict. Excluding the 1962 war, there are more than seven major events between the two states over recognition of borders till date. Commencing in September and October of 1967, there were two separate incidents involving exchange of fire on the northern border between India and China with casualties on both sides[46]. This time, the area was close to Sikkim, then a protectorate of India. While there are several claims and counter claims from each side, the cause of these incidents was similar to the earlier border clashes of 1959 and 1962 i.e. troops coming in contact while the Indian army was putting-up border markers along with some other trivial issues[47].

However, more significant was an event in 1987 when the second border war between the two country's was predicted [48]. In this case too, a similar event occurred when the Indian army had started patrolling areas north of the demarcated McMahon line as far back as in 1984. This was after India politically granted NEFA the status of a province. Being disputed, the Chinese objected to the same. Consequently, the Chinese once again consolidated their positions. When the Indians found out, they airlifted a Brigade to the area and war was imminent. Nonetheless, by the summer of 1987, both sides disengaged and diplomacy, though antagonistically applied, did prevail. This incident coincides with a revived aggressive Indian policy of securing its frontiers - including the Siachin glacier issue with Pakistan that also formally commenced in 1984 [49].

Nevertheless, the first incident of the 21st Century occurred in 2013. This time, both countries ground forces took up aggressive postures with counter claims in the Aksai Chin area[50]. The two withdrew after diplomatic efforts with India dismantling few border posts that were viewed as aggressive Indian posturing by the Chinese. Hence the cause of the incident in this area is yet again related to Indian advances in a region that was required to remain demilitarized as per pre-1962 positions i.e. the convention being followed after the Chinese withdrawal after the war of 1962. Again in September 2014, a standoff occurred in the south of Aksai Chin as India started construction of a canal that was resisted by the local Chinese population[51]. After three weeks of standoff, both sides pulled back following hectic diplomatic efforts. Diplomacy worked in all these incidents – and at least until now.

In retrospect, the incident of 1987 occurred while there were gradually improving diplomatic relations between the two and mutual visits by important dignitaries including Prime Ministers (PMs) from both sides had concluded. However, the last two incidents i.e. 2013 and 2014 have occurred much later when trade, commerce along with diplomatic relations between the two have significantly improved. Note that bilateral trade between China and India exceeded US $73 Billion in 2012. Currently, it exceeds US $ 100 Billion for consecutive years from 2022[52]. The seemingly improving relations are met with exceptions as explained above. Even the 2013 event had occurred days before the Chinese PM's visit to India. Something India's neighbors including Pakistan need to remain cognizant of, and should draw important lessons.

However, more recent incidents involving conflict between Indian and Chinese military forces have taken place in January, 2020[53].

Left: Chinese soldiers guard the border on the Nathu La mountain pass connecting India and China's Tibet Autonomous Region. (Photo: Stringer).

Bellow: Wives and families of soldiers of the Assam Rifles in Tezpur during the 1962 War with China. (Photo: Terry Fincher).

Bottom Left: 1962 war - Chinese soldiers aim with the W85 heavy machine gun. (Photo: servimg.com).

Right Page Above: November 25 - 1962, soldiers of the Assam Rifles arrive at Tezpau after border clashes with China. (Photo: Terry Fincher).

In the incident, it is once again agreed that India's construction of a new road to a high-altitude Indian air force base is seen as one of the main triggers. What followed was a clash of Indian troops in May, 2020 in which the Chineese responded with sticks and fists in the 'Galwan' area on the Line of Actual Contact i.e. LAC. The incident left at least 20 Indian soldiers dead with several casualties while some causalties were also reported on the Chinese side. In September, 2020, shots were reportedly fired in frustration from the Indian side[54]- an event recurring after more than 45 years. The situation finally calmed down through diplomacy at state level and with the involvement of local military commanders up to Corps level. Until January, 2022, there have been approximately 14-15 such engagements of various types. The latest clash has been as late as December, 2022[55]. Nevertheless, for the time being, a doctored calm prevails[56] by both sides not trying to aggravate the situation[57]. Although India is attempting to enhance its support for the US in the Indian Ocean and play with its long held desires of adopting the position of a regional hegemon[58]. albeit the long history of such struggles in the region[59]!

Consequently, both have undertaken purposed infrastructure development at key points along the disputed border areas along with increased deployment of troops and repositioning of populace at key locations[60]. The emphasis of the belligerents is clearly on building abilities[61] to undertake Military Operations in the high-altitude, ultra cold and dry region of the world and to sustain these operations as per strategic assessments and feasibility. Therefore, infrastructure includes evelopment of roads, tracks, airfields, helicopter landing zones and staging areas or living quarters with feeding of logistics through extended railway tracks, specifically in Indian held Kashmir side.

However, going by Maxwell's analyses supported by other facts mentioned above, the Indian army's overall line of action in this conflict does appear to occasionally and periodically adopt the pre-1962 war tactics. This is the shade of gray that is perhaps or could be transforming into the dark side of the story and would require a completely separate research. Without over simplifying, it can be explained that the Indian army, by nature of Indian political system, cannot act independently. Therefore, it is reasonable to consider that when shades of aggressive politics are accompanied by domestic political compulsions - these combine to set a belligerent mood in India. This was the setting and method applied by Nehru, the military hierarchy and his political opponents before the aggressive forward policy was formulated and applied in 1962. As elsewhere, often this mood is generated by a congregation of individuals with hawkish political mindset[62] like unifying the nation through war– a repeat of 1962 , 1987 and perhaps recently in 2019[64]. A factor important for India's neighbors and that Pakistan too must keep in view when the bravado of the Shiv Sena of today comes through the Indian parliament. Unfortunately, after arrival of the new Indian political leadership of Mr Modi with controversial Shiv Sena (read also as extention of Gujarat riots of 2002) related background, further possibilities of enhancement in tensions cannot be ruled out[65].

In essence, this dark side may potentially also impede progress made between the India and China. However, there is yet another side of this conflict that needs elaboration to further complete the picture i.e. this was a military conflict between two of the worlds very large sized and rising states. Each brought with itself its friends and allies – a factor that shaped the dynamics of strategic alliances and continues to do so till date!

Analysis of the World of Strategic Interests and Alliances: Past, Present and Future

From the military forces application point of view, all incidents including the 1962 war were tactical manoeuvres conducted by tactical sized forces i.e. only three divisions or equivalent strength from each side were involved in 1962 war[66]. However, the ensuing political and military contest between India and China resulted in certain strategic effects. An overview of these relationships using the **3G (Geopolitical, Geo-economic and Geophysical)** analytical [67] tool would therefore be beneficial to comprehend the wider effects of this conflict. Moreover, the ensuing strategic partnerships can be seen in light of the background of Indian political stance at regional and international level. When it comes to strategic alignments and blocs, it is motivated by state interests and events.

Firstly, regarding regional players' alignments and then the great powers. Interestingly, since independence, India had strongly adopted and steadily solidified its stance as a non-aligned state i.e. it was not a member of the US (western) or Soviet Bloc. In fact, India was the de facto leader of the Non Aligned Movement (NAM) of Afro-

Asian states - only to be rejected by most after the 1962 war[68] for reasons explained subsequently. In fact, India had continued to receive economic assistance from USA since 1947 that increased as tensions enhanced with China after 1959[69].

