

# SECOND to NONE

BIANNUAL

Colours of Falcons



COVER STORY

# AIR POWER

Beyond 2050



**Anatolian Eagle-2021**  
A View from Konya

**Soaring High**  
Promoting Air-Mindedness in RPAF

**Bombed to Atoms**  
The Tale of an Unbelievable Feat

**EXCLUSIVE**  
**Combating Cyberterrorism**  
PAF's Cyber Force Stands Up

**MARTYRS' DAY**  
Honouring the Shuhada



**TOGETHER WE TRAIN & RISE**  
Ex ACES Meet 2021-2



**FANTASTIC FANTAN**  
Tale of a Rugged Warrior



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## Advertising & Subscription

0321 5599774

0310 4808022

Note: Contents are not necessarily the official views of nor endorsed by the PAF. Information in this magazine is current at the time of publication.

Cover Page Photo:  
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# EDITORIAL TEAM

from the

# EDITOR-IN-CHIEF

**A**s we recuperate and start adjusting to the new 'normal' in post COVID-19 times, we look forward to the future with renewed hope and vigour. The future certainly looks exciting, holding incalculable potential in aviation technologies. Observing emerging technologies in aviation and aerospace, 'Star Wars' and 'Star Trek' movies comes to mind. As kids, we watched these sci-fi movies in awe. It was hard to believe that such peaks of technology would ever be possible. However, it all seems possible now, after a few decades. From hypersonic aircraft flying with enormous speeds to aerial platforms equipped with laser weapons, seems like we're barely scratching the surface of what's possible. This is what we have carried as the cover story, bringing out an in-depth analysis of air power in 2050 and beyond.

New emerging technologies in every field around us are making our lives easy, however, it is pertinent to note that they also come with inherent risks and dangers. With cyber warfare quickly becoming a beast to be tackled with, PAF has established its own cyber wing to combat nefarious attacks in the realm of cyber space. While discussing futuristic developments, it is also important to look at the past and bring out stories which are long forgotten. Once such interesting tale which we penned down for our worthy readers, is of 'Fantastic Fantan', the rugged A-5 III aircraft which served the PAF for decades.

In this edition, we have featured an in-depth account of the day when it all starts, the Passing Out Parade. It is a day when boys turn into men, taking a headfirst plunge into the skies that they will dominate for the rest of their lives. When talking about the past, one cannot forget the sacrifices of our gallant Shuhada, Ghazis and veterans who went beyond the call of duty to safeguard the aerial frontiers of our beloved country. Like always, last year's Martyrs' Day was observed by PAF personnel with honour.

In contemporary times, mutual cooperation and learning from each others experiences is crucial between friendly nations. When this aspect is examined through the lens of air forces, a very effective tool to achieve these goals are international air exercises. Recently, such an exercise was curated by Turkey, titled 'Anatolian Eagle-2021', which has been suitably covered by our foreign correspondent. Pakistan has taken a similar initiative in the form of ACES Meet. The exercise was a huge success, with Turkey and several other air forces participating in the auspicious event. Another event that has been covered in detail is the aviation powerhouse Dubai Airshow 2021. The airshow has gradually grown into an event attended by thousands of high-profile aviation officials securing deals worth billions of dollars in a matter of days. Another interesting chapter of PAF history

which needs apt recognition was the initiative taken in 1950s by AVM Sir Richard Acherley, the then C-in-C of RPAF. Titled as 'Shaheen Air Training Corps' and 'University Air Squadron', the two schemes were launched by RPAF to attract youth to join the air force. The most alluring feature of these endeavours was the training that the cadets received on gliders and piston-engine training aircraft. Large number of PAF officers are the product of these shinning schemes, ACM Anwar Shamim Khan and Air Cdre MM Alam being few of the examples. The exploits of national hero Wg Cdr Salim Baig have also been presented in this issue. Despite having two confirmed aerial kills against IAF to his name and credited with flying sorties that had a definite hand in turning the tide of the war, the hero has shunned fame that he rightly deserved.

We end with flair. The F-16 is one of the most iconic fighters in the history of aviation. Different air forces around the world have painted their F-16s in striking liveries, which we have captured in all their glory for readers. The usual updates and aviation news from all around the world have been thoroughly covered, as well. As always, it was pleasure to curate the magazine. We strive to bring you the best content that aviation has to offer. We hope that commitment shines through.

Happy Readings!



*Muhammad Ali*

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On 05 August, 2021, on completion of two years of illegitimate revocation of the special status of IIOJ&K, contriving demographic changes and continued military siege by India in gross violation of human rights, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force expressed his resolve to stand with brave and resilient people of IIOJ&K in their peaceful struggle against Indian oppression. In his message, he said that the international community should not forget its responsibility towards the people of Indian Occupied Jammu & Kashmir. We will continue to pursue a firm policy of political, moral and diplomatic support to the people of IIOJ&K in their struggle for the right of self-determination.



## ARMY CHIEF BRIEFED ON OPERATIONAL MATTERS OF PAKISTAN AIR FORCE



On 16 September 2021, Chief of Army Staff (COAS) General Qamar Javed Bajwa visited Air Headquarters Islamabad and called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force. During the meeting matters of mutual professional interest were discussed. The Air Chief highlighted various ongoing projects being carried out by PAF. COAS hailed PAF sacrifices for the country and their all-out support to the Law Enforcement Agencies (LEAs). COAS also appreciated

PAF's role in provision of humanitarian assistance and facilitating recent evacuation operations from Afghanistan. Earlier, during the visit, COAS was also given detailed briefing on operational matters of the Pakistan Air Force.

## ACM FAROOQ FEROZE KHAN (RETD) LAID TO REST WITH FULL MILITARY HONOURS

On 10 October, 2021, Former Chairman Joint Chiefs of Staff Committee and Chief of the Air Staff Pakistan Air Force, Air Chief Marshal Farooq Feroze Khan (Retd) who expired in Islamabad due to cardiac arrest, was laid to rest at PAF graveyard Nur Khan with full military honours. A smartly turned out contingent of Pakistan Air Force also presented gun salute at his grave. After the burial, floral wreaths were placed at the grave of the deceased on behalf of President of Pakistan, Prime Minister, Chairman Joint Chiefs of Staff Committee, Chief of Army Staff, Chief of Naval Staff, Chief of the Air Staff and other dignitaries.

Earlier funeral prayers of Air Chief Marshal Farooq Feroze Khan (Retd) were held at PAF Base, Nur Khan. The funeral was



attended by Chairman Joint Chiefs of Staff Committee, Chief of the Air Staff, Chief of Naval Staff, former PAF air chiefs, war veterans, senior civil and military officials.

## CAS-SERENA HOTELS INTERNATIONAL SQUASH CHAMPIONSHIP CONCLUDES AT MUSHAF SQUASH COMPLEX

Pakistan Squash Federation (PSF) in collaboration with Pakistan Air Force, Serena Hotels and Combaxx Sports, organized Chief of the Air Staff-Serena Hotels & Combaxx Sports International Squash Championships for Men & Women at Mushaf Squash Complex, Islamabad between 11 – 15 October, 2021. Apart from Pakistan, a group of 22 foreign players from 10-countries (Austria, Czech Republic, Egypt, England, France, Hong Kong, Russia, Serbia, Spain & Switzerland) entered in Men & Women events.

The finals of Men & Women events were played on 15 October, 2021. Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force who is also the President of Pakistan Squash Federation, graced the closing ceremony as chief guest and awarded trophies & prize money to the finalists.



The Women final was played between World No 69 Marie Stephan from France and World No 81 Salma Eltayeb from Egypt wherein Salma Eltayeb defeated Marie Stephan with a game score of 11-6, 12-10, 11-04 in 18 minutes. Whereas the Men final was played between World No 59 Auguste Dussourd from France and World No 67 Moustafa El Sirty from Egypt in which Moustafa El Sirty defeated Auguste Dussourd with a game score of 09-11, 11-07, 11-06, 12-10 in 47 minutes and won the championship finals.

## PARTICIPANTS OF NATIONAL SECURITY WORKSHOP VISIT AIR HEADQUARTERS

03 November, 2021, participants of 23<sup>rd</sup> National Security Workshop from National Defence University visited Air Headquarters, Islamabad. The contingent was led by Major General Ehsan Mehmood Khan, DG ISSRA, NDU. A briefing on "Organization of PAF and nature of its operations" was given to the visiting participants of National Security Workshop.

Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force while addressing the participants said that air and space power have always been the decisive enabler of operations in the land and maritime environments. Referring to the regional geo-political environment, he said that PAF is fully cognizant of the security challenges and is actively pursuing its operational development plans. He further added that Pakistan Air Force attaches utmost importance to its operational preparedness and remains ready to respond to any challenge to the national security. Later, the Air Chief also interacted with the participants of Security Workshop and answered their questions.

The visiting members of National Security Workshop included parliamentarians, faculty members and senior military as well as civil officers.



## DG ISI CALLS ON AIR CHIEF

On 10 November, 2021, Lieutenant General Faiz Hameed, Director General Inter Services Intelligence called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office. Various matters pertaining to national security and synergy amongst tri-services and intelligence organisations were

discussed during the meeting.

DG ISI expressed his appreciation for the thorough professionalism of PAF personnel, and their resolve to safeguard the aerial frontiers of Pakistan. The Air Chief lauded the diligent efforts of Inter Services Intelligence for maintenance of regional peace and stability.

## INVESTITURE CEREMONY HELD AT AHQ

On 11 November, 2021, operational and non-operational military awards were conferred upon officers, JCOs and airmen of Pakistan Air Force in recognition of their distinguished services during an Investiture Ceremony held at Air Headquarters, Islamabad. Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force was the Chief Guest at the occasion.

During the ceremony, Air Vice Marshal Amir Shahzad, Air Vice Marshal Zubair Hassan Khan, Air Vice Marshal Salman Abbas Shah and 39 PAF officers were conferred Sitara-i-Imtiaz (Military). 36 Tamgha-i-Imtiaz (Military) and 06 Tamgha-i-Basalat (including 04 Shuhada) were also awarded to PAF officers. 08 Junior Commissioned Officers of Pakistan Air Force were also conferred Tamgha-i-Khidmat (Military) Class-I. The decorations were awarded in recognition of acts of extra ordinary devotion to duty and outstanding contributions towards service. A number of PAF high ranking officers and personnel were also present at the occasion.



## INAUGURATION OF PAKISTAN'S FIRST NATIONAL CYBER SECURITY ACADEMY

On 23 November, 2021, Dr Arif Alvi, President Islamic Republic of Pakistan, inaugurated country's first ever National Cyber Security Academy at the opening ceremony of International Conference on Cyber Warfare & Security 2021 (ICCWS 2021) at PAF Complex, Islamabad. Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force received President Alvi at the conference venue. The event was also attended by Air Marshal Javaid Ahmed (Retd), Vice Chancellor Air University and Air Vice Marshal Abbas Ghumman, Director General C4I PAF along with civil-military and foreign dignitaries.

While addressing the ceremony, President Dr Arif Alvi declared the issue of cyber security as a global threat having implications on national security of the country. The President appreciated industry-academia collaboration, where PAF worked closely with the Air University and HEC in establishing country's first ever Cyber Security Academy. Terming it as a historic occasion, the President called for pursuit of excellence in cyber domain.



Chief of the Air Staff's vision on evolving cyber domain has defined PAF's role in contributing to security objectives under National Cyber Security Policy 2021.



## CLOSING CEREMONY OF INTERNATIONAL CONFERENCE ON CYBER WARFARE & SECURITY

On 24 November, 2021, two days International Conference on Cyber Warfare and Security

concluded at Islamabad. Mr Shafqat Mahmood, Federal Minister for Education was the chief guest at the closing ceremony. The minister was received by Air Marshal Nauman Ali, Vice Chief of the Air Staff, Pakistan Air Force along with Air Marshal Javaid Ahmed (Retd), Vice Chancellor Air University and Air Vice Marshal Abbas Ghumman, Director General C4I PAF as he arrived at the venue. The event was also attended by civil-military dignitaries and leading Academia, think-tank and Cyber Industry representatives.

Federal Minister Shafqat Mahmood, while addressing the ceremony, underlined the need for building strong cyber security capabilities as the country is under constant cyber attacks. The Minister lauded PAF along with Air University for the successful conduct of International Conference on cyber Warfare and holding of Cyber Security Industry Exhibition. Presence of leading players of cyber industry in the exhibition would help bring cutting edge technologies to the country. Shafqat Mahmood praised PAF for providing patronage to Air University in establishing Cyber Security Academy and strengthening academia to meet technological challenges.

## SECRETARY GENERAL OF DEFENCE & NATIONAL ARMAMENTS DIRECTOR, ITALY CALLS ON AIR CHIEF



On 25 November, 2021, Lieutenant General Luciano Portolano, Secretary General of Defence & National Armaments Director, Italy called on Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force in his office.

The visiting dignitary lauded professionalism of PAF personnel and exceptional progress made by PAF over the years, especially through indigenization. The Air Chief highlighted the cordial relations between the two

countries and reiterated his resolve to further augment the existing cooperation between the two Air Forces.

Various matters of mutual interest and professional cooperation also came under discussion during the meeting.

## AIR CHIEF WITNESSES ALL PAKISTAN BILINGUAL DECLAMATION CONTEST-2021 HELD AT PAF ACADEMY ASGHAR KHAN

On 27 November, 2021, All Pakistan Bilingual Declamation Contest-2021 was held at PAF Academy Asghar Khan, Risalpur. Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force was the chief guest on the occasion. The Air Chief lauded talented youth from premier academic institutions of Pakistan who participated in the contest. The chief guest emphasized the significance of co-curricular activities for the wholesome grooming of the students.



First prize in English speech was awarded to Pre Cadet Muhammad Ali of PAF College Sargodha, while the first prize in Urdu speech was won by Gentleman Cadet Usaid Usmani of Pakistan Military Academy, Kakul. The coveted trophy of All Pakistan Bilingual Declamation Contest-2021 was won by the team of Pakistan Military Academy, Kakul. The declamation contest was followed by a highly entertaining variety show presented by the Academy Dramatics Club.

## PAF WINS 30<sup>th</sup> CAS CHALLENGE CUP POLO TOURNAMENT

On 5 December, 2021, PAF won the 30<sup>th</sup> Chief of Air Staff Challenge Cup Polo Tournament, which was played at the lush green Islamabad Polo Club. PAF won the final match by defeating PAF Blue with five to four goals. Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force was the chief guest on the occasion.



The chief guest gave away prizes amongst the players and awarded the CAS Challenge Polo Cup to the winning team. The Air Chief congratulated the winners and appreciated the club management for successful conduct of the event in order to promote sports in Pakistan. The chief guest also emphasized upon the significance of sports for mental as well as physical health of the youth.

The tournament commenced on 29 November, 2021 and 08 teams (PAF, PAF Blue, PAF White, Asean Kalabagh, Boquival, Buraq ASC, Hakuna Matata and PBG) participated in the tournament. Diplomats, high ranking military & civil officials and polo enthusiasts witnessed the match. CAS Challenge Cup Polo Tournament was introduced in 1985 and ever since it has been a regular feature in the PAF Sports Calendar ever since.



## AMBASSADOR OF AZERBAIJAN CALLS ON AIR CHIEF

On 9 December 2021, Ambassador 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. During the meeting, both the dignitaries discussed matters of professional and mutual interest.

H.E. Mr. Khazar Farhadov commended the professionalism of PAF and acknowledged its rising indigenous capacity in aviation industry. The Air Chief said that Pakistan and Azerbaijan had longstanding religious, cultural and historical bonds which were manifested through strong ties between the air forces of two countries. 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 brotherly States.

## BEGUM RASHEEDA MINHAS LAID TO REST WITH FULL MILITARY HONOURS

On 11 December, 2021, Pakistan Air Force paid tribute to Begum Rasheeda Minhas, mother of Pilot Officer Rashid Minhas (Shaheed), Nishan-e-Haider, who breathed her last in Karachi. A smartly turned out contingent of Pakistan Air Force presented guard of honour to the deceased.

The funeral prayers were attended by air & ground crew of No 2 Squadron of PAF, which is named after Pilot Officer Rashid Minhas Shaheed. Several high ranking civil and military officials were also present at the funeral. Air Vice Marshal Zaeem Afzal, Air Officer Commanding, Southern Air Command, Pakistan Air Force alongwith PAF personnel offered fateha for the departed soul.

Floral wreath on behalf of Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force was also laid on her grave.



## ASIAN INDIVIDUAL SQUASH CHAMPIONSHIP-2021 CONCLUDES AT MUSHAF SQUASH COMPLEX

On 19 December 2021, 21<sup>st</sup> Asian Individual Squash Championship for Men & Women organized by Pakistan Squash Federation (PSF) concluded at Mushaf Squash Complex, Islamabad. The Men's event comprised 32 players, whereas, the Women's event had a 16 players' draw. Apart from Pakistan, a group of international players, officials and referees from Hong Kong, Iran, Kuwait, Malaysia, Qatar, Singapore & Sri Lanka participated in the tournament.

The finals of Men & Women events were played on last day. Air Marshal Aamir Masood, Senior Vice President PSF, graced the closing ceremony as chief guest and awarded trophies & prize money amongst the finalists. Squash legends Mr Qamar Zaman and Mr Jansher Khan along with event sponsors also attended the prize distribution ceremony.

The Women's final was played between Tong Tsz Wing from Hong Kong and Rachel Mae Arnold from Malaysia wherein Tong Tsz Wing defeated Rachel Mae Arnold with a game score of 3-0 (11-8,13-11 and 11-5) in 34 minutes. The Men's Final was played between Ng Eain Yow from Malaysia and Yip Tsz Fung from Hong Kong in which Ng Eain Yow clinched the Men's title of 21<sup>st</sup> Asian Squash Championship. He defeated Yip Tsz Fung with a game score of 3-0 (11-6, 13-11 and 11-9) in 40 minutes and won the championship finals.



## GRADUATION CEREMONY OF NO 55 COMBAT COMMANDERS' COURSE HELD

On 20 December 2021, the Graduation Ceremony of No 55 Combat Commanders' Course was held at Airpower Centre of Excellence (ACE). Air Marshal Syed Noman Ali, Vice Chief of the Air Staff, Pakistan Air Force was the chief guest on the occasion.

While addressing the course participants, the chief guest said, "Meticulous training has always been our core strength and we would continue to guard it." He further said that ACE remained at the pinnacle of PAF's combat training and played a pivotal role for developing excellent aerial combat skills of future air warriors. He also expressed his satisfaction on implementation of emerging warfare concepts in the elite institution of PAF.

Air Marshal Syed Noman Ali, Vice Chief of the Air Staff, Pakistan Air Force also awarded certificates and trophies to the graduating officers who underwent a strenuous and professionally demanding course. The Chief of the Air Staff

Trophy for overall best performance amongst combat pilots was awarded to Squadron Leader Muhammad Bilal Khan, while Air Officer Commanding Air Defence Trophy for overall best performance amongst combat controllers was awarded to Squadron Leader Rana Muhammad Abid.

The ceremony was attended by Principal Staff Officers and field commanders of Pakistan Air Force.







“ We live in strange times. Technological progress has broken all predictable levels of advancements. Everyday humans are now able to do tasks on a daily basis-which would've been considered witchcraft even a few decades ago. However, this luxury does not come without a cost. With computers and automation gaining more and more control every single day, nefarious forces have started using the same medium to infiltrate and sabotage the systems on which our infrastructure stands. As war moves from the physical to the digital, it is integral that we do all that we can to tackle this dangerous, looming threat. ”



by Air Cdre Muhammad Ali, SI (M) (Retd)

## PAF's Cyber Force Stands Up

# COMBATING CYBERTERRORISM



Soon after taking over as the Prime Minister of Pakistan, Mr Imran Khan had already prioritized his measures for the future of Pakistan and not surprisingly the 'Cyber Security' remained the foremost domain which needed pressing attention. As a visionary, he knew that securing the countries strategic assets and economical nerve Centres from cyber attacks would be of prime importance. Thus he tasked his worthy cabinet to first of all recommend and finalize the country's first ever cyber security policy. After due deliberations and detailed considerations, the maiden cyber security of Pakistan was drafted and was finally approved by the cabinet in Jul 2021. This policy would go a long way in safeguarding the cyber space of the country and the credit certainly goes to the incumbent govt under the leadership of PM Imran Khan.



Above: Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, PAF inaugurating the CSC (Cyber Security Centre) at AHQ Islamabad. (All Photos PAF Archives).

**W**e think of the world wide web as an indispensable tool that delivers the world to our doorsteps, but it is also a wide-open conduit for cyber attacks. We have learnt to live with cybercrime, identity theft, credit card fraud, hacking and stealing of personal information, but now there's a threat that is much more frightening and destructive. Terrorists as well as nation states can get into a network that controls some physical asset and cause it to malfunction or self-collapse just like it was attacked by a kinetic weapon. No reports of troop movements to signal a threat or an air raid warning to give heads up, just a sudden out of the blue digital takedown of dams, power plants, factories, air traffic, financial systems and more. The world is now in a digital arms race against hostile nations, hackers and terrorists. It's a frightening new world of cyberwar.

### An International Threat

In the last three years, cybersecurity has received perhaps more attention than at any time during the last three decades. Proponents of greater cybersecurity have deployed cyber-doom scenarios that frame prospective cyber-threats in terms of "war" and "disaster" and offer the possibility of total economic, social, or even civilizational collapse. The Federal Bureau of Investigation (FBI) has warned that a cyberattack could have the same impact as a "well-placed bomb". It has officially been referred to as "weapons of mass disruption," implying that cyberattacks might have impacts comparable to the use of weapons of mass destruction (WMD). Proponents of cyber attacks also describe it as, "A grave and growing capacity for crippling the tech-dependent society."

Even though everyday is a technological miracle. We can now drive, connect with friends and family, bank, travel but all that convenience has a dark side. In last three years, several high-profile "cyberattack" incidents have served to focus attention on cybersecurity even more sharply than before. These have included two large-scale cyberattacks attributed to Russia. One

Title Photo: A glimpse from inside the corridors of CSC which would serve as the hub of all PAF's Cyber Security matters in future.





Left: Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, PAF along with Principal Staff Officers of PAF praying for the prosperity of recently inaugurated CSC at AHQ.



Left Centre: AVM Ghulam Abbas Ghumman, DG C4I briefing the air chief regarding the various aspects of newly inaugurated facility at AHQ, Islamabad.

Bottom: Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, PAF along with Principal Staff Officers of PAF pose for a historical group photo after the inauguration of CSC.

was against the Baltic nation of Estonia in the spring of 2007, and one against the nation of Georgia in July and August of 2008, which coincided with a Russian invasion of that country.

### A National Threat

Pakistan is no different when it comes to the ever-increasing threat of cyber-attacks. In the late hours of October 29, 2021 and early morning of October 30, 2021, a cyber-attack on the National Bank of Pakistan's servers was detected. The breach of the systems caused nationwide disruption of services at the state-owned bank. Somebody had used an entirely new class of weapon to effect destruction. Although this recent cyber-attack on one of the country's biggest financial institutions was one of the most serious incidents in the history of the country, it was not the first of its kind.

The banking sector has been at



Above: A panoramic view of the CSC at AHQ, Islamabad.

Bottom: Engraved at the entrance lobby of CSC are the names of the committed and pioneering team members who worked day-in and day-out to establish the facility in record time.

the receiving end of cyber-attacks for a few years now. Database of 69, 189 bank cards of one of the leading private banks of Pakistan was put for sale on the dark web in February 2019. The data breach cost the bank data worth \$3.5 million. In November 2018, Pakistan's banking industry suffered a unique form of cyber attack. Data of almost all Pakistani banks was breached, affecting nearly 20,000 banking customers, causing significant financial losses to the institutions. Various websites of Sindh High Court in July 2021, attack on ATMs in Peshawar in December 2020, and security breach of Careem in April 2018, were also notable cyber attacks.

We are living in an era now, where we have to wonder whether terrorists and unfriendly states could cause damage with computer codes that, before they could only cause with a bomb. Could we afford to wait for the next deadly attack on Pakistan, which could be delivered with the tap of a key, instead of bullets and bombs, by an anonymous enemy using bits and bytes. Using only a computer, terrorists or nations could attack critical infrastructure like the power grid that could result in a blackout for the majority of the country. With computers permeating our environments and cyber weapons unleashed, how long before a computer virus, a true digital weapon, is launched against the more sophisticated military targets.

Here comes the more important question to our minds. Who all are behind this form of lethal and covert warfare? Generally speaking, the majority of us consider this to be carried out by individual hackers or cyber thieves but unfortunately this is not true. Unfriendly states, authoritarian regimes with more sinister designs are also using this as the weapon of choice to destroy the peaceful nation states, and that is more alarming.



ACM Zaheer Ahmed Baber Sidhu, NI(M)  
Chief of the Air Staff

AVM Abbas Ghumman  
Gp Capt Usman  
Gp Capt Qasim  
Wg Cdr Salman  
Wg Cdr Hasan  
Sqn Ldr Shahla  
Sqn Ldr Tayyab  
Sqn Ldr Khalid  
Sqn Ldr Zeeshan  
Sqn Ldr Bilal  
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Sqn Ldr Kashif  
Sqn Ldr Waqas  
Fit Lt Aruba

VISION  
"To Become an Effective, Ubiquitous & Highly Responsive Cyber Force"

ONE TEAM  
ONE MISSION

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Sqn Ldr Shoab  
Sqn Ldr Faizan  
Sqn Ldr Ahmed  
Sqn Ldr Khuram  
Sqn Ldr Firdous  
Sqn Ldr Abdullah  
Sqn Ldr Toussif  
Fit Lt Salman



### National Cyber Security Policy-2021

Back in 2018, the newly elected government of Prime Minister Imran Khan faced multiple challenges on variety of fronts. However, being a visionary leader, the Prime Minister Imran Khan considered the cyber warfare to be one of the gravest threats to Pakistan. Within months after he was sworn in, the PM tasked his cabinet to prepare the cyber security policy and take all necessary measures to fight this menace on priority. He also gave guidelines to state organizations to prepare effective response to this emerging new challenge. Finally, the efforts bore fruit in November 2021, when the nation's first 'National Cyber Security Policy' was approved; indeed, a significant milestone in present times. Finalized by Ministry of Information Technology and Telecommunication, the policy stated that a cyber-attack on Pakistan would be taken as an act of aggression against national sovereignty and would be defended with appropriate response measures in accordance with national and international

Left: A Collage of various state-of-the-art facilities available in CSC.

Bottom: Futuristic looking ambiance is the hallmark of the newly erected CSC infrastructure.



laws for reciprocal respect of digital sovereignty. The draft policy envisaged developing secure and resilient cyber systems and networks for national cyber security and response. "To mitigate cyber threats the country faces today and to improve the national cybersecurity outlook, it is imperative to undertake the strengthening of national cybersecurity capabilities through the development of essential and well-coordinated mechanisms, implementation of security standards and regulations under a policy and legislative framework," the policy added. The guiding principles to achieve policy objectives, including all actions, would be driven by the need to protect people and enhance national and public prosperity, respective public and private organizations would be responsible to ensure the cybersecurity of their online data.

### PAF's Cyber Force Stands Up

The Pakistan Air Force, more technologically advanced among the three-armed forces, had felt the need most, to protect its resources from cyber-attacks. Taking lead and guidelines from the PM Imran Khan's policy on cyber security, ACM Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, PAF tasked a team of professionals and enthusiasts under



the command of AVM Abbass Ghuman to establish PAF's Cyber Command on war footings. Then the miracle happened. In less than four months after the air staff approval in Jul 2021, the first and one of its kind Cyber Security Centre (CSC) was established at AHQ in Oct 2021. The main purpose of CSC would be to train what it calls 'PAF's Cyber Warriors'. It is the first step towards establishing the ultimate PAF's Cyber Command which is

envisaged to be ready for action by Mar-April 2022 timeframe.

"PAF Cyber Command, when fully operationalized, will play a significant role for supporting growth of cyber security demands in the field of academics, technology and professional competence in line with the vision of the Govt of Pakistan and would be a game changing transformation towards 5<sup>th</sup> dimensional



Above: Cyber Range at CSC would serve as the arena for carrying out cyber war games and training exercises.

Left: Briefing sessions are given utmost importance among the various activities carried out at the CSC.

warfare,” said ACM Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, PAF at the inauguration of the facility.

The Air chief further added that the new set-up would include comprehensive research and development (R&D) and certification structure in addition to operational requirements. It would enhance the vital industry-academia linkage as envisaged by the national cyber policy and the PAF has established various state-of-the-art infrastructures like Cyber Technology Park (CTP) at NASTP (National Aerospace Technology Park) PAF Nur Khan and National Cyber Security Academy (NCSA) at Air University in this regard.

“I would also like to appreciate my team who worked day and night for developing these cyber capabilities. PAF will Inshallah become a highly responsive and resilient cyber force for combating contemporary warfare and play a significant role in cyber defence of the country in line with National Cyber Security policy,” said AVM Abass Ghuman as the CSC got operational.

The main purpose of the CSC is to function as the nerve centre of the PAF’s Cyber Command and it is a facility that houses an information security team responsible for monitoring and analyzing organization’s security posture. It is a unit where security experts have devised defences against cyber attack on organization - to figure out attacks through the



internet, what is its payload, motivation, what is it going to do once it is actually in the system etc etc.

The objectives of the Cyber Command, is to build a force, trained and equipped, for conducting sustained cyber operations through the electromagnetic spectrum, fully integrated with air and space operations. The establishment of fully operational centralized Cyber Command will enable PAF to strengthen its emerging cyber security requirements. Its mission is serious - to execute decision-making, accelerate operations, provide battle changing opportunities, and deny those capabilities to adversaries. The baseline setup will uplift PAF Cyber Security capability in line with the dictates of modern warfare. It will set the pace for the operationalization of Cyber Command, and will be upgraded through R&D

setups and collaboration with national / international industry through NASTP (National Aerospace Technology Park), another brilliant initiative taken up by the PAF. To prevent the organization from cyber threats, Hardware and Software Evaluation labs are already performing critical tasks of advanced mobile forensics, data recovery and password decryption. These operations are underway at state-of-the-art facilities such as National University of Science and Technology (NUST) and the Air University (AU), directly in collaboration with PAF. In pursuit of excellence, PAF IT Academy would also be utilized for specialized training courses & certifications in the field of Information Technology / Cyber Security. It is also pertinent to put your

**Left Page Top:** Personnel of the ‘Red Team’ seen busy in carrying out routine activities at CSC.

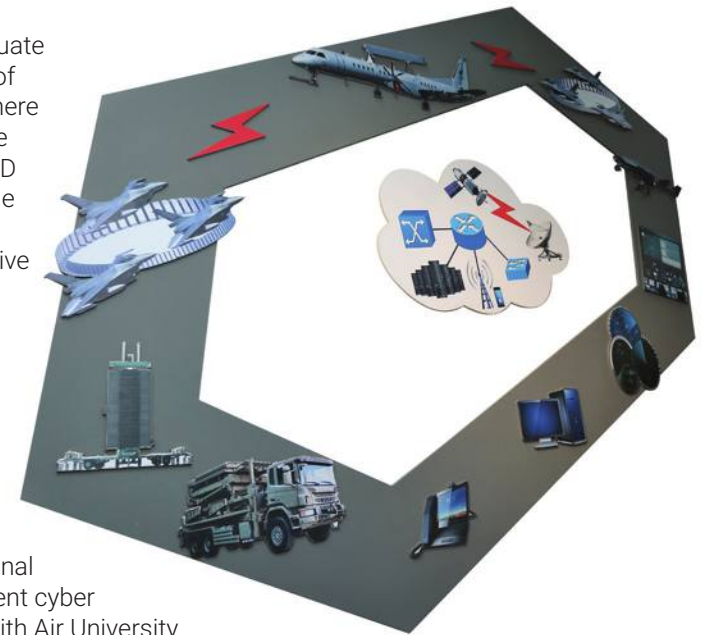
**Left Page bottom:** ‘Right from a Hollywood Movie’- PAF personnel monitoring and controlling the cyber domain from the nerve centre of CSC.

**Bottom:** Red Team and Blue Team at CSC work ‘side by side’ to test and evaluate their capabilities thus enhancing the overall efficiency of PAF Cyber warriors.

capabilities under a test, to evaluate the strengths and weaknesses of the inherent systems. This is where the role of cyber range will come in place. With the concept of RED and BLUE teams, the cyber range carries out extensive real time exercises to evaluate the offensive and defensive capabilities of the system in near realistic environment.

### Industry-Academia Linkage

Another important aspect is the training and capacity enhancement of the human resource involved in these operations. In line with the national cyber vision of developing resilient cyber systems, PAF in collaboration with Air University had also taken major initiatives. These initiatives were primarily focused to build a strong supply line of cyber talent, create strong industry-academia linkages, establish comprehensive R&D setups and strengthen national as well as PAF cyber operational capability. These projects included establishment of **National Cyber Security Academy (NCSA)**, conducting the 2<sup>nd</sup> International Conference on Cyber Warfare and Security, and development of **Cyber Technology Park (CTP)** at NASTP PAF Nur Khan on the direction of Chief of Air Staff. Potential of NCSA can be fully capitalized if it is integrated with the Cyber Industry through Cyber Technology Parks. It is pertinent to highlight that the first ever **Cyber Centre of Excellence** is being established at NASTP Nur Khan. **CTP** would



“Chief of the Air Staff’s vision on evolving Cyber domain has defined PAF’s role in contributing to Cyber Security objectives under National Cyber Security Policy 2021.

This platform would act as a stepping stone and create an opportunity at national level in cyber capability development and capacity enhancement while staying abreast with latest technological trends.

The world is now in a digital arms race against nations, hackers and terrorists. The number of countries armed with cyber weapons is in dozens not to mention terrorists and criminal hackers. Unless we find ways to counter these threats there is a real danger that all this technological progress will do more damage than good. However, the PAF Cyber Command is here, to protect not only PAF but also country’s vital and strategic assets from belligerent cyber-attacks by the adversaries.



be a comprehensive setup, technology demonstrator and a platform to collaborate with National / International Cyber firms under one roof. True dividends of industry academia linkage in cyber domain can truly be obtained by this setup. CTP will assist in joint collaborations between the government and companies, professional bodies and serve as a gateway to attract advanced cybersecurity companies that would work hand in glove with government.