Subsequently, as initial Chinese reactions became evident after their forward patrols were engaged, the Indian leadership pleaded to the US in secrecy for assistance. Thus, emergency US and later British military aid was made available before the intense fighting in 1962. The reason was simple – like today – India was a symbol of democracy while China was a communist power. Actually, short of the main military engagements, Indian army's assessment was the necessity to involve US tactical airpower to hold back the Chinese. Upon request, a US aircraft carrier was also dispatched to the Bay of Bengal but was too late to intervene and turned back before deploying[70]. All this was in addition to the ongoing assistance by USSR. Note that India-USSR relations had been initiated earlier by mutual visits between Nehru and Khrushchev in 1955 as a part of Soviet attempts to influence Third World Countries. Therefore, economic, trade and military relations between the two had commenced much to the disliking of Mao. But during this conflict, USSR was recovering from the Cuban Missile crisis of mid-1962[71]. Thus, USSR was neither in a position to antagonize the West nor did it want to close its options with India. Simultaneously, it also consented to the Chinese requirements in 1962 for defending their own territory, should the Indians cross the traditionally accepted geophysical boundaries between them.

Whereas, Indo-US relations date back since post independence era, they were strengthened by Eisenhower's visit to India in 1959[72]. Unknown to many and never accepted openly, US economic aid had flowed to India since the post-independence era. In 1962, India clearly depended on the West and in particular USA when the conflict was unfolding. Hence, on one hand, despite its NAM posture to the world and domestic audience, the Indian government followed a policy of western alignment by playing the anti-communist role of containing the Chinese only – not the USSR. On the other, it also successfully followed a policy of dual front at that time by keeping the Soviet's engaged and supportive – a repeat of these would be visible decades later– something that is perhaps still being played today i.e. as of 2022.

That the pre-partition Indian border demarcations had several issues is widely known. It is also equally understandable that due to the dynamics of the partition process and historical perspective of cultural factors, India has always maintained certain amount of hostility towards Pakistan. Nonetheless, during the mid-1950s to early 1960s, China had peacefully settled border disputes with Myanmar, Nepal and Pakistan[73]. In fact, initial Chinese assessment had expected the Indian issue would be relatively simpler. It is interesting to note that in the years before settlement of the border demarcation issue, Pakistan was apprehensive about China regarding

Top: Indian soldiers with artillery guns near the de-facto border in Arunachal Pradesh (Photo: BBC).

Bottom: A tense stand-off between the two sides during the 1962 war. (Photo: aneelanike).

her possible expansionist policy - as normally perceived at that time. Thus Pakistan had initially proposed a joint defence pact with India, only to be rejected by Nehru[74]. Under a separate set of circumstances i.e. apprehensions of Soviet communist expansion, Pakistan was also a member of the now defunct SEATO and CENTO since 1954[75]. Nevertheless, after western military assistance to India in 1962, Pakistan feared that the same could be used against it. Later, in the backdrop of USSR's continued assistance to India and subsequent US embargo[76]. on Pakistan after the 1965 war with India, relations with China progressively improved[77].

The global bloc alignments hence witnessed changes in the 1950s – 60s. In that, during the late 1950s, China had started to drift away from the USSR due to its own border quarrels[78] but most importantly due to détente[79]. Therefore, while today's reasons may differ up to a certain degree, it is clear that the bloc and allied-state realignment was evident through the mid 1950s – 60s. This was prominent in 1962-65 i.e. in the transition years, as the US would continue to leverage India against China. This is evidently existing till date albeit greatly improving economic, trade, technological and military ties between India and USA. Thus, in the 1960s, India was never really 'NAM' - as openly stated. India always maintained dual bloc relations with Russia and USA in Diplomatic, Informational, Military and Economic (DIME[80]) spheres to improve its instruments of power – something clearly visible today as well. The exception is that until relatively recent years, it is accompanied with positive attempts to diplomatically and economically improve relations with China while aggressively following a policy that is benign on the face. The motivation has improved stability in relations, trade and of course, the overall business. However, in the background, a subtle change has apparently taken place in the thinking of the Indian leadership and will be discussed subsequently.

Viewed from the lens of Indo-China conflict, the differences from 1962-65 are also important. While Pakistan still maintains friendly relations with China, it definitely enjoys a love-hate relationship with the US since the 1965 war. It has been dependent upon USA in several ways including the stability of the region in the context of the Afghan issue. Overall, Pakistan is no longer as strong a US ally since Russian expansion is no longer valid in South Asia. It is only a partial US partner in regional Counter Terrorism efforts with several concerns from both sides. While Pakistan has only recently started to improve relations with Russia, the context is totally different i.e. like Europe, it is mainly to accrue benefits of cheaper oil, gas and grain. This is however to the disliking of the west – especially USA. Nonetheless, the Sino-Russian relationship[81]is steady with improvements since post Mao era of 1980s and after the disintegration of USSR. Another major contextual difference is that US-China relationship[82] is totally transformed. In brief, besides issues East of China with Taiwan and the ownership of islands in South China Sea, it is transitioning beyond economic competition and economic interdependence to strategic competition between USA and China.

To the Pacific states and USA, the rising strategic competition it is less about the fear of the spread of communism. Now, it is more about two factors i.e. 'which system of governance is better' and that 'who would dominate the world in the future'. Similarly, despite its requirements to economically flourish that may exist up to a certain level on the west including USA and EU, Russia has politically drifted away and is following its own path. Perhaps it is an attempt or drive to revive its USSR-like political might and military status at global level. For these and other strategic reasons, it is more cooperative with China. This is further evident since the breakout of the war in Ukraine since February, 2022. An event that has exasperated the polarization between the western bloc including NATO and EU against Russia. As a consequence, Russia supports China in its stance regarding the Pacific as does China diplomatically support Russia. Apparently, the world is witnessing itself drifting towards a multipolar geo-political environment.

Finally, compared to 1962, there is one more aspect regarding India i.e. stronger US – India relationship that is in synchronization regarding each other's counter strategy against China, at least in the Indian Ocean. This is once again the main ingredient of developing strategic interests of USA and India. The recent Indian attempts to stretch itself towards Vietnam and Japan, possibly as a counter to the erstwhile Chinese string of pearls; and in support of the US Pacific pivot can be interpreted in the same context[83]. Hence, Indian diplomatic and military ventures in the strategic domain including her aspirations for development of an air force as an aerospace force, a blue water navy, an expeditionary role for the army (called Out of Area Operations capability), massing forces for a two front scenario i.e. against China and Pakistan, improved range Ballistic and Undersea Missiles with nuclear arsenal enhancements and desires to induct Tu-160 M 'white swan' strategic bomber aircraft[84] from Russia are in the context of her political and mythical psyche of Bharat!

From an analytical point of view, Indian leadership has an in-principle understanding and several agreements[85] with the US progressively over the years. Today, after atleast a decade of negotiations, they are like the Basic Exchange and Cooperation Agreement (BECA) involving amongst other services is availability of US geospatial information, the Logistics Exchange Memorandum of Agreement (LEMOA) that mainly involves access to designated military facilities on both sides, the Communications Compatability and Security Agreement (COMCASA) that opens the way to sensitive US military equipment exports to India with certain US conditions and the Industrial Security Agreement (ISA) that mainly opens the way for India to receive classified industrial information from USA. These are a part of the new US South East Asian Bloc against China. From almost a nil amount in 2008, today these pacts and agreements span over US $ 20 Billion. Indian membership to the QUAD involving USA, Japan and Australia and eventually active participation in multinational Exercises like the Malabar series in Guam and Pitch Black in Australia are in the context of the same.

In this complex web of geostrategic, geopolitical and geo-economic factors between regional and global players, these are the intertwined, sometimes drifting and conflicting connections between nation-states based on national interests. Another aspect that is clear from this entire expose is that we are witnessing a repeat of the geopolitical tensions of the 1950s-60s due to the rising geostrategic competition between the dominant powers of across the globe. In that, India has once again been courted by the US to support it against China and perhaps act as its agent in the Indian Ocean Region. The west is likely to continue backing India – just like the 1960s – where India; notwithstanding the horrific events in Kashmir - represents democracy with no real role or even condemnation by Global powers and International Govermental Organizations of global repute like UNO, HRW and AI, etc. Meanwhile, India continues to play on both sides of the field – just like in the 1960s – it continues to support USA and West against China while accruing benefits of the low cost Russian oil and Rouble standard and trading standard being floated.

Where does this leave us as per the subtitle of our topic i.e. 'Background and future of one of the least studied war of the region?' With the recent events and temperaments flaring up due to the war in Ukraine since February, 2022 and later in the Taiwan Straits in August, 2022; it is clear that this frozen conflict in the northern region of India has a potential to flareup. Most likely, as historically witnessed – it would continue to depend upon the posture of the Indian Military machine and the Indian political leadership - how it presents itself or reacts to the next incident in one of the highest battlegrounds of the world! These events and developments cannot be disassociated with the jingoistic rule in India today[86]!

Some assess relations between China and India as strategically stable but with tactical anxiety – a rather mild view of the situation. Viewed in the context of 1962 war, the developments discussed so far can, depending on the circumstances, theoretically play a positive in Indo-China relations i.e. through constructive dialogues. Conversely, relations can also further deteriorate if played negatively. The matter can be considered to possess the potential to destabilize not only South Asia but other regions as well. For the present, review of the series of varying intensity military stand-off's between India and China actually mirror the underlying and possibly impending political tension between the two. What can be drawn from the 1962 Indo-Chinese war in terms of regional stability is that it has had and continues to be assessed as a threat to regional stability. Viewed realistically in the backdrop of its history along with developments since 1959, and further correlated with the events from 2022-23 onwards in the region north of the Black Sea and recent events in the Straits of Taiwan – any future mishandling certainly possesses the ability of events to spin out of control on a much wider scale – possibly regional to global cascading effects. The following is summarized regarding the conflict till date: -

(a) The region continues to represent a tense region over a large geographical swathe with political ramifications for both[87] .

(b) Both sides are militarily building infrastructure and continue to enhance deployments.

(c) Both sides undertake exercises, including special forces and airpower employment. Military literature does not preclude ballistic missile employment.

(d) This potential conflict now clearly draws linkages to other geo-politico-economic events and military conflicts or tensions in the World – in specific – in the Straights of Taiwan, tensions in the Korean peninsula, conflicts in the Middle East Region and rising tensions in the Red Sea, and the Persian / Arabian Gulf region

Conclusion

While there are many lessons and conclusions that can be drawn from this expose, in essence, we have considered six main factors while analyzing the 1962 Indo-China war. Chronologically,

(a) First is the history of the problem. Though complex but neither difficult to comprehend nor resolve, at least technically. Since it has a cultural context with customary understanding and perhaps folklore on the Indian side, it remains presently unresolved. For resolution, the traditional Indian biases would need to be overcome by Indians themselves specifically the BJP / RSS type hawks.

(b) Second is that diplomatic, informational and specifically economic relations between India and China have been steadily improving based on a generation of efforts from both. These are the reasons that we should remain optimistic regarding their future relations. It must be however noted that economic cooperation was initiated to improve diplomatic relations and is not 'critical' in the sphere of either's interdependence.

(c) The third point we considered was the scars of 1962 war, specifically for India and the ensuing tensions with the three relatively recent border incidents of 2013, 2014, 2020 and surely of 2022. These counteract the second factor (above), and that recurrence of such skirmishes or recent tactical standoffs, though never desirable, cannot be totally ruled out. This is also a lesson, that business is business and that a diplomatic exchange involving sipping a cup of tea is just that. Hence, economic and trade relations can alone seldom deactivate tensions specifically in issues of national sovereignty and interests. Something few in Pakistan yet need to fully comprehend regarding Kashmir and other simmering issues.

(d) Fourth is about global relationships; bloc alignments and the drive towards multipolarity in the 21st Century. Although the Indo-Russian relationship continues to be time tested, India has diversified its military import sources and has a clear tilt towards the west – especially the US. Nevertheless, there are still many mutual military and economic cooperation projects with Russia – especially after the Ukraine crisis and the Indian spree of purchasing cheap Russian oil and the prospects of all future trade in Rouble. Conversely, Russia and China are now much more strategically closer compared to 1962 – especially after the war of 2022 in Ukraine and to some extent the developments in the ME. Although each would take care of their own interests, Russia would need to walk a much more careful path should there be any future Indo-Chinese conflict. Similarly, in the aftermath of the Ukraine war of 2022, Russian politico-military support to India may not continue as it did in 1962. Therefore, the altered 3G (Geopolitical, Geostrategic and Geo-physical) priorities now affect previous regional strategic alignments and would place restrictions on India while allowing more strategic leverage to China.

(e) The fifth and dominant factor is that Indo-US relations are stronger and steadier than 1962 and span across the diplomatic, informational, economic and especially increasing realm of military cooperations and agreements. Each has mutual 3G benefits in this relationship along with achieving counterbalance against China – specifically in the Indian Ocean Region (IOR). In the wake of increasing and open US support to India against China, India would need continued support from its other newly found Pacific theatre allies. Examples include but are not rrstricted to agreement on the signatures to various agreements including the LEMOA allowing USN and IN warships to replenish at each other's ports. Another factor that Pakistan would need to take into cognizance in the 21st Century environment of multipolar and interchanging to floating coexistent Bloc alignments.

(f) Beyond these five factors is the last, the most important and intrinsic factor that dominates the remaining i.e. India itself is the most important player regarding the future of this frozen conflict. After all, the conflict did start as a result of miscommunications, non-negotiating aggressive attitude, incorrect military advice and miscommunication between political and military leadership within India. Then, the fuel to the fire was from internal Indian politics, specifically from the BJP / VHP / RSS aggressive stance, combined with hawkish political inputs along with media outburst and public pressure – something that has reemerged in India from the past 8-10 years and that Pakistan must be able to read this, should the events start to snowball. Today, the Indian internal political structure is progressively getting more aggressive under the BJP and Mr Modi along with a military that wants to become more vocal as it gains more muscle. In today's media intense world, another minor incident like the 2020 Galwan episode can easily spin out of control. Then, external factors related to geostrategic alignments can quickly emerge to play their role – positive or negative – as per the national interests of the regional and international players. Indeed, while there are reasons to remain optimistic about the improving political and economic relations between India and China, there are at least an equal number of reasons that foretell that care must be exercised as any minor event could be a threat to trigger another major military confrontation. The extention of the Galwan incident could also transcend elsewhere for example, any minor incident between patrolling Indian and Chinese Navy warships in the Indian Ocean Region or elsewhere.