Martyrs' Day - 2021

# HONOURING the SHUHADA

“Every year, PAF observes 7 September as the ‘Martyrs’ Day’ and this year was no exception. In one of its finest traditions of paying tribute to the Shuhada, Ghazis and Veterans of PAF, several solemn and prestigious ceremonies are held around the country. The editorial team brings out the first-hand account of these activities for the nation to cherish and feel proud of.”

by Editorial Team



**P**AF observes Martyrs’ Day on 7 September every year, to pay tribute to the air warriors who paid the ultimate sacrifice to defend their motherland during the 1965 War. The day is a reminder of the indomitable spirit with which PAF out-maneuvred and out-performed an enemy five times its size. Right from the start, PAF ruled the skies and never let the enemy achieve its nefarious designs. Several factors contributed to this unlikely success. PAF’s insightful leadership, motivation of the personnel and its carefully curated training are a few that comes to mind. However, in the 1965 war, one factor made all the difference. The do or die spirit of the men of PAF. The indescribable motivation that made the men of PAF lay down their lives for their nation.

This spirit was especially observable on 6 September, when IAF jets attacked Pak Army troops near Lahore, to help its forces on the ground. This attempt was thwarted by the bravery of soldiers on the ground and in the air. While army officers like Major Raja Aziz Bhatti Shaheed stopped the Indian forces on the ground, brilliant PAF pilots like Sqn Ldr Sajad Haider and his team ruled the skies overhead and destroyed the advancing ground forces of enemy. Next day on 7 September, enemy tried to take revenge by attacking PAF Sargodha, however, the brilliance of Sqn Ldr MM Alam turned the enemy misadventure into a nightmare. On this day, Sqn Ldr MM Alam shot down five IAF Hawker Hunters in a blink. And that was not even his total kill count. He went on to claim some more enemy aircraft, earning himself the title of the only ‘Ace’ of the region.

While remembering the feats of our great ghazis, one cannot forget the supreme sacrifices made by our legendary Shuhada. Sqn Ldr Sarfraz Rafiqui is one such air warrior who laid down his life for the nation and was bestowed with two gallantry awards, Hilal-e-Jurat and Sitara-e-Jurat. By shooting down four enemy vampires along with his No 2 in the opening round of war on 1 September, he had sealed the enemy’s fate. This exemplary air battle of wits and courage shattered the enemy’s morale once for all. Later, on 6 Sep while attacking IAF Halwara he displayed highest level of leadership and comradeship. He refused to leave behind his under command despite his guns got jammed during the thick of the air combat. He ultimately attained shahadat after knocking down a couple of enemy aircraft.

To honour such men, PAF started to observe 7



September as ‘Air Force’ day every year after 1965 war, however, since couple of years it is now observed as Martyrs’ Day. Major ceremonies are held at air bases all across the country. The day starts with Quran Khawani and dua for the PAF shuhada and deceased veterans all across mosques at PAF installations. A major ceremony is held at Air Headquarters at Islamabad where the Chief of the Air Staff, PAF lays down a wreath at martyrs’ monument. The ceremony is attended by principal staff officers, officers, airmen and PAF civilians.

During this year’s ceremony, Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, PAF laid down a floral wreath on the Martyrs’ monument. During his address at the occasion, the Air Chief paid tribute to all heroes of PAF who responded to the nation’s call with unparalleled courage and put their lives ahead of others for a cause greater than life. He further added that PAF was alive to the evolving situation in the region and remains fully prepared to defend sovereignty and territorial integrity of Pakistan. On this special day, he also extended reverence to the generations of Kashmiris who have laid down their lives fighting for

**Title Photo:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, laying wreath at the Martyrs’ Monument at Air Headquarters, Islamabad.

**1:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, addressing at the occasion.

**2:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, Pakistan Air Force, offering ‘Fateha’ at Martyrs’ Monument at Air Headquarters, Islamabad.

freedom. He assured Kashmiri brothers and sisters of resolute commitment and steadfast moral, political and diplomatic support. The wreath laying was followed by the offering of Fateha by all present at the occasion.

A similar ceremony was held at the grave of Plt Off Rashid Minhas, NH (Shaheed). A smartly turned out contingent of PAF presented the gun salute to the one and only Nishan-e-Haider of PAF. On behalf of Chief of the Air Staff PAF, Air Vice Marshal Zaeem Afzal laid a floral wreath and offered fateha to pay homage to the young Shaheed, who has his final resting place in Karachi. Similar ceremonies were held all across PAF installations and air bases where the respective Base Commanders paid tributes to the shuhada and deceased veterans.

Another venerable tradition that is carried out on this day is the Guard Mounting Ceremony held at Mazar-e-Quaid in Karachi. The ceremony is traditionally held to commemorate the Quaid's visit

to PAF Academy Risalpur (now PAF Academy Asghar Khan) in April, 1948. On 6 September every year, a contingent comprising aviation cadets from PAF Academy Asghar Khan takes charge as the guards at the Quaid's mausoleum.

The day started with assembly and march-past of the PAF cadets. That was followed by the inspection of the honour guard by the Air Officer Commanding (AOC) PAF Academy. This year the Chief Guest was Air Vice Marshal Qaiser Janjua, AOC PAF Academy Asghar Khan. Later, a contingent headed by the AOC, laid the floral wreath on the grave of the Quaid on behalf of the personnel of PAF. The cadets then officially took over the guard duties at the mausoleum. The Guard Mounting Ceremony takes place thrice a year, with the guard duties being exchanged by the three services. On 6 September, the duties are taken over by PAF. The honour is given to the Pak Army on 23 March, while Pak Navy gets this honour on 14 August.



1

1: A smartly turned out contingent of cadets from PAF Academy Asghar Khan during the Guard Mounting Ceremony at Mazar-e-Quaid.

2: Air Vice Marshal Qaiser Janjua, Air Officer Commanding, PAF Academy Asghar Khan during the wreath laying ceremony at Mazar-e-Quaid.

3: Air Vice Marshal Zaeem Afzal, Air Officer Commanding, Southern Air Command, laying down floral wreath at the grave of Plt Off Rashid Minhas, NH (Shaheed).

4: Homage to the Eternals- Air Vice Marshal Qaiser Janjua, Air Officer Commanding, PAF Academy Asghar Khan saluting at the final resting place of the 'Father of the Nation'.

Bottom: PAF cadets preparing to take over guard duties at Mazar-e-Quaid.

All Photo: PAF Archives



2



3

Every year, Martyrs' Day is covered extensively in the media. All major channels air documentaries and programs specially made for the occasion. These programs pay homage and highlight the achievements of PAF. Well-versed PAF veterans appear on talk shows to enlighten the audience about PAF's role in wars. Media personnel and senior anchor persons also visit Air Bases to record special programmes on the occasion. Special events are also arranged all across PAF Bases, wherein civilians get a chance to interact with the men in blue, including viewing PAF aircraft up close. It is a day befitting of the glorious men that it pays homage to.

4



# AIR DEFENDERS GRADUATE

## A View from the Parade Square

“Twice in the calendar year, young aviators at PAF Academy Asghar Khan climb the stairs at Falcons' Hearth to join the ranks of men in blue who have safeguarded the aerial frontiers of their beloved country since its inception. From Sarfraz Rafiqui to Rashid Minhas and from MM Alam to Noman Ali Khan all have been through this prestigious institution which is considered to be nursery of producing the finest.”

by Muhammad Khan

The sturdy walls of the PAF Academy Asghar Khan have been patron to countless promising cadets who went on to become heroes of the nation. Men who went on to save thousands of lives have begun their careers in this Academy which stands tall in its humble yet enduring grandeur at Risalpur. From Sarfraz Rafiqui to MM Alam, every ace of PAF has once laughed in these halls, trained in its vast grounds and set ablaze the skies above it, the first time they flew their planes.

On the fine morning of 18 October 2021, the usually sombre PAF Academy Asghar Khan was abuzz with excitement. A jovial, inspiring spirit could be felt by everybody present. And there was good reason for it. It was the day that the academy longed for quite some time. The day when all the cadets who had been putting in their sweat and blood for years would finally get their well-deserved reward; the coveted branch insignias on their chests and officer ranks on their shoulders. They would remember this day for the rest of their lives, when they finally take their first step into a new and promising carrier.

The graduating cadets belonged to the 145<sup>th</sup> GD (P), 91<sup>st</sup> ENGG and 101<sup>st</sup> Air Defence courses. A total of 125 Aviation Cadets including five Royal Saudi Air Force Cadets graduated at the Ceremony. The synchronized parade of the graduating

Title Photo: Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, PAF inspecting the parade at the graduation ceremony. (All Photos PAF Archives).

Left Above: Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, PAF awarding Best Pilot Trophy to Aviation Cadet Sargent Abdul Rehman.

Left Centre: Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, awarding Quaid-e-Azam banner to No 3 Sqn, the champion squadron.





the audience, it was the time for the arrival of the chief guest. Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, Pakistan Air Force was the chief guest at the graduation ceremony. The Air Chief arrived at the academy in the morning and was received by the Air Vice Marshal Muhammad Qaiser Janjua, Air Officer Commanding (AOC), PAF Academy Asghar Khan.

**Top:** Sherdils performing at the graduation ceremony at PAF Academy Asghar Khan.

**Left Above:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, reviewing the parade during the graduation ceremony.

**Left Centre:** Hamza flight performing during the graduation ceremony.

As the Air Chief took position at the dais, he was presented with guard of honour by the parade commander and the AOC Academy, the chief guest reviewed the smartly tuned out cadets of the academy. Later, recitation from holy Quran was carried out.

Once the recitation was done, it was time for the main event. The cadets were neatly lined up, waiting to finally receive the reward for their toil. Air Chief Marshal Zaheer Ahmed Baber Sidhu walked to the cadets and awarded them branch insignias, pinning them on their chests one by one. He also spoke a few words of encouragement and acknowledgement to each cadet as he faced them. These words will be remembered by these young men forever. Then, there were the cadets who stood out from the rest, the ones who went the extra mile. These cadets reaped the reward for their extra labour in the form of prestigious trophies. Chairman Joint Chiefs of Staff Committee Trophy for the best performance in General Service Training was awarded to Aviation Cadet Squadron Under Officer Nayyer Ashfaq

**Left Bottom:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, along with graduating officers at PAF Academy Asghar Khan.

**Right Above:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, awarding branch insignia to a graduating cadet.

**Right Centre:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, awarding sword of honour to Aviation Cadet Squadron Under Officer Anas Mustafa.

**Right Bottom:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, awarding sword of honour to Aviation Cadet Wing Under Officer Sufiyan Siddique.



cadets was a sight to see. With months of practice under their belt, every single movement was executed perfectly, which made the group of cadets seem like a single, coordinated organism. First to enter the parade venue were the four squadrons of the academy under the command of Academy Under Officer. Marching on the patriotic tunes played by the PAF band, the synchronised movements of the marching-in cadets enthralled the audience which comprised foreign dignitaries, senior military and civilian officers, parents and families of the graduating cadets.

The voice of the parade commander leading the parade, boomed across the grounds throughout the event. Once settled in front of the audience, the parade commander called-in the 'Alam' party, carrying the flag of the Pakistan, the PAF and the 'The Quaid-e-Azam Banner'. This proud flag is symbolic of the nation's father, Quaid-e-Azam's famous visit to the academy on the 13th of April, 1948, where he coined the term 'Second to None' for PAF. At the end of each term, the banner is awarded to the champions squadron of the academy. Once lined up in front of





whereas Chief of the Air Staff Trophies for best performance in Air Defence and best performance in Engineering disciplines were won by Aviation Cadet Sargent Hanzallah Moin Khan & Aviation Cadet Sargent Muhammad Aqib respectively. Chief of the Air Staff Best Pilot Trophy for outstanding performance in Flying Training was awarded to Aviation Cadet Sargent Abdul Rehman. Sword of Honour for overall best performance in College of Aeronautical Engineering was won by Aviation Cadet Wing Under Officer Sufiyan Sidique whereas Sword of Honour for overall best performance in College of Flying Training was awarded to Aviation Cadet Squadron Under Officer Anas Mustafa.

After the cadets had been officiated by Air Chief Marshal Zaheer Ahmed Baber Sidhu, it was time for them to be sworn in. The oath was read out by the narrator and the cadets repeated it, swearing that they would uphold the sanctity of the prestigious burden they were about to take on and to never hesitate to put their life for the nation.

Once the oath was done, it was time for the Air Chief's address at the occasion. While addressing the audience, the Chief Guest said, "I am proud that Armed Forces of Pakistan are professionally competent and well-trained to cope with all internal and external challenges. Our brave Air Warriors have always displayed great courage during testing times and upheld Quaid's vision of PAF being Second to None. I assure you that PAF is very well poised to preserve our freedom at all costs." The Air Chief also emphasised that "Pakistan is a peace-loving Nation and desires to maintain friendly ties with all countries. However, our desire for peace must not be misunderstood as weakness. Let me make it clear, that there can be no peace without a just settlement of the Kashmir issue. We condemn the grave human



**Above:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff receiving the guard of honour at the graduation parade.

**Below:** Flag party leading the march-past in front of the saluting dais at the graduation parade.



**Top:** Nine-ship formation aerobatic team 'Sherdils' performing at the venue.

**Right Above:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff, along with AOC PAF Academy witnessing aerobatic display of Sherdils at the occasion.

**Right Centre:** Dignitaries from diplomatic corps also witnessed the parade at the graduation ceremony.

**Right Bottom:** Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of Air Staff talking to freshly commissioned officers of PAF at the occasion.

rights violations in IIOJK. I urge the international community to play their role in ending human rights violations and atrocities in Occupied Jammu and Kashmir."

Addressing the graduating cadets in the end, he said, "Remember, today is the beginning of your journey in PAF as an officer. You have been trained well at this leading Air Force Academy and must continue to work hard in order to keep abreast of latest developments in technology, modern concepts and current trends related to role of Air Power in modern warfare. You should also seek inspiration from the legacy of our forefathers who, despite tough challenges, kept PAF's flag high."

The address was followed by the graduating cadets marching out of the grounds, saluting the Air Chief one last time before they moved towards the stairs at the historic 'Falcon's Hearth' monument. Next up was the impressive 'Hamza Drill', a display designed to pay homage to the companion of the Holy Prophet (SAW), the revered Hazrat Hamza (RA). It was an impressive display of



synchronization, with every single participant performing flawlessly, executing group manoeuvres which were a sight to behold. The display was accompanied by several well-timed, blank shotgun shots which added to the overall experience. At the finale, was the aerobatic display by a 9-ship formation team of the fearless 'Sherdils', pulling off their world-famous, death-defying manoeuvres in front of the enthralled audience. The team was led by Wg Cdr Yasir Khan, OC Advanced Jets Training Squadron. Thus ended the passing out ceremony, with boys turning into men, ready to take fate in their own hands and defend their nation with their soul and body, just like their predecessors have done before them.



# TOGETHER WE TRAIN & RISE

## Ex ACES MEET 2021-2

“ACES Meet is designed with the goal of enhancing capabilities, elevating combat expertise and increase cooperation and interoperability between participating air forces. Orchestrated by PAF ACE and attended by the air forces of Turkey, Uzbekistan and the UK, we bring to you an account of this year’s exercise which proved to be a great success.”

by S.Khalil

Since its inception in 2017, Exercise ACES Meet has been a platform to award an opportunity for interaction between the allied countries and air forces in the domain of air power employment and interoperability. ACES Meet 2017, 2018 and 2021-1 served as beacons in fulfilling this objective to the maximum. In continuation, with the same objective, ACES Meet 2021-2 was conceptualized. In ACES Meet 2021-2, PAF participated with various types of fighter jets, force multipliers and combat crew. It was a matter of privilege for PAF ACE to host a team of outstanding air

warriors as foreign participants, who operated state-of-the-art equipment and were master of its employment in the field of modern aerial warfare. In the same regard, a fighter squadron from Turkish Air Force (TuAF) participated along with its combat and support crew. Observers from allied countries including United Kingdom and Republic of Uzbekistan were also part of the exercise.

### Arrival of Participating Nations

The TuAF team comprising pilots, engineers, technicians, support staff



Above: A pair of TuAF F-16s taxiing out for an exercise training mission. (Photo: CWO Muhammad Iftikhar).

Right: ACM Zaheer Ahmed Baber, Chief of the Air Staff, PAF meeting the TuAF personnel during Ex ACES Meet 2021-2 at an operational PAF air base. (Photo: CWO Muhammad Iftikhar).

Left: A TuAF F-16 seen in action during the exercise. (Photo: CWO Muhammad Iftikhar).

(All Photos PAF Archives unless stated).



**Top:** ACM Zaheer Ahmed Baber, Chief of the Air Staff, PAF, gearing up for a mission.

**Left Inlets:** The contingent commander of TuAF delivering a presentation during the exercise ACES Meet 2021-2.

**Briefing session** in progress during the exercise.

**Bottom:** PAF Mirage takes off to participate in an exercise training mission.

**Above:** ACM Zaheer Ahmed Baber, Chief of the Air Staff, PAF pose with participants of the exercise during his visit to the operational air base.

**Right Inlet:** ACM Zaheer Ahmed Baber, Chief of the Air Staff, PAF interacting with TuAF and PAF aircrew during his visit to the operational air base.

**Right Bottom Inlet:** Air Cdre Hassan Faisal, Commandant ACE receiving TuAF contingent commander at his arrival at an operational air base.



and special services personnel arrived at an operational PAF air base in TuAF transport aircraft on 15 Oct 2021. On arrival the contingent was given a warm welcome by Air Cdre Hasan Faisal, Commandant ACE. Presentation of flower bouquets to Turkish members and exchange of souvenirs/patches were the order of the day on arrival. Later the TuAF F-16s arrived after carrying out a long ferry all the way from their home bases.



**The Exercise**  
ACES Meet 2021-2 afforded the opportunity of mutual learning in the essential domain of Counter Terrorism (CT) Operations. In addition, it provided the right stage to synergize all the combat and support assets during Large Force Employment (LFE), creating a near realistic learning



environment. Two-force concept was inculcated in both the phases which were planned and executed with outstanding professionalism and utmost fervour by all the participants.

Counter Terrorism Ops missions were focused to evolve, practice and refine CT tactics to minimize sensor to shooter kill chain for time sensitive and dynamic targeting. These missions were flown in a near realistic scenario based on sub conventional threat environment, which involved coordinated employment of fighter jets, ISR platforms and special forces on ground. Para jumps of special forces, target identification by non-kinetic means followed by simulated engagements through kinetic platforms on planned, static and dynamic targets were undertaken in support of special forces utilizing contemporary procedures in permissive environment.

The overall aim of LFE phase was to evolve and practice integrated and role-oriented employment of fighter jets and force multipliers in a high threat environment. The offensive packages comprised mutually of PAF and TuAF aircraft which were used in air to air and air to ground roles for degradation and neutralization of enemy's system of forces through variety of weapons. The contested air situation was incorporated by employing Airborne Early Warning platforms along with ground-based sensors to form the high threat Air Defence environment to achieve near realistic combat scenarios in the exercise setup. Additionally, threat assessment was also carried

JF-17 Thunders also played a key role in the exercise.



PAF F-16s flew side by side with their Turkish counterparts during the exercise.

out through airborne and ground based Electronic warfare systems. Moreover, force multipliers were employed in various roles to augment the complexity level of LFE setups especially Combat Search and Rescue (CSAR) concept was also included in the exercise for participants to be exposed to diverse planning and approach. During LFEs, real time elimination procedures were

through Air Boss to achieve desired learning objectives.

#### Air Chief's Visit

Another important event of the exercise was the visit by ACM Zaheer Ahmed Baber Sidhu, Chief of the Air Staff, PAF on 25 October. On arrival the air chief was received by Air Cdre Omer Shah, the Base Commander. Later, the air chief attended a comprehensive briefing regarding the conduct of exercise at the ACE. He also met



Top Right: A Turkish pilot strapping-up for an exercise training mission.

Left Page bottom: The exercise included PAF C-130s cargo aircraft and its personnel, which together with fighter jets simulated delivery of ground forces.

Right: Sharpening the Spear: Turkish Air Force pilot performs inspections before take-off.

Bottom: The TuAF contingent arrived on their transport aircraft at the PAF operational air base where they were received with open arms by their PAF counterparts.



the visiting allied officers of various participating nations and remained with them for some time.

While addressing the exercise participants, the Air Chief said "ACES Meet is unique as participating air forces bring along a vast experience of combat operations, whether in counter terrorism or composite flying domains. The existing global security scenario coupled with the evolving dynamics of air warfare, calls for enhanced partnership between Pakistan and participating air forces."

### Distinguished Visitors' Day

Another important day during the ongoing multinational air exercise "ACES Meet 2021-2" at an operational air base of Pakistan Air Force (PAF) was the 'Distinguished Visitors Day' which was observed on 28 October, attended by the senior military officials. Among the officers, were Air Vice Marshal Imtiaz Sattar (Cdr AFSC), Major General Asif Mehmood Goraya (GOC 3 Air Defence Div), Air Vice Marshal Shahid Mansoor Jehangiri (DG JO), Air Vice Marshal Kashif Qamar (DG Log), Air Vice Marshal Ikram Noor, Air Vice Marshal Asim Rashid Malik DG Aero (Engg) and Rear Admiral Naeem Sarwar (DG Public Relations, Pakistan Navy). The visiting senior officers of the armed forces appreciated the operational preparedness of the participating forces and conduct of the exercise. The exercise would further strengthen and promote the friendship and cooperation between the participating air forces, the PAF spokesman said. The military dignitaries from the participating countries were also present on the occasion.



Top: A group of TuAF pilots pose for the camera moments before departure for an exercise training mission.

Above: Turkish pilots gear up for a training mission during the exercise.

Left: All geared up, Turkish pilots heads towards their aircraft.

Bottom: Turkish F-16 taxis to the runway to fly alongside their PAF counterparts during the exercise.

Although the main purpose of the joint training was professional interaction, some recreational activities were also made part of the exercise calendar to promote national elements. An international night was arranged for the foreign participants to get them acquainted with indigenous Pakistani attire and local cuisines along with exposure to traditional handicraft items. The foreign contingent of Ex Aces Meet was given an opportunity of sightseeing through organizing a visit to Lahore. Apart from shopping and sightseeing of historical places, the itinerary also included visit to the vehemently intense flag lowering ceremony at Wagah Border which provided the visitors with a unique experience.

Exercises like ACES Meet, carry valid lessons, everlasting experiences, professional competence and above all inculcate the spirit of comradeship that is the core attribute of any force. With diverse experiences in peace and war, different working environments but with a common aim to "Train and Rise", the participating Nations yearned to achieve the desired objectives. Therefore, quality learning, will to fight and comradeship were the aims to be achieved through ACES Meet 2021-2. It is keenly hoped and prayed that the friendships and bonds developed during the interaction, will last for years to come.

These exercises enhance interoperability among friendly forces who are ready to face challenges in order to uphold the sanctity of peace both at National and International level. The exercise participants departed with the message that coming together is beginning, staying together is progress and working together is success.



Top: The complex environment of ACES MEET, in which personnel train together.

Centre: PAF SSW land through their highly maneuverable parachutes at a specified training area during the exercise.

Bottom: PAF SSW personnel along with allied combat personnel were also the part of exercise.



# DUBAI Air Show 2021

## SHAPING THE FUTURE OF AEROSPACE INDUSTRY



“The Dubai Airshow has quickly grown to be an event of magnificent proportions. With attendance going into tens of thousands and deals being made worth billions of dollars, the airshow has established itself as a benchmark of international aviation cooperation. Pakistan has been a regular participant of the event from the start. From JF-17 to Super Mushshak, PAF has won over countless hearts and secured numerous lucrative deals over the years. This year was no exception.”

by S. Khalil



Title Photo: Super Mushshak remained the star of the Dubai Air Show-2021. (Photo: Snappers Crew).

Above: PAC Kamra showcased its various products at the air show which remained the centre of attraction for the thousands of visitors every day. (Photo: PAC Kamra).

Rigth Bottom: Bird Eye View of exhibition area of Dubai Air Show 2021. (Photo: Airbus DS).

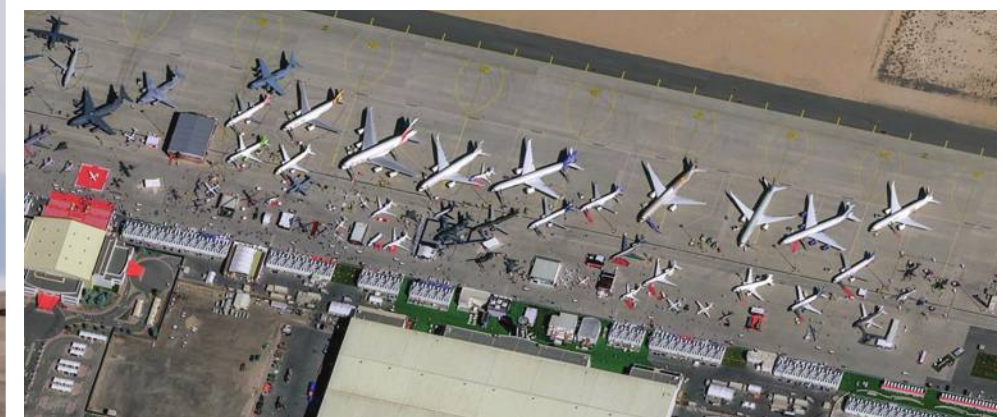
From pretty spectacular aerial displays to aircraft manufacturers picking up some big orders, the Dubai Air Show 2021 which was held from 14-18 Nov 2021 at Al-Makhtoom International airport, was also dominated by unmanned systems, particularly combat drones.

Dubai Air show is one of the largest and most successful events in the world, connecting aerospace professionals across all areas of the industry to facilitate successful global trade. With 161 aircraft on display, 314 civil and military delegations, 40 percent decision makers in attendance, over US \$54.5 billion worth of orders booked, some 1, 200 exhibitors, 16 country pavilions, nearly 85, 000 trade visitors and 1,420 media attendees to cover it all, the show made headlines around the globe.

After two years of being apart, countries

showcased new fancier liveries of their airliners, Boeing showed off its new 777X, which made its first international flight to the Middle East to join the air show's flying programme. Russians pushed the cutting-edge, long-awaited stealth fighter Su-57 Checkmate for the first time at any public display. Freighters also had a nice weekend at the Dubai Air show.

While the show was dedicated to both commercial and military aircraft, this year's edition seemed to lean heavily toward the former. Still, Defence News noticed a significant number of light-attack aircraft at the show. Nearly 150 countries were represented. Among the biggest participants were China, which made a solid showing. It brought along the L-15 supersonic trainer and its available weaponry. The state-owned defence firm China National Aero-Technology Import and Export Corporation – better known as CATIC – displayed a range of anti-aircraft missiles, munitions and fighter jets.



More than 100 American companies had exhibits at the air show, including defence giants Lockheed Martin and Raytheon Technologies. At the 2019 Dubai Airshow, the USA had an F-22 Raptor on static display. This year, it brought a prototype of the F-35 Joint Strike Fighter.

While, Brazil's President Jair Bolsonaro roamed the tarmac outside the booth of Brazilian aerospace company Embraer, inspecting the interior of a hulking C-390 Millennium transport aircraft, smiling and waving to crowds of reporters, the French Armed Forces Minister, Florence Parly, surveyed the range of helicopters and maritime patrol aircraft at the Airbus pavilion, surrounded by French airmen in uniform.

The response was overwhelming at the Pakistan Air Force display, especially of the crowd that had come to see the Super Mushshak - a matter of pride for the country and expats who visited the show. Equally amazing response was from Europeans, who were made up of questions. This year, the indigenously developed Made in Pakistan, Super Mushshak, was on the map again. Impressed by the seven minutes aerobatics performed by Wg Cdr Majid Ali, and hard-core military standard upgraded glass cockpit, long queues formed to see what the world now recognizes as a quality product, the Super Mushshak.

"Prof Temel Kotil, who is head of Turkish Aerospace Industry (TAI), has requested the Pakistan Air Force to enhance production capacity, to receive new orders especially from European countries," said Air Cdre Faisal Ayaz of PAC Kamra in an optimistic tone. While Pakistan endeavours to attract European markets to sell its Made in Pakistan trainer aircraft, the PAF has already sold over 50 Super Mushshaks to the Turkish Air Force to train its pilots. In July, 2022, the first



Top: UAE Air Force Boeing C-17 Globemaster dispensing flares at Dubai Airshow 2021 (Photo: Snappers Crew).

Centre: Bell Boeing V-22 Osprey on display at Dubai Airshow 2021 (Photo: Snappers Crew).

Bottom: Chinese Hongdu L-15 Falcon advanced jet trainer (AJT) performing spectacular display at the Dubai Air Show 2021, to promote its potential Middle Eastern market. (Photo: Snappers Crew).



batch of the Super Mushshaks will take flight in Turkish airspace.

"The world is actually amazed that the Turkish Air Force will be using PAF's Super Mushshak to train their fighter pilots as a standard. And that is why a delegation from Finland, was also extremely interested among others," said Air Cdre Faisal Ayaz. According to the official, the PAF has already sold 134 Super Mushshak planes mostly to Middle Eastern countries and some in Africa.

Visitors who thronged PAF stall to view products were pleasantly surprised with the advancements in avionics and machining capabilities, and products like the canopy manufacturing and ground support equipment at the PAF display booth. "Visitors were inquisitive about the cost of the aircraft, it's air time? How high could it fly? Can surveillance cameras and weapons be loaded on it?" were some of the basic and common questions asked by these enthusiasts, the official elaborated.

PAC Kamra stall had also put on display the capabilities of various PAC factories, some of the highlights are as follows:

**Mirage Rebuild Factory**

MRF displayed its overhauling capability of Mirage III & V aircraft and ATAR 09C engines. Moreover,

Right: PAC Kamra showcased its various products at the air show which remained the centre of attraction for the thousands of visitors every day. (Photo: PAC Kamra).

Right Centre: A general view of various stands displaying modern armament at the Dubai Air Show. (Photo: Snappers Crew).

Bottom Left: Aviation enthusiasts through the static display area of Super Mushshak to have a close look agile trainer. (Photo: PAC Kamra).

Bottom Right: Super Mushshak enthralled the audience with its enviable aerial display at the air show. (Photo: Snappers Crew).



hydraulic, fuel and pneumatic pipe manufacturing facility, painting of aircraft and components, blending of engine blades, repair / overhaul of jet fuel starter and other Mirage and ATAR engine parts were also displayed.

#### Avionics Production Factory

APF displayed the design, development and production capabilities of avionics of JF-17 thunder aircraft like avionics activation panel, upfront control panel, smart multifunctional colour display etc. Moreover, MRO capability of TPS-77 Radar was also displayed.

#### Aircraft Maintenance Factory

The stall displayed JF-17 Thunder and SMK aircraft as main products of PAC. The visitor showed interest in both products, general questions were related to technical details, capabilities and commercial cost of the products, the visitors were also interested in the capabilities of JF-17. The static display of SMK attracted a lot of visitors to observe the new glass cockpit and aircraft in general.

#### Aircraft Rebuild Factory

ARF displayed its manufacturing capabilities of canopy, aircraft harnesses and other structural parts for numerous aircraft systems. This also included the parts manufactured for Boeing aircraft.

Another highlight of the show was the visits by various high-ranking officials and dignitaries to the PAC stall. Some of the important personalities who visited included Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff PAF, Chairman Joint Chief of Staff Committee, Ex-Army Chief General (R) Raheel Shareef, Chairman PIA etc. Air Marshal Muhammad Mughees Afzal, Chairman PAC Kamra welcomed the distinguished guests at the Pakistan pavilion and briefed them about the ongoing projects and

future plans of the various factories working under his leadership.

The Dubai Air Show was a very interesting event in several ways where there were winners and losers also. Obvious winner was the A320 family that absolutely crushed, racking up more than 300 plus orders besides Boeing's 737 Max that also picked up big orders. There were losers too. While Emirates showed signs of reducing its fleet of Boeing 777s and not a single order was placed for 777x and the sales of 797 also suffered.

We would however, like to mention one more winner – PAF's Super Mushshak.

“With 161 aircraft on display, 314 civil and military delegations, over US \$54.5 billion worth of orders booked, some 1, 200 exhibitors, 16 country pavilions, nearly 85, 000 trade visitors and 1,420 media attendees to cover it all, the show made headlines around the globe.

Interested buyers sought PAF for all the certifications. And although the PAF has built the Super Mushshak for military purposes only, PAC Kamra is now working on fulfilling the necessary qualifications to sell the aircraft to the private sector in future. SAAB, which sells Mushshak engines, landing gear and the propeller, has also already agreed to provide the designed data of the trainer aircraft to PAC Kamra.



1: Wg Cdr Majid Ali getting ready for aerial display at the Dubai Air Show. (Photo: Snappers Crew).

2: Russian Mi-28 Helicopter remained a major attraction during the air show. (Photo: Snappers Crew).

3: Entertaining the enthusiasts around the world since 1965, 'Red Arrows' performance at the show was a show stealer. (Photo: Snappers Crew).

4: Russian Knights-Aerobatic demonstration team produced some death-defying manoeuvres during the Dubai Air Show. (Photo: Snappers Crew).

5: Russian Su-57 'Checkmate' was put on display outside Russia for the first time at Dubai Air Show-2021. (Snappers Crew).

6: Emirati Forsan aerobatic team flew on the opening day at the Dubai Air Show in Dubai. (Photo: AP)



# A VIEW FROM THE



“The ‘Star Wars’ sci-fi movies predicted it all. However, nobody could believe that we’d see it in our lifetimes. Futuristic looking aircraft flying with unbelievable speeds, spaceships and weapons being controlled by Robots and laser weapons dissecting the enemy aircraft into halves. It looked exciting but a far-fetched dream. However, over the past few years, the airpower, or to be precise, ‘Air & Space Power’ has progressed by leaps and bounds. It is evident that this is just the tip of the iceberg. From hypersonic aircraft to drone swarms to weapons that can eliminate targets from outer space, the future of air warfare is equally fascinating and frightening.”

by Fahad Masood, MRAeS, Sqn Ldr (R)

For a good part of the 1900s outrageous advancements were prophesized by the stargazers regarding 21<sup>st</sup> Century technology. This thought traversed to cinematographers of Gene Rodenberry’s Star Trek to George Lucas’s Star Wars. A next-generation of ‘Trekkies’ was born. From laser tech to hypersonic, aerospace weapons were depicted with as much relative fictional accuracy as possible. And now, come year 2050, these might actually be reality! War that will break out on the acme national resource, water, will pull everyone in. Regional and global super powers will look to come out victorious with their fair share of water. Directed Energy Weapons aka LASERS will be the weapon of choice and use of upper atmosphere aka ‘Aerospace’ is where the fight will take place. The first adopters are the ones who, like always, will have the edge and come out as victors over the vanquished. Hypersonics is already being practiced and will be opted over Stealth technology of the past in 6 Generation Fighter aircraft. Along with ‘Loyal Wingmen’ and continuously self-learning & evolving artificial intelligence will enable strategists to operationalize aerospace power doctrines to win battles as well as the wars of 2050s and beyond.