Civilian recruits enlisted to help Indian troops in Ladakh during the 1962 war with China (Photo: Three Lions)

In quintessence, for a combination of the aforementioned six reasons including external and internal factors, it could be argued that excluding economic dividends, the overall balance of assessment is that the 1962 Indo-Chinese war had and could continue to negatively affect regional stability even in the 21st Century. If aggravated, it can very easily affect the regional stability, possibily extending to a global level. While the responsibility to maintain stability in relations with monitoring of several internal politico-military aspects is in-principle on both sides, it certainly appears to be higher on the Indian political while its military leadership should not unnecessarily beat the war drums every few months!

REFERENCES

46 Wikipedia. "The Chola Incident". http://en.wikipedia.org/wiki/Chola_incident .
47 Wikipedia. "Sino-Indian border dispute". http://en.wikipedia.org/wiki/Sino-Indian_border_dispute
48 Wikipedia. "Sino-Indian skirmish" http://en.wikipedia.org/wiki/1987_Sino-Indian_skirmish.
49 Wikipedia. "Siachin Conflict". http://en.wikipedia.org/wiki/Siachen_conflict.
50 "The Daulat Beg Oldi Incident", Wikipedia, http://en.wikipedia.org/wiki/2013_Daulat_ Beg_ Oldi_ Incident.
51 "India-China Border Dispute", Global Security. Org, http://www.globalsecurity.org/military/world/war / india-china_conflicts.htm.
52 India-China trade goes up to over $67 bn in first half of 2022, PTI, https://www.business-standard.com/article/ international/india-china-trade-goes-up-to-over-67-bn-in-first-half-of-2022-122071301577_1.html
53 Rajagopalan, Rajeswari Pillai; he Galwan Valley India-China Skirmish Is a Gamechanger for New Delhi https://thediplomat.com/2020/06/the-galwan-valley-india-china-skirmish-is-a-gamechanger-for-new-delhi/
54 India-China dispute, BBC, https://www.bbc.com/news/world-asia-53062484
55 Stephenson Alex and Rajeev Nishant, Why We Should All Worry About the China-India Border Dispute, USIP, https://www.usip.org/publications/2023/05/why-we-should-all-worry-about-china-india-border-dispute.
56 Markey, Daniel and Scobell Andrew , Three Things to Know About China-India Tensions, USIP, https://www.usip.org/publications/2023/10/three-things-know-about-china-india-tensions.
57 Al Jazeera, India and China pledge to maintain 'peace and tranquility' along border, https://www.aljazeera. com/news/2023/8/16/india-and-china-pledge-to-maintain-peace-and-tranquility-along-border.
58 Nisar, Muhamad Adan, Indian strategic desires in region and role of Pakistan, Pakistan Today, Jan 28, 2023.
59 Aslam Samrah, The Indian Hegemony in South Asia, Paradigm Shift, January, 2021, https://www.paradigmshift.com.pk/indian-hegemony-in-south-asia/
60 Nagao, Satoru,Infrastructure Development in the India-China Border: Factoring the Western Support, Institute for Defence and Security Policy, https://isdp.eu/infrastructure-development-in-the-india-china-border-factoring-the-western-support/; 27 Oct, 2022.
61 Swartz John, Tracking India's Infrastructure Development Near the Line of Actual Control, ORF, https://www.orfonline.org/research/tracking-indias-infrastructure-development-near-the-lac, 17 Oct, 2023.
62 Neville Maxwell, India's China War, (Worcester and London: Ebenezer Baylis and son Limited, 1970),176-177.
63 Ibid,362-364, 438-443.
64 Implies to the post-Pulwama Indian attempts to strike fictitious targets and Pakistan's response - Feb, 2019.
65 "Narendra Modi", Wikipedia, http://en.wikipedia.org/wiki/Narendra_Modi.
66 Neville Maxwell, India's China War, (Worcester and London: Ebenezer Baylis and son Limited, 1970), 425.
67 The 3G Methodology: A Practical Approach to Strategic Foresight, RCDS Synopsis, 16 December, 2014.
68 Ibid, 251-252, 262-264.
69 Maxwell, India's China War, (Worcester and London: Ebenezer Baylis and son Limited, 1970), 378.
70 Ibid, 411.
71 Ibid, 423.
72 "India-US Relations", Wikipedia, http://en.wikipedia.org/wiki/India%E2%80%93United_States_relations.
73 Neville Maxwell, India's China War, (Worcester and London: Ebenezer Baylis and son Limited, 1970), 425.
74 Ibid, 206.
75 Ibid, 207.
76 "Pakistan-US Relations", Wikipedia, http://en.wikipedia.org/wiki/Pakistan%E2%80%93United_States_relations.
77 Neville Maxwell, India's China War, (Worcester and London: Ebenezer Baylis and son Limited, 1970), 275.
78 Ibid, 285 .
79 "Détente", Wikipedia, http://en.wikipedia.org/wiki/D%C3%A9tente (accessed 10 January, 2015).
80 R Hilson, "DIME/PMESII Model Suite Requirements Project", DTIC, Information Technology Division, www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA525056.
81 "Sino-Russian Relations", Wikipedia, http://en.wikipedia.org/wiki/History_of_Sino-Russian_relations.
82 "China-US Relations", Wikipedia, http://en.wikipedia.org/wiki/China%E2%80%93United_States_relations.
83 F. William Engdahl, "Obama's Geopolitical China 'Pivot': The Pentagon Targets China", Global Research, February 02, 2013, http://www.globalresearch.ca/obama-s-geopolitical-china-pivot-the-pentagon-targets-china/32474.
84 White Swan For India? Air Force Ex-Chief Hints At Possible Acquisition Of Russian Tu-160 Bombers To Counter China's Bulging Might, Eurasian Times, https://eurasiantimes.com/white-swan-for-india-air-force-russian-tu-160-bombers-chinas/.
85 U.S. Security Cooperation With India, fact sheet, Bureau of Political-Military Affairs, 20 Jan 2021, https:// www.state.gov/u-s-security-cooperation-with-india/#:~:text=U.S.%2D India%20defense%20 trade%20 cooperation,(ISA)%20now%20in%20place.
86 Purohit Kunal, Modi's Hindu Nationalist Diplomacy Is Hurting India's Image, Foreign Policy, https:// foreignpolicy.com/2023/08/28/india-modi-diplomacy-bjp-hindu-nationalism-religion-manipur/, 28-Aug-2023
87 Tirzu, Aleksandra Gadzala, Rising tensions along the Indian-Chinese border, https://www.gisreportsonline.com/r/china-india-border-2/ 08 August, 2023.

Pilot Officer Rashid Minhas (NH)

The highest VALOUR AWARD

"Rashid Minhas remains an enduring symbol of valour. In the pivotal year of 1971, at the tender age of 20, Minhas found himself in a situation that would forever etch his name in the annals of heroism. Confronted by a treacherous attempt to hijack his aircraft, he displayed extraordinary resolve by refusing to surrender control of the plane to the would-be hijacker. Instead, he chose to make the ultimate sacrifice, embraced martyrdom and stopped his aircraft from falling into enemy hands. The first and only PAF man to receive the honourable Nishan-e-Haider, Rashid Minhas's legacy lives on to this day."

by Muhammad Khan

Amidst the Minhas clan, a sub-shoot of the illustrious Rajputs, a young soul took his first breath on 17 th Feb, 1951. He opened his eyes in Karachi, in the home of Abdul Majeed, a respected civil engineer. From the bustling streets of Karachi, his family's journey led them to Lahore and then to the charming city of Rawalpindi. It was during his formative years at St. Mary's Academy that Rashid's fascination with aviation history and aero-modelling began to flourish. In an entry dated 7 Aug 1965, he wrote in his diary, "Today I promise from my heart that out of three defence forces, I will definitely join any one."
His parents, at the time, had no idea of young Rashid's concealed fervour. They wanted him to follow in his father's footsteps and become an engineer. However, once Rashid revealed his plans, they gave in, sensing the unrelenting nature of his decision. Once he had sights locked on his eventual goal, Rashid Minhas whizzed through O and A levels and quickly joined PAF College Lower Topa for his initial training.

He was passionate about soaring among the clouds, free of all restraints. This time finally came, when he joined 51 GD (L) course at PAF Academy Risalpur in Aug 1969. In the academy, he grabbed every single opportunity to be airborne, absorbing information like a sponge from his instructors while on the ground. He completed his primary and secondary flying training on Harvard and T-37 aircraft, proving himself to be a promising pilot from the get go.

His efforts paid off and he finally earned his wings on 14 March, 1971. It was a proud moment for him and his family. The first order of business was a conversion course on the T-33. He joined the No 2 Sqn, which unbeknownst to him at the time, would later boast about having him as their comrade for decades to come.

The conspiracy

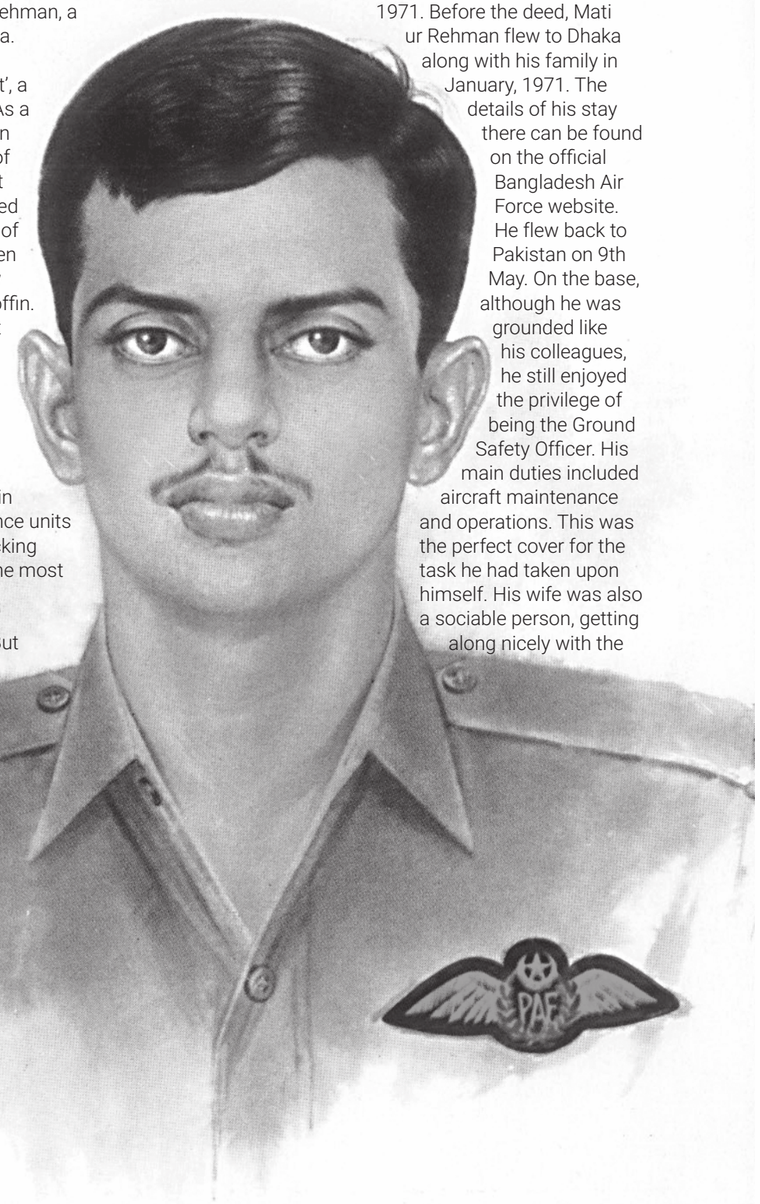
This tale has a hero. But depending on which soil you call your own, the name changes. For Pakistan, its Rashid Minhas. For Bangladesh, the man was Mati ur Rehman, a PAF flying instructor hailing originally from Dhaka.

In 1971, the army initiated 'Operation Searchlight', a counter-insurgency operation in East Pakistan. As a precautionary measure, Bengali officers and men were restricted and kept a strict eye on for fear of treason or sabotage. The same applied to PAF. It was a tough decision but one that PAF was forced to take at the time. As the scenario spiralled out of control, flying privileges and equipment was taken away from the Bengali pilots and crew. This new humiliating restriction was the final nail in the coffin. Multiple conspiracies began to hatch in different locations.

One of these locations was the Masroor Air Force Base in Karachi. The Bengali personnel wanted a plan which would simultaneously damage PAF's capabilities and alert the world to Bengal's freedom movement. The group met in small, secretive gatherings, wary of the intelligence units who were on high alert. It was decided that hijacking an aircraft and defecting it to Bangladesh was the most suitable way to accomplish their goals.

The first aircraft of choice was the F-86 Sabre. But gaining access was almost impossible and starting up a Sabre without a proper crew and equipment was a difficult task. Thus, the idea was dropped. The next target was a two-man aircraft about to be flown by a trainee. A T-33 that the trainee usually flew was a valuable enough aircraft. Next, it was to be decided who would be the trainee and, more importantly, who would be the hijacker. Rashid Minhas's name was finalized as the trainee, as the conspirators grossly underestimated his resolve. Mati ur Rehman was selected as the man who would carry out the deed.

Mati ur Rehman was a pilot hailing from Dhaka. He passed the PAF Sargodha entrance exam and moved to West Pakistan in 1956. Becoming a competent pilot, he quickly rose through the ranks and was appointed as a Flying Instructor at PAF Base, Masroor in 1971. Before the deed, Mati ur Rehman flew to Dhaka along with his family in January, 1971. The details of his stay there can be found on the official Bangladesh Air Force website. He flew back to Pakistan on 9th May. On the base, although he was grounded like his colleagues, he still enjoyed the privilege of being the Ground Safety Officer. His main duties included aircraft maintenance and operations. This was the perfect cover for the task he had taken upon himself. His wife was also a sociable person, getting along nicely with the



wives of the other personnel. All these factors made him the perfect candidate for the treacherous plot.

His sole concern about the entire operation was the safety of his family. He was assured that his wife and daughters would be moved to the Indian consulate a day before the deed.