Flying has always been fantasized since times unknown to Leonardo’s Ornithopter. From Firnas’s ‘scientific leap of faith’ to Celebi’s flight across the Bosphorus in the 1600s, the third dimension has

# FUTURE

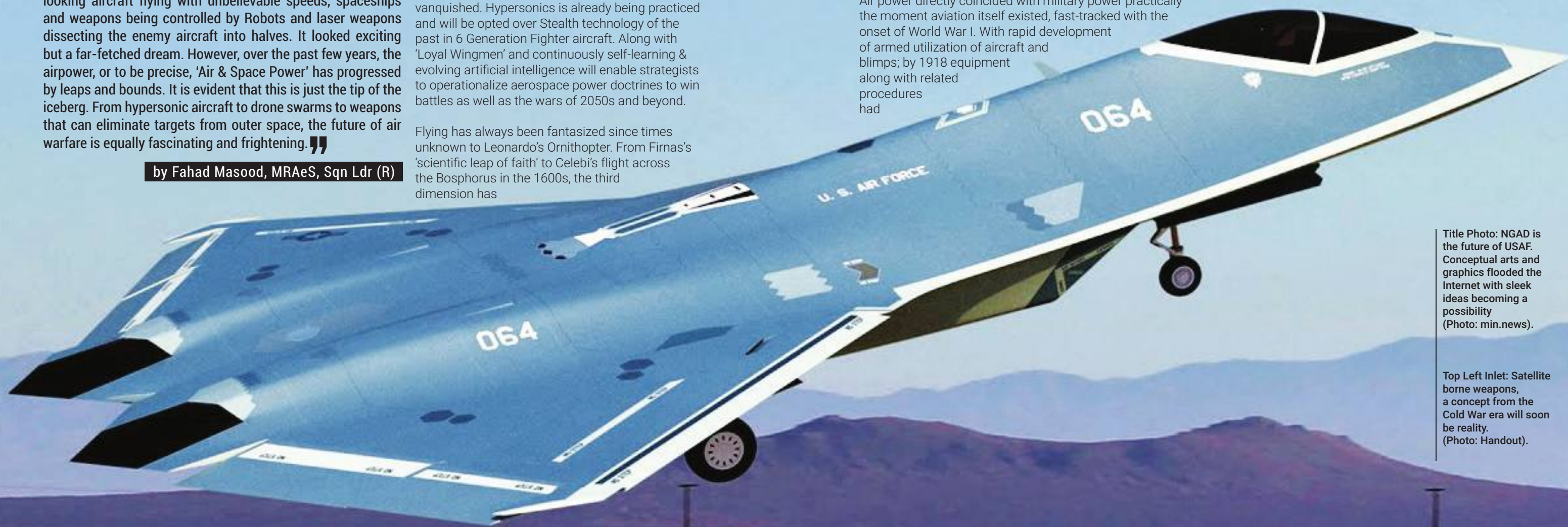
## AIR POWER BEYOND 2050

exhilarated both young and old as well as men and women. We have seen flight come of age to become one of the most sought-after expression of power by both developed and developing nations for a good part of the previous 150 years. And there is seemingly no end in sight. In this article, we will delve into where it is expected to be in a few decades from now. The past lessons, contemporary trends and future potentials will be looked at in chronological order. Aim is to relate theory, history and technology of airpower to ensure a best possible probable projection.

### The Evolution of Air Power

Air power directly coincided with military power practically the moment aviation itself existed, fast-tracked with the onset of World War I. With rapid development of armed utilization of aircraft and blimps; by 1918 equipment along with related procedures had

been established to employ it in every possible role, except for air-to-air refuelling which came much later. During the next century, air power took great strides in budding disciplines like propulsion, aerodynamics, metallurgy and electronics. Mimicking land and sea warfare in evolution, air power has experienced accelerated change that muddle efforts to oversimplify its implications on contemporary geo-political, geo-economic and international security paradigms.



Title Photo: NGAD is the future of USAF. Conceptual arts and graphics flooded the Internet with sleek ideas becoming a possibility (Photo: min.news).

Top Left Inlet: Satellite borne weapons, a concept from the Cold War era will soon be reality. (Photo: Handout).



Air power doctrinal philosophy has evolved correspondingly, with names like Clausewitz, Jomini, Mahan, Corbett, Douhet, Mitchell, Trenchard, Seversky, and Slessor casting remnant shadows over air power dynamics till date. Air power was still in its puberty between WWI and WWII when these stalwart proponents of the third dimension were committed in comprehending its efficacy. Royal Air Force (RAF) came into existence in 1918 which paved the way for independent air forces,

beyond control of land forces. All proponents of Air Power single-mindedly focused on relative independence of the force. Starting from long-range strategic bombing & maritime defence, 'Command of the Air' was considered to be the pivot. Bombers were the weapon of choice till the Fighters came up to par with the advantage of speed on their side. The expression 'In thrust we trust!' was born in the crucible of World War I, but came of age in the inferno of World War II. Britain became first of many

countries to be subjected to strategic bombardment by cruise & ballistic missiles, namely the German V-1 and V-2. Close air support as well as Aerial interdiction played a central role in Allied counter-offensives as a follow-up to German blitzkrieg. Aircraft carriers ousted the battleship as primary combatant at sea. Furthermore, aircraft became significant apparatuses in anti-submarine manoeuvres. War was above all a contest to seize and control bases for land-based air power. All in all,

**Top: Concept art of a future U.S. fighter jet shooting down incoming missiles with a laser weapon system. (Photo: staging.taktikz.com).**

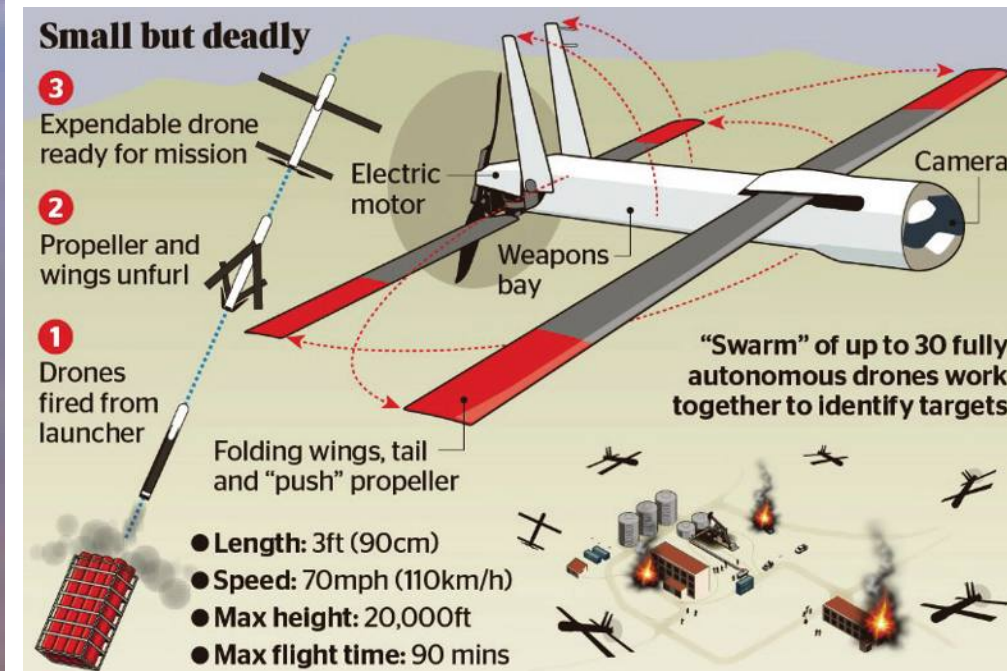
**Inlets: Portability is an added advantage of Drone Tech. (Photo: replyua.net).**

**ISR for MALE and HALE UAVs is bread and butter. (Photo: Carlos Ay).**



**Left: Swarm Drones already used commercially at event shows are already militarised and with nano-tech have become an even 'bigger' weapon. (Photo: defence.pk).**

**Below: Firing Sequence and deployment of 'Locust Swarm Drone'. (Photo: markosun.wordpress.com).**



just like today, penalties of degraded air superiority in relation to the enemy were potentially catastrophic. 'Bombers will always get through' was an idea that was pushed for long but fighter escorts were the real saviours of their iron-clad slow-speed big brothers. The uprise of masses against their own governments, demanding capitulation in order to stop the carnage, was an ill-conceived notion which failed miserably in the attacked nation states. A decisive end of war with Germany and Japan was not attained with bombing only. It required combined effects of blockades, losses on battlefield, and Axis economic mismanagement. The 'Absolute Weapon' was the race post WW-II. Nuclear technology R&D was accelerated. Fighter-bombers as well as attack aircraft with solo &

dual crew progressively side-lined the heavies in strike role. Forever dismantling the bomber-era of yesteryears with heavy bombers and tactical air power compromising of light bombers and fighters. PGMs (Precision Guided Munitions) have blazed the trail with LGBs (Laser Guided Bombs) over past 40 years. Air battle management along with sensor fusion became core of the air operations in Iraq, Serbia, and Afghanistan. Dynamic targeting, successful engagement of a target on the move, has been the selling point of PGMs. They have also proved their efficacy in urban area targeting, such as Baghdad, as well as against fixed military installations. Minimizing collateral is the competitive advantage it maintains against older bombs. Synergy between air and

ground forces in this domain has resulted in many a success stories till date, even in cases involving relatively small ground forces.

USA had maintained an edge over the rest of the world in air power. But the tides of time are changing rather

“Aerospace wars of the future with their high-tech weapons will be won by countries that have the ability to adapt with change and make best-possible decisions in an ever-changing risk management paradigm .



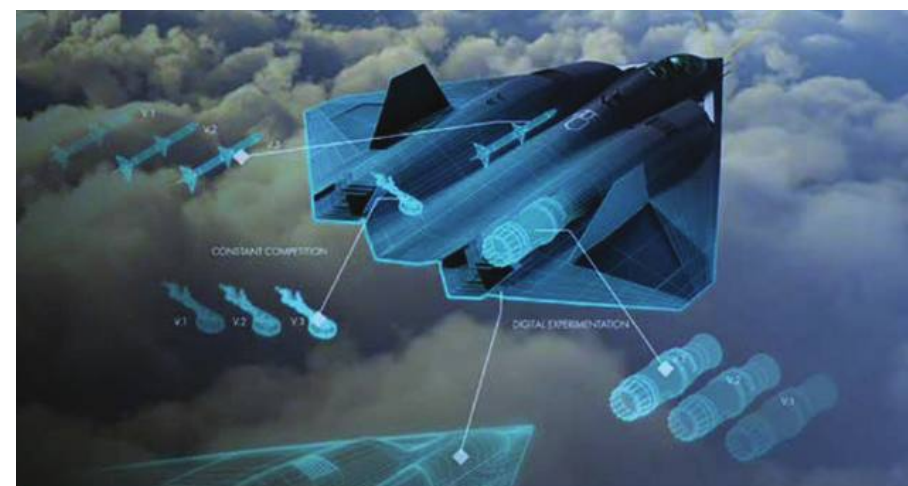
quickly with regional players like China & Russia flexing muscles in the Middle East and Africa. Globalization is ensuring democratization of technology, money and information to be available to all in this village space. 'Carpet Bombing' theory of the past is being replaced by accurate ballistic and cruise missiles. Unmanned aerial vehicles are gradually taking central role in all air campaigns. That's why the future of air power looks to be heavily relying on 'Unmanned', however, the only question is 'When'.

### Air Power Theory

Theorists of the early decades of the previous century have put in continued efforts to delineate the land and air power characteristics. Alongside speed, reach is one the most favoured traits of air power. To overfly the engaged armies and navies to engage 'centre of gravity' to make decisive alteration in the thought process of the adversary commander. Second is 'Zero Terrain Friction' wherein the air element, unlike the army and navy, can enforce presence at greater distances and areas. Various countries define 'Air Dominance' or 'Air Superiority' as a

pre-requisite to freedom of air power employment. SEAD (Suppression of Enemy Air Defence) or Counter air operations to take out adversary air element threatening the 'pockets' of air superiority are intermittently continual options exercised.

One of the biggest proponents and users of air power is the USAF which in true letter and spirit have put into effect 'Global Reach! Global Power!' with the use of long-range bombers and airlift capability generating air bridges and using coercive techniques of precision bombing. Arrival of PGMs and cruise missiles have enabled accuracy,



**Top: US Navy would prefer a six-generation manned fighter jet as opposed to an advanced unmanned aerial vehicle (Photo: U.S. Navy).**

**Bottom: NGAD is a "family of systems", with a fighter aircraft as centrepiece of system, and other parts of system likely to be unmanned escort aircraft to carry extra munitions and perform other missions. (Photo: aeromag).**

**Right Page Inlet: Turkey's mobile directed-energy weapon (DEW) Alka that is capable of taking down different types of drones (Photo: en.rayhaber).**

### Correlating Intensity and Technology

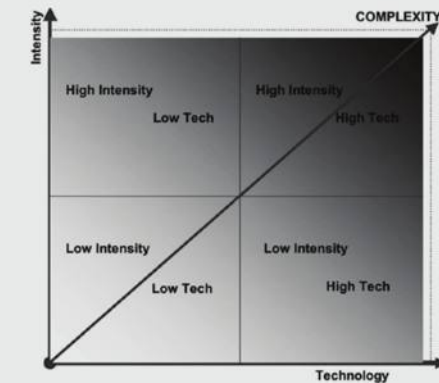


Fig 1

calibrated response competency as well as minimized collateral damage via a centralized operation capability.

### Various Elements at Play

As future is constantly connected to present-day, which in turn learns from history for a clear comprehension of coming events. Understanding challenges of developing security environment will be imperative to the mode in which air forces will function in times to come. And out of all variables, one is 'Globalization' – a double-edged sword defined as democratization of information, finance and technology, which will force the future planners to look disproportionately at world events. Correlating the intensity, technology and complexity from Fig 1, we can clearly see that the 'complexity' has a direct exponential relationship in air warfare.

The term 'Revolution in Military Affairs (RMA)' was coined back in early 90's after the Gulf War but remains pertinent in contemporary times. According to Table 1, inspired by 'Forecasting Change in Military Technology, 2020-2040' by Foreign Policy program at Brookings, we can point out the game-changers for the post-2050 era. In terms of speed, range, lethality, or other defining characteristics, technologies showing moderate advances might improve performance by a few percent or at most a couple of tens of percent. Those experiencing high advances will be able to accomplish tasks on battlefield far better than before—perhaps by 50 to 100 percent, to the extent improved performance can be so quantified. Finally, technology areas in which revolutionary advances occur will be



### Forecasting Change in Military Technology 2020-2040

	Moderate	High	Revolutionary
<b>Sensors</b>			
Chemical Sensors		X	
Biological Sensors		X	
Optical, Infrared, and UV Sensors	X		
Radar and Radio Sensors	X		
Sound, Sonar and Motion Sensors	X		
Magnetic Detection	X		
Particle Beams (as Sensors)	X		
<b>Computers and Communication</b>			
Computer Hardware			X
Computer Software			X
Offensive Cyber Operations			X
System of systems/ Internet of things			X
Radio Communications			
Laser Communications	X		
Artificial Intelligence/Big Data			
Quantum Computing			
<b>Projectile, propulsion and platforms</b>			
Robotics and autonomous systems			X
Missiles	X		
Explosives		X	
Fuels	X		
Jet Engines	X		
Internal-Combustion Engines	X		
Battery-Powered Engines		X	
Rockets		X	
Ships	X		
Armor		X	
Stealth		X	
Satellites		X	
<b>Other weapons and key Technologies</b>			
Radio-Frequency Weapons	X		
Nonlethal Weapons		X	
Biological Weapons		X	
Chemical Weapons		X	
Other Weapons of Mass Destruction	X		
Particle Beams (as Weapons)	X		
<b>Electric guns, rail guns</b>			
Lasers		X	
Other weapons and key technologies (cont).		X	
<b>Nanomaterials</b>			
3D printing / additive manufacturing		X	
<b>Human enhancement devices and substances</b>			
		X	

Table 1

able to accomplish important battlefield tasks that they cannot now even attempt.

Deducing from enumerated Table 1, broad-based technologies in air power marked in red will revolutionize the future scenarios. Delving into specific weapons will follow but with this calibrated information, it is safe to say that it is information and systems management that will play the biggest role in ensuring victory. Resources like Robotics, AI, Big Data, IOT, Cyber Ops etc will without doubt be the tip of the sword in more ways than one.

### Weapons of the Future

Naming futuristic weapons of choice in the air domain following the trends in aforementioned table are problematic in many ways. But still, here it goes.

### 1. Autonomous Aerial Weapons

AI-based airborne robotic vehicles to search & destroy enemy troops as well as equipment on ground or in the air, without risk to friendlies (theoretically at least). Onboard computers interpret sensor data to ID and target hostile forces with built-in weapons. Robots still query human controllers at remote sites for 'clear to shoot', and friendly forces carry IFF transponders that identify them as 'friends'. Difficulty remains in quick and reliable discrimination between hostile forces and neutral or friendly parties or objects, such as civilians, cows, trees, and tractors. Systems that check-in with human controllers are vulnerable to communication failures. Malfunctioning robots could fire wildly at anything and that would be a big challenge.

US Navy is currently analysing air frames, targeting systems, AI-enabled sensors, new weapons and engine technologies to engineer a new 6<sup>th</sup>-Generation fighter to fly alongside the F-35 and ultimately replace the F/A-18. (Photo: theaviationgeekclub).



Left Inlet: In the current times, E-bombs are one of the most serious threats to our modern tech-dependent infrastructures and lives after the nuclear bomb. (Photo: Steve Jurvetson/Flickr).

Right Inlet: UK is all set to have Uncrewed lightweight affordable novel combat aircraft (LANCA) beside piloted aircraft later in this decade. (Photo: flightglobal).

Left: U.S. Navy and U.S. Marine Corps aircraft can't fly planes equipped with long fixed booms, so they use the "hose and drogue" system instead (Photo: Lockheed Martin).

Prime examples of such air borne weapons are MQ-25 Stingray Unmanned Carrier Aviation Air System (UCAAS), Elbit Systems' Hermes 450, UCAV WZ-2000 etc. Not to mention the impervious Swarm Drones namely Perdix drones, X-61A Gremlin air launched drones, US Navy and Marine Corps' Low-Cost UAV Swarming Technology (LOCUST) program, RAF's Lightweight Affordable Novel Combat Aircraft (LANCA) unmanned loyal wingman program, CH-901 UAVs, AVIC 601-S 'Anjian' etc.

### 2. Directed-Energy Weapons

A ranged weapon that damages targets with highly focused energy, including laser, microwaves, and particle beams fall under the umbrella of Directed-Energy Weapons. Potential applications of this technology includes weapons that target personnel, missiles, vehicles, and optical devices. In various countries like Russia, China, Turkey, Iran and United Kingdom, research has enabled them to generate directed-energy weapons

and railguns to counter ballistic missiles, hypersonic cruise missiles, and hypersonic glide vehicles. The first known use of directed-energy weapons in combat took place in Libya in August 2019 by Turkey, which claimed to have used the ALKA 'Directed-Energy Weapon'.

### 3. Space-Based Weapons

This is Star Wars 2.0, if not better! Space would be the ultimate battle ground. Weapons in orbit would have the ability to see and zap anything on ground, in air, or nearby in space. Main mission of space-based weapons would be to defend against ballistic missiles fired at targets on

Earth. Fleets of interceptors or battle stations stationed in orbit, poised to fire at any attacking missiles. Leading approach for the future would be the use of solid projectiles – such as tungsten rods – that would impact missiles. But laser battle stations are more efficient and sustainable. Presently, technology is maturing with arrival of nanotechnology and Moore's Law is in action. Interceptors hit warheads to destroy them, which is challenging but possible. Weapons in need of chemical fuel or electrical power would be replenished in space through a strong network of supply chain management.



Russia recently announced the next-generation MiG-41 which will have the ability to shoot down hypersonic missiles. (Photo: daydaynews).

#### 4. Hypersonic Aircraft

Launched from a standard runway, a hypersonic aircraft flies faster than Mach 5 to strike anywhere in the world in a couple of hours. It also has enough thrust to deliver a satellite to low-Earth orbit. To get off the ground from a runway, a hypersonic plane hitches a ride on a conventional plane or have its own conventional jet engine. That engine carries the hypersonic craft to an altitude where air density and resistance are less. Here it reaches supersonic speeds and then shift to its scramjet engine. The scramjet scoops up air and mixes it with fuel so it burns as the mixture flows through the engine at supersonic speeds. This means scramjets can achieve some of the speed of a rocket without having to carry heavy oxidizer (to mix with fuel), as rockets did in previous generation of thrusters. The technology matured over the previous half a century, with engineering upgrades in metallurgy and design. Scramjet engines start only when the plane flies faster than the Mach 1. Remotely piloted, UAV or UCAV are aircraft of choice for this tech because pilots are now redundant in the cockpit!

#### 5. E-bombs

In the world of 2050 plus, everything has gone 'e'. Something like the 'Graphite bomb', was used in 'Gulf War-1' where Saddam's power grid was dismantled. High-power microwave pulses knock out computers, electronics, and electrical power, crippling military and civilian systems. A rapid increase in electromagnetic field strength during a pulse, induces surges of electric current in conductors. This burns out electrical equipment – semiconductor chips

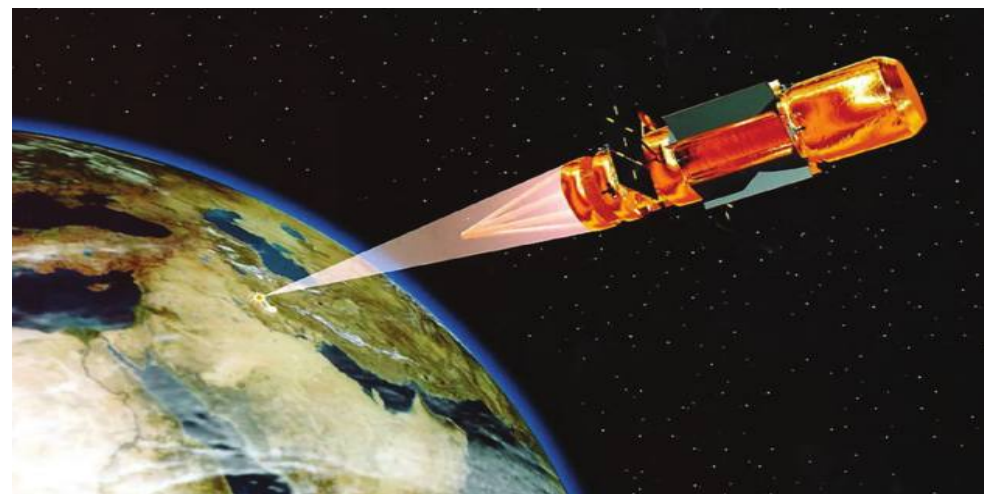
are particularly vulnerable. Special bombs generate the most intense pulses covering large areas, but unmanned aircraft carrying smaller generators pinpoint targets. The effects also depend on local conditions, and are hard to predict. Sensitive enemy military equipment sometimes shielded, and microwaves also disable friendly electronics within range.

#### 6. 6<sup>th</sup> Generation Fighter Aircraft

Providing superiority in air combat domain was the push behind the 6<sup>th</sup> Generation fighter program. With the emergence and increasing use of digital and innovative technologies, countries looked for next-level fighter jet capabilities. Lets have brief look at what the air forces around the world are vying for in the future.

#### USA's F/X or Next Generation Air Dominance (NGAD)

The US Air Force (USAF) was one of the leaders in the race for the development of a six-generation fighter aircraft. USAF Research Laboratory released a rendering of the next-generation aircraft F/X in March 2018, which indicated the aircraft had a sleek, stealthy design with a high-energy laser capable of cutting



enemy aircraft into half. Also known as Next-Generation Air Dominance (NGAD) or Penetrating Counter Air, the future aircraft has a longer range and larger payloads, as well as the ability to carry hypersonic weapons. F/X fighters provide significant enhanced stealth capabilities and work in coordination with unmanned vehicles. The jet was developed and flown in one year. It remains unclear who designed and developed the prototype, but it is understood that advanced manufacturing technology was used to develop it.

#### Future Combat Air System (FCAS)

Joint programme between Germany, France and Spain, the Future Combat Air System (FCAS) delivered a next-generation fighter (NGF), which operates as part of a manned-unmanned teaming formation with attack and

**Top: The 'PERDIX' is a micro-drone swarm system developed for the US DoD/ Naval Air Systems Command together with MIT Lincoln Laboratory. (Photo: WarLeaks).**

**Bottom: 'Rods from God': A Space weapon project from the 60s that was abandoned due to cost. (Photo: nationalinterest.org).**

**Right Page Above: 'Charlies'... been there done that... here to stay in the future for externally carried pods. (Photo: forbes.com).**



surveillance drones, known as 'remote carriers'. All the flying elements are connected by a 'Combat Cloud' powered by AI. Air forces operate the FCAS sixth-generation aircraft at a safe stand-off distance while deploying the remote carriers in dangerous areas to deal with threats. Key capabilities of the aircraft include improved survivability with active and passive stealth features, enhanced SA through advanced avionics and sensor suite. Fighter jet also provides greater manoeuvrability, speed, and range, thanks to powerful engine and advanced flight control system. The jet is installed with novel effectors to ensure increased firepower, including stand-off kinetic loads, directed energy weapons, and electronic warfare capabilities. Dassault Aviation and Airbus were awarded a joint concept study (JCS) contract by the French and German governments for the FCAS programme in February 2019.

#### Russia's MiG-41

Russia's sixth-generation aircraft MiG-41, also known as PAK-DP, is a future interceptor that operates at extremely high altitudes at speeds exceeding Mach 4. The MiG-41, a long-range interceptor would replace the ageing MiG-31 interceptor. Developed by

Mikoyan (MiG), the fighter, equipped with an interceptor missile system, provides capability to intercept hypersonic missiles. The aircraft is modified to create an unmanned variant. The new interceptor is equipped with long-range air-to-air missiles, advanced target search and detection equipment, and stealth technology.

#### UK's Tempest

Launched by Britain in 2018, the Tempest fighter jet project is a trilateral cooperation between the UK, Italy, and Sweden. Combat aircraft would enter service with Royal Air Force (RAF) in 2035 as a replacement of the Typhoon. It has an adaptable architecture suitable for a range of operations, with provision to change software and hardware according to mission needs. Other key features include an advanced flight control system, enhanced survivability, and scalable autonomy. Equipped with advanced technologies such as futuristic wearable cockpits using gaming technology, eye-tracking technology, and augmented reality, the jet will serve the RAF for the next half a century. Other technologies incorporated include stealth, optional manning, directed-energy weapons

and hypersonic weapons. The aircraft's ability to exchange data with multiple platforms provides armed forces with comprehensive picture of future battlespace. It uses swarming technologies to control drones while Cooperative Engagement Capability will allow platforms to coordinate during attack or defence operations. A radar technology, known as a multi-function radiofrequency system, developed for Tempest is able to provide over 10,000 times more data than existing systems.

#### China's J-X

China developed a new fighter jet with sixth-generation capabilities such as commanding drones, stealth capability, and AI. The J-X also features hypersonic weapons, laser, and swarm warfare capabilities and provides improved capabilities compared with country's J-20 and J-31 aircraft. A 6,620 ft wind tunnel, built to support the new fighter aircraft program became operational in May 2020 by performing a flow field test for secretive new aircraft.

#### Space – the Final Frontier!

Since the days of Star Trek and Star Wars, space has been romanticized to be a place of peace. But as technology continues to evolve, things appear to go other way around. With the advent of near-space travel and space-tourism, militaries around the world are eyeing for their share of the pie. Air power is turning into Aerospace power! Majority of the countries have already renamed or are in the process of renaming their 'air force' as 'aerospace force'. For instance,

1



Iran's IRGC Air Force converted into the IRGC Aerospace Force in 2009. Russian Aerospace Forces or VKS comprise the aerospace branch of Armed Forces of Russian Federation. Russia established the VKS as a new branch of its military on 1 August 2015 with merging of the Russian Air Force (VVS) and Russian Aerospace Defence Forces (VVKO) on recommendation of Ministry of Defence. French Air and Space Force (AAE) became air and space force of French Armed Forces on 10 September 2020. United States Space Force (USSF) is space service branch of the U.S. Armed Forces, one of the eight U.S. uniformed services, and the world's first and currently only independent space force. So where does Space start from above mean sea

level? This question needs deep deliberation. The recent 'space' flights by billionaires Jeff Bezos 'Blue Origin' and Richard Branson's 'Unity-22' are up for discussion. Fédération Aéronautique Internationale (FAI) agrees with Blue Origin to define beginning of space as Kármán line at an altitude of about 62 miles. It's also where the National Oceanic and Atmospheric Administration says "a conventional plane would need to reach orbital velocity or risk falling back to Earth." But then you have agencies like NASA and the U.S. Air Force that defines the edge of space begins 12 miles south of the Kármán line. According to the space agency, an altitude of 50 miles is where the Earth's atmosphere "blends into space." But one thing is for sure, no matter which 'Kármán line' is followed, space is truly up for grabs

and the one who exploits it as first adopter will reap the benefits for a very long time to come.

How do the 'aerospace' doctrines resolve real physical differences between air and space? Well, there are really two different perspectives as to doctrinal view of physical environment of space (and they are not mutually exclusive).

1. First, space may be viewed as a medium—like land, sea, and air—within which military activities can be conducted to achieve objectives. This view is particularly relevant at tactical (i.e., operation of specific platforms) and strategic (i.e., space as a domain that must be protected and controlled) levels of war. Former is level at which individual executing space squadrons operate while latter, consistent with national policy, is level at which unified commands focus on, as tasked by National Command Authorities (NCA).
2. Second doctrinal view of space is "effects-centric" and is primarily relevant at operational level of war. In theater applications, space capabilities can and



do provide same 'high-ground' effects as air capabilities, albeit with different platforms and methods. This arena is where aerospace doctrine is primarily focused.

Most functions performed today in atmosphere by air-breathing systems may also be done in future in space. As technologies evolve, and as it becomes possible to do functions more efficiently, more effectively, and at less cost from space, then those functions will migrate to space. Doing so will provide enhanced capability, survivability and greater efficiency through multi-layering of systems. Today those migrated functions include weather, navigation, ISR and communications. In future, Air Force missions such as close air support, interdiction, offensive counterair, defensive counterair, and strategic attack may all come from space.

One of the few variations that will 'forcefully' creep in is the term "air superiority" replaced by 'space superiority'. Why? Because here we are talking of superiority in a particular physical environment. That is not to say that 'aerospace superiority' is not a legitimate term—it is. But it may still be theoretically possible to enjoy 'air superiority' without a corresponding 'space superiority' (and vice-versa). These two things are specific functions of platforms dependent on specific physical environment of air and/or space. Undoubtedly, however, as technology improves, distinction between 'air superiority' and 'space superiority' will become less and less apparent.

3



4



### Conclusion

Is it strength in numbers or enhanced quality or diversified portfolio that will tilt the balance of air war in a proponent's favour in 2050 and beyond? Considering the 'theory-history-technology' matrix, it appears that the deciding factor would be 'a diversified portfolio'. Aerospace wars of the future with their high-tech weapons will be won by the countries that have the ability to adapt with change and make best-possible decisions in evolving and fluid situations. Humans will remain a big part of the equation because AI will still not be strong enough to take 'creative' and 'moral' decisions essential to wars. Centre of gravity of military power would be the space. Everything from navigation to communication to intelligence satellites would operate in space. If any power has to knock out the other, it would have to knock out those

assets up there, first. It seems like science fiction, but one wonders how somebody in 1800s would have felt about a description of what World War II was going to be like. The details may not be as mentioned — there may be other players, it may not happen in 2050 — but historically every century had a major war. 21<sup>st</sup> century probably won't be the first without a major global war.

All Page Photos-Impressive 3D rendered art works of various futuristic hypersonic aircraft designed by vying countries would be a reality in coming years.

1: USA's F/X or Next Generation Air Dominance (NGAD).

2: Russia's T-60 'Golub' program.

3: Europe's Future Combat Air System (FCAS).

4: 3D rendered image of China's J-50 'Trident' aircraft. (All Photo: Rodrigo Avella).

# FANTASTIC

# FANTAN



*Tale of a Rugged Warrior*



Title Photo: A-5 III remained the formidable weapon system serving the PAF for more than two decades. Seen in the illustration is the view of No 26 Sqn 'Black Spiders' flight lines at PAF Base Peshawar. (All pics from PAF Archives unless stated).

Most dogfights last just a few seconds. They usually involve two opposing pilots, one of whom has no idea who the other guy is. Most kills happen that way. In 1986, A-5 and F-16 pilots entered the arena over the desert, North of Multan, for the first time. Leading a two ship formation of A-5s during the first Dissimilar Aircraft Combat Training (DACT) (2 vs 2) in the annual Jetstream Exercise, Wg Cdr Hamid Khawaja (later ret'd as AVM), saw the F-16s pop out of the blue, with an aim to kill them. Wg Cdr Hamid Khawaja and his wingman were there to do the same. From then

on what happened didn't just happen. The A-5 pilots were watching their flight manoeuvring, looking around. It was closed in, hard turning, mano a mano, the longest few minutes the PAF's F-16 pilots had ever endured.