The day:

Oblivious of the events that the day had in store for him, Rashid Minhas relaxed in the mess. He ordered his breakfast in a leisurely manner. He was in no hurry. He wasn't scheduled to fly that day, so he could take his time. Earlier in the day, it had been decided that the visibility levels were not safe for solo training missions. The pilots who were due for dual-flying missions were checking their schedules, so they could get the briefing from their respective instructors. One of these pilots noticed Rashid Minhas's name on the board, due for a 'Solo Consolidation' mission.

Rashid Minhas was waiting for his breakfast when he was told about the change. He quickly jumped up and told the staff to cancel his breakfast. He rushed to his flying instructor Flt Lt Hasan Akhtar, who gave him a mission briefing for the day's mission. After changing into his pilot gear, he decided that although he didn't have enough time for a full breakfast, he could manage to have a few gulaab jamuns, one of his favourite snacks. One of the last people with whom he interacted was Plt Off Tariq Qureshi, a close friend. He shared a few sips of a cold drink with him before heading out before the take-off time, which was 1130 hrs. "That was the last we saw of him, munching snacks on his way out," remembers Qureshi. Rashid Minhas went through the check-ups. With the call sign Bluebird-166', Rashid Minhas's T-33 taxied out of the main tarmac.

After this, a substantial chunk of the events that transpired between Rashid Minhas and Mati ur Rehmanare speculated using physical evidence. In all probability, Mati ur Rehman had appeared in Rashid Minhas's view before he could take off, gesturing to him to stop his aircraft using some fake excuse. Seeing one of the instructors stopping him, Rashid Minhas must have thought that it must be some new, important information about the mission. Once still, Rashid Minhas must've thought that Mati ur Rehman would probably communicate with him on the intercom. Instead,

(All Pics PAF Archives unless specified).

Left: The Ace's intellect was well-known amongst his peers, as was exhibited by his excellent debating skills, displayed here in a competition at PAF Academy in 1970.

Bottom Left: No time to waste, aged 17, Rashid Minhas looks resolute in this picture with his batchmates in this picture from 1968, taken in PAF Academy.

Right Page Top: Rashid Minhas, aged 19, can be seen on posing as a young cadet under training at PAF Academy Risalpur in 1970.

Right Bottom: Standing Tall - Rashid Minhas standing in the middle in the second row in a group photo in Aero Medical Institute in 1971.

Mati ur Rehman, not burdened by the heavy flying equipment, possibly stepped on to the aircraft's wing and entered the aircraft's rear cockpit.

The T-33 does not have a seat cushion. The pilot is supposed to use his parachute as a seat cushion. Mati ur Rehman wasn't equipped with a parachute when he climbed in. This means that it would've made controlling the aircraft a much more difficult task from the rear cockpit. It can be safely assumed that he needed Rashid Minhas's compliance to achieve his nefarious goals. This he probably achieved by using a replica pistol, which was later retrieved from the wreckage.
Exactly at 1128 hrs, the ATC Tower received a disturbing call, "Bluebird 166 is hijacked!". Immediately afterwards, the T-33 took off from runway 27 at 1130 hrs. Once airborne, the T-33 turned left and started steering 120 degrees. During this time, Rashid Minhas was able to make two more desperate calls to the ATC, repeating that his plane had been hijacked. These were the last words heard from the T-33.

In the ATC, Flt Lt Asim Rasheed had just received the call that no controller ever hoped to receive. The reality finally sank in when the T-33 took an unusual turn and flew down to dangerous levels.

He called the Sector Operations Centre (SOC) and gave him the news. However, the SOC started demanding details. Asim Rasheed made a judgement call, hung up on the SOC and immediately made a call to the Air Defence Alert (ADA) Hut.

"A T-33 has been hijacked! Scramble!" he ordered.

The call was heeded by Wg Cdr Shaikh Saleem, OC of No 19 Squadron. He rushed to his F-86 with his wingman, Flt LT Kamran Qureshi, as No 2. Kamran Qureshi took off first, followed by the leader. The biggest problem, however, was that the SOC had no clue about the location of Rashid Minhas's aircraft.

The low level that it had dropped down to was not just to elude visual spotting, it also ensured that the aircraft did not show up on radar. Another pair that was scrambled to intercept the T-33 was Flt Lt Abdul Wahab and Flt Lt Khalid Mehmood.
Wahab recalls the incident in these words, "We knew something was wrong, we had seen the aircraft taxiing dangerously fast. After we got airborne, there was a lot of confusion. Nonetheless, we gave fake calls on 'Guard' channel that the F-86s were behind the T-33, and it would be shot down if it did not turn back. However, with no real prospects of scaring Mati ur Rehman with warning bursts from the F-86's guns, the only option that remained was to order Minhas to eject. A flurry of radio calls then started, asking Bluebird-166 to eject. There was no response, but the calls continued for several minutes, being repeatedly transmitted by the F-86s, as well as the SOC."

In the hijacked T-33, Rashid Minhas and Mati ur Rehman were locked in a deadly struggle. Each tried to overpower the other. The trainer T-33 had inter-linked flight controls, which complicated the scenario greatly. Mati ur Rehman was hell bent on flying the T-33 to India. However, Mati ur Rehman had not factored in the resolve of Rashid Minhas. The wiry, young pilot that the conspirator thought would be easily overpowered proved to be a force of nature. He staunchly refused, trying his best to not let Mati ur Rehman have his way. The deadlock continued as the aircraft neared the Indian border.
As the point of no return came closer, Rashid Minhas knew he could never let the aircraft cross the border. In the chaos, he came to the conclusion that he had no choice. It was the moment of truth for the young pilot who had the courage to do which even veteran pilots might not have been able to.

Some 51 kilometres away from the Indian border, Rashid Minhas deliberately dipped the

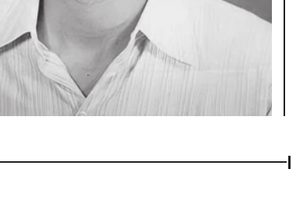
T-33 and crash landed near Thatta. The estimated time of the crash was 1143 Hrs. The young ace had given his life to stop an aircraft falling into the hands of the enemy. Back at the base, the news had spread like wildfire. Most speculated that the hijacking had been successful. A phone call from Shah Bandar cleared the dreadful mystery. It was reported that an aircraft had crashed near the region. There were no survivors. The search and rescue helicopter was dispatched immediately. The men located the aircraft at a distance of 64 nautical miles from Masroor, on a heading of 130°. The tail of the T-33 numbered 56-1622 could be seen sticking out of the water-logged, soft muddy terrain at the mouth of Indus River, just 32 nautical miles short of the border.

The honour given to the martyr

Coincidentally, the Air Chief Rahim Khan was hosting President Yahya Khan at lunch in Peshawar when he received the call. He filled Yahya Khan with the details and suggested that Rashid Minhas be presented with Sitara-e-Jurat. Yahya Khan's memorable response was, "Why only a Sitara-e-Jurat? The boy deserves nothing less than a Nishan-i-Haider!"

The Air Chief was pleased. The announcement was made the same day and Rashid Minhas became the youngest recipient and the only one from the air force to receive the prestigious Nishan-i-Haider. Rashid Minhas quickly became a national hero in Pakistan. The former Air Chief Marshal Asghar Khan and the then Air Chief Marshal Rahim Khan were greatly moved by the tragic loss. They both penned down separate letters to Rashid's father, condoling him on the death of such a fine son and acknowledged the supreme sacrifice made by the young hero.