"Earlier before the mission, we had cleaned up the aircraft. Took off everything, the racks and the fuel tanks. The A-5 had more fuel capacity than its predecessor F-6. We could fly at required speed with less power. Also, we were emitting less heat signature that's why they could not get an early lock-on to us. The F-16s were better than us in every

way, in turning, in climbing, in running away, in coming in. But our plan was to not engage for too long. And that's how we got six kills during the exercise," AVM Hamid Khawaja (Ret'd) recalled. That was not the only morale booster for the A-5 pilots. During another exercise in PAF Base Rafiqui, Wg Cdr Hamid Khawaja was tasked to attack a bridge on a canal in Chicho-ki-Malian (small town in Punjab). PAF F-16s were heading towards the same destination, but only to intercept the raiding A-5s.

Fast and heavy, the A-5, was a viable threat in air-to-ground combat yielding amazing results.



“For more than quarter of a century, the A-5 III served the PAF as the front line low-level tactical attack aircraft. Although it didn't participate in any all-out war, however, it remained a potent weapon system for years. Let's take a gander at the A-5 III's legacy, it's fascinating service in PAF, all extracted from the veterans who flew this 'Fantastic Fantan'.”

by Air Cdre Muhammad Ali, SI (M) (Ret'd)



The then Squadron Commander, Wg Cdr Hamid Khawaja, had put together two packages of four Mirages and six A-5 IIIs. He planned it such that the F-16 pilots went chasing in the wrong direction, enabling the A-5 pilots to complete their mission and escape. Later, this episode did upset a lot of people in the F-16 squadrons, but this is what the nature of this challenging profession is like.

A curious feature of the A-5 history was its reputation as the leading ground attack jet despite its inferiority (with respect to performance) compared with other fighters in the PAF

inventory of that time. Over the years, PAF pilots, engineers and maintenance crew developed a kind of love and hate relationship with this rugged warrior owing to its diverse characteristics. That's why it deserves a rightful place in the history of PAF as one of the potent weapon systems that served the nation for more than two decades.

While the Chinese A-5 achieved fame on the strength of several outstanding attributes, of these, perhaps the most important was its excellent low level capability. "The more it hugged the ground at high speeds, the more stable it used to become compared

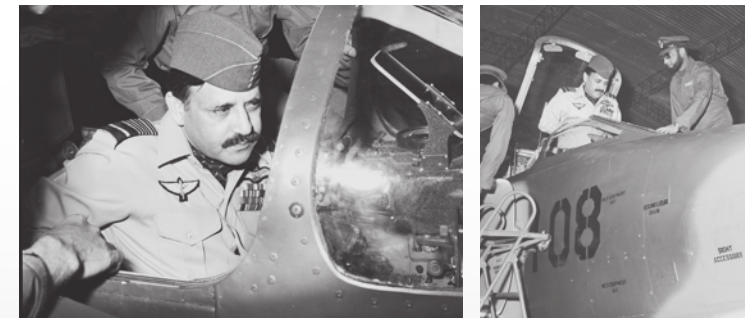
with other jets in the PAF's fleet. The A-5 was excellent in the ground attack role," reminisced AVM Sajid Habib (Retd). To these attributes were added, a heavy offensive weaponry, though the true combat potential of the A-5 was achieved only after a long period of gestation.

Back in the 1997-98, Wg Cdr Sajid Habib was the officer commanding of Sqn No 16 'Black Panthers', which was equipped with A-5 IIIs at that time. Under his command, 'Panthers' won the ACES trophy for the second time. That year, the No 16 Sqn, also scored Alpha every month in every exercise

**Top: A-5 III from No 26 Sqn seen in action at PAF Base Peshawar.**

**Left Bottom: The twin engine jet could fly at 1, 200 km/h along the contours of the earth.**

**Inlet: Formation of eight A-5 IIIs prepare for take-off for a mass raid mission.**



in live bombing and strafing. The sqn achieved the same feat almost a decade ago, when it won the ACES trophy for the first time under the command of Wg Cdr Zafar Mirza in 1989-90. From there on there was no looking back. The A-5s earned their reputation and its pilots performed outstandingly in all exercises armament competitions and fire power demos.

**The Pioneers**

Ferries of the A-5s from Nanchang, China commenced in the summers of 1983 and continued till mid of 1984, without the laborious and costly land hopping routine, which the PAF pilots experienced while ferrying F-6s almost a decade ago. The first six aircraft were delivered on 12 February, 1983, under the command of Wg Cdr Hamid Saeed Khan and his seven colleagues,

Wg Cdr Farooq Siddique, Sqn Ldr Mansoor Ahmed, Sqn Ldr Saeed Akhtar, Sqn Ldr SA Muddassir, Flt Lt Altaf Saleemi, Flt Lt Saifoor Ahmed and Flt Lt Ahmed Yar Khan. The ferry engineering officer was Sqn Ldr Asfar Majeed. Another six were delivered to Pakistan four days later. All-in-all 54 dual-engine A-5s were ferried from China in the coming months.

A young Flt Lt in 1982, Sajid Habib was also among the pioneering pilots who went to Nanchang, China to complete ground training course on A-5 IIIs. "By comparison, the A-5 was unusual looking. Our reaction was, what is that?" Perhaps, a cross between Mirage and F-6," AVM Sajid Habib (Retd) remembered with a smile.

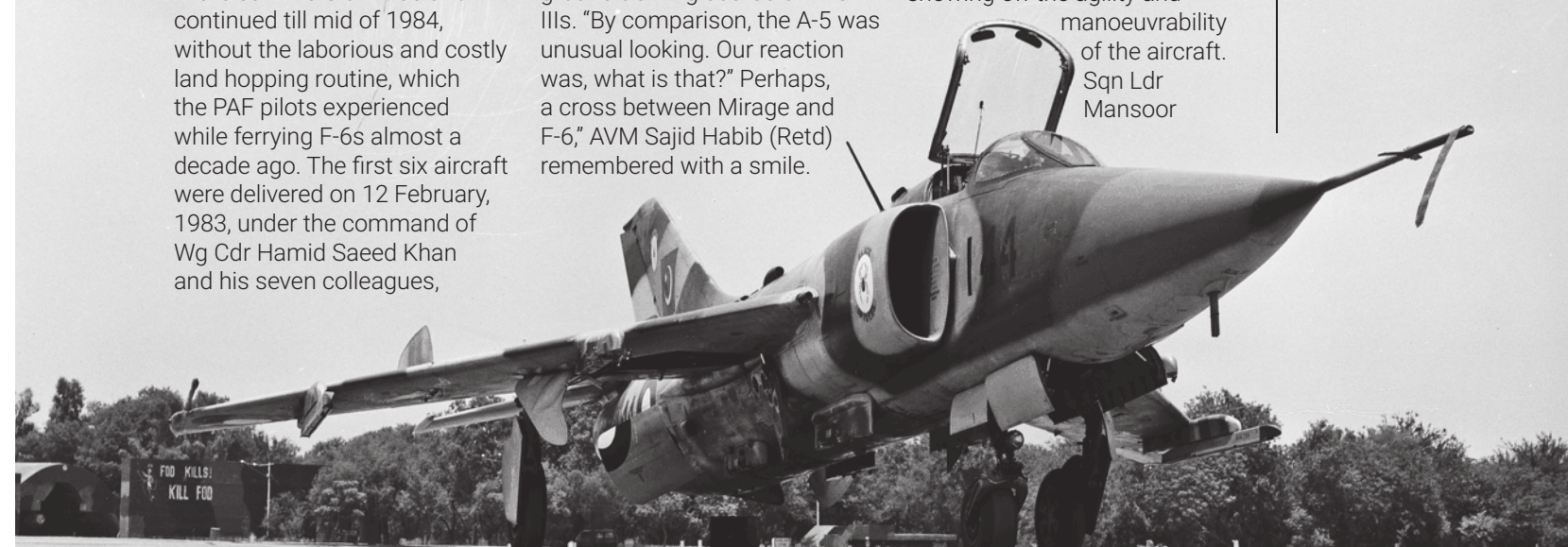
Accompanying him during the course were Flt Lt Hanif, Sqn Ldr Saeed Shahi, Flt Lt Altaf Saleemi, Flt Lt Khawaja Latif. Wg Cdr Hamid Saeed Khan was the contingent commander. "These were the difficult times, as none of the locals could speak and understand English. Even the A-5 dash-one and checklist were in Chinese which made our lives miserable, however, Flt Lt Saleemi did a great job in translating all the procedures into English," remembers AVM Sajid Habib (Retd).

Mocked initially, the A-5's fuel capacity was incredible. "It could fly farther than an F-6 fitted with fuel tanks. The first A-5s flew direct from Hotian to Rafiqui Air Force Base, at 34, 000 ft, with some 1, 300 litres fuel to spare after we landed," added AVM Sajid Habib (Retd), who carried out his first ferry in one go.

**Re-Equipments**

No 16 Sqn, the 'Black Panthers' was the first sqn of the PAF to be equipped with A-5 III. The re-equipment ceremony was held on 21 March, 1983 wherein General M Iqbal, Chairman Joint Chiefs of Staff Committee was the guest of honour. Wg Cdr Hamid Saeed Khan was its first sqn cdr. During the ceremony, Wg Cdr Tahir Ahmed flew his A-5 in an aerobatic demonstration showing off the agility and

manoeuvrability of the aircraft. Sqn Ldr Mansoor



**Left Inlets: ACM Anwar Shamim, CAS PAF inspecting the newly arrived A-5 III aircraft at the re-equipment ceremony of No 16 Sqn at PAF Base Rafiqui.**

**Group Photo: The first batch of pioneers who went to China for undergoing ground training course on A-5 III at Nanchang from Oct to Dec, 1982. From L to R- Flt Lt Hanif, Sqn Ldr Saeed Shah, Wg Cdr Hanid Saeed (Contingent Commander), Flt Lt Sajid Habib, Flt Lt Altaf Saleemi, Flt Lt Khawaja Latif. (Photo: AVM Sajid Habib (Retd)).**

**Bottom: A fighter jet that contributed extensively to pilots' training and direct conversion to more advanced jets especially the F-16.**





Ahmed, Sqn Ldr SA Muddassir, Flt Lt Altaf Saleemi and Flt Lt Saifoor Ahmed flew their A-5s in a four ship formation the same day. Two days later, on Pakistan's Defence Day, another formation of A-5s flew by, led by the Rafiqui Base Commander, Air Cdre Amjad H Khan. PAF was proud to present their newest combat aircraft to the watching world.

Next in line for re-equipment was the No 26 Sqn which got converted on to A-5 IIIs in mid of 1983, under the command of Wg Cdr S Arshad Toor. In 1985, after converting on A-5 IIIs, the sqn won the three top laurels, the Professionals, Flight Safety and Command Armament competition trophy.

No 7 'Bandits' was the last sqn to receive handful of A-5 IIIs replacing the vintage B-57 Bombers. On 27 December, 1983, the re-equipment ceremony of the squadron was held at PAF Base Rafiqui, with Wg Cdr Shams Khan as its first sqn cdr. At the same time, the sqn was also re-assigned the new role as the 'Tactical



**Top: Not bloodied in conflicts, but given its effective offensive role, the Fantan remained in the front line starting from its operational debut in the 1980s. A-5 III fly in box formation in their last ever appearance in Pak-Day parade, 2006.**



**Inlet 1: 'Young Panthers' under the command of their Sqn Cdr, Wg Cdr Shahid Jahangiri of No 16 Sqn.**

**Inlet 2: The A-5's lethality combined with its lively performance, it endeared to its crews.**

Attack Squadron'. At the end of the ceremony, two B-57s in close line astern position flew past the venue indicating end of their valuable service to PAF. Moments later, in came the agile and sleek A-5s in close 'vic' formation.

### The Backdrop

PAF pilots argued that the A-5 did not distinguish itself on any major event but flew with somewhat equal distinction. It did well over the mountains as well as over the southern desert. Its cosmopolitan nature was fundamental in its design, its origins much to the previous wars and subsequently to the urgent need to re-equipment by the PAF during 80s. And even though the A-5s were inducted around the same time as the F-16s, the numbers of 'Fighting Falcon' delivered to Pakistan were insufficient, against an enemy air force four times its size. The Swedes had declined to sell Pakistan their Saab 105s and the PAF had refused the A-7 offered by USA. The dangerous signals after the 71 war followed by a decade long Afghan war had not been ignored by the PAF high command, which was continuously considering the future requirements for the air force. The search took on a new urgency and the PAF once again turned to the Chinese, who readily came up with the Nanchang A-5 III. Well suited to the low level attack role, the A-5 was adaptable and extremely potent. Despite its limitations, it was to serve the PAF valorously in the coming decades.

In the winters of December, 1983, another 17 A-5 IIIs that joined the PAF fleet were equally split between No 16 and No 7 squadrons. The final delivery of some 13 A-5s, should have commenced in China on 19 January, 1984. Bad weather meant that the 14 pilots led by Rafiqui Base Commander

Air Cdre Saeed K Kamal, were all delayed at Hotian before the aircraft got to Rafiqui.

Gp Capt Wali Mughni (Retd), who was then Squadron Commander of No 26 Sqn, remembers an incident of his life which was difficult for him to shake away. In the winters of 1984, he along with his contingent flew to China to test-fly the newly selected A-5-III. Day after their arrival heavy snow started and continued for next 21 days. "Those were very hard days, we were stuck in our rooms and heavy snow didn't allow us to go outside," remembers Gp Capt Wali Mughni (Retd). It cleared off on 22nd day and we desperately went to airport to carry out the test flight. Just after take-off, Wg Cdr Wali Mughni broke cloud cover at 2,000 ft, and performed the necessary checks. He found the aircraft in perfect shape and threw it around to check the various systems. Accomplishing the mission, it was time to land. "As soon as I descended the runway had disappeared under fresh snowfall. The weather changed all of sudden without my expectations. Chinese ground staff frantically tried blowing the snow away using F-6 jet engines mounted on trucks," recalled Gp Capt Wali Mughni (Retd). By the time they reached the end of the runway, the cleared stretch was again covered by snow.

**Right: Re-equipment ceremony of No 26 Sqn at PAF Base Rafiqui. Wg Cdr Sarfraz Toor, Sqn Cdr leading the parade.**



**Right Centre: 'Black Panthers' won the ACES trophy for the second time in 1997. Proud members of No 16 Sqn pose with their Sqn Cdr, Wg Cdr Sajid Habib (5th from left standing) after winning the competition. (Photo: Panthers Den).**



**Right Bottom: No 26 TA Sqn got deployed at PAF Murid during 'Ops Sentinel' in 1999. From L to R front row - Flt Lt Shariq Zaman, Flt Lt Arif Bilal, Flt Lt Tariq Azeem, Flt Lt Mehr Gul, Flt Lt Amjad Mehmood. Second row - Flt Lt Amer, Flt Lt Khurram. Wg Cdr Nadeem A Khan, Sqn Cdr standing at the back.**



Various modifications were carried-out on A-5 III by the PAF including the AIM-9 sidewinder and Matra 550.

"It was now a matter of pride and honour. To eject or do whatever it takes to land the fighter. In no way I was convinced to abandon the brand new aircraft. I made two attempts for landing, however, could not locate the runway on final approach due to heavy blizzard. Finally, I informed the control tower that I was coming-in for landing for the last time," Gp Capt Wali Mughni (ret'd) said, who was by then flying on vapours. As soon as he touched down, his fuel finished completely and the engine flamed out on the runway. It was a close call, however, he managed to save a valuable PAF asset at the end of the day.

### The Aircraft

The twin-engine fighter was an improved version of the Shenyang F-6, a Chinese derivative of the MIG-19. But the A-5s stronger wings allowed it to carry more air to ground weaponry. The F-6 was an air superiority fighter-interceptor, with limited air to ground capabilities. The two afterburning WP-6 turbojet engines provided the rugged A-5III, with its necessary propulsion. PAF A-5IIIs were different considerably from the Peoples Liberation Army Air Force (PLAAF) versions, with several design features being introduced to increase the jet's strike range.

The swept wing A-5 III could carry bombs, rockets and air to air missiles. It had



1

1: Wg Hamid Khawaja, Sqn Cdr No 16 Sqn along with sqn pilots.



2

2: Wg Cdr Nadeem A Khan, Sqn Cdr leading the pack of 'Black Spiders' at PAF Base Peshawar.



3

3: Wg Cdr Mushtaq Ahmed, Sqn Cdr No 26 Sqn introducing his under-command pilots to ACM Mushaf Ali Mir, CAS PAF during his visit to an operational base during 'Ops Sentinel'.

Bottom: PAF ground crew played an important role in maintaining the fleet of A-5 IIIs. Seen in the illustration is the view of flight lines at PAF Base Peshawar.



two GSH guns. External fuel tanks could be carried under the wings and rockets were mounted on under wing pylons. There were four belly stations, which could carry Durandals, Rockeye MK 20 CBU, BL-155 CBU or MK 82 and Snake Eye bombs. However, a fully loaded aircraft (2 AAM, 2 Drop Tanks and 4 bombs) performed averagely.

### Modifications

There were several modifications done to the A-5, to overcome complexities of flying operations. The bombing mode (CCIP) that existed in the aircraft was tried out but proved to be of little benefit. The sight was depressed to levels where the pilot could not see it unless his helmet was touching the canopy. Nonetheless, by 1987, PAC Kamra had started overhauling the A-5III. Prior to this, the aircraft had to be ferried to China for attention. The year 1988 was the last time the three A-5s flew to China for overhauling and modifications. At PAC Kamra, engineers transformed the A-5 into a force of reckoning. With two wing mounted cannons, and an array of western and Chinese bombs, including the runway busting Durandals and unguided rockets, the A-5III was turned into a lethal weapon system. For interception, the A-5III could call upon both western Matra 550 and AIM-9 sidewinders, as well as Chinese air-to-air weapons. A tactical air navigation (TACAN) system was also installed in 1985. Later, modifications included installation of GPS-100 which proved to be handy during low level tactical attack missions.

Top: The PAF heavy weight from No 7 Sqn takes off from PAF Base Rafiqui.



Right Inlets: 'Black Spiders' pose with their Base Cdr, Air Cdre Anwar M Khan after winning various prestigious trophies.



'Making History'- For the first time, ACES trophy (Combat Efficiency) was won by a non F16 Sqn, No 26 Sqn. Wg Cdr Zafar Mirza, the proud Sqn Commander pose with his under command fighter pilots after winning the coveted trophy.

The A-5 was believed to be identical to the F-6 but the PAF soon found otherwise. The A-5 was underpowered for the air combat role and most F-6 pilots flying the A-5, treated it as if it was a powerful and agile machine as its predecessor was. Another problem was that the FT-6 trainer was used as a dual seat trainer for the A-5. The FT-6, had a thrust-to-weight ratio of 0.83 compared with the A-5's 0.68. Moreover, the nose of the A-5, which was meant to house radars, was also much heavier than that of an FT-6. It required more muscle power, given that the jet engines of both aircraft produced the same output. These factors were sometimes overlooked by the newly converted young pilots, leading to some grave consequences.

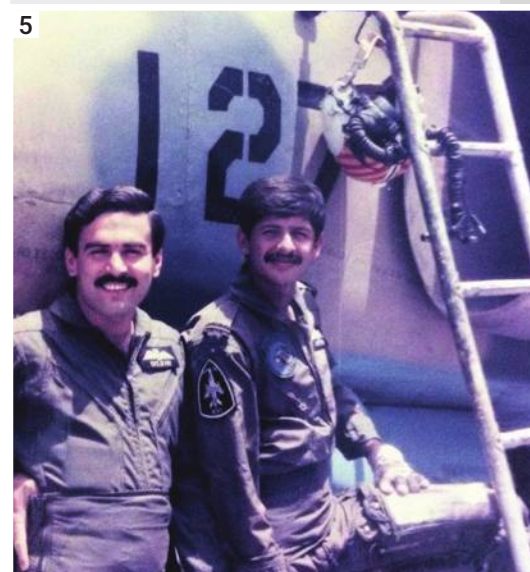




While it carried more fuel than the F-6, the A-5 was like a cheap but primitive Mirage. "It was incomparable to the F-16. The ejection seat was unreliable and initially we had several unfortunate accidents. Subsequently, the Chinese ejection seats were replaced with zero-zero Martin Baker seats. Another problem was the lack of stall warning. As you approached the stall there was no pre-stall buffet or noise of the turbulent airflow over the canopy. The first indication was the onset of a tip stall causing the wings rock. This was mistaken by many pilots during the initial years as a control problem. The aircraft had not been spin tested and had the same spin recovery procedure as the F-6 which was aerodynamically different," recalled AVM Hamid Khawaja (Retd). Initially the PAF pilots flying the other weapon systems, underestimated the 'Fantastic Fantan'. With proper tactics, the A-5 could hold its own against other jets. During exercises, initially, the agile Mirage pilots found it difficult to escape. On the other hand, when being chased, A-5

pilots also found it difficult to lose their tail. The A-5 possessed another performance feature, which enabled it to outpace most contemporary PAF service fighters was that it was difficult to spot. While the F-16 and F-7, if flown well, could get the better of the A-5, AVM Salman Bukhari (Retd), an A-5 veteran who holds the record of flying the maximum number of hours, said that this jet was invisible. "It's camouflage livery on top and the under surface sky blue paint job made the A-5 III almost from the ground and especially from above when flying high-speed, low-level missions. I remember during exercises, our opponents could simply not spot us from above. It was a feature in which the A-5 had attained greater notoriety than any other weapon in the arsenal," added AVM Salman Bukhari (Retd), smiling.

Historically, three PAF squadrons, No 7 Sqn 'Bandits', No 16 Sqn 'Black Panthers' and No 26 Sqn 'Black Spiders' were re-equipped with A-5 III aircraft, No 16 Sqn being the pioneer. However, No 7 Sqn



1: Amazingly, Flt Lt Sajid Habib (standing on ladder) flew his first ever mission on the same A-5 III (Tail No 110) decades before its retirement in 2007.

2: Air Cdre Sajid Habib, Base Cdr PAF Base Peshawar pose with A-5 III (Tail No 110) after flying the last flight of A-5 III at PAF Base Peshawar.

3: 'Farewell Flight'- Air Cdre Sajid Habib, Base Commander PAF Base Peshawar flew the last flight of A-5 III (Tail No 110) thus marking the beginning of the retirement of aircraft in 2007. Picture taken by Air Cdre Sajid Habib from inside the cockpit.

4: Panthers fly in close formation over Peshawar.

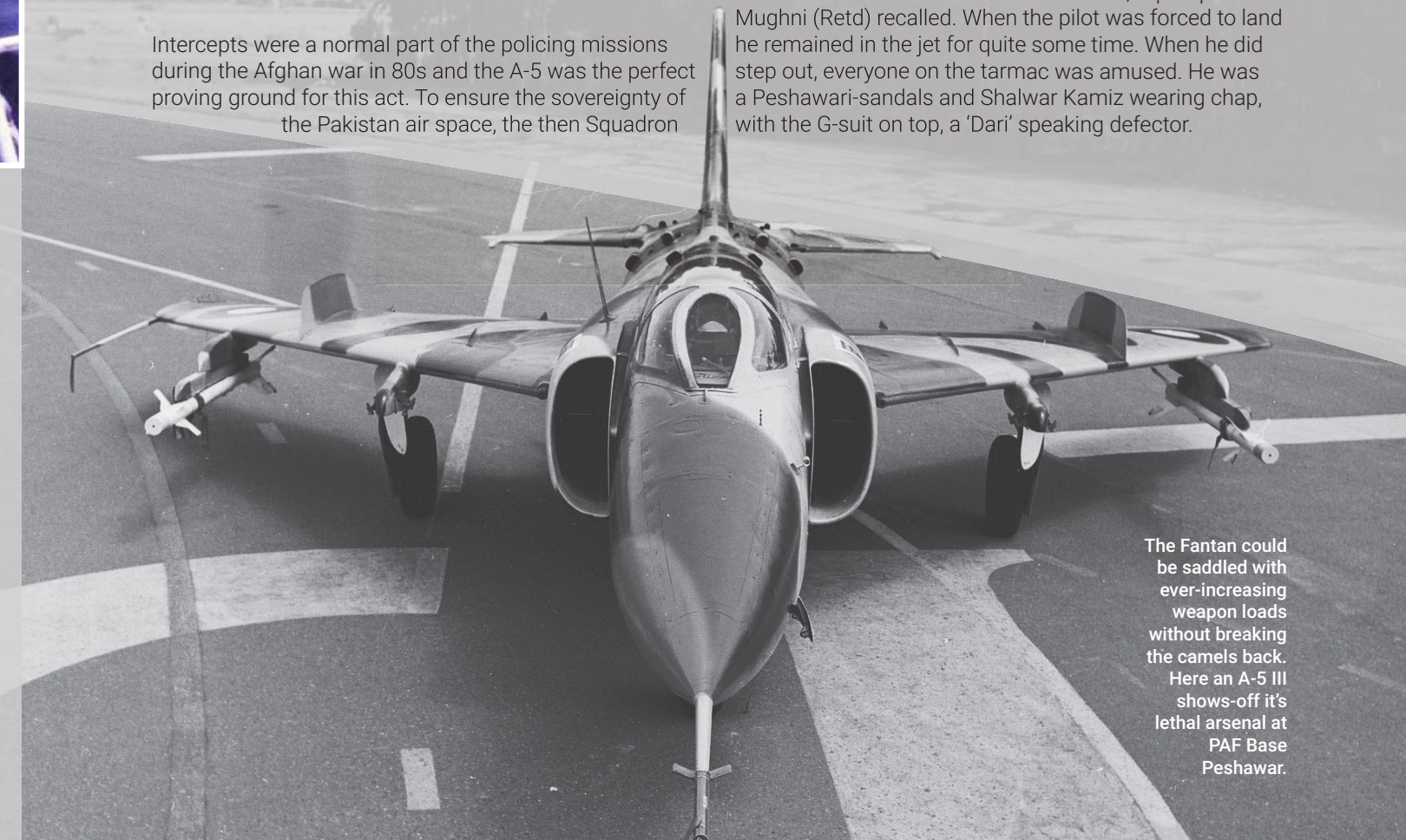
5: All Smiles- Flt Lt Jaffri and Flt Lt Gulzar in a jolly mood after a mission.

6: A-5 pilots under the command of their Sqn Cdr, Wg Cdr Shahid Jahangiri during annual mountain camp at PAF Qadri (Skardu).

was the first A-5 sqn to relinquish the 'Fantans' and got converted on to Australian 'ROSE' Mirages. The other two sqns carried on with legacy of A-5 till its retirement from PAF service. Initially, PAF Base Rafiqui housed all the three A-5 sqns, however, No 16 and 26 sqns moved to their final destination at PAF Base Peshawar in 1989. Being at Peshawar, the two sqns played an important role on variety of occasions. The sqns participated in all major operational activities and exercises of the PAF, which included Ops Sentinel, Hi-Mark 2005, Saffron Bandit, Banner Towing, Air-to-Air firing camp and DACT at different locations.

Intercepts were a normal part of the policing missions during the Afghan war in 80s and the A-5 was the perfect proving ground for this act. To ensure the sovereignty of the Pakistan air space, the then Squadron

Commander of No 26 Sqn, Wg Cdr Wali Mughni, was alerted to get airborne to investigate an aircraft and enforce a no fly zone. Within three minutes, after radars picked up an unidentified aircraft, the sqn cdr was chasing the intruder along with his wingman. On his way, he was informed that a Russian jet had peeled off from 8-ship formation on a bombing run along the Pak-Afghan border. "Being a fighter pilot is an attitude. We used to itch for such an opportunity, to get a kill. But the intruder started waggling the wings of his SU-25 and put his gears down. Obviously we could not engage someone who had indicated to surrender," Gp Capt Wali Mughni (Retd) recalled. When the pilot was forced to land he remained in the jet for quite some time. When he did step out, everyone on the tarmac was amused. He was a Peshawari-sandals and Shalwar Kamiz wearing chap, with the G-suit on top, a 'Dari' speaking defector.



The Fantan could be saddled with ever-increasing weapon loads without breaking the camels back. Here an A-5 III shows-off its lethal arsenal at PAF Base Peshawar.



1: A-5 III was continuously adapted to perform roles other than that for which it was conceived and performed every task demanded of it.

2: A-5 III from No 16 Sqn 'Black Panthers' in typical camouflaged livery fly over Peshawar.

3: JF-17 Thunder, shown on the patch, replaced the 'Fantans' of No 16 Sqn in 2010.

4: Sqn Ldr Masood Hussain pose with his 'Fantan' during deployment at PAF Base Qadri (Skardu).

5: Wg Cdr Salman Bukhari after flying a mission at PAF Base Qadri (Skardu).

6: Pioneering ferry team along with Air Cdre Amjad H Khan at Hotian, China.

“Starting from 1987, PAC Kamra played an important role in overhauling the A-5 IIIs. Before this the aircraft had to fly to China for overhaul.”



### High Altitude Ops

“Deployment to PAF Qadri at Skardu used to be an event, we all waited anxiously throughout the year. It was fun flying there. Weather was good, especially if you are coming from Rafiqui,” remembers AVM Salman Bukhari (Retd). A-5 III was very successful platform for deployment to high altitude airfield like Skardu, which has more than 7000 feet elevation. “Mirages had their peculiar problems operating from high altitude runways and F-6s had limited fuel endurance. All in all, A-5 III was the weapon system of choice when it came to high altitude operations. Flying low in ‘Shigar’ valley and making low level passes over frozen lakes were some of the things you can’t forget,” adds AVM Salman Bukhari (Retd).

Majority of pilots who have flown A-5 are of the opinion that the fuel carrying capacity of A-5 III was phenomenal, perhaps its biggest advantage. “We used to take-off from Peshawar, carry out bombing at a range in Skardu and return. No other aircraft could fly that distance,” said veteran A-5 pilot, AVM Salman Bukhari (Retd), who topped in weapons systems during one of the biggest armament competitions in 1996. AVM Salman Bukhari (Retd), who had flown all PAF jets

attributed its success to its stability at low levels, long hauls and weapons carrying capacity.

A-5 pilots have bitter and sweet memories. “It’s never easy to bid farewell to your comrades, especially the ones you have trained for so long. I saw my wingman catch fire and he could not eject. He lies in the vicinity of the runway at PAF Base Rafiqui. May Allah Bless his soul, I still find that very difficult to reconcile,” AVM Hamid Khawaja (Retd) said in a gloomy tone. Some also have sweeter memories. The A-5 squadrons were like springboards for conversion on to more advanced F-16s. It was a norm that the A-5 pilots used to convert directly on the Fighting Falcons. One of the prime reasons was that the pilots were able to fly two-hour missions comfortably, thanks to its impressive endurance. AVM Hamid Khawaja and ACM Sohail Aman along with many others were among those who later converted onto F-16s.

### Farewell to Fantan

The year 2007, was the beginning of the end for the A-5s. After serving the nation for more than two decades, the ‘Fantan’ finally gave way to the

more agile, state-of-the-art JF-17 Thunder. A-5 III tail number 3W-110, was the first to be retired, the same jet that AVM Sajid Habib flew as a young Flt Lt for the very first time at PAF Base Rafiqui. He was not going to turn down the request to enjoy the last moments in the sky in the A-5, and so had the privilege to fly it for one last time as Base Commander, PAF Base Peshawar.

“The jet flew so smoothly. The credit went to the engineers, who maintained the aircraft so well that not a single needle fluctuated. It was 101 percent



serviceable sortie. I along with squadron commanders of No 16 and No 26 Sqns on my wing flew the farewell flight. To record the historical event, I took along my trusted digi-cam for making videos. It was nostalgia, a mix feeling of satisfaction and pride. It was painful to say good bye to a friend with whom you had such a long association," added AVM Sajid Habib (Retd) recollecting memorable times spent with the aircraft. After a low buzz over the airfield it was time for Air Cdre Sajid Habib to land back amidst the cheering crowds.



2: A-5 III would be remembered as the aircraft of choice when it comes to low level strike missions. Wg Cdr Hamid Khawaja in lead, delivers bombs over Thal range.



3: A-5 III remained the backbone of PAF fighter line-up for decades. 4: It operated on more fronts for a considerably longer period with other weapon systems of PAF. A-5 III leads the formation during Firepower Demo, 1998.

5: Show of Force - The A-5 was also the mainstay of the PAF's fighting force for over two decades. PAF weapon systems of 90s era fly over Karachi coast.

6: At the right place, at the right time. A-5 III fly in close formation over Peshawar.

“During its service A-5 flew 141,917 sorties in 117,373 hours. No 26 Sqn was the first unit which was re-equipped with JF-17s in 2010.”

In addition to strategic attacks, it was used with equal facilities for land and maritime missions.



The A-5 holds a special place in the PAF's aviation history. In some respects, the combat career of the A-5 III, was much less spectacular than that of other jets. While it never saw an actual war, it remained in the front line service throughout its tenure. Be it Ops Sentinel, stand-off with India or Kargil war, A-5 was there to defend and respond. A-5 sightings in the air have long gone. The jet now joins the heritage of aircraft collections in the PAF Museum, Karachi. Few of the A-5s are installed at busy crossroads of major Pakistani cities reminding the nation that the 'Fantastic Fantan' played its part while defending the aerial frontiers of this sacred motherland.

### A-5 III Specifications

Crew:	1
Length:	15.65 m (51 ft 4 in)
Wingspan:	9.68 m (31 ft 9 in)
Height:	4.33 m (14 ft 2 in)
Wing area:	27.95 m <sup>2</sup> (300.9 sq ft)
Empty weight:	6,375 kg (14,054 lb)
Gross weight:	9,486 kg (20,913 lb)
Max takeoff weight:	11,830 kg (26,081 lb)
Powerplant:	2 × Liming Wopen-6A
Maximum speed:	1,210.23 km/h (Mach 1.12)
Range:	2,000 km
Combat range:	400 km (250 mi, 220 nmi)
Service ceiling:	16,500 m (54,100 ft)
Rate of climb:	103 m/s (20,300 ft/min)
Wing loading:	423.3 kg/m <sup>2</sup> (86.7 lb/sq ft)

To remind the nation about the historic role the 'Fantastic Fantan' played for decades, an A-5 III was recently erected on the 9<sup>th</sup> Avenue in Sector I-8, Islamabad.