Another great honour was the renaming of PAF Base at Kamra, which was renamed to PAF Base Minhas. In Karachi and several other cities, boulevards have been named after him. In Dec 2003, Pakistan post issued a two-rupee postage stamp in his honour. A staggering 500,000 tickets were printed and sold-out within a few days. Shahzad Khalil took it upon himself to visualize the entire incident in a teleplay titled 'Rashid Minhas'. It was broadcasted on PTV during the 80s. It was a beautifully written and directed teleplay.



Top: One of the few pictures of Rashid Minhas where he seems not beyond his age, taken with elder sister and maternal cousin in 1966.

Left: Years before he carried the weight of the nation's honour on his shoulders-Spending happy times with his Aunt, sisters and cousins as a child.

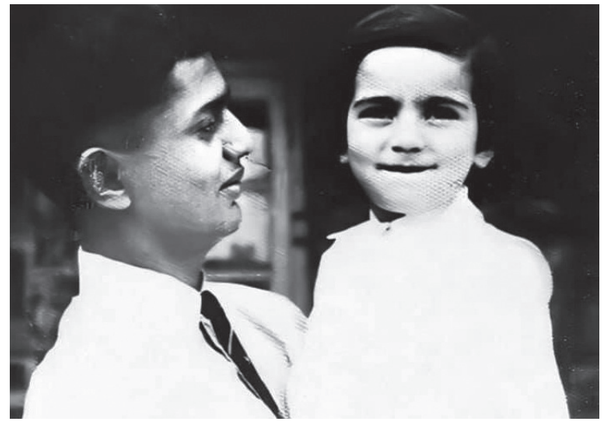
Left Center: Postage Stamps of Rs 2/- issued by the government of Pakistan in the year 2003 honouring the great sacrifice by Rashid Minhas.

Bottom Left: During Training in Risalpur Academy while on Route March 1970.

Bottom Right: One can see why people close to Rashid Minhas(Aged 15 here) always claimed he had eyes that could peer into your soul.

His last resting place

Rashid Minhas (NH) rests in Fauji Qabiristan in Karachi. Situated right next to the famous Gora Qabiristan, the cemetery is the final abode of the hero.



پرواز ہے دونوں کی اسی ایک فضا میں
گرگس کا جہاں اور ہے شاہیں کا جہاں اور

The vulture and the eagle soar
In the same air, but in worlds apart.

Allama Iqbal

On the headstone, an apt and beautiful piece of Urdu poetry has been engraved. It translates to:

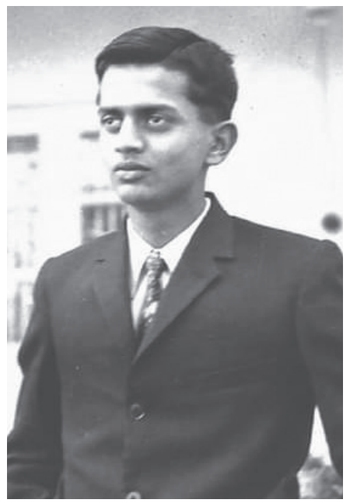
Though they both fly through the same breeze,
The trail of a follower is different from the trail of a defector.

Rashid's martyrdom translates into Iqbal's verse,
The flying domain of a hawk is different from that of a vulture.

Left: A family man through and thorough Rashid Minhas looks lovingly at his 5-year-old niece, months before his martyrdom in 1971.

Left Center: A Family Unaware of the Honour Awaiting Them - The family of Rashid Minhas posing for a picture when he was one-year-old.

Bottom Left: A Nation Stood Proud An Urdu Daily with the header 'Rashid Minhas has added another unforgettable chapter in the Nation's history', as declared by then Prime Minister Zulfiqar Ali Bhutto.



Bottom Left: Posing for a photograph after commissioning as Pilot Officer at Karachi 1971.

Bottom Right: A Proud Nation - The apt headline of a Daily Newspaper when the hero received a well-deserved Nishan-e-Haider.

Türkiye to get new F-16s, if Congress approves

byscramble.nl
11 July 2023

(Photo: Marco Dijkshoorn)

During the 11-12 July 2023 NATO summit in Vilnius, Lithuania, Turkish president Recep Tayyip Erdoğan gave the green light for Sweden to join NATO.

For those who follow the developments and political course of Türkiye closely, the statement by US National Security Adviser Jake Sullivan that "the US will move ahead with the transfer of F-16 fighter jets to Turkey in consultation with Congress" did not come as a real surprise.

Back in February 2023, US Secretary of State Antony Blinken publicly confirmed that the Biden Administration supported a possible sale of F-16 fighter aircraft to Türkiye, and this has now gained traction after president Erdoğan agreed to drop his veto on Sweden joining NATO.

Dating back to October 2021, the Turkish government made inquiries to procure 40 new F-16s in the Block 70/72 "Viper" configuration and Viper upgrade packages for 79 existing Block 50/Block 50+ Fighting Falcons. The USD20 billion deal would also include 900 air-to-air missiles and 800 bombs.

In mid-May of this year, the Türk Hava Kuvvetleri (TurAF, Turkish Air Force) received the first F-16 Block 30 that was modernised with the indigenously developed Özgür (aptly translated to: "Free") Project. Türk Havacılık ve Uzay Sanayi (TUSAŞ or Turkish Aerospace Industries) developed the upgrade. Özgür-upgraded F-16s can fire indigenous ammunition and missiles which marks the independence that Ankara is seeking and the huge strides that the Turkish defense industry is making.

Latest batch of QEAF Advanced Eagles delivered

(Photo: Phil Gorman)

by scramble.nl
03 August 2023

On 31 July 2023, the latest batch of Al-Quwwat Al-Jawiyyah Al-Amiriyyah Al-Qatariyyah (QEAF, Qatar Emiri Air Force) F-15QA Advanced Eagles arrived at RAF Mildenhall around 20:00 hrs LT.

The five F-15QAs, call signs RETRO61 to RETRO65 (serials 17-0034 to 17-0038), flew St.Louis Lambert IAP (MO) to Mildenhall and were accompanied by two KC-10A Extender tankers. The KC-10As flew under callsign GOLD11 (84-0186) and GOLD12 (86-0030), with GOLD11 routing Scott AFB (IL) to Bangor International (ME) and GOLD12 routing Bangor to RAF Mildenhall.

The Advanced Eagles departed Mildenhall on Thursday morning 3 August.

With the delivery of these five aircraft, only three F-15QAs are still in the US for trials. These are customer (construction) numbers 17-0001 (QA01) and 17-0002 (QA02). Number three, 17-0010 (QA10), was damaged on 18 May 2021 when it left the wet runway during the landing roll and as per standard procedure the ejection seats were activated in case the aircraft would dig in and/or tumble over. The aircraft is still under repair.

(Photo: just illustrative).

byscramble.nl
10 July 2023

Rafale M for Indian Navy

On 13 and 14 July 2023, Prime Minister Narendra Modi will be in France. It is expected that India and France will sign a defence-industrial road map to push India to scale up its manufacturing of hardware platforms.

In addition to this roadmap agreement, the Prime Minister is reported to be signing a deal for the purchase of 26 Dassault Rafale M naval fighter aircraft for the Bharatiya Nau Sena (IN, Indian Naval Air Arm). The Defense Acquistion Council (DAC) will approve a so-called Acceptance of Necessity (AON) from the Minister of Defence, Rajnath Singh, to acquire the French-built Rafales.