Over decades, Exercise 'Anatolian Eagle' is playing a vital role for the Turkish Armed Forces and its friendly/ allied countries. It simulates realistic combat training in a high threat environment. Instead of looking towards exercises like the American Red Flag Alaska or Canada's Maple Flag, several air forces in the region fly to Turkey to participate in the Anatolian Eagle.

The 'Anadolu Kartali Egitimi', as it is called in the Turkish language, officially started in 2001. The Training Centre for the exercise is located in Konya Air Base. A short distance from this vast air force facility lies one of the largest military training areas of the world. This allows the participating air forces to employ more than 60 air assets. It also provides them with a secluded, shielded venue to practice

their strategies without worrying about air traffic.

Since its inception, 43 Anatolian Eagle Trainings have been performed. More than 35000 personnel have participated, using some 2920 air platforms which flew around 24222 missions. Up till now, 14 different countries have taken part in Anatolian Eagle which include Belgium, France, Germany, Netherlands, Israel, Italy, Jordan, Spain, Pakistan, Qatar, United Arab Emirates, United Kingdom, USA and Saudi Arabia. NATO assets have participated in the Anatolian Eagle, as well.

**History of Anatolian Eagle**

The Turkish Air Force (TuAF) is one of the most well-equipped, well trained and competent air forces of the World. Possessing a wealth of



Top: On final exercise day, two beautifully painted F-4E Phantoms from 111 Filo of TuAF also appeared for aerial display. (Photo: Vincent Martens).



Top Left: Azerbaijan Mig-29 on its way to take off for the final mission of Ex Anatolian Eagle 2021. The two Mig-29's that participated came from Nasosnaya Air Base in Azerbaijan. (Photo: Vincent Martens).

Right: Qatari Air Force participated in the exercise with their four brand new Rafale aircraft, three single seat and one DQ. (Photo: George Karavantos).

International Air Force exercises always prove to be an excellent tool of mutual learning between air forces of participating nations. Turkey entered this high-stakes arena a couple of decades back with the famous exercise named 'Anatolian Eagle'. Ever since, the nation has conducted the exercise several times, with a diverse number of nations being invited to the event. Let's venture into the details of this exercise held at Konya, Turkey in Jun-2021.

by Vincent Martens

Pakistan Air Force's JF-17 stole the show in Turkish International Air Exercise Anatolian Eagle. (Photo: Turkish Media).



A View from Konya

# ANATOLIAN EAGLE-2021

'Two Finest in One Shot'- Two of the emerging and leading fighter jets of the world, Pakistan's JF-17 Thunder and Qatar's Rafale fly in harmony during the exercise. (Photo: PAF Archives).



Top Left: Briefing session remained the routine through out the exercise. Seen in photo are Pakistani and Qatari pilots after an intense briefing session. (Photo: Turkish Media).



Top Right: Brothers in Arms- Pakistani and Qatari pilots pose in front of a Qatari Rafale during the exercise. (Photo: Turkish Media).



Right: Aircrew from all the participating countries pose for a historical group photo during Exercise Anatolian Eagle-2021. (Photo: Turkish Media).

resources, the political instability of its neighbors and their incessant arms race, has forced the TuAF to own state-of-the-art weaponry and to maintain the highest level of training. That's why to achieve this important goal, the TuAF sent a select personnel to participate in 'Red Flag' exercise held at USAF's Nellis Base in Nevada in 1983. A crew of six consisting of four pilots and two WSO's (Weapon System Officers) were sent. They were initially sent as observers, but later they were able to execute two missions in USAF aircraft. After participating in the exercise and realizing its benefits, the Turkish Air Force saw the need of a training regime like the 'Red Flag' to be carried out in Turkey where some of the allied countries from the region could also participate. This resulted in a two self-coordinated joint trainings by the Turkish Air Force

in 1988 at Incirlik Air Base. At that time, the training was given the name 'Anatolian Flag'.

High-ranking senior officers accumulated all the training and benefits of Red Flag and Anatolian Flag and documented them. These documents were then sent to Turkish Air Force Command, with the recommendation that a multi-national exercise of the same stature be held in Turkey. This would give Turkish pilots and personnel the vast amount of experience and training that comes up with such exercises. Other benefits would include enhancement

of diplomatic relations with the invited nations and also the money saved by not sending aircraft and pilots all over the world for such exercises. Eventually, the recommendation was given a green signal. The exercise was titled 'Anatolian Eagle'.

Konya Air Base was chosen to become the home base for the Anatolian Eagle because of its position in the middle of Turkey and the vast space it offered. In June 2000, preparations began for the exercise. The facilities and buildings constructed in Konya were very close in design to the ones in Nellis Base, USA. On June 12, 2001 the Operation Centre was completed together with the Red-White-Blue Headquarters, the ACMI building, and other similar structures. The first Anatolian Eagle (AE-01) exercise was held from 18 - 29 June, 2001. Besides the TuAF, the event was attended by US and Israeli Air Forces.

### The Exercise

The Anatolian Eagle (AE) exercise is as close to real war training as it gets. With missions that become more and more complex as the exercise progresses, the participants are subjected to gruelling tasks that only the best of the best can endure. The aim of the exercise is to test and enhance the exchange of knowledge and interoperability between all participants. The Tactical



Training Centre in Konya was established to reach similar objectives, which included:

- To train fighter pilots for victory and teach them how to survive.
- To test and evaluate the combat readiness of the fighter pilots and the progress made during the exercise.
- To reach military goals in a short time with the minimum amount of resource and effort based on a given scenario.
- To support the testing and development of existing and newly developed weapons or aircraft systems.
- To build a training environment in order to attain the requirements of

the TuAF Command and foreign air forces.

- To develop joined and combined operational procedures.
- To increase the operational training level of the pilots and air defence personal in a most realistic environment.
- To increase mission effectiveness.
- The chance for fighter pilots to execute their planned tactics during COMAO's (Combined Air Operations).

### Exercise Breakdown

The scenario of the exercise consists of a Blue Force that flies CAMAO against the opposing Red Force. The Red Force have tactical and strategic targets, positioned in 'Red Land',

Top: Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff was the especial guest at the closing ceremony of the exercise. The Air Chief along with his Turkish counterpart witnessed the ongoing exercise on the final day. (Photo: Turkish Media).

Bottom: Air and ground crew from all the participating nations pose for a group photo in front of HQ building at Konya. (Photo: Turkish Media).



which have to be eliminated by the Blue Forces. However, these targets are heavily protected by GBAD (Ground Based Air Defence) systems like Surface to Air Missile Sites, etc. The Red Forces will use their fighter aircraft to simulate aggressor tactics.

An electronic warfare test and training range is established, with a wide array of threat emitters, integrated with recognized air picture and ACMI. Everything has been curated to expose aircrews to a high-threat environment. The exercise area gives the pilots the opportunity to fly at low level as well up to 50,000 feet. Three live firing ranges can be used, which are the Koc, Tersakan, and Karapinar range. During the exercise, TUAF tankers give air-to-air refueling support for both forces. Besides the combat missions, the participants engage in air-

lift and air-dropping missions, slow mover escorts, and CSAR (Combat Search and Rescue) missions. The Red Force or the 'bad' guys normally consists of only Turkish aircraft. Two squadrons were based at Konya AB, the 132 and 133 Filo, and these are used as aggressors during the exercise. Besides these, an Electronic Warfare Squadron was assigned to the Red Force.

The White Headquarters is the brain of the Anatolian Eagle where training missions are planned and studies are carried out. The Command Control Centre (CCC) is monitoring and observing all missions in real-time. They have the location, position, and flight information of all participating aircraft. This data is fed into Real Time Monitoring ACMI (Air Combat Maneuvering Instrumentation). The White Headquarters also



A JF-17 Thunder from 'Black Panthers' sqn taxi out for a mission while other one follows in the background. (Photo: George Karavantos).



A Qatari Rafale takes off for an exercise mission. (Photo: George Karavantos).

Bottom Left: Exercise in full swing, F-16C with markings of 162 Filo taxi out while an Azerbaijan Mig-29 uses its afterburner to get away from the airfield as quickly as possible. (Photo: Vincent Martens).

Bottom Right: A Turkish pilot getting strapped in his F-16, while the crew is taking care of the final checks. In the background a F-16D with conformal fuel tanks from 161 Filo getting its own attention. (Photo: Vincent Martens).

houses the Radar Operation Room. Locking down and shooting images of SAM and anti-aircraft systems are monitored from these facilities.

The Red Forces have their own 'Red Building' which is used to prepare their missions. Only personnel of the Red Forces have the permission to enter this building, while at the same time Red Force personnel are not allowed to enter other buildings. The Turkish and foreign squadrons are put in the Blue-1, Blue 2, and Blue 3 buildings.

If an aircraft is 'killed' during the missions, certain specific procedures are to be followed. After being shot, the aircraft has to fly to a pre-designated location and fly for around one minute. If required, the dead aircraft is declared 'alive', simulating that a new aircraft has arrived to take on the fight.

Normally, there are two missions flown daily, Eagle-1 and Eagle-2. The day of a pilot usually starts

“ In Anatolian Eagle-2021 Exercise, Azerbaijani Air Force participated with 2x MIG-29s and 2x SU-25s, Qatar Air Force with 4x Rafale jets, Pakistan Air Force with 5x JF-17s, and NATO with 1x E-3A AWACS aircraft.



Left: An F-16C from 152 Filo leaving the Anatolian Eagle platform, on its way to another Eagle 1 flight. It is carrying an ACMI device developed by the Turkish Space and Defence Technologies. (Photo: Vincent Martens).

Bottom: Air Cdre Ahsan Yousaf, PAF contingent commander, along with a Pakistani and Qatari pilot pose in front of Qatari Rafale. (Photo: PAF Archives).







around 0700 hrs with the Eagle-1 briefing. Around 0930 hrs, the first aircraft take off and the mission ends around 1230 hrs. At the same time, the Eagle-2 flight briefing is already underway and the actual mission starts around 1430 hrs. In the meantime, debrief of the morning mission is underway. The Eagle-2 flight ends around 1800 hrs. Between 1100 hrs and 1700 hrs the mission planning sessions for the next day are conducted. Back-to-back missions are flown throughout

the second week uptill Thursday, when only Eagle-1 flight is carried out. This marks the end of the action. The mass briefings are held and participants prepare for the flights back home.

#### Anatolian Eagle 2021

After two years of break, fighter jets once again roared in the Ex Anatolian Eagle 2021 held at Konya. Strict COVID-19 SOPs were enforced by TuAF to ensure safe and healthy environment for the participating air crew.

The exercise was held from the 21 June to 2 Jul. This year, the air forces of Qatar, Pakistan and Azerbaijan participated with their fighter jets. NATO also participated with an AWACS aircraft. Besides these countries, observers from Bangladesh, Belarus, Bulgaria, Burkina Faso, Georgia, Iraq, Sweden, Kosovo, Lebanon, Hungary, Malaysia, Nigeria, Romania, Tunisia, Ukraine, Oman, Jordan, and Japan were also present. The Turkish Army, Navy forces

**Top: For this year's exercise TuAF participated with 38 Fighting Falcons divided over eight different squadrons. Seen during take off is an F-16C Block-50 of TuAF departing for a mission. (Photo: hebergementwebs.com).**

**Bottom: Konya has two separate flight-lines which can be used for parking of at least 50 fighter aircraft. Seen in photo are TuAF F-16s and Azerbaijan's platforms parked on one side of tarmac. (Photo: Vincent Martens).**



and special operations troops were also involved in the training.

A NATO Response Force was created for the first time which consisted of six F-16's, one KC-135R and six Stinger Air Defence Teams. The Turkish Navy participated with two Frigates and two fast-attack missile craft boats. 38 Turkish Fighting Falcons were deployed at Konya by the Turkish Air Force. The ANKA-S UAV of 302 squadron also took part in the exercise.

A week before the real game starts there is an incessant movement at Konya Air Base. The ramp area of the civil airport at Konya is used as temporary parking space for the larger aircraft like the C-130, A-400, and C-17. On a specified day, all participants arrive and a Mass-in Briefing takes place. A specific day is used for familiarization flights, which serves to familiarize the pilots with base operations and training areas. The same day is also used for mission planning of the first exercise day. A brother-in-arms for the Turkish military and a regular participant of the Anatolian Eagle, Pakistan Air Force participated wholeheartedly this year, as well. PAF's first participation in Konya was back in 2004, and this year was the ninth time, PAF flew to Turkey for AE. This time around, PAF chose the JF-17 Thunder to participate in exercise.

“The International Anatolian Eagle Exercise is carried out every year at the Anatolian Eagle Training Centre (Konya) in a realistic combat environment to improve the capabilities of national and foreign elements, test new tactics and techniques, develop joint and combined operational procedures, and maximize mission effectiveness by increasing mutual support between forces.

Although, PAF's JF-17s have been upgraded to Block III, the five aircraft that flew during the exercise were the Block II variant.

Qatar Air Force with their new Rafale aircraft certainly made things interesting for PAF. "This will be the very first time that PAF and TuAF pilots had an opportunity to pitch their Air Warfare capabilities against the Qatar Air Force Rafale jets, which was recently bought by India and Greece," said a military official.

The Azerbaijan Air Force made their debut in the exercise this year. They participated with two Su-25 and two Mig-29 aircraft which added variety to this year's edition of exercise. The pilots carried out flights to study flight zones, flight landing strips and the air navigation state along the

**Centre: A Turkish pilot displays patches of 'Ex Anatolian Eagle' on the final day of the exercise. (Photo: George Karavantos).**

**Bottom: An Azerbaijan pilot going through aircraft's documentation before proceeding for the exercise sortie. (Photo: menafn.com).**





route. These missions helps the aircrew to get familiarized with the conditions at the departure and landing fields, as well the alternate airfields.

PAF's No 16 Multirole Squadron "Black Panthers" was selected by PAF to participate in the exercise. It was a matter of great pride for the combat crew of the squadron to participate in an international exercise of such nature. The squadron commander chose the best possible team comprising combat crew, aeronautical engineers, technical ground crew, and support personnel for the exercise. Then started the

preparations for the participation in exercise. First on cards was the planning of ferry flight from Pakistan to Turkey. Multiple hops en-route were selected for the ferry flight to ensure smooth and safe flight all the way to Konya.

On arrival, the PAF contingent received a warm reception by their Turkish counterparts. Hugs, exchange of patches and greetings was the order of the day on arrival. A specified area on the tarmac at Konya was designated for the PAF contingent and their assets for the entire exercise. Before the exercise officially started, the Pakistani participants were given

an opportunity to undertake few sorties to familiarize themselves with the terrain and area of operations.

What makes international air force exercises so beneficial is the fact that the event is attended by a diverse number of pilots and aircraft from various countries. This makes the exercise a crash course in practical skill and knowledge for the participants. Another important aspect of this international exercise is to enhance mutual cooperation and diplomatic relations between the participating countries. Air and ground crew regularly

**Top: A PAF pilot climbs down from the cockpit of JF-17 Thunder of No 16 Sqn 'Black Panthers' after an exercise sortie. (Photo: defenceturkey.com)**

**Inlets: The Azerbaijan Air Force brought two SU-25 'Frogfoots' from Dollyar Air Base to participate in the exercise. (Photo: Vincent Martens)**

**A Turkish F-16 seen in action during exercise Anatolian Eagle. (Photo: Vincent Martens)**

interact with their counterparts during briefing sessions, flight lines and other social activities planned during the two week long exercise. Long lasting friendships are developed between the comrades which would be cherished for the years to come. The exercise also provide an excellent opportunity to understand various diverse cultures and complement each other in achieving a common goal.

An important high light of the exercise was the visit by Air Chief Marshal Zaheer Ahmed Baber Sidhu, Chief of the Air Staff Pakistan Air Force on 1 July 2021. He along with his Turkish counterpart, General Hasan Küçükakyüz remained at the base for some time and witnessed the ongoing operations carried out during the exercise.

On his arrival, the Air Chief was



The end of the Anatolian Eagle 2021 exercise. The last formation flying , Azerbaijan SU-25 leading the package, together with the soloturk F-16's and F-4E's.(Photo: Vincent Martens).



given a detailed briefing about the conduct of the exercise. While interacting with the participants, the Air Chief praised the operational readiness and professionalism of the participating aircrew. He also underscored the significance of training in air operations for synergetic and effective employment of assets in a real scenario. He further added,

"Such exercises contribute immensely in achieving greater

synergy and cooperation amongst friendly forces."

After two weeks of aerial combat, another AE episode came to an end. It is clear that the Turkish Air Force is going to continue to evolve the exercise and play a significant role in aerial warfare training for the participating air forces of the region for coming years.

**Centre: TuAF F-16 and two Azerbaijan Su-25 fly in close formation during the exercise. (Photo: mod.gov.az)**

**Bottom: 'Bad Guys'- Especial red-coloured tail markings were used on the F-16s of 132 Filo of TuAF, to distinguish them from the Blue force. Eight aircraft were used in the aggressor role during the exercise. (Photo: Vincent Martens)**

# The Tale of an Unbelievable Feat

# BOMBED TO ATOMS



Through brush and paint, Gp Capt Hussain (Retd) brings back to life, the historic scene of 'B-130' bomber dropping tons of TNT on heavy Indian artillery guns deployed on BRB canal, east of Lahore. (All Photos PAF Archives unless specified).

“One C-130 cargo plane carrying about 18,000 lbs of bombs destined for a bridge. This was the initial test of the offensive against an enemy five times the size. Would it achieve its objective? The answer thundered over India in Sept 1965. As the iron ring of PAF closed around the enemy, a crew from the transport squadron carried the fight ever nearer. Perhaps the best barometer of a bombing raid is to read about the pride and confidence, which brims from this article.”

by S.Khalil

In the last minute of the run-in, OC No 35 Wing, Wg Cdr Zahid Butt, saw the navigation lights of an aircraft heading towards them from the right. “At first I thought it was a star, but then I saw that it was clearly moving. As we were only 40 seconds away from bomb release, I decided to say nothing, although before take-off I had warned my crew that if the Indian Air Force was on the ball, we would probably be intercepted over the target. By the time the navigator had called “Bombs gone”, the aircraft had passed in front of us, and I lost contact with it as it flew behind our left wing. I immediately transmitted that we were being tracked by a fighter, and I asked our loadmaster in the freight hold to keep an eye for the enemy aircraft behind,” wrote late Zahid Butt in his debrief.

sacrifice, and risking of one’s life for others. And then there were those who went above and beyond the call of duty and played a pivotal role in turning tables against the enemy during the war. What perhaps the enemy lacked, the PAF had in overwhelming strength, brave airmen in the likes of Wg Cdr Zahid Butt, Flt Lt Sardar M Asif, Flt Lt Nazeer Ahmed Khan, Flt Lt Rizwan Chaudhry, Flt Lt Javed H Malik, and many others, the decisive element, the will to do or die.

### “B-130” Hercules

One of the most enterprising demonstrations of the PAF’s genius for improvisation, which also shocked the west, related to the night bombing campaigns during the 1965 war. The immense load carrying capabilities of the C-130s, coupled with the frequently demonstrated ability of No 6 Sqn’s crews to drop supplies in all types of weather conditions into drop zones (DZ) in the narrow valleys surrounded by treacherous

The 1965 war called for incredible and varying feats of bravery every day. We had the strong PAF leadership, the will to defeat the enemy, self-



Any Time Any Where- PAF C-130 displays its versatility by taking-off from ‘Katcha’ runway track of Skardu airfield.



mountains, gave the station commander of the transport base at Chaklala, Gp Capt Eric Hall, the idea of using these big transport planes as bombers.

Long before the 1965 war, the PAF had adapted its smaller twin-engined Bristol Freighter transport aircraft to carry a 4,000 lbs bomb load beneath each wing. No 6 Sqn had undertaken a limited amount of training in night bombing against lightly defended targets. The normal load capacity of the C-130, however, was well over 20,000 lbs, which gave it a bombing potential equivalent to the heaviest bombers of World War II.

Gp Capt Eric Hall had already done some tinkering with the mechanics of how to carry the bombs in the C-130. His technicians had helped him devise some simple wooden cradles on which the bombs were laid on the floor of the Hercules. In flight, the cradles would be unleashed just before the DZ and would slide out like any other cargo. The bombs would separate quickly, assume normal trajectories and arm themselves on the way down. However, in the normal 'drop' configuration, the C-130 was structurally limited to a maximum speed of only 150 knots because of the open ramp and rear doors. This low speed vastly increased the giant aircraft's vulnerability to ground fire or interception.

"Disbursed to Miranshah, as the war started, we were sitting together when Wg Cdr Zahid Butt, had an epiphany. Why not remove the ramp door?" recalled retired AVM Sardar Asif (then Flt Lt), as he narrated the incredible story of valour from the 1965 war.

"We had been dropping supplies, but delivering bombs was something never attempted from a C-130 Hercules. It was out of the working range of a cargo plane," quipped AVM Sardar M Asif (Retd). He is one of the surviving crew members, who flew the first and most daring, risky, low-level night bombing raid from a transport aircraft. The target of the raid was the nuisance Kathua Bridge in Kashmir. "Destroy the bridge and we could cut off an important Indian supply line," AVM Sardar M Asif (Retd) said.

To execute the mission, the crew would have to fly with the ramp of the Hercules 'open' to drop the bombs. The odds expression in the air force, "Speed is life." With the the Hercules could only go as fast as 150 knots, explained

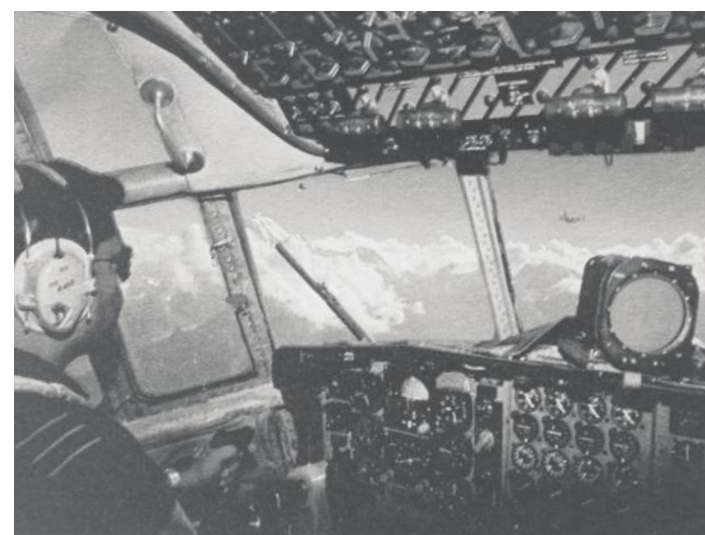
AVM Sardar M Asif (Retd). "Flying this slow over enemy terrain was simply suicidal. Any faster, and the aircraft would suffer structural damage. To execute a bomb-run so daring, the crew needed to fly at least 250 knots, 250 feet above ground level (AGL), to evade enemy radar and least of all, be challenged by Indian fighters."

were counter to the ramp dropped open,

After some plastic surgery on the rear end of the aircraft, the C-130 was ready for action. The crew got their blessing from the higher Command, when Air Marshal Nur Khan, the then C-in-C of PAF, liked the idea of carrying out a surprise low level bombing run in the cover of darkness.

The C-130 got airborne, with Wg Cdr Zahid Butt as captain and Flt Lt Sardar Asif in the co-pilot seat, and with two 500 lb bombs in the belly of the Hercules. The crew had selected the Jamrud Range to test their theory. However, there was another problem. They were unable to get their hands on 3 to 4 minutes delay switches that they had requested for the bombs.

"If we were going to drop the bombs from 500 ft AGL, we would need time to get away from the target before the debris and shrapnel from the explosion could pierce the aircraft," the retired senior officer said. So the crew decided to go in at almost tree top level, design a climbing profile that ensured that the aircraft reached overhead the target at 8,000 ft, deliver the bombs, descend below the radar cover and return home in one piece. On 9 and 10 September, 1965, the practice run over Jamrud was spot on. In three days the C-130 was converted to bombing configuration and was ready for its offensive operations, by the night of 11 September. No bombsight, of course, was fitted to the C-130s, whose crews would use the same aiming techniques for bombing as for supply dropping. Wg Cdr Zahid Butt, who had insisted on conducting the first mission, had calculated that at about 280 knots, would give the Indian defence system an approximate reaction time of only seven minutes, between detection of the C-130 and the start of its bombing



run, reducing the risk of interception to a minimum.

On 12 September, an atmosphere of optimism prevailed on the tarmac at Peshawar. Prayers were also said and they needed them. When the enemy were busy transporting supplies through the Kathua bridge, the PAF were loading a more lethal cargo into the belly of the C-130. In the dead of the night, the crew took off, with the intent to paralyze India and to shorten the war. Yes, it was a day to remember. It was such daring efforts that out of the many sky battles, the PAF had gradually achieved air superiority.

"We were young. Missions like these got our juices flowing," said AVM Sardar M Asif (Retd) reliving the moments in his mind. At night, unseen and unheard until their payload hit, they took-off to strike terror into the hearts of the enemy.

To avoid getting picked up by the enemy radar network, they made their approach low-level, skimming the mountains. The calm, little moments before the storm came to an end when Flt Lt Sardar Asif had a visual of the bridge. The C-130, now a dangerous all-purpose aircraft, climbed to bombing altitude for the knockout punch. From 8,000 ft, still maintaining climbing attitude, the full weight of the raid fell on the target area as the CWO Ashfaq, the load master literally pushed the 18,000 lbs cargo of destruction out of the tail end. The blast sent an inferno of flames into the night sky visible for miles.

**Left Page Top:** There's your ship, the dangerous all purpose aircraft, the green and white headache that led the enemy change his mind.

**Left Page Bottom:** While some aircraft became famous during the war, the "B-130" became legendary.

**Top:** C-130 Hercules is well-known for carrying out variety of missions.

**Left Inlet:** The enemy asked for it, let them have it. PAF "B-130" crew heads across the border to hand out bitter medicines.

**Left Bottom:** Sqn Ldr Masood A Khan (2nd from left) was the Sqn Cdr of No 6 Sqn during 1965 war.



The shock waves produced from the explosion were so immense that the plane was shaken and crew found it difficult to control the aircraft at these lower speeds. In the melee, instead of banking right towards the planned escape route, the pilots turned left, only to find themselves over an Indian airfield behind the hills. Anti-aircraft guns started screaming, "Oh no you don't." and the PAF boys saying, "Sorry boys. We will."

"The enemy gave us a warm welcome, thousands of pounds of flak fired by their ack-ack criss-crossed our track. We had already descended lower and their guns filled the sky with deadly black mushrooms above us. We could almost smell the nauseating acid smoke," he said thinking back.

### Night Fighter Alert

It was an almost accurate run and all 18,000 lbs of arsenal fell in the target area, when the loadmaster in the freight load, who was on the lookout for enemy aircraft called, "There's something coming in with no navigation lights." This was the same aircraft Wg Cdr Zahid Butt saw earlier, which he thought was a star, had its nav lights on. The enemy seemed to pour in on them from every point

on the dial - port side, six o'clock high.

"I wanted to descend and take evasive action. I turned hard and reduced the speed to about 130 knots. Naturally, the fighter couldn't match the tight turn, and he overshot us, appearing just ahead and below. If I'd had a front gun or two, I could have shot him down, but of course the C-130 was unarmed. During our low level exit, I continued taking evasive action, and we did not relax until we had crossed the border and were flying over our part of the earth," Wg Cdr Zahid Butt wrote in his debrief. Wg Cdr Zahid Butt kept a steady hand in the rough going. Back at the base, ground crews uncrossed their fingers, when they saw their sweet flying ship returning. "The only damage we found to the aircraft was a 0.5 inch

**Top: A historic group photograph of gallant aircrew of PAF Base Chaklala, under the command of legendary Wg Cdr Zahid Butt, OC No 35 Wg (standing in centre) which participated in 1965 war.**

**Left Inlets: Flt Lt Nazeer A Khan along with his trusted co-pilot, Flt Lt Javed H Malik (left) in a memorable photograph.**

**'For Indians with Love'- Flt Lt Sardar M Asif Khan proudly sitting on the stack of 500 lbs bombs being loaded into the belly of mighty Hercules.**

**Bottom: 'Nothing is Out of My Reach'- Hercules from No 6 Sqn lands at Gilgit airport, one of the shortest and trickiest runways of the world.**

bullet hole in the port wing tip," wrote Wg Cdr Zahid Butt. A stubborn tough gang, this outfit.

"His cool and his courage saved his crew," said AVM Sardar M Asif (Retd) about his late comrade. Although it was an almost accurate run and all 18,000 lbs of arsenal fell in the vicinity of target area, the bridge was not destroyed. The crew may not have succeeded to break a vital link in the supplies, however, the shattering surprise attack shocked the enemy nonetheless, lowering their morale and the will of the Indian forces and their leaders. Heavy flak marked the enemy's determination to protect their assets, but from then on, PAF's bombing crews were seeking targets of opportunity and pulverizing them. The PAF higher command could only express the pride and confidence in those who carried forward the nation's struggle against aggression.

There was only one lesson learnt from the raid that night. "When we de-briefed, the seniors cautioned us not to lose quick-wittedness when experiencing severe turbulence produced by the shock wave of the exploding bombs," AVM Sardar M Asif (Retd) said laughing.

The bombing raid over Kathua may not have achieved the desired results, however, it armed the PAF with a new capability- provision of an improvised 'Heavy Bomber' in the shape of its versatile C-130 'Hercules'. Not only the transport air crew but the air staff were confident that the PAF C-130 could be subsequently used as a 'B-130 Bomber' during the war. PAF didn't have to wait for long. An SOS message came from the brethren in Khakis who needed immediate help at a crucial juncture during the war.

**Right Inlet: 'We Did Our Part'- Dashing and Dauntless crew of No 35 Wg, PAF. From L to R- Flt Lt Sardar M Asif, Flt Lt Rizwan Chaudhry, Flt Lt Viqar Abdi, Flt Lt SK Wasti, Sqn Ldr Masood Khan, Wg Cdr Zahid Butt, WO M Ashfaq.**



**Right Inlet: 'It All Starts with a Briefing'- From L to R- Flt Lt Nazeer A Khan, Flt Lt Javed H Malik, Flt Lt Rizwan Chaudhry, 'unknown', WO M Ashfaq (Centre 2nd row).**



Sqn Ldr Abdul Masood Khan (4<sup>th</sup> from left), Sqn Cdr No 6 Sqn along with aircrew, pose for a historic group photo after completing a successful operational mission.

### Gallantry Awards: Transport Aircrew 1965 War

Name	Designation	Award
Gp Capt Eric Hall	Station Commander PAF Chaklala	SJ
Wg Cdr Zahid Butt	OC No 35 Wing Chaklala	SJ
Sqn Ldr Abdul Masood Khan	Sqn Cdr No 6 Sqn	SJ
Flt Lt Nazeer A Khan	Pilot	SJ
Flt Lt Viqar Abdi	Navigator	SJ
Flt Lt Rizwan Chaudhry	Navigator	SJ
Flt Lt SK Wasti	Navigator	SJ
WO M Ashfaq	Load Master	TJ
WO M Hafeez	Load Master	TJ

During the closing days of the war, Indian Army had put to offensive whatever they had in a desperate attempt to capture Lahore. With all guns blazing they made a final attempt to breach Bambawali-Ravi-Bedian (BRB) Canal and fulfill their nefarious designs. Indian heavy artillery guns were amassed East of BRB to bomb the city of Lahore day-in and day-out. The indiscriminate fire mainly targeted the

civilian population, an act only a brutal enemy could conspire.

Two sets of aircrew had been created specially to conduct night bombing missions, comprising the most experienced aircrew the PAF had to offer - daring and gutsy. The first crew set under the command of Wg Cdr Zahid Butt consisted of Flt Lt Sardar Asif (Captain/Co-pilot), Flt Lt Rizwan Chaudhry (Navigator), WO M Ashfaq (Load Master). The second set comprised Flt Lt Nazeer Ahmed Khan (Captain), Flt Lt Javed Hayat Malik (Captain/Co-pilot), Flt Lt Khalid H Wasti (Navigator) and WO M Hafeez (Load Master). Entire missions

were flown at extremely low altitude. Little time was afforded to convert the aircraft into bombing configuration. This was where the expertise of CWO Ashfaq came in. He led the team of technicians and loaders to prepare the aircraft for bombing missions in shortest possible time. "The focus was on completing the mission successfully, not on how we'll get back. If we did a good job, progress would improve a great deal," AVM Javed H Malik (Retd) said. In one of the heaviest night time air strikes in a C-130, the second team was to concentrate their payload of 18,000 lbs of bombs on Indian guns just outside Lahore close to Attari. Responding to the earlier request of Pak Army, PAF planned a night bombing mission on 21<sup>st</sup> September, 1965, on the deployment of Indian heavy guns at Bambawali-Ravi-Bedian (BRB) Canal, using the second team. Once the plan of bombing BRB by an improvised C-130 carrying such a heavy payload was shared with Pak Army commander, they were unconvinced. They argued that the friendly troops were located too close to the bomb line and in case of any miscalculation on part of C-130 crew, the safety of their own troops would be in danger. Moreover, they were of the opinion that any error in drops could also destroy the BRB canal thus inundating the entire sector. However, on assurance of Major (later Maj Gen) Naseerullah Babur (the Army liaison officer with No 6 Sqn who was overwhelmingly impressed by the professionalism of the aircrew) the Pak Army leadership got convinced. This put an extra burden on the aircrew. They knew that there was no chance of failure. Their own pride and honour of PAF was at stake.

In the dead of night on 21 September, Flt Lt NA Khan and Flt Lt Javed Malik got to the tarmac. There awaiting them was their giant four engine Hercules loaded with conventional 500 pounders, which had a date with certain guns. The crew took their places. Pilots NA Khan and Javed Malik made themselves at home in the cockpit. Flt Lt Wasti making last minute checks at his navigator station. The Hercules swung into the wind and zeroed in on the enemy target. Its siren became a harbinger of death in the battlefield. The other crew set under the command of Wg Cdr

Zahid Butt was to follow after some interval. The two C-130s reached their check point on the River Ravi at 2300 hours. They started their carefully timed run-in. The cargo planes climbed to 8,000 ft. Some 20 tons of terror rained from the skies, devastating the Indian artillery, a vital cog in one of the major Indian deployments. Some 40 guns disintegrated into molten chaos.

The aerial assault was without parallel in PAF history, with precision not seen before either. In almost less time than it takes to tell, the bombs shattered India's military objective. The target area, which was a pretty busy place pre blitz, the guns were of as much use to the Indians as last Sunday's newspaper, said AVM Javed H Malik (Retd).

"Down there was a pyrotechnics display. Even that high, the C-130 shuddered and rattled as if caught in a violent turbulence. Everything perished," AVM Javed H Malik (Retd) recalled. There was no part of the target area that had not felt the weight of the C-130's attack. Rare fire rose above the smoke and dust clouds.

This time there were no welcoming ack-acks, as the pilots ran out of the target area and set for home. Flaps down,

Flt Lt NA Khan and Flt Lt Javed H Malik eased down the Hercules on the runway, a lot lighter when they had left.

Pakistan Army was pleased. The enemy's heavy artillery guns were destroyed and with it, India's war plans," said AVM Javed H Malik (Retd). This night bombing tactic resulted in a ceasefire two days later. During the war, No 6 Sqn flew 22 such night bombing missions against the enemy without losing a single aircraft. During the war, Indian media, as usual claimed that IAF Bombers had destroyed several C-130s parked at Chaklala during one of the night raids. However, after the war, the

station commander, Gp Capt Eric Hall very proudly lined up all five Hercules in the inventory of PAF during the visit by IAF air chief after the cease fire. Wg Cdr Zahid Butt and his exemplary aircrews set the highest possible standards for our nation to ensure that the people never forgot the sacrifices made by the airmen of Pakistan Air Force. They fought to preserve freedoms we all enjoy today, and often at times take for granted. As we mourn the loss of most of these gallant aircrew who have left us over time, we stand by these heroes, worthy of the nation's highest honour for valour in action.

It's September again, that time of the year to remind Indians that war does not pay and that General Chaudhry, then C-in-C Indian Army, who dreamt of celebrating victory in Lahore Gymkhana Club over a peg of whisky, was a bad prophet.

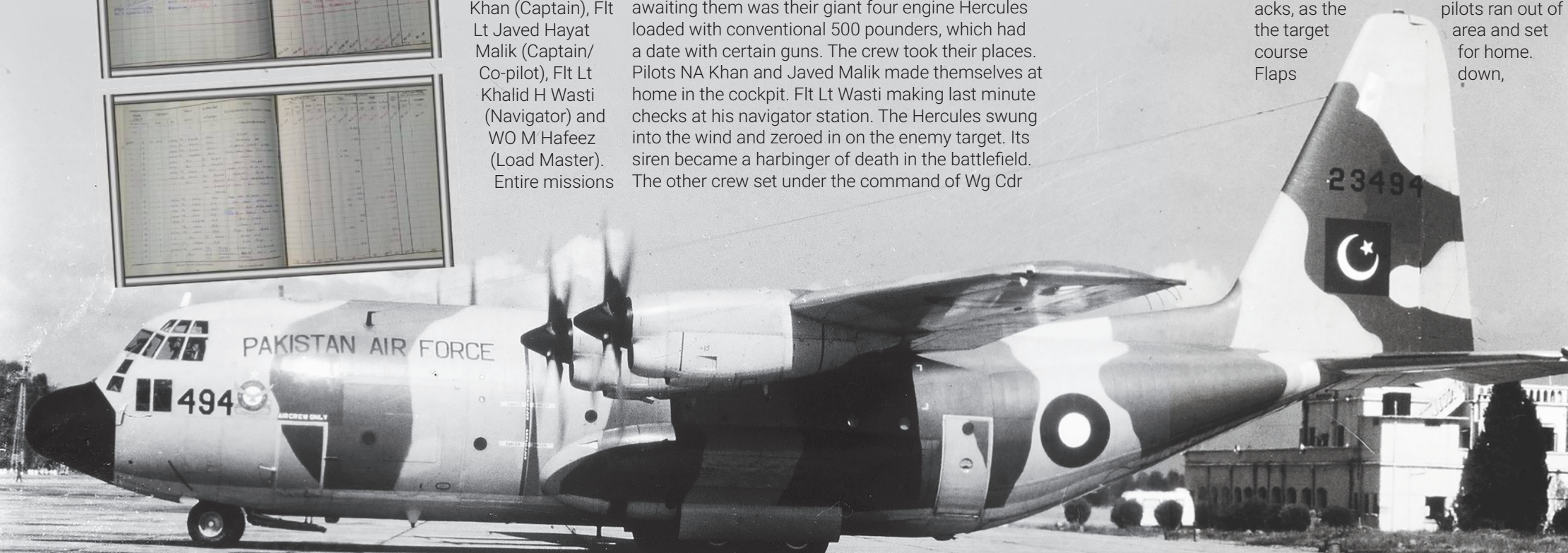


Left Page: Flying log book of AVM Sardar M Asif (Retd) depicts the variety of operational missions flown by the veteran during 1965 war.

Left Page Bottom: Painted in desert-camouflage, a Hercules from No 6 Sqn gets ready for an operational mission at PAF Chaklala. Old ATC building in the backdrop.

Left Inlet: Flt Lt SK Wasti was awarded with SJ after the 1965 war.

Right Inlets: 'Day of Recognition'- Gallant aircrew of No 35 Wg, Chaklala being awarded with Sitara-e-Jurat by President of Pakistan, Field Marshal M Ayub Khan. From Top to Bottom, Gp Capt Eric Hall, Gp Capt Zahid Butt, Flt Lt Nazeer A Khan, Flt Lt Rizwan Chaudhry.



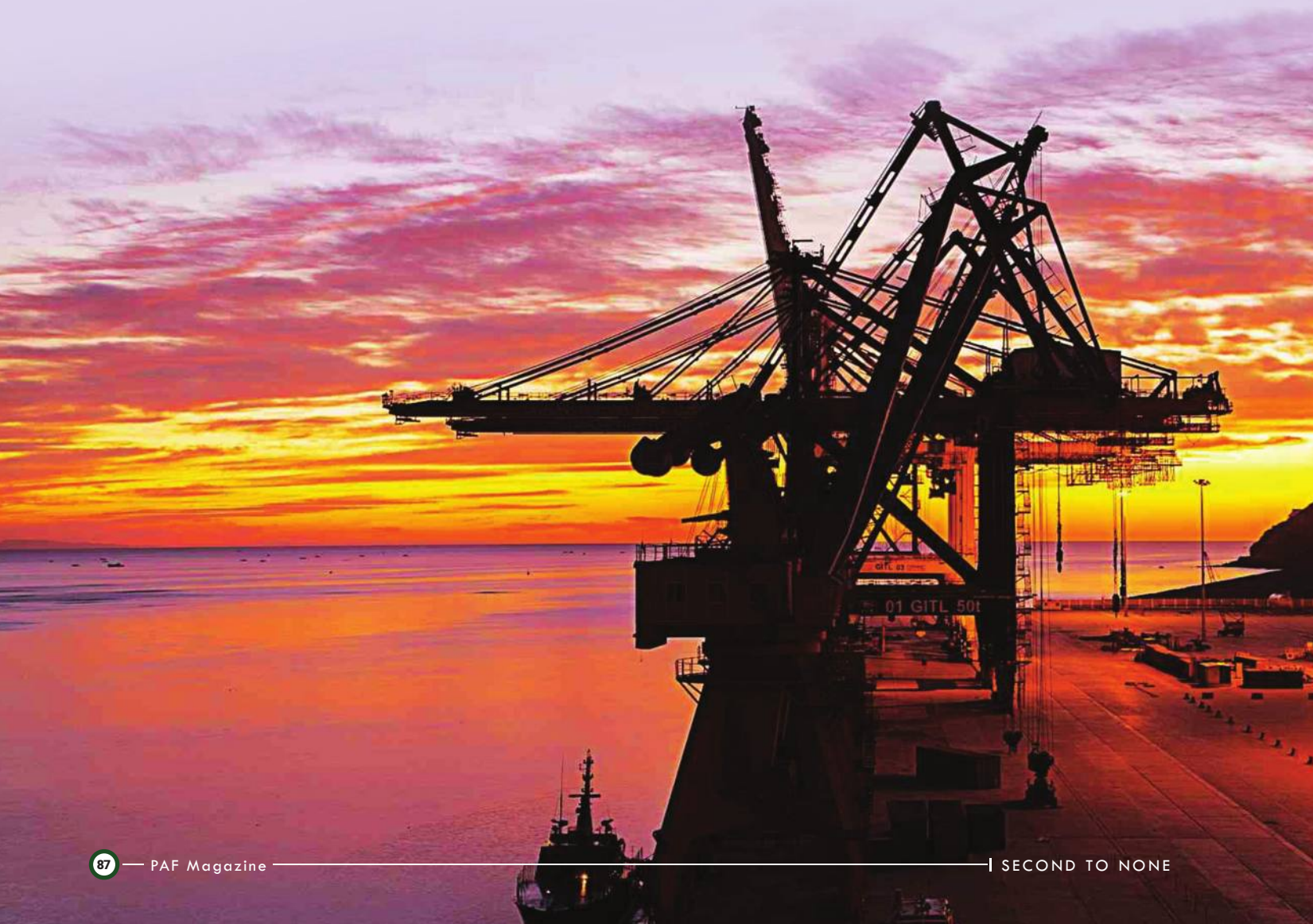


# China Pakistan Economic Corridor

## A Win-Win for the Region

“Is China Pakistan Economic Corridor (CPEC) really a win-win game changer for Pakistan and China? Why it is discussed so much on international? The article is an endeavour to answer some of the leading questions that have emerged since CPEC has gained traction and focus of media around the world.”

by Air Cdre Raza Haider



The emergence of China in 21<sup>st</sup> century as a super power and its sustainable growth has led to the One Belt One Road (OBOR) initiative. The initiative encompasses more than 70 countries. In its essence, it is a revival of the legendary Silk Road, a trade route of interest in the past connecting Chinese, Indian, Persian, Greek and Roman civilizations or linkages of route points important for trade and defence. Whatever we call it, out of the 6 OBOR corridors, China Pakistan Economic Corridor (CPEC) is its flagship project.

### What is CPEC?

The China-Pakistan Economic Corridor (CPEC) is a framework of regional connectivity and was under consideration since Karakorum highway construction in 1959. However, it started with full pace in 2002 when China started to develop Gwadar port as part of the OBOR plan. CPEC concept was formally inked during Chinese Premier's visit to Pakistan back in May, 2013. An official Memorandum of Understanding (MoU) was signed between the 2 countries. The major projects of CPEC, worth approximately USD 60 billions, include the Gwadar deep-sea port development, a network of roads to transport goods, oil and gas between Pakistan's Gwadar Port and China's Kashgar city, the expansion of Karakorum highway, further development of energy sector, laying of optical fiber networks, mining projects, high speed railway project, special economic and industrial zones, precision advanced agriculture, tourism, etc. The list goes on.

In the complete concept, Gwadar port, which has also been termed 'Jewel in the OBOR crown', is predicted to be a global maritime hub in the future. Many experts are of the opinion that CPEC is not only an economic



or trade initiative but China's plan to expand its influence in the world through 'String of Pearls' in which Gwadar is the key pearl. The other side is of the opinion that it's a win-win case for Pakistan. In this optimistic scenario, Pakistan will assist China to connect to the world through Gwadar and, in return, will receive economic revival and investments.

### What is String of Pearls?

String of pearls is a sea trade route that originates from South China Sea till Red Sea. Historians believe that whosoever controls this string will control the world. Here pearls mean the 'strategic choking points' or ports that have geostrategic importance and can be utilized for trade in peacetime and for controlled movements during war. This includes Strait

of Malacca (connecting South China Sea with Bay of Bengal), Strait of Hormuz (connecting Arabian Sea to Persian Gulf) and Strait of Mandeb (connecting Arabian Sea to Red Sea and Mediterranean Sea).

These three ports have great significance not only for trade of commercial goods but also for defence needs especially for supply of oil and gas from gulf states via strait of Hormuz and Malacca. Gwadar port would eliminate the dependency of China on Strait of Malacca or Hormuz as China would be directly connected with Gwadar via land route; which would be a big strategic advantage.

### Importance of Gwadar Port

Gwadar port is strategically important because of its unique location and sea depth in the region. China is the biggest crude oil importer of the

Top: High stakes - A military sentinel patrols in the foreground of a massive carrier and cranes in Gwadar port. (Photo: AP/ File).

Bottom: A futuristic concept of the planned Gwadar Airport. (Photo: cpec.gov.pk)



world and around 60% of China's oil comes from the Persian Gulf by ship travelling around 13000 km in 40 days till its commercial hub of Shanghai. The route is not only full of risks like sea pirates or bad weather but can also face blockades in case of a war either at Indian Ocean or at Strait of Malacca. Development of Gwadar port will not only reduce the distance and time to 1/4<sup>th</sup> from Gwadar to Kashgar in China; but would also be available for smooth operations around the year in peace or war. Thus, Gwadar may be the solution of 'Malacca dilemma' as it will bypass Indian Ocean and Malacca. Moreover, commercial goods from China would be travelling in the opposite direction via CPEC to the Middle East and beyond. Thus, in the future, Gwadar would be a hub of commercial activities greatly benefitting both Pakistan and China.

### Significance of CPEC for China

China is an emerging super power and second-biggest economy of the world. It may be the leading one in the near future. Therefore, China is to maintain its growth momentum which has built-up in the last five decades by reaching out to the world through the safest and most reliable trade and defence routes possible. In this regard, the major benefits of CPEC to China would include:

- To have safe Sea Lines of Communications (SLOC) bypassing vulnerable Strait of



Malacca for oil, gas and other trade goods.

- To have direct access to Gwadar deep sea port from Kashgar China as shortcut with Central Asia, Middle East and Europe. In this way, CPEC will provide an alternate route of Asia Pacific which has strong US military presence.
- With Gwadar operations, travelling distance and time would be reduced to 1/4<sup>th</sup> as CPEC would be acting as a bridge.
- New markets especially in Africa and Central Asia would be explored.

- Global partners of China would be created in neighboring countries through investments to have international dominance.

### Significance of CPEC for Pakistan

The main aim of CPEC for Pakistan is to modernize the infrastructure and strengthen the



economy through modern transportation networks, energy projects and special economic zones. The benefits of CPEC to Pakistan would be immense; out of which a few major one are:

- Gwadar port will be the economical hub and gateway to central Asian countries and, thus, will promote the economic development of Pakistan.
- Pakistan will have a network of high-quality wide motorways / infrastructures like Karakorum highway which will be newly constructed, widened and strengthened for heavy vehicles, a motorway between Karachi and Peshawar and so on.
- CPEC would create Millions of jobs by 2030.
- Energy shortfall issue would be resolved as majority of the projects are almost completed.
- The CPEC road will be crossing Gilgit Baltistan (GB) region which is known for fresh fruits, cherries,

apples and apricots. CPEC is going to boost business opportunities for local traders. The region is considered as a mountaineering paradise, because its home to five out of the eight peaks which are above 8000m including K-2. This makes it a big opportunity for tourists and climbers.

- Karachi Peshawar railway Main Line (ML-1) of 1700 kms having 180 stations will be upgraded with high-speed tracks and trains. The same network is also planned to be extended to connect to China Xinjiang railway station in Kashgar.
- Network of gas pipelines are planned to transport LNG and gas i.e. pipeline between Gwadar and Nawab Shah.
- New state of the art airport at Gwadar is currently under construction.
- Improvement in areas like agriculture, tourism, Special Economic Zones, etc are in progress.

### Conclusion

Considering all aspects of economic and defence needs, CPEC is a win-win strategy for both Pakistan and China. Operations of Gwadar port and development of roads network from Gwadar till Kashgar in China, will not only provide new markets for China's commercial goods; but will also meet defence needs of China bypassing sea choking points like Strait of Malacca. In return, Pakistan will attain an economic boost not only from Gwadar port being hub of all economic activities but also through generation of roads infrastructure, energy projects, special economic zones, high speed trains, new airport, agriculture and tourism. Thus, it can be safely said that CPEC will be game changer for both Pakistan and China, who will remain to be a key partner in our future grand economic and strategic aims.

Top: Khunjerab Pass is a 4,693-meter high mountain pass situated in Karakoram Mountains, strategically located on Pakistan's northern border (Gilgit-Baltistan) and China's southwest border (Xinjiang). (Photo: Shutterstock.com).

Left Page Above: Chinese President Xi Jinping (right) meets with Pakistani Prime Minister Imran Khan at the Great Hall of the People in Beijing in November 2018. (Thomas Peters AFP).

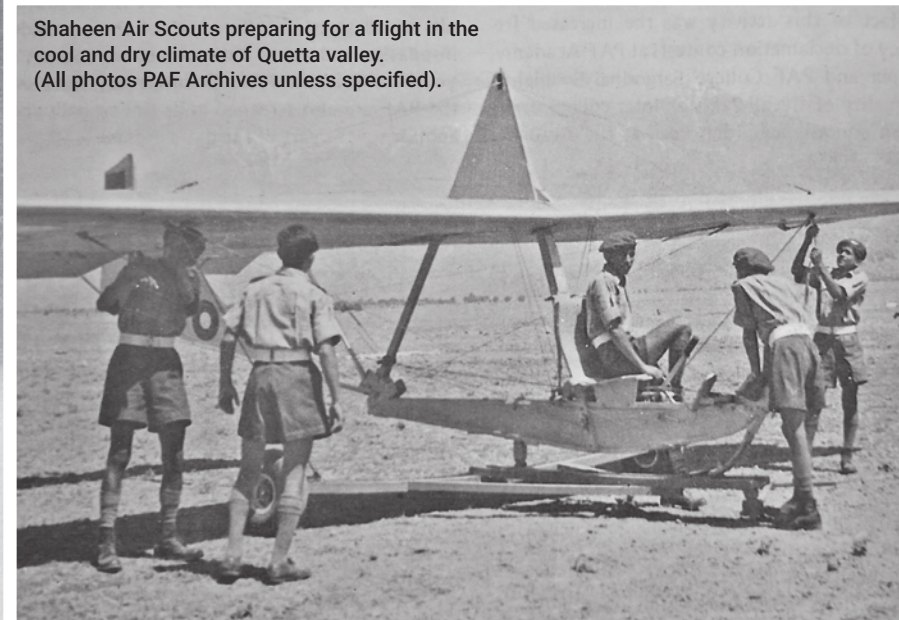


Promoting Air-Mindedness in RPAF

# SOARING HIGH

Title Photo: With no power of its own, a tow jeep assists a glider catch thermals and stay aloft from the air force base in Quetta, which had become a centre of glider activity in the early days.

Shaheen Air Scouts preparing for a flight in the cool and dry climate of Quetta valley. (All photos PAF Archives unless specified).



The month was November and the year 1949, location Dyal Singh College Lahore. Standing in front of the college notice board was a smart young boy in his late teens. Displayed on the notice board was something intriguing that the boy couldn't afford to take his eyes off. An announcement by the Royal Pakistan Air Force (RPAF) regarding the formation of 'University Air Squadrons' at major cities of Pakistan including Lahore, Dacca, Drigh Road (Karachi), Chaklala (Rawalpindi) and Peshawar. The occasion not only opened up new vistas in the career of the young boy but also marked the beginning of a new era for the RPAF. This young boy was none other than Anwar Shamim Khan who would go on to command the Pakistan Air Force in late 70s.



“The major challenge for the nascent RPAF, post-partition, was to induct quality manpower especially for its flying stream. An innovative idea, brought forward by the then C-in-C of RPAF, AVM Sir Richard Atcherley not only brought the fascinating career offered by the service into limelight but also attracted the youth to join RPAF in enormous numbers. The author digs out the history, important events and achievements of two famous schemes, SATC (Shaheen Air Training Corps) and UAS (University Air Squadrons) which proved to be a great success in achieving their prime objectives.”

by Air Cdre Muhammad Ali, SI (M) (Retd)

During the formative years of the nascent RPAF, there was dearth of equipment, infrastructure and above all human resources. The response to the RPAF's recruitment drive across the West and East wings of country was less than enthusiastic. Therefore, a need was felt to introduce some out-of-the-box solutions to address this issue. To fulfil this pressing requirement, the then commander-in-Chief, AVM Sir Richard Atcherley came up with an idea. He knew that out of the three services, air force had the most glamour and offered a fascinating lifestyle. However, the only thing was to showcase it to the youth in an effective manner. He decided to promote air mindedness among the nation's youth and to achieve that he opened up the doors of the air force by introducing a two prong strategy, the establishment of 'Shaheen Air Scouts' and 'Air University Squadrons' all across the country. Within months the response was overwhelming, the youth thronged the RPAF recruitment centres in large numbers thus paving way for the selection teams to choose 'the very best'.

### Shaheen Air Scouts

The scheme of air scouting under the umbrella of 'Shaheen Air Scouts' was launched on 2 September, 1949 with the formation of No 1 Flying Patrol of Shaheen Air Troops at RPAF station Drigh Road, Karachi. Eight pioneering entrants were enrolled on the very first day. Air Scouting centres were simultaneously opened



1: First Batch of students of University Air Squadron in front of Auster Aiglet aircraft at Walton Lahore.



at other RPAF stations as well including Lahore, Chaklala, Peshawar and Dacca. RPAF recruiting teams stationed on these air bases regularly visited the local schools to promote air mindedness among the students. The objective was to select from them the bulk of future aircrew for the RPAF. Boys between thirteen and eighteen years of age from the local schools in the vicinity of these air stations were recruited and were given training in various disciplines including aeromodelling, gliding and aeronautical subjects. The students were given uniforms at a very nominal price, free pick & drop from their schools to RPAF

stations and also free meals were served in the air force messes during their visits.

As envisaged, the scheme proved to be a great success producing gratifying results. By December 1950, some 2000 students got themselves registered with RPAF as the air scouts. Keeping in view the astounding success of the program, AHQ decided to upgrade the scheme and the program was renamed as 'Shaheen Air Training Corps' (SATC). For the first time the objective of the corps was officially defined which stated, "To promote and encourage, among boys, a practical interest

in aviation and to make them suitable for service in RPAF, to foster in them a spirit of adventure, and to develop the quantities of mind and body which go into the making of a good leader and a good citizen."

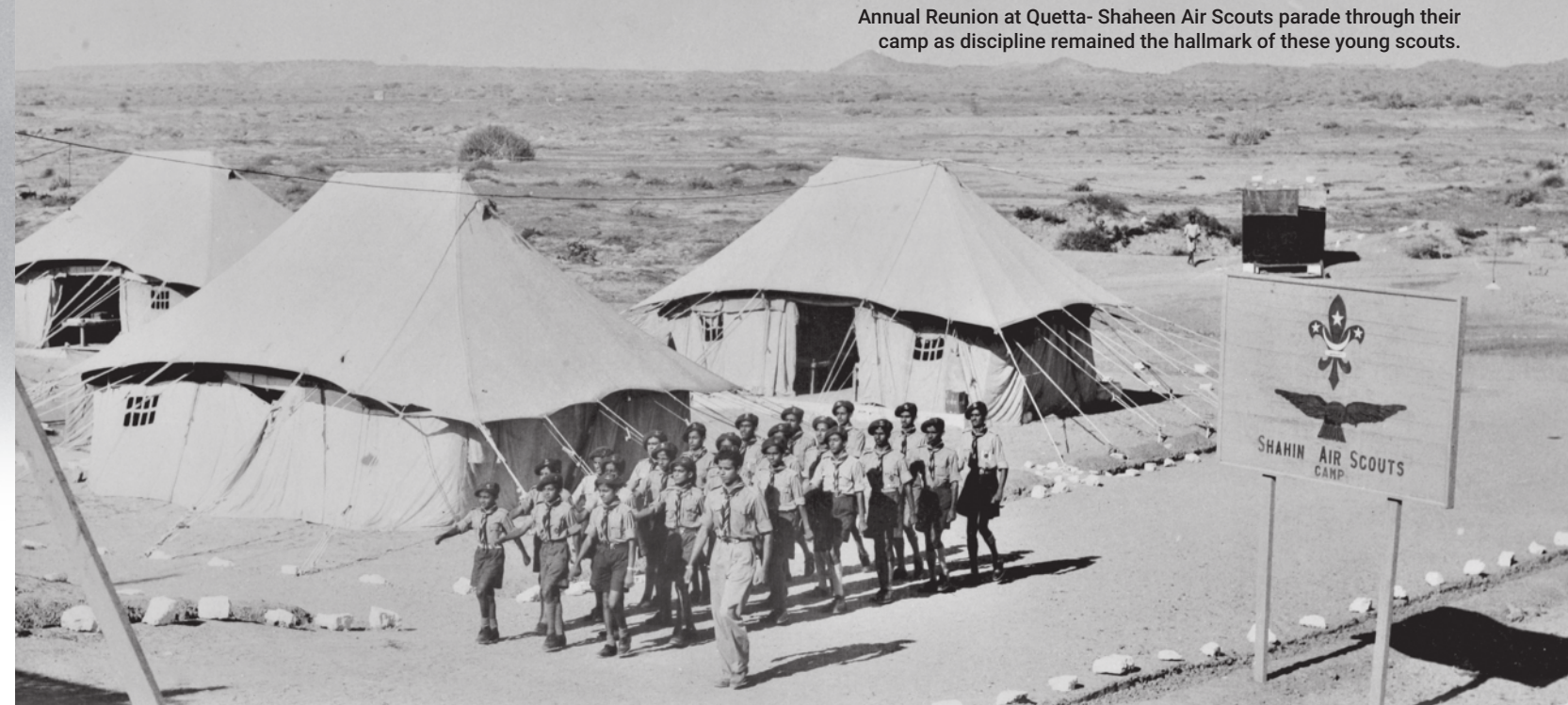
The training of the air scouts was carried in two phases, each lasting for two years. In the first phase the students were given instructions in subjects like service customs, civic sense, physical training and target firing practice. The second phase was more fascinating for the young students as it offered them a chance to practically apply themselves in the art of flying. It included gliding, elementary

2: Polish glider instructors, Maria Mikulska (2nd from left) and Zofia Turowicz (3rd from left) along with a group of Shaheen Air Scouts at PAF Drigh Road (now PAF Base Faisal). (Photo: Turowicz Archives)

3: Flt Lt Banach (extreme left) along with a group of University Air Squadron and Shaheen Air Scouts in front of Auster Aiglet aircraft at PAF Drigh Road, now PAF Base Faisal. (Photo: Daud Shah).

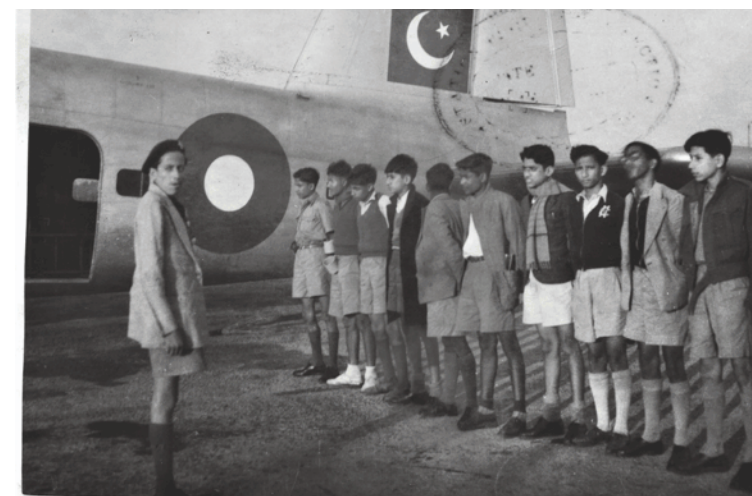
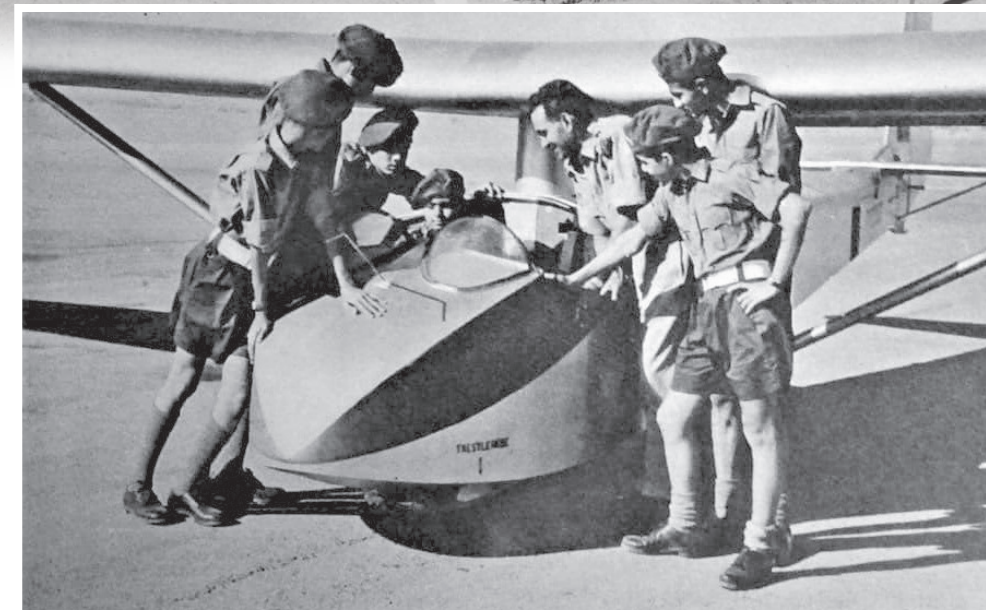


4: All Smiles- Zofia Turowicz along with a budding Shaheen moments before 'Soaring High' at PAF Drighroad (now PAF Base Faisal). (Photo: Turowicz Archives)



Annual Reunion at Quetta- Shaheen Air Scouts parade through their camp as discipline remained the hallmark of these young scouts.

airmanship, aero-modelling and workshop maintenance of gliders. On top of it all, during summer vacations, the students were to attend a six week long air scouting camp held annually. This was the activity to which every scout used to wait anxiously. These annual camps provided an opportunity to these young students to rub shoulders with the RPAF pilots to whom they always looked up to and tried to learn a trick or two from their personal flying experiences. The first such camp was held at Chaklala from May to July 1951. Subsequently, it was held annually at other stations, Samunqli (Quetta)



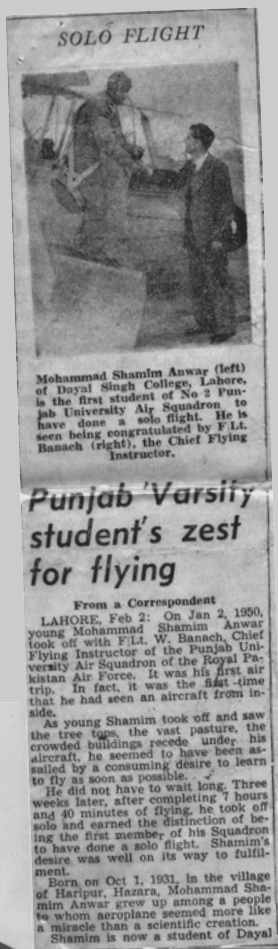
in 1952, Peshawar 1953 and Parachinar in 1954. As the camps gained more popularity among the youth, it was decided to introduce an inter-wing scouting competition as well, the first such competition was held at Sargodha in 1954.

Obviously for the students, gliding remained the most sought-after phase of the entire training curriculum. Being the first step into the fascinating world of flying

Above: Shaheen Air Scouts listen carefully to their instructor Flt Lt Banach before launching for a gliding sortie.

Left: On a Tour- One of the many attractions for the students of University Air Squadron and Shaheen Air Scouts was the annual reunions held at various nominated air stations. Veteran Bristol Freighter was the obvious choice for transporting these budding scouts.

AVM Atcherley, C-in-C, inspecting a smartly turned-out group of Shaheen Air Scouts at Quetta. Gp Capt Asghar Khan (extreme right) also seen in this historical photograph.



career, gliding always drew the youngsters by the hundreds. It was this aspect which led the RPAF leadership to establish the 'Central Gliding School' at Drigh Road on 1 May 1950. The pioneering institute of the then nascent RPAF played a pivotal role in imparting flying training to the potential pilots. While acknowledging the services of the school, it would be unjust

not to recognise the herculean efforts put in by its legendary instructors. These were times when the recently recruited Polish pilots and technician were seen everywhere in RPAF, giving a helping hand whenever and wherever needed. Central Gliding School was no different. Perhaps it would be fair if we attribute the initial achievements of this prime institution to the Poles and especially one Pole, Flg Off (later retd as Sqn Ldr) Zbigniew Mikulski. In November 1949, he was tasked by the RPAF leadership to establish the Central Gliding School at Drigh Road.

Mikulski was a highly experienced glider instructor with some record breaking performances to his

credit. His heroics were not limited to gliders only. He was recognised as the 'King' of solo aerobatics whose memorable performances used to mesmerise large audiences during official air displays conducted by RPAF. Luckily, he was not alone in this challenging task. His wife Maria Aniela Younga Mikulska, a Civilian Gazetted Officer of RPAF also joined hands in raising the school from scratch. Ms Mikulska was no ordinary lady. Since 1930s, she was engaged in glider flying back home. She was

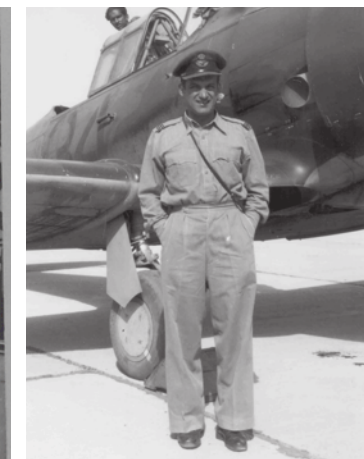


**Left Inlet:** Anwar Shamim Khan from UAS Lahore broke all previous records of flying the first solo flight. All the major newspapers carried the historic news appreciating the young pilot.