In December 2022, Scramble Magazine first wrote on the Rafale M emerging as the frontrunner for the Multi-Role Carrier-Borne Fighter (MRCBF) programme to supply 26 fighter aircraft for the Indian Navy aircraft carriers.

All the 26 Rafale M fighters will be single-seater versions. Indian Navy pilots will be trained in France as well as on advanced simulators at INS Hansa (Goa). It is understood that one squadron of eighteen aircraft will be onboard INS Vikrant (R11) and the remaining eight will be based at INS Hansa as reserves for rotation.

BALTIC AIR POLICING

In the heart of Europe, on the coast of the Baltic Sea, between NATO and EU members Poland and Lithuania, there is a small piece of land of 223 km2 called Kaliningrad. This strategically important region is Russian territory. Kaliningrad Oblast, which has no land connection with Russia, is 370 km away from its homeland at the closest point. Of course, since there is no possibility of connection by land, both military and civilian transportation to this Oblast can only be provided by sea and air. As you can see, Russian jets generally do not use transponders, do not communicate with Air Traffic Control or prepare a flight plan when entering and leaving this region, which is surrounded by NATO and European airspace. This is where the demanding prevention activities that make up a large part of the Baltic Air Policing (BAP) Mission begin. In short, the most basic aim is to prevent Russian jets from flying in this region by waving their arms.

BAP is the result of agreements made to achieve a single standard of security in NATO/ EU airspace for NATO member states that do not have the necessary air capabilities. Since the three Baltic states, Lithuania, Latvia and Estonia, which joined NATO on 29 March 2004, do not have the necessary air assets to contribute to NATO Air Command on their own soil, Alliance members provide protection to these countries through the Baltic Air Policing.

Air policing is a purely defensive mission, with 17 NATO member countries contributing to it so far. Although countries usually participate in the Air Policing mission, which is planned at a high level of readiness on a 24/7 basis, with 4 aircraft, this number can rarely go up to 6. While only 1 country was on duty in the same period until May 2014, after the 2014 crisis between Russia and Ukraine, it started to be carried out by 3 or 4 countries with 12-16 aircraft. After 2015, the number of countries varies between 1-3 and the number of aircraft varies between 4-13 according to the period. The number of personnel participating from each country also varies between 50-100.

As in the past, NATO will continue its air policing duties as long as needed to protect its airspace. For this purpose, each NATO member country will continue to show unity and solidarity, even if they come from different countries and different cultures.

ITALY DEPLOYS F-35 FIGHTERS TO POLAND IN SUPPORT OF NATO DETERRENCE AND DEFENCE

The first two Italian F-35A fighter jets arrived at Malbork Air Base on September 13, 2023. The jets - augmented by two other aircraft - will patrol the skies over the European eastern flank.

"The deployment of modern 5th generation fighter aircraft to Poland – just half a year after the end of a similar deployment by Royal Netherlands Air Force F-35 – demonstrates NATO's ability to forward position advanced fighter capabilities in a flexible manner," said Major General Gianluca Ercolani, Chief of Staff at Allied Air Command. "It is another proof of the fact that Allies are operating integrated by design under efficient air command and control arrangements to execute meaningful deterrence and defence along the eastern flank," he added.

"With the offer of our 5th generation fighter aircraft to NATO, we underscore that Italy is fully committed to supporting the Alliance's collective enduring missions", said Lieutenant Colonel Ciro Maschione, Commander of the Italian F-35 Detachment "Task Force Air – 32° Wing". "Since 2019, the Italian Air Force has seamlessly deployed their F-35s to NATO Air Policing and Air Shielding missions in Iceland and Estonia – as a matter of fact our Eurofighters are leading the 63rd rotation of NATO 's Baltic Air Policing in Lithuania in parallel to this F-35 deployment", he added.

In the afternoon of September 21, 2023, two F-35 of the Italian Air Force Task Force Air-32nd Wing executed their first alert scramble out of Malbork Air Base, Poland under NATO orders.
NATO radars picked up the tracks of Russian aircraft flying in international airspace over the Baltic Sea close to NATO borders. Launched by NATO's Combined Air Operations Centre at Uedem to investigate the incident, the Italian F-35s intercepted and identified two Russian Federation Su-30 FLANKER fighter jets which were not on a flight plan and had not contact to Air Traffic control.

Upon identification, the F-35s escorted the Russian jets towards national Russian borders. The encounter was conducted in a professional manner and the NATO F-35/ returned to Malbork Air Base upon completion of the mission. At no time did the Russian aircraft enter NATO airspace. NATO fighter jets regularly launch for such routine missions along the Alliance's borders e.g. on the Baltic Sea shores to keep Alliance populations and territories protected.
"During this initial period of deployment in Poland, we carried out approximately 200 hours of flight and several A-Scrambles guaranteeing the security framework required by NATO", declared the Commander of the TFA Lieutenant Colonel Ciro Maschione, "The activity conducted by the Task Force is the tangible demonstration of the operational projection capacity that the Italian Air Force and Armed Forces are able to express wherever they are called to intervene. The results obtained with the use of the fifth generation F-35 aircraft have once again testified to the leadership role that the Air Force has in the use of the valuable weapon system."

by Cem Doğut
Analyst & Photographer

ITALIAN TASK FORCE AIR 32nd WİNG

The Task Force is equipped with four fifth generation F-35A Lightning II aircraft from the 6th Wing of Ghedi and the 32nd Wing of Amendola. F-35 aircraft operated by the 13th Squadron of the 32nd Wing and the 102nd of the 6th Wing are fifth geneariton, omnirole, supersonic, single-seat, single engine aircraft, capable of expressing innovative capabilities that guarantee information superiority.

HOW TO SUBSCRIBE

HOW TO SUBSCRIBE

- Subscription Card inside the Magazine
- Email
  chiefeditor@secondtonone.com.pk
- Website
  www.secondtonone.com.pk
- Phone Call
  +92 315 3121123
  +92 310 4808022

Digital Edition also Available

www.secondtonone.com.pk

FREE FREE DELIVERY FREE FREE

Online
www.secondtonone.com.pk
contact@secondtonone.com.pk

Phone
+92 315 3121123
+92 310 4808022
051 950 6551

Post
PAF Magazine Section
Dte Gen PR (Air Force)
PAF Complex E-9 Islamabad

3 EASY WAYS TO ORDER

PAKISTAN AIR FORCE
SECOND to NONE

PAKISTAN AIR FORCE
SECOND to NONE

2024

With the Compliments of
Chief of the Air Staff
Pakistan Air Force

FOLLOW US:
@DGPR_PAF @DGPR.PAF
@dgpr_paf @PakistanAirForceOfficial

Directorate General Public Relations (Air Force)

www.paf.gov.pk

National Logistics Corporation

Air Freight

The World Within Your Reach

NLC Log Services offers end-to-end multimodal logistics solutions including:

* International Air & Sea Freight
* Project Cargo Management
* Multimodal Cargo Solutions
* Air & Sea Chartering
* Customs Brokerage
* Trucking Services

Road Freight


Marine & Air


Train Freight

Dry Ports


Logistics Parks

+92 21 111 652 000 | info@nlc.com.pk | www.nlc.com.pk