**Bottom:** Air Scouts after a gliding mission at PAF Station Quetta.



regarded as the first female glider pilot and first female instructor pilot of Poland, earning several Polish National Soaring records. The couple later became gliding legends in the RPAF, owing to their stellar performances in soaring. The couple was later joined by another towering personality, Ms Zofia Turowicz, wife of the famous Pole, Air Cdre Turowicz. Together they jelled as a team and played an anchoring role in the training of budding RPAF cadets. Soon after taking over the command of school in May 1950, Flt Lt Mikulski persuaded the AHQ to open up four more glider training units at Lahore, Chaklala, Peshawar and Dacca. Replicating the successes of the initial units, it was decided to extend the training to other areas as well. Thus came into existence three more units at Chittagong, Kohat and Samungli (Quetta). A year later two more female glider pilots joined the group of instructors. Ms Banu Ahmed, the first Pakistani lady to learn gliding and obtain 'A' category in instructional flying. Another WWII pilot Rea joined them thus completing the team of instructors. Under this arrangement, the first glider training course was launched in later months of 1950. Air Scouts from all eight units joined the pioneering course. The course became an annual feature held at Drigh Road only, however, after 1955, Samungli was chosen as the alternate location for conducting gliding courses as it offered a more conducive climate, considered best for soaring.



**Left Above:** Legendary Flt Lt Mikulski in the cockpit of Harvard trainer. He would be remembered for his long and outstanding services rendered for training and grooming of young PAF pilots. (Photo: M. Oteski).

**Right Above:** Flt Lt Muchowski, the first flying instructor of PAF ACE, Air Cdre MM Alam. (Photo: M. Gorzula).

**Centre Above:** General Ayub Khan awarding 'Glider Wings' to successful scouts on completing their glider training at Quetta. Young Zahid Hussain (2nd from left) also seen in the photograph. (Photo: Zahid Hussain).



**Glider Instructors, Maria Mikulska and Zofia Turowicz surrounded by Shaheen Air Scouts at Drighroad (now PAF Base Faisal). (Photo: Turowicz Archives).**

EoN 'Baby' Olympia gliders were used for imparting glider training to students at Drigh Road. Designed and produced by Elliotts of Newbury, EoN Olympia 1 (Type 5) glider flew its first flight in January, 1947. Weighing almost 300 Kgs with a wing span of 50 feet, these dashing EoN gliders soared high in warm and humid climate of Karachi. These large-winged birds were a common sight for the local populace during those early years after independence and also a great way to attract the youth for recruitment into RPAF. Mikulski, being an experienced gliding pilot, also improvised

new techniques and methods to simplify flying procedures. He worked on improving ground base for gliding, by introducing towing jeeps fitted with glider towing winches. This arrangement significantly reduced flying costs and also made the system more efficient.

In 1952, Air Cdre Farooq Haider (Retd), received his A and B licences on "Eon Primary" and the "Sedberg." He could climb to 1,000 feet, remain airborne like an eagle, circuiting close to the home base during practice and land. "Primary was my baby. You could find me in the

primary all the time," he recalled. Later, in the Sedberg, he was manoeuvring, stalling, spinning, side slipping and rapidly losing height. By the time, Farooq Haider earned his C licence in June 1955, endorsed by Sqn Ldr Zbigniew Mikulski himself, he was only 12 years old, not even old enough to drive a car. From then on he was competing and catching air currents to soar higher than ever. The veteran remembered a sortie from 1957, when he soared for 7 hours 15 minutes and 25 seconds. "We took off at 10 am and landed at 5:15 pm. The currents took us to model town, Shahdara and in

**Flt Lt Mikulski along with a trainee pose for the camera minutes before taking off.**



**Above: Flt Lt Turowicz leading the flight of Shaheen Air Scouts during their 'Wings Award' ceremony held at Quetta, July 1952.**

the end we intentionally headed back to base. It was the month of May, and it was freezing at that altitude," Farooq Haider (Retd) recalled is a well-known PAF veteran of both the wars against India. Being an Air Defence controller during 1965, he played a key role in achieving large number of aerial kills for the PAF pilots.

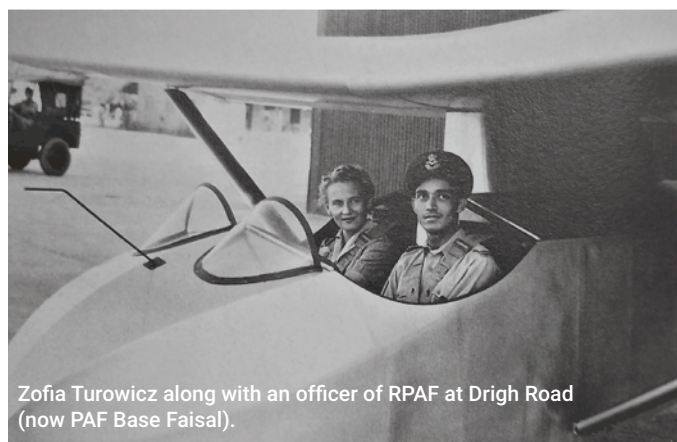
He stopped gliding after 1958, when he joined the air force. "But I continued with aeromodelling, a hobby that won me many competitions," he said.

People soared for different reasons. For Air Cdre Farooq Haider (Retd), it represented tremendous amounts of freedom. "Sail planes were items of superb beauty. It used to be so quiet, just whistling through the air while soaring with the hawks and learning the moods of the air. I remember constantly seeking out sources of lift to compensate for the glider's otherwise descent through the air," Air Cdre Farooq Haider (Retd) said, describing the beauty of motor-less flights.

For over a decade, SATC imparted glider training to large

number of schools boys across the country. Zahid Hussain was one such enthusiast who earned his coveted glider wing from none other than the President of Pakistan, Field Marshal M Ayub Khan. Being the son of the most famous aerobatics pilot of PAF, the legendary Air Cdre FS Hussain, flying was in his genes. "Those were the most memorable days of my life," Zahid Hussain recollects. "We use to desperately wait for the summer vacations so that we can join the two months gliding camp held at Samungli, Quetta. On ground, the glider 'eon primary' looked like a scary

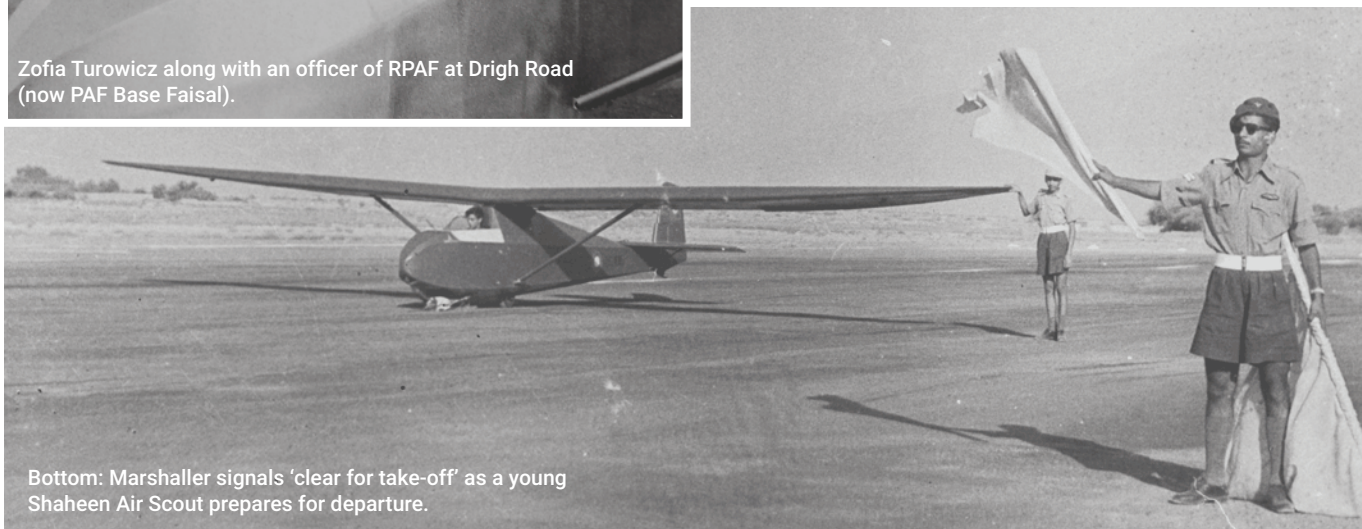
**Bottom: Sitting Centre row- Zofia Turowicz (3<sup>rd</sup> from left), Maria Mikulska, (5<sup>th</sup> from left), Sqn Ldr Turowicz (6<sup>th</sup> from left), Flt Lt Banach (extreme right) along with a visiting dignitary and Shaheen Air Scouts at Drighroad (now PAF Base Faisal).**



**Zofia Turowicz along with an officer of RPAF at Drigh Road (now PAF Base Faisal).**



**Maria Mikulska, ensuring that the scout was all set for take-off.**



**Bottom: Marshaller signals 'clear for take-off' as a young Shaheen Air Scout prepares for departure.**





wooden-structured plane from the Wright brothers' times, however, in air it was fun. There were no instrument panels, just the rudimentary flying controls to manoeuvre the sailplane through rising currents," he added.

Another legendary PAF pilot of international fame, Air Cdre MM Alam was also the product of SATC. He learnt the tricks of trade during his initial flying career from the famous Pole, Flt Lt Muchowski at SATC, Dacca. Being a student of Govt High School at Dacca, young Alam flew with SATC and earned his coveted glider wing during the graduation parade at Quetta. He later joined RPAF College at Risalpur in 1952.

### University Air Squadrons

During late 1940s, the youth of the nation had limited choices

when it came to selection of attractive careers for themselves. Civil Services of Pakistan and large industrial organisations remained the top fields of choice with Pak Army as the next most sought after. Air Force also remained one of the top careers, however, with its stringent physical/ medical fitness requirements, risky nature of job as a flier and above all high drop-out rate during flying training continued to disenchant youth towards military flying as a profession. This effected the RPAF's induction process badly during early years and the organisation found it difficult to fill the required quota of pilots for its flying branch. Moreover, the high drop-out rate of candidates during flying training phase at Risalpur also had phenomenal budgetary constraints for the service.

The organisation needed a solution to these problems and needed it fast. Fully cognizant of these challenges, the then C-in-C of RPAF, AVM Atcherley came out with a brilliant plan which later took shape in the form of UAS (University Air Squadrons). The idea was to attract the youth of the colleges and universities with the charm of flying profession and without any compulsion on them to make any commitment to join RPAF. Upon final approval from the AHQ, UAS was officially formed in 1949. The main purpose of the scheme was to attract the keen, healthy and intelligent minds from national universities and colleges. Initially five air squadrons were opened at Drigh Road, Lahore, Chaklala, Peshawar and Dacca. Within months of their formation, the scheme received tremendous response from all across Pakistan. Large number of students from various colleges and universities flocked PAF stations nationwide for registration and enrolment. Auster Aiglet and Tiger Moth aircraft were made available to these UASs. The primary



**Top: A group of budding Shaheen Air Scouts pose with the pioneer of gliding in Pakistan, AVM Sir Richard Atcherley (Sitting in Centre) at Karachi.**

**Top Inlet: Hands on - AVM Sir Richard Atcherley personally taking an Air Scout on a training flight.**

**Left Bottom: Governor Punjab Sardar Abdur Rab Nishtar inspecting University Squadron on 20 Dec 49. Flt. Lt. W. Banach a Polish Officer being introduced to the Governor.**

**Right Page Above: Air Cdre Farooq Haider in his younger days as an Air Scout. (Photo: Air Cdre Farooq Haider Retd).**



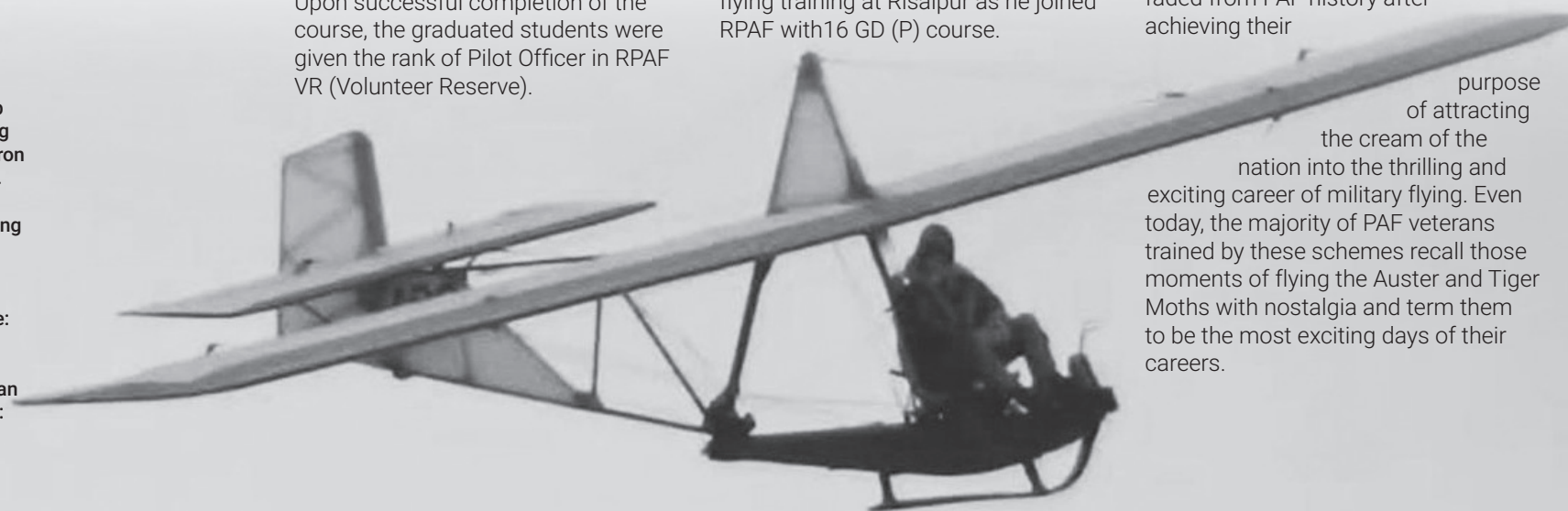
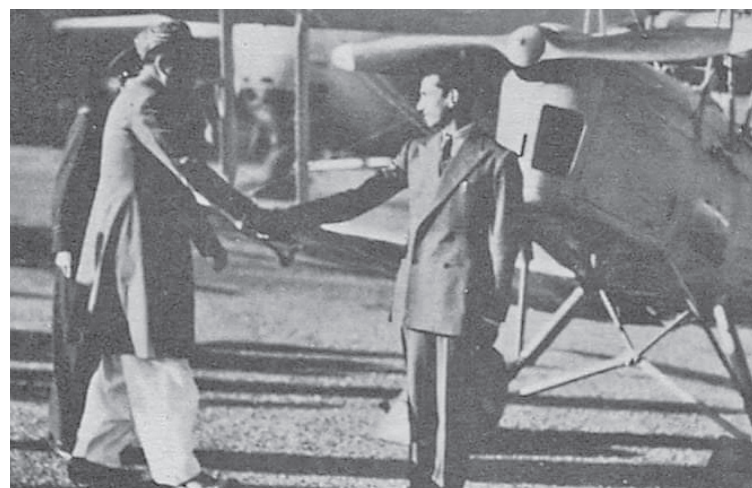
aim of these units was to give basic feel of flying to students and in turn also to look out for a natural talent among the youth. Another fringe benefit came in the form of curtailing the high drop-out rates of candidates during flying phase at Risalpur. UAS imparted elementary flying training to potential pilots amongst university/ college students thus producing better and flying aptitude-tested group of young cadets for induction at RPAF College Risalpur. The concept was so successful that after some time it was decided by the AHQ to direct all the selected GD (P) candidates to UAS for obtaining elementary flying training, before being inducted at Risalpur. Later, it was also agreed upon that in each course of 25 cadets, 20 would come from UAS. Other than flying training at UAS, the students were also given comprehensive ground schooling on subjects like aerodynamics, aeronautical engineering, radio/ radar, meteorology and service procedures. Upon successful completion of the course, the graduated students were given the rank of Pilot Officer in RPAF VR (Volunteer Reserve).

Poles played an important role in establishing UAS across the country, just they did in case of SATC. Experienced and senior RPAF pilots were tasked to establish these units across East and West wings of Pakistan. Flt Lt Banach established UAS at Lahore, Flt Lt Muchowski at Dacca, Mr Anderson at Rawalpindi, Mr Busby at Peshawar and Mr Walker at Karachi. One of the talented students of Flt Lt Banach was AVM Mehmood Akhtar Bukhari (Retd), who rose to fame during 1965 war by carrying out successful bomber operations.

"I started my flying on Tiger Moth in 1950 being part of UAS at Lahore. My instructor was Flt Lt Banach, a very professional pilot who played an instrumental role in training young students both at UAS and RPAF College, Risalpur," said AVM Mehmood Akhtar Bukhari (Retd) in an interview. He further added that this experience helped him a lot during professional flying training at Risalpur as he joined RPAF with 16 GD (P) course.

Unfortunately, these two brilliant institutes became victims of their own success. For years, they promoted the charismatic image of the 'Men in Blue' which resulted in huge numbers of nation's youth applying for joining the RPAF. Once the recruitment was not a problem anymore for the RPAF, slowly and gradually the need of maintaining such schemes with huge financial constraints was not considered viable any more. Thus began the beginning of the end of these wonderful institutes. By 1961, both the schemes were officially laid to rest. The founding father of these two brilliant schemes, AVM Sir Richard Atcherley, paid rich tributes to these units while addressing at the tenth anniversary of SATC, he said, "Let us remind ourselves anew. Of the aims of SATC and re-pledge ourselves to its objectives: to fit the rising generations to serve Pakistan in the air, and to so develop their minds and bodies that they become good leaders, good citizens, men of honour, self-reliant, and self-disciplined."

Both the schemes have long since faded from PAF history after achieving their



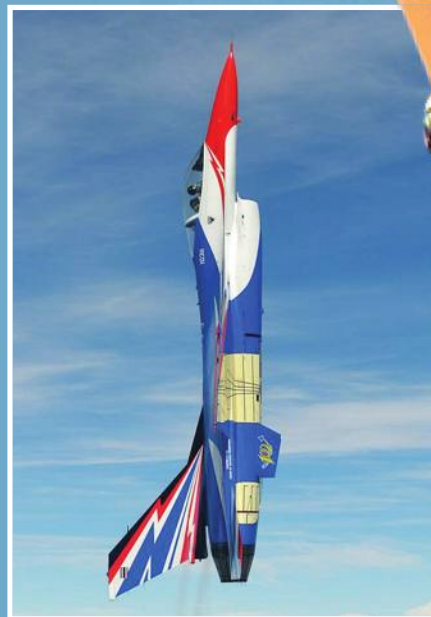
purpose of attracting the cream of the nation into the thrilling and exciting career of military flying. Even today, the majority of PAF veterans trained by these schemes recall those moments of flying the Auster and Tiger Moths with nostalgia and term them to be the most exciting days of their careers.

# COLOURS

# FALCONS

*Amazing Liveries from around the World* of

**L**iveries are the special paint schemes used in military and civil aviation on aircraft in order to help identify them and also to make them look attractive and stand out among fleets. The purpose of liveries can be historical as well as contemporary. They are used to celebrate national events, traditions, anniversaries, achievements of respective aircraft and squadrons, war victories, international exercises, airshows and formation of aerobatic teams. A livery is a set of eye-catching insignia which may contain colours, graphics, art, typography or a combination of these. Air forces around the globe regularly paint their aircraft in colourful liveries to catch the spotlight in the world of aviation. Various artistic paint schemes of military aircraft are showcased at the Royal International Air Tattoo (RIAT) at RAF Fairford every year, the largest international airshow. Specially painted aircraft participate in competitions and the most appealing aircraft gets the best livery award. There are countless fighter aircraft with gorgeous looking paint schemes all over the world. However, General Dynamics' aerodynamic wonder: the 'Fighting Falcon' is worth a feature in Second to None.



by Awais Lali

**Title Photo:** Royal Netherlands Air Force has been using F-16 as its solo aerobatic aircraft since 1979. RNLAF Demo Team appeared with several beautiful liveries over the years. This peculiar F-16 AM (J-015) called 'Orange Lion' served as the Solo Display aircraft from 2009 to 2014. Inspired by the Dutch Lion, which is part of the Dutch Heraldry, this orange-black livery got a tremendous amount of love at air shows. (Photo: Mark Broekhans).

**Bottom Left:** This vibrant F-16A (10311) livery nicknamed 'Centennial Falcon' belongs to Royal Thai Air Force. Representing Thailand's flag and 100 years 'Centennial of RTAF Founding Father's' (1912-2012) this aircraft has performed solo aerobatics in many airshows. (Photo: Katsuhiko Tokunaga).

**Bottom:** Royal Norwegian Air Force F-16AM (686) painted in Norwegian national colours on 100th anniversary of Norway's Military Air Power (1912-2012). (Photo: Chris Lofting).





1: In 2012 the Belgium Air Force had another special coloured F-16A MLU flying around in anniversary markings. That year the 349 squadron celebrated its 70th anniversary. The unit was established in 1942 and took part in all massive operations during the Second World War. The squadron flew during the D-Day operation the first flights over the beaches of Normandy. (Photo: Vincent Martens).

2: Egyptian F-16s are easily identifiable with their orange tail/wing markings and Arabic tail numbers. Deployed in Greece for training purpose, this F-16C is seen on display at Andravida Air Base during Hellenic Air Force Open Days 2016. (Photo: Rob Schleiffert).

3: Balikesir based 192 Kaplanlar (Tigers) squadron is an active member of NATO Tigers Society since 1980 which has organized Tiger Meets in 2005 and 2015. This F-16D (93-0696) wearing Tiger livery merged with Turkish flag is seen operating from Volkel Air Base Netherlands during Tiger Meet 2010. (Photo: Mark Broekhans).

4: Being a major NATO Tiger member since 1962, 31 'Tigers' Squadron of Belgian Air Force has hosted eight Tiger Meets and won the prestigious 'Silver Tiger Trophy' for ten times which is the highest among the members. This F-16 AM (FA-94) wearing Tiger colours is seen taxiing at Landivisiau Base, France during Tiger Meet 2017. (Photo: Mark Broekhans).

5: An F-16AM (J-511) of Royal Netherlands Air Force carrying special livery to commemorate 60 years of 312 Squadron, lands at Leeuwarden Air Base during RNLAF Open Days 2011. The tail art is inspired by squadron insignia which is two crossed golden swords interlaced with lightning strike. (Photo: Mark Broekhans).

6: An F-16D (10803) from No. 5 squadron wearing low-vis squadron insignia, which is a falcon in attack. No. 5 'Falcons' operates the most advanced F-16s in PAF fleet. Equipped with F-16C/D Block 52+ aircraft today, the squadron has a rich combat history with PAF service. (Photo: Awais Lali).

7: Special tail design for F-16B (6814) from Republic of China Air Force's 455<sup>th</sup> Tactical Fighter Wing celebrating 80th anniversary of Sino-Japanese war (1937-2017) (Photo: Airshi,airliners.net).

8: Equipped with 80 F-16E/Fs, UAE Air Force is the only air force in the world flying the Block 60 variant. Apart from being technologically ahead of other variants, F-16E/Fs nicknamed 'Desert Falcon' carry a light two-tone desert camouflage paint scheme which makes them stand out. Seen here is an F-16E (3037) executing a 'high-alpha pass' in Dubai Air Show 2019. (Photo: Umar Aziz).



F-16 Fighting Falcon, fondly called 'Viper' by its flyers, is a compact, single engine, all weather multi-role fighter aircraft designed and produced in the 1970s by General Dynamics, which was later acquired by Lockheed Martin in the early 1990s. It was the winner of the Light Weight Fighter (LWF) and Air Combat Fighter (ACF) competitions, which led to its production and induction into United States Air Force. The F-16 is a highly agile aircraft with combat proven capabilities in air-to-air and air-to-ground roles. It was the first fighter purpose-built to withstand high G-loads (9G) and fly at speeds reaching Mach 2. It was also the first aircraft based on the fly-by-wire control system. F-16 has been declared the most successful combat-proven 4<sup>th</sup> generation fighter by Lockheed Martin. Designed and developed in the 70s, the improved variants of F-16 are still being produced for export. A total of 4,588 F-16s have been produced till date and around 3000 are in active service in 25 countries. Apart from its high-performance design, the aesthetically pleasing airframe has won the hearts of both the pilots and aviation enthusiasts over the years. It would not be unjust to call F-16 the most beautiful fighter aircraft ever built in the history of aviation, which has inspired many generations of aviation enthusiasts.



F-16 is the most widely produced modern day fighter after Mig-21 and F-4. Being in service with many air forces around the world, F-16 has made public appearance with numerous eye-catching liveries till date. The most prominent ones include those of solo and formation aerobatic teams like Turkish Air Force's Solo Turk, United States Air Force's Thunderbirds and Viper Demo Team, Belgian Air Force's Dark Falcon, Royal Netherlands Air Force's Orange Lion, Republic of Singapore Air Force's Black Knights and Hellenic Air Force's Zeus. Apart from demo teams, F-16s have been painted with special liveries including full fuselage, half fuselage and tail arts for occasions such as international exercises and air shows. The Royal International Air Tattoo (RIAT) airshow and NATO Tiger Meet exercises are the most noteworthy events in which air forces exhibit the creative liveries apart from capabilities of weapons systems as well as competence and professionalism of their ground and air crew.

NATO Tiger Meet is an annual military exercise which allows NATO's 'Tiger Squadrons' to converge at a hosting base to share ideas and experiences of combat flying as well as keeping friendly relations among the nations. Squadrons from NATO Air forces with Tiger as their squadron crest are members of NATO Tigers Association which is responsible to keep solidarity between the air forces. The Tiger Meet always brings forth the most alluring liveries. Among the participating aircraft, F-16s painted in bright tiger stripes and fascinating tail arts are always the show stealers.



1: F-16s with unusual camouflaged paint schemes identical to those of Russian aircraft are assigned to Aggressor squadrons of USAF. This particular 3-tone camo livery belongs to 64<sup>th</sup> Aggressors based at Nellis Air Base which is assigned to 57<sup>th</sup> Adversary Tactics Group. (Photo: Mark Von Raesfeld).

2: Volkel based F-16AM (J-055) from RNLAf 313 Squadron with Tiger Meet 2010 livery. 313 Squadron is a NATO Tiger since 1990 and has hosted Tiger Meet at Volkel Air Base, Netherlands in 2010. (Photo: Vincent Martens).

3: Famous for its artistic paint jobs, Belgian Air Force revealed a new livery for its F-16 Solo Display team in 2018 which was named 'Dark Falcon'. The team has been attracting the crowd with its eye-catching liveries at various western airshows. Flown by Capt. Stephan 'Vador' Darte, Dark Falcon has black-grey-white fuselage inspired by Falcon feathers. Dark Falcon's tail featured two different Falcon arts for 2018 and 2019 seasons. (Photo: airshowstuff.com).

4: Inducted in PAF's No 19 Squadron in 2014, 4 ex-Jordanian F-16ADFs painted with Lion markings are lining-up for take-off. (Photo: Awais Lali).

5: A US Air Force Reserve Command F-16C (86-0246) exclusively painted in this stunning livery for 75<sup>th</sup> anniversary of 457<sup>th</sup> fighter squadron in 2019. The livery highlights the squadron colours and insignia with silhouettes of its former aircraft. (Photo: dvidshub.net).







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1: This spectacularly distinctive F-16 belongs to Hellenic Air Force's official demo team 'Zeus' which made its first appearance in RIAT 2015. Representing ancient Greek mythology king and father of Olympian gods 'Zeus', this F-16C Block 52+ (523) wears an artistic livery comprising of Zeus's face, symbols of his powers and "Aetos Dios" the eagle believed to be his personal companion beautifully blended with Greek flag. (Photo: Hellenic Air Force).

2: A formation of Centennial Falcons making a sharp split for a photo mission. Nieuport biplane, one of the first aircraft used by RTAF painted under the belly catches the viewer's attention in no time. (Photo: Katsuhiko Tokunaga).

3: Lighting up the sunset sky with intense flare action during a demo flight, this F-16 AM (FA-123) piloted by Commandant Tom 'Gizmo' De Moortel remained Belgian Air Force's Solo Display aircraft from 2015 to 2017. The jagged grey-black-white F-16 was named 'Blizzard' for its vigorous performance. (Photo: Marco Spuyman).

4: Formed in 1953, USAF's 'Thunderbirds' is the world's 3<sup>rd</sup> oldest aerobatic team. The team operates 6 F-16s in formation aerobatics. Thunderbirds have flown F-84 Thunderjet, F-100 Super Sabre, F-4 Phantom and T-38 Talon before switching to F-16A in 1983 and then to F-16C in 1992. Painted in a unique white livery with traces of red and blue stripes and a thunderbird at bottom, these F-16s are the most eye pleasing among USAF fleet. The livery is inspired by a mythical creature 'Thunderbird' found in old Native American cultures; a supernatural being of power and strength. (Photo: aerobaticteams.net).

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5: As Thunderbirds opposing solos perform the most exciting manoeuvre; the 'Knife Edge Pass', a blue thunderbird painted underneath the F-16 is clearly visible in this perfectly timed photo. (Photo: Airdotshow.com).

6: Italian Air Force leased total of 37 F-16 ADFs refurbished by AMARC under 'Peace Caesar' agreement between 2002 and 2004 to replace the old F-104s until Eurofighter came to operational readiness. (Photo: Michael Balter).

7: Photographed during its last days in service with Texas Air National Guard, this F-16C (84-1393) from 111 Fighter Squadron received this colourful livery to celebrate the unit's 90th anniversary (1917-2007). The unit switched to UAVs and this aircraft was retired to a museum in Houston in 2008. (Photo: Nathan Havercroft).

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1: A Greek F-16C embellished with 60 years tail designed on 60th anniversary of 340th Squadron. Callsign 'Fox' 340 squadron was formed in 1953 and completed its 60 years with HAF in 2013. (Photo: eagle.ru).

2: The other side of '60 years Arrows' tail on F-16C (076) featuring silhouettes of F-86E and F-5; the aircraft previously operated by 341 Squadron with a 60 years logo. (Photo: eagle.ru).

3: F-16C Block 25D (84-1264) from 122nd Fighter Wing of Indiana Air National Guard with heritage WWII styled stripes and tail colours honoring its predecessor unit; the 358th Fighter Group which served in the war. (Photo: military.wikia.org).

4: First former Warsaw Pact country to purchase F-16, Poland celebrated 100 years of Polish Air Force (1919-2019) by painting this F-16C (4047) in low-vis 'Raven' livery based on insignia of 302 squadron which served as Polish unit of RAF in WWII. The livery carries an amazingly painted Raven art on the top, an RAF roundel under the cockpit and the code 'WX' marked on the tail which was used to identify 302 squadron's aircraft in the war. (Photo: Krzysztof Dymel).

5: US Air Force unveiled a brand-new livery for its famous Viper Demo Team in 2020. Based at Shaw Air Force Base, Viper demo F-16C (94-0047) was given a black-grey-yellow snake-scale paint scheme 'Venom' being its namesake. Venom has yellow snake eyes under the cockpit and a snake tail

extending to its tail fin blending perfectly with an F-16 logo taken from the team's insignia. This livery received a warm appreciation from aviation community all over the world. (Photo: theaviationist.com).

6: Derived from the insignia of 341 'Arrows' of Hellenic Air Force, this special tail art commemorated 60th anniversary of the squadron (1954-2014). (Photo: eagle.ru).

7: Inspired by an ancient Greek mythology 'Argo and the Argonauts' the Hellenic Air Force emblazoned this F-16C (122) of 346 'Jason' Squadron with this mesmerizing tail design on squadron's 20th anniversary. 346 Squadron is the namesake of Prince Jason who is believed to have sailed on a ship 'Argo' with his crew 'Argonauts' to retrieve Golden Fleece from a Dragon while an Eagle protected them. (Photo: eagle.ru).

8: A striking Tiger tail art painted on The Royal Norwegian Air Force F-16AM (671). This aircraft belonged to RoNAF 338 Squadron which remained a full member of NATO Tigers from 2003 to 2018 when it was disbanded. (Photo: airplane-pictures.net).

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8





1

Sr No.	COUNTRY	AIRCRAFT
1	Bahrain	F-16 C/D Block 40
2	Belgium	F-16 A/B Block 1,5,10,15 MLU
3	Chile	F-16 A/B Block 20 MLU, C/D Block 50
4	Denmark	F-16 A/B Block 1,5,10,15 MLU
5	Egypt	F-16 A/B Block 15, C/D Block 32,40,52
6	Greece	F-16 C/D Block 30,50,52
7	Indonesia	F-16 A/B Block 15, C/D Block 25
8	Iraq	F-16 C/D Block 52
9	Israel	F-16 A/B Block 1,5,10, C/D Block 30,40,52
10	Italy	F-16 A/B Block 5,10,15
11	Jordan	F-16 A/B Block 15 ADF,20 MLU
12	Morocco	F-16 C/D Block 52
13	Norway	F-16 A/B Block 1,5,10,15, 15 OCU
14	Oman	F-16 C/D Block 50
15	Pakistan	F-16 A/B Block 15 MLU, 15 ADF, C/D Block 52
16	Poland	F-16 C/D Block 52
17	Portugal	F-16 A/B Block 15, 15 OCU
18	China / Taiwan	F-16 A/B Block 20
19	Romania	F-16 A/B Block 20 MLU
20	Singapore	F-16 A/B Block 15 OCU, C/D Block 52
21	South Korea	F-16 C/D Block 32,52
22	Thailand	F-16 A/B Block 15 OCU, 15 ADF
23	Netherlands	F-16 A/B Block 1,5,10,15,15 OCU
24	Turkey	F-16 C/D Block 30,40,50
25	UAE	F-16 E/F Block 60
26	USA	F-16 C/D Block 40,50,52
27	Venezuela	F-16 A/B Block 15



2



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1: Belgian F-16AM (FA-116) from 31 'Tigers' Squadron with a gorgeous Tiger Meet 2018 livery (Photo: Finn Aviation Photography).

2: Italian F-16A (MM7239) with checkered tail art of 18<sup>th</sup> squadron and 37<sup>th</sup> wing takes off from Florennes, Belgium. (Photo: Vincent Martens).

3: Belgium was one of the four nations which decided to purchase F-16s from US simultaneously in 1975 under Multi National Fighter Program (MNFP). To commemorate 45 years of MNFP, BAF decorated this F-16AM (FA-116) with tail art containing flags of the MNFP nations which are United States, Belgium, Norway, Denmark and the Netherlands. (Photo: Finn Aviation Photography).



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4: Beautifully painted in Singapore's national colours, these F-16Cs belong to Republic of Singapore Air Force's display team 'Black Knights'. The bright red and white livery is based on Singapore's flag; red fuselage with five white stars and a crescent. The team was formed in 1973 and it progressed from operating Hawker Hunters, F-5Es and A-4s before it finally converted to F-16s in 2000. Black Knights was temporarily disbanded in 2009 but was resurrected in 2013, replacing its previous livery with the current. (Photo: Katsuhiko Tokunaga).

5: As a host squadron for NATO Tiger Meet 2021 and four-times 'Silver Tiger Trophy' winner, Portuguese Air Force's 301 'Jaguars' proudly displayed this impressive Tiger liveried F-16AM (15116) at Beja Air Base Portugal. 31 Squadron is a NATO Tiger member since 1978. (Photo: Jorge Penedo).

6: One of the MNFP (Multi National Fighter Program) country, the Netherlands inducted F-16s in 1979. Carrying 40 Years Fighting Falcon tail art to celebrate 40th year in service, this F-16AM (J-642) is flying at Air Power Demo at Volkel Air Base, Netherlands. (Photo: Finn Aviation Photography).

7: Griffins' have been actively participating in national and international exercises including Anatolian Eagle, Red Flag, Green Flag and ACES Meet. This F-16BM (86612) with 'Griffins' tail art is seen landing during ACES Meet 2021 hosted by Pakistan Air Force at Mushaf Air Base. (Photo: Awais Lali).

8: Republic of Singapore Air Force F-16D (06-5035) from Arizona based 425<sup>th</sup> Fighter Squadron flying with 'Best of Both Worlds' livery to acknowledge US-Singapore partnership. 425<sup>th</sup> FS is a US-Singapore joint unit primarily tasked with training of Singapore's F-16 pilots. (Photo: Vincent Martens).



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1: Flying with a ferocious red tiger livery painted for Tiger Meet 2014 held at Schleswig-Jagel AFB Germany, this F-16C (94-0090) belongs to 192 Filo; a NATO Tiger squadron of Turkish Air Force. (Photo: Jeroen Bos).

2: A 4-ship formation adorned with national colours and insignia flying on completion of 40,000 F-16 hours with Italian Air Force in 2010. The formation included existing special liveries from each squadron whereas the lead aircraft (MM7253) had the 40,000 hours tail art with tricolour and insignia of all the three squadrons. (Photo: David Marsili).

3: A bright red and white Danish flag themed livery was painted on RDAF F-16AM (E-191) to commemorate 800th year of the Danish flag. This astounding livery made public appearance in RIAT 2019. (Photo: Karolis Kavolelis).

4: Painted in 3-tone camouflage, Aggressor F-16s from USAF play the bad guys in war games. Aggressor aircraft are painted in enemy liveries in order to achieve realistic war-time scenarios in training exercises. (Photo: Vincent Martens).

5: An F-16AM (84713) carrying traditional checkered tail from PAF's No 11 Sqn 'Arrows'. Piloted by Wing Commander Affan Aslam, this F-16 is seen performing a max-rate turn during a demo flight. No 11 Squadron has been assigned for Solo Display at various national and international air shows including Pakistan Day parades and Izmir air show 2011. (Photo: Awais Lali).

6: Venezuela was the first Latin American country to get F-16s in 1983. Equipped with F-16 A/B OCU aircraft, Venezuelan Air Force's Air Group 16 'Dragons' celebrated its 30th anniversary in 2013 with a special Dragon tail art integrated in Venezuelan flag. (Photo: Vincent Martens).



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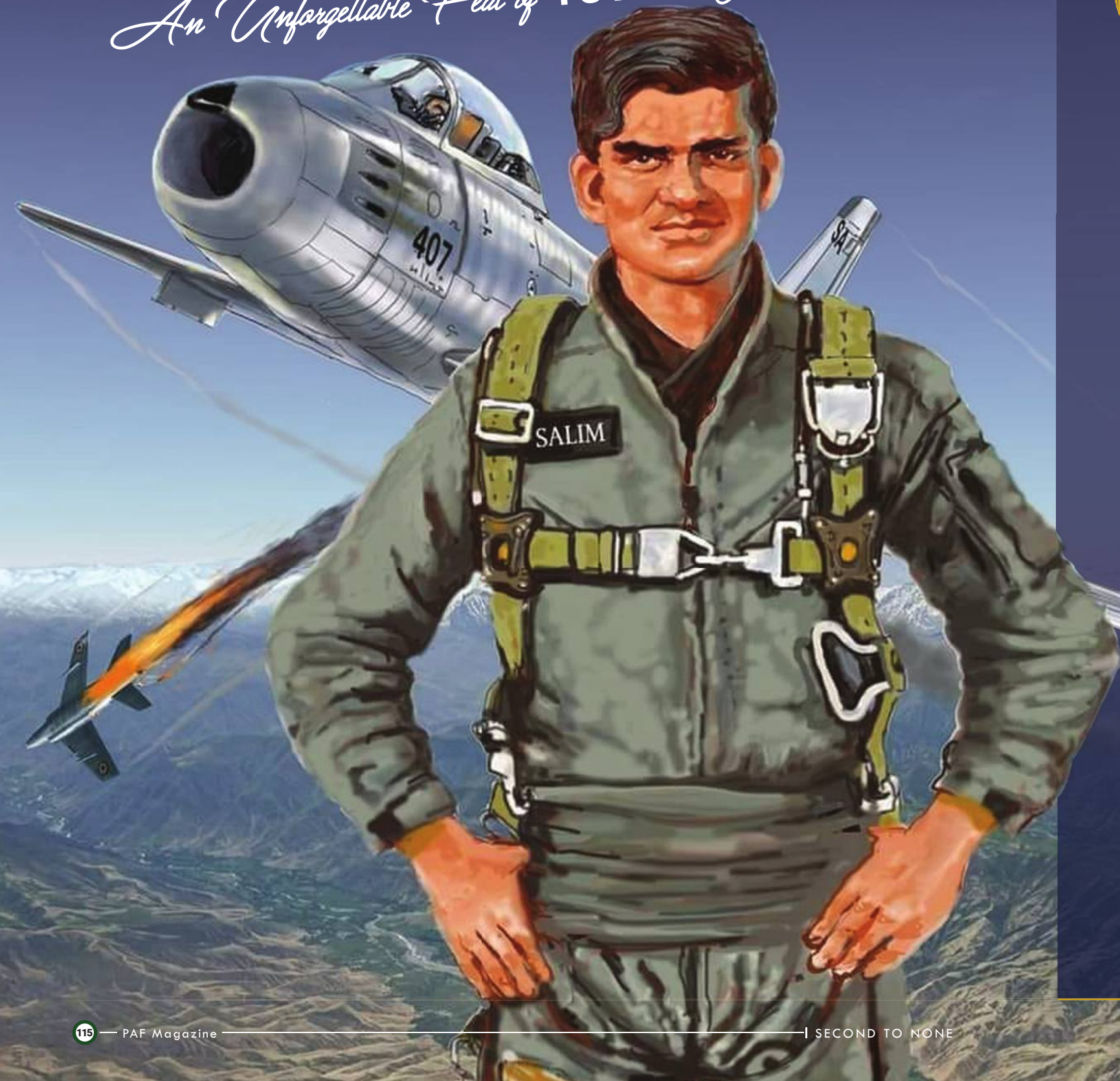
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# BAIG STRIKES TWICE

*An Unforgettable Feat of 1971 War*

“Wg Cdr Salim Baig Mirza might not be well-known among the public but is a legend in aviation circles. Still known for his calm and humble demeanour, he was a great asset to PAF during the 1971 War. His superb air combat skills earned him two confirmed aerial kills against IAF. His courage and extra ordinary skills are remembered by all and are, fortunately, passed down to his countless pupils he trained in his later years.”

by Fahad Masood, MRAeS, Sqn Ldr (R)



It was 3 December, 1971, 5 p.m when two PAF officers entered the transit lounge at Lahore airport and were anxiously waiting to fly to Peshawar by a PIA flight, en route from Karachi. They were Flight Lieutenant Salim Baig Mirza and Squadron Leader SM Anwar. SM Anwar had been charged with carrying some classified documents to Air Headquarters Peshawar. That is when they found that war has erupted in West Pakistan when PAF Mirages struck Indian airfields. Baig being the younger and yearning for combat, wished to join the action and reach his squadron at the earliest. He believed that he belonged in his Sabre cockpit and that he should have been there when the war started.

He always believed that he had been trained and mentored for that very day. They were told that the PIA flight had been cancelled and they would have to move by road from Lahore to Peshawar. After some insistence, PIA station manager arranged a van for their journey from Lahore to Peshawar. There was no motorway in those days but a less busy Grand Trunk Road from Lahore to Rawalpindi and then leading to Peshawar.

They were made to travel with the headlights off which made the journey longer and a lot more agonizing. Enemy air raids were expected and there was a complete black out in the towns driven by. Of course, there were no mobile phones those days to keep abreast with the ongoing developments about the war. Thus, the two curious officers endeavoured to reach Peshawar at the earliest.

“We reached PAF Officers’ Mess Peshawar at about 0600 hrs on 4 December and after changing into my flying gear, I headed straight to my parent unit, the No 26 Sqn. I was keen to get into the action because I had already missed the opportunity to take part in the first strike to Srinagar airfield,” recalled Wg Cdr

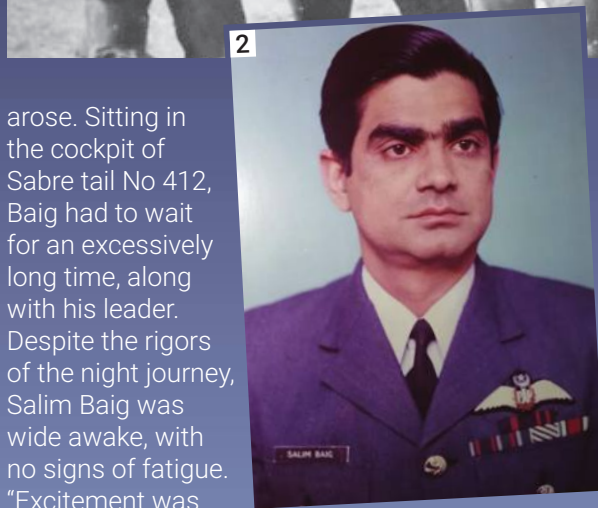
Salim Baig Mirza (Retd) while talking to the author. With a thousand plus hours on the F-86 Sabre, having travelled all night with no sleep, this plucky combat aviator was itching for a fight with the enemy. He was delighted to be put on cockpit alert straight away on reaching the ADA (Air Defence Alert) hut, along with Flight Lieutenant Khalid Razzaq as his leader.

As he was being updated and briefed for the mission, Indian Air Force (IAF) Hunters struck Peshawar airfield at 0715 hrs. They caused no damage except destroying two dummy aircraft on the tarmac. The Base Commander gave instructions to keep on standby two additional aircraft, ready to scramble at a moment’s notice, if the need

Title Photo: Wg Cdr Salim Baig’s calm and calculated aggression earned him two confirmed kills against IAF during 1971 war. (Photo sketch by Artist Shujaat Ali).

Bottom: Flt Lt Salim Baig Mirza (2<sup>nd</sup> from Left) along with others officers at a PAF operational base during 1971 war. (All Photos PAF Archives).





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arose. Sitting in the cockpit of Sabre tail No 412, Baig had to wait for an excessively long time, along with his leader. Despite the rigors of the night journey, Salim Baig was wide awake, with no signs of fatigue. "Excitement was running high in anticipation of action with the enemy aircraft who had dared us and thrown up a challenge with first strike. But it was seemingly an unending wait of more than two and half hours in the cockpit. During this waiting period all sorts of questions came to my mind. Will the IAF aircraft again attack our base? Will we get a scramble in time to intercept? Will it be a futile wait? Will some other pilots replace us before we launch into action etc.?" reminisced Wg Cdr Salim Baig Mirza (Retd).

At about 1030 hrs, the hooter finally blew and they were asked to scramble. Excited with impending combat, the adrenalin rushed as the pair started up their trustworthy Sabres. Both aircraft were airborne within minutes. Radar controller asked them to climb to 5000 feet and head for Cherat Hills about 30 miles south-east of Peshawar. Just after two to three minutes of flight in the direction of Cherat, they were asked by the Controller to return to base to counter an imminent Indian attack. One hard turn and the both aircraft were approaching the base in a westerly direction. While doing so they

heard "Killer Control" (ground observer), which meant that the airfield was under attack by Indian Hunters who were seen heading in the easterly direction towards Peshawar town. Baig spotted one enemy aircraft at a very low altitude heading in the opposite direction. He immediately informed his leader and they both made a hard turn-about to pursue the enemy aircraft.

However, as they rolled out, they received another call,

"Hunters pulling up for another attack." Apparently, sensing no opposition, the raiders had decided to have one more go at the airfield. Baig and his leader were determined not to let that happen. The pilots turned in the direction for the airfield and pushed their aircraft to the max. Baig made a call and punched his extra fuel tanks as he prepared for hard manoeuvring combat at low altitude. The North American F-86 Sabre, designed by Edgar Schmued, was a legendary jet fighter and perfect for dogfights against the Hunter at lower altitudes. No wonder, it was the

backbone of the Pakistan Air Force in both Indo-Pak wars of 1965 and 1971. Flt Lt Baig had mastered this fine machine by then, and was about to push its manoeuvring and shooting prowess to its limits.

Right over the base, Baig spotted one Hunter turning left across the runway and informed the leader. By then, the leader Flt Lt Khalid Razzak too had seen the raider, called contact and was already in a dive to position himself behind the enemy aircraft. Baig held

off for a while looking out for other enemy fighters. That is when he spotted another Hunter from the right side, trying to sneak in behind the leader. Baig immediately updated his leader and manoeuvred for the second Hunter who was still more than a mile behind Khalid Razzak.

It was a unique situation, a lethal, high-speed merry go round you see in World War II war movies. The lead Hunter was chased by the Sabre-leader, who in turn was pursued by the No 2 Hunter, which in turn was being pursued by the Sabre flown by Salim Baig. While the two in front lagged behind their targets by almost a mile, Baig being lighter with no extra fuel tanks, closed in behind the second Hunter. This is the point where his skills instincts and all the training kicked in. He tracked his target in the A-4 gunsight, with the pipper on the adversary canopy and opened fire.

**“**In a three-seconds burst from my Sabre's six machine-guns firing at the rate of 120 round per seconds, I hit him square and thick black smoke started coming out from the belly of the Gnat.

"While firing at the enemy aircraft, I was getting closer in range but in spite of my bullets hitting the target, there was no sign of smoke or fire. The Hunter was proving to be a tough nut to crack. I was aware that the Hunter's distance from leader's aircraft was becoming less and could be fatal if not warned in time. I, therefore, told leader to "Break" - a manoeuvre performed by fighter aircraft to avoid extreme danger. At the same time my bullets showed their effect and the Hunter aircraft started to emanate thick smoke from the right side of its fuselage and wing root and in the next instant, I saw it hitting the ground," recalled Wg Cdr Salim Baig Mirza (Retd).

Flg Off Kotteiezath Puthiyavettill Muralidharan could not eject and went down with the aircraft. Muralidharan was from Nilambur and belonged to No 20 Sqn of IAF. The other enemy aircraft managed to escape. Later, it was revealed through IAF war history that Flt Lt Khalid Razzak had damaged the other Hunter and the pilot managed to land at an under-construction runway at Jammu in Kashmir. PAF personnel including ground crews, support personnel at flight line saw the entire

1: From Left to Right: FLt Lt Tariq Nazir, unknown, Flt Lt Rahim Yousufzai, unknown, Flt Lt Pervaiz Iqbal Mirza, Flt Lt Salim Baig Mirza during 1971 war.

2: Portrait of Wg Cdr Salim Baig Mirza.

3: Younger Days- Flg Off Salim Baig Mirza pose for the camera after a training sortie.

4: Waiting for an ADA scramble on a sunny day with Flt Lt Tariq Nazir Syed during 1971 war.

5: Sekhon's Gnat in gun sight of Baig's Sabre.

dogfight with excitement. As the duo landed back, the crew lifted Baig on their shoulders and shouted 'Allah-o-Akbar' at the top of their voice.

On 14 Dec 1971, a formation of four F-86F Sabres, led by Wg Cdr Sharbat Ali Changezi, along with Flight Lieutenants H K Dotani, Amjad Andrabi and Maroof Mir, took off from Peshawar to attack Srinagar airfield. To ensure success of the bombing mission, Flt Lts Salim Baig and Rahim Yusufzai flew in two F-86s as escorts. They knew that the IAF had no radars in Kashmir valley and depended on the observation posts pitched atop the Pir Panjal ridges, and elsewhere, to detect the aircraft. The Sabres descended to low level over the Pir Panjal Pass, and turned toward north of Kasba village to line up southeast to northwest, in 31/13 direction, the Srinagar runway orientation. The leader, Wg Cdr Changezi and his team pulled up on calling contact with runway, lined up and dropped their bombs on the runway. Instantly, they were face-to-face with IAF Gnat.

"I heard my leader telling his No 2 to immediately 'Break' to the left because there was an enemy Gnat aircraft firing at him. Leader and No 2 commenced a tight left turn to avoid the danger. No 3 (Flt Lt Amjad Andrabi), after pulling out of the bombing run, spotted them and manoeuvred to get behind the Gnat. Meanwhile, No 4 had completed his bombing dive and having no visual



contact with the other formation members decided to leave the battle area," Wg Cdr Baig recalled. Baig asked No 6 (his wingman) to jettison external fuel tanks and headed in the direction of the fight which had developed within visual and hearing distance west of the airfield. Because of high-G turns,

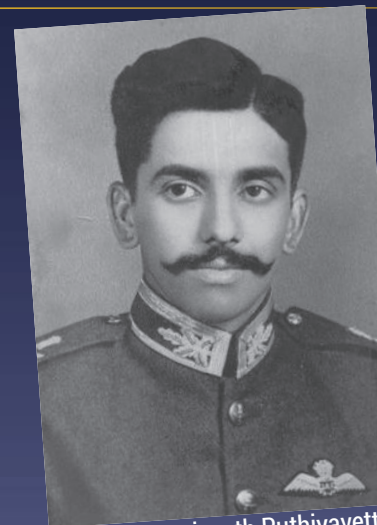
No 2 had depleted his speed and was unable to sustain manoeuvring energy for the fight. He, therefore, decided to roll out and leave the scene of action by turning away to the right. No 3 had by this time had taken position behind the Gnat and had commenced firing with his guns. He also communicated on

his radio that he was going to shoot him down. Baig picked them up from below and settled into an orbit on top at about 3-4000 feet higher. He could see the three aircraft in a tight circle with Gnat being in front, a Sabre (No 3) behind him who was followed by another Sabre (leader) at a height of about 200 feet above the ground. Wg Cdr Baig further explains the battle account in these words. "I was expecting the matter to be over in a short while because No 3 was well placed within gun range behind the Gnat. After a few seconds I heard No 3 calling that he was "Winchester" which meant that he had run out of ammo and his guns had stopped firing after missing the target in front. Andrabi found after landing that his bullets missed the mark because of a drop tank hang up i.e.

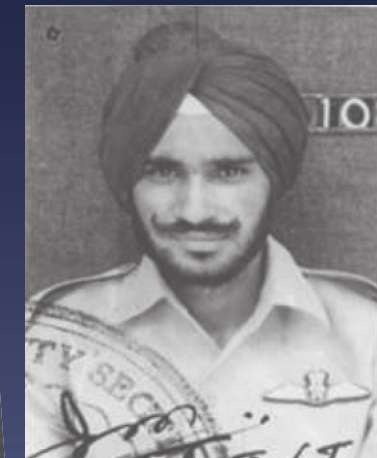
when he punched his extra fuel tanks, one of the drop tanks did not jettison and caused asymmetric firing conditions and spoiled his gun tracking."

At that time, Baig saw the Gnat momentarily rolling his wings level to jettison drop tanks and then went into a high G turn with renewed vigour to manoeuvre behind the lead Sabre. Within a couple of turns he could see the distance dangerously closing between the two. That is when Baig decided to get into the act.

"At the same time, I heard an anxious call from the leader asking me to come down and relieve them of this imminent threat. I asked my wingman to get into fighting position and then dove down manoeuvring my aircraft to get into the orbit of the fighters below. In a matter of few seconds, I was behind the Gnat and firing from a close range of about 1000 feet. In a three-seconds burst from my Sabre's six machine-guns firing at the rate of 120 round per seconds, I hit him square and thick black smoke started coming out from under his fuselage belly. The Gnat levelled his wings and headed for the airfield. It was obvious for that, for him, the fight was over. I stopped firing at him and saw the canopy of his cockpit fly away from the aircraft. But the very next moment, the Gnat snapped over inverted on its back and crashed into the undulated ground of the valley, killing the pilot," reminisces Wg Cdr Baig (Retd). Later after the war, the same dogfight was covered in an article by Wing Commander G M David, a retired Indian Air Force officer, he narrates, "They found 37 bullet holes on the Gnat's rear fuselage, tail plane and fin. That knocked out its flight



Flg Off Kotteiezath Puthiyavettil Muralidharan, IAF.



Flg Off Nirmal Jit Singh Sekhon, IAF.

control system, meaning the laws of flight had abandoned the Gnat."

IAF's No 18 Sqn (Flying Bullets), equipped with Gnats, was responsible for the Air defence of Srinagar Air Field on that day. Flight Lieutenant Baldhir Singh Ghuman (G-Man) and Flying Officer Nirmal Jit Singh Sekhon, were ordered to scramble to meet the Pakistani formation. Flying Officer Nirmal Jit Singh Sekhon, was decorated posthumously with the Param Vir Chakra, the highest wartime Indian gallantry award.

After the war, Baig was redeployed to Risalpur as a flying instructor, where he resumed training the budding potential pilots of PAF. During this tenure as the flying instructor at the Academy, Baig trained scores of student pilots who later rose to senior ranks while serving the PAF. One of his personal students at the Academy was Flt Cadet Masood Akhtar who later rose to the rank of an Air Marshal in PAF. "I was most fortunate to be mentored by one of the best instructors of the Academy. Being more of an introvert and a shy person to

boot, I would not have survived flying training with a gung-ho, brash flying instructor. There was no way I could have made to an aviator in the PAF without this great man. There was not a single occasion when Baig Sahib raised his voice or lost his temper on my failures or weaknesses, of which there were quite a few. He was so down to earth and humble that I actually never discovered his stellar achievements during the war. He, in fact, never talked about his extraordinary performance during the conflict with India. Very frankly, while many hands shaped my career during my 35 years' service with the PAF, without Baig Sahib's nimble hands and mature and sober nature, there was no way I would have survived the tough and gruelling flying training at Risalpur. In brief, Baig Sahib has had a major hand in what I am and who I am today in life. I am truly grateful to this great combat aviator."

“Hunter aircraft started to emanate thick smoke from the right side of its fuselage and wing root and in the next instant, I saw it hitting the ground.

Left Page Top: Instructor Pilots at PAF Academy Risapur 1971 / 72, Flt Baig Sitting 2<sup>nd</sup> from Right.

Left Page Centre: On deputation to UAE during 1976-77, Sqn Ldr Salim Baig (standing Centre) was commanding the only Mirage Sqn of UAE air force.

Left Page Bottom: From Left to Right: Flt Lt Rahim Yousufzai, Flt Lt Salim Baig, Flt Lt Tariq Nazir, Wg Aziz (Sitting).

He also taught the tricks of fighter flying to Air Chief Marshal Mushaf Ali Mir (Shaheed), Chief of Air Staff, as his personal student in fighter conversion course at Peshawar. Another protégé of his in No 26 Squadron, Air Marshal Qaiser Hussain (Retd), pays rich tributes to Wg Cdr Baig in these words, "I am a lucky person to have been his student in Fighter Conversion Unit. I cannot forget him and his witty remarks. While converting onto F-86 Sabres, I flamed out at 35 feet AGL during a skip bombing run at Jamrud firing range as his No 3. As I pulled up and announced my engine failure, he did a barrel roll and in no time was on my wing, guiding me and got a relight, as I was told to eject if no joy (not getting a relight of the engine). I was then escorted by him and I landed through a Simulated Flame Out (SFO) pattern. May Allah bless him and his family. I was lucky to be associated with him during our deputation to UAE, where we flew Mirages."

Born in Hisar, Haryana in India in 1942, Baig was the 7<sup>th</sup> amongst 13 siblings, 7 brothers and 6 sisters. His



**Left Page Top:** Flt Off Salim Baig Mirza along with USAF colleagues during his initial jet training at USA.



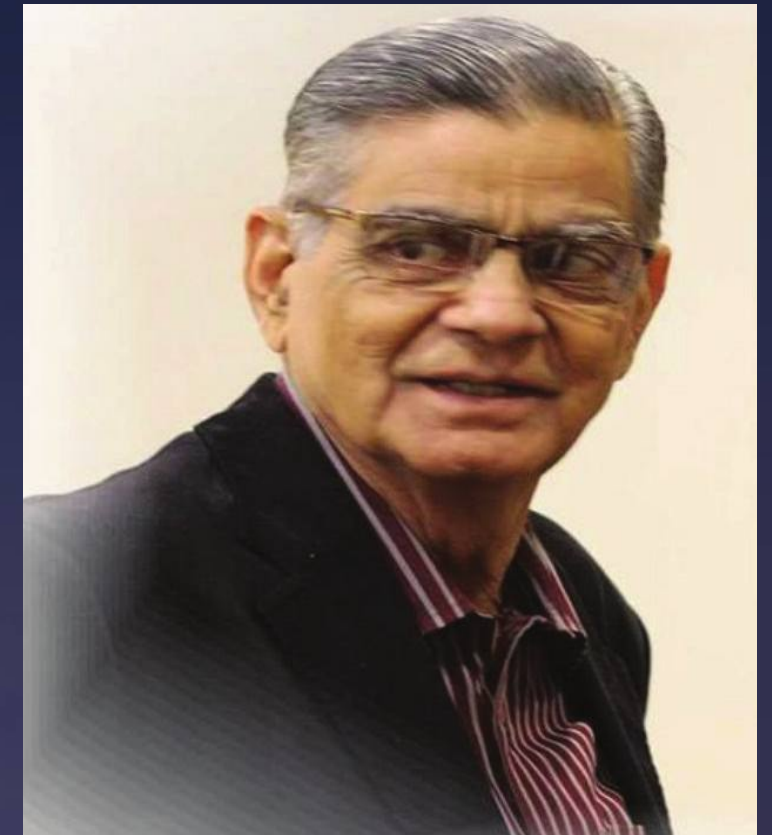
**Left Page Centre:** Flt Lt Salim Baig Mirza (Centre) along with Soviet Defence Attache and legendary SqN Ldr MM Alam in foreground.

**Left Page bottom:** A collage of photos taken during his training at USAF.

father was a police officer who opted for Pakistan. The partition upheaval saw his family migrate to Multan where he attended Muslim High School for his primary and secondary education. Fast forward to the late fifties, he first joined Forman Christian College and then the illustrious Government College. Salim Baig Mirza joined PAF College Risalpur in August 1961 in the 36 GD (P) course. He distinguished himself at the flying training college and along with four course mates was sent to the USA for advance training. There he flew the T-37 and T-33 at Laredo (Texas) and then F-86 for Combat Crew Training course at Nellis air force base. Baig joined back the PAF in 1964 and was posted to No 15 F-86 Squadron at Sargodha, where he flew operational missions during the 65 War. He experienced his first combat when he saw his leader Flight Lieutenant Yusuf shoot a Gnat in Taran Taran area between Kasur and Amritsar.

Begum and Wing Commander Salim Baig Mirza are presently settled at Lahore where they have raised a family with two sons and one daughter. Their eldest son and the daughter are doctors, their other son is an officer in the Pakistan Navy.

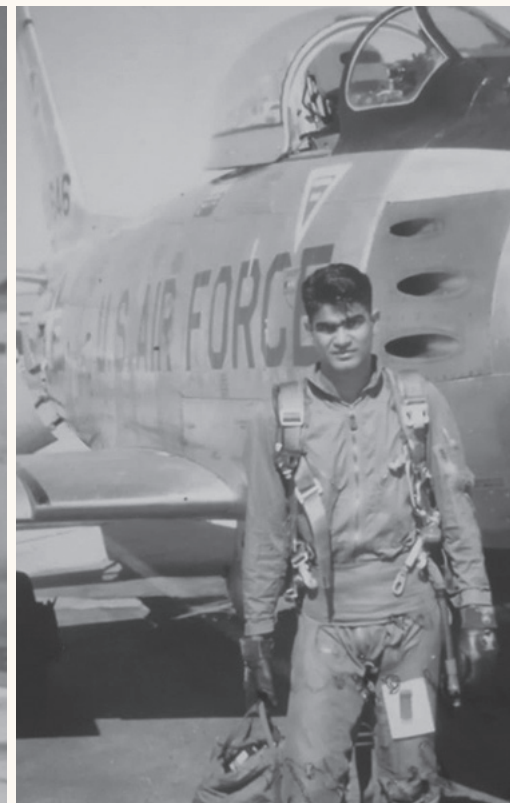
There's another interesting anecdote of the 1971 war. It so happened that two of his Indian Air Force mates from the fighter training stint in the US, Flight Lieutenants Tejwant Singh and Bhargwat were shot down and became prisoners of war in Pakistan. Both were subsequently kept in the PAF Provost Unit



along with another nine, just behind the present day PAF Information and Selection Centre in Rawalpindi. As Baig came to know about them, he decided to visit his erstwhile colleagues in the temporary internment camp with fruits, edibles and books for them. While he found Tejwant in high spirits, Bhargwat was rather depressed, even though it was a mere confinement with a rather friendly treatment. Baig exchanged pleasantries with Tejwant who had been shot down by Flying Officer Maqsood Amer in a Sabre, and asked "Tango (his nick name from US days), why on earth did you get into a turning battle with an F-86?" To which he replied "...Yaar bus ghalti ho gae (I made a mistake my dear friend)."

There are men amongst us who lead unassuming lives,

despite achieving feats that few could even dream of doing. These men live their lives without being recognized or given the distinction that is due to them. What makes these men remarkable is that they are completely fine or even prefer this arrangement. Wg Cdr Salim Baig Mirza is the epitome of this type of individuals. Despite having several impressive feats under his belt, he has never boasted or even mentioned his achievements. After the war, he quietly went back to his purpose, adding more value to the force that he has dedicated his life to. Although they might brush off their feats as simply their 'duty', there is no doubt that it is upon the shoulders of men like Wg Cdr Salim Baig Mirza that PAF is always considered 'Second to None'





# The Republic of Kazakhstan orders two Airbus A400M aircraft

by André Orban  
1 Sep 2021



The Republic of Kazakhstan has placed an order for two Airbus A400M aircraft and becomes the ninth operator together with Germany, France, United Kingdom, Spain, Turkey, Belgium, Malaysia and Luxembourg.

With the delivery of the first aircraft scheduled in 2024, the contract includes a complete suite of maintenance and training support. Together with the agreement a Memorandum of Understanding has also been signed to collaborate on Maintenance and Overhaul services and with a first step of creating a local C295 maintenance centre.

"The A400M will become the cornerstone of Kazakhstan's tactical and strategic airlifting operations," said Michael Schoellhorn, CEO of Airbus Defence and Space. "This new export contract brings the total number of A400M orders to 176 aircraft, a figure that we expect to increase in the near future. With more than 100 aircraft delivered and 100,000 flight hours in operation, the A400M has proven its capabilities, reaching a state of maturity that many potential customers were waiting for."

With the capacity to accommodate the country's inventory and conduct military, civil and humanitarian missions, the A400M will enable Kazakhstan to quickly respond to any mission by rapidly deploying game-changing capabilities over long distances and enabling effective access to remote areas.

# China's J-16D electronic warfare aircraft reveals jamming pods, missiles at Airshow China 2021

by GT Staff reporters in Zhuhai  
28 Sep 2021



A J-16D electronic warfare aircraft is on display at the Airshow China 2021 in Zhuhai, South China's Guangdong Province, from September 28 to October 3. In addition to two electronic warfare pods on the wingtips, it carries four jamming pods under its wings and air inlets, as well as two missiles under its belly. Photo: Yang Sheng/GT.

China's J-16D electronic warfare aircraft will reveal its jamming pods and missiles in its first public appearance at the Airshow China 2021 in Zhuhai, South China's Guangdong Province, to be held from September 28 to October 3. Experts say that the debut of this new aircraft will display China's confidence and transparency on related technologies.

The J-16D is equipped with four jamming pods under its wings and air inlets, as well as two missiles under its belly, in addition to the two electronic warfare pods on the wingtips.

According to the description of the J-16D aircraft at the exhibition, this is a new type of electronic warfare aircraft developed based on the J-16 fighter jet and it has a comprehensive combat capability that integrates reconnaissance, attack and defence.

The J-16D can effectively counter hostile advanced air defence systems of early warning, command and communications as well as interception and strike. The new aircraft will enhance the electronic warfare capability of the People's Liberation Army (PLA) Air Force and boost its systematic combat capability.

The J-16D will be vital for the PLA to control of electronic space and information in modern warfare, Zhang Xuefeng, a Chinese military expert, told the Global Times at the air show.

Usually, these types of aircrafts are highly confidential and China's display of the J-16D shows confidence and transparency, Zhang said.

What do you see when you look at the Moon? Beauty? Craters? Some people see dollar signs. You'll occasionally see our only natural satellite billed as 'Earth's eighth continent' because it's full of resources that are hard to ignore. A rare form of helium, helium-3, could be used in fusion power stations here on Earth. Rare elements, such as neodymium, could be extracted and returned home for use in smartphones and other electronics.

But how do we get them here without blowing all the profits on rockets? According to a study published in 2019, a lunar elevator could be the answer. A cable anchored to the lunar surface would stretch most of the 400,000km (250,000 miles) home. It couldn't be directly attached to the Earth, due to the relative

motions of the two objects, but it could terminate high in Earth orbit.

That would have the added benefit of placing it above the bulk of our space junk, a growing problem as we launch ever more satellites. Solar-powered robotic shuttles could move up and down the cable, acting as a conveyor belt to ferry precious resources our way.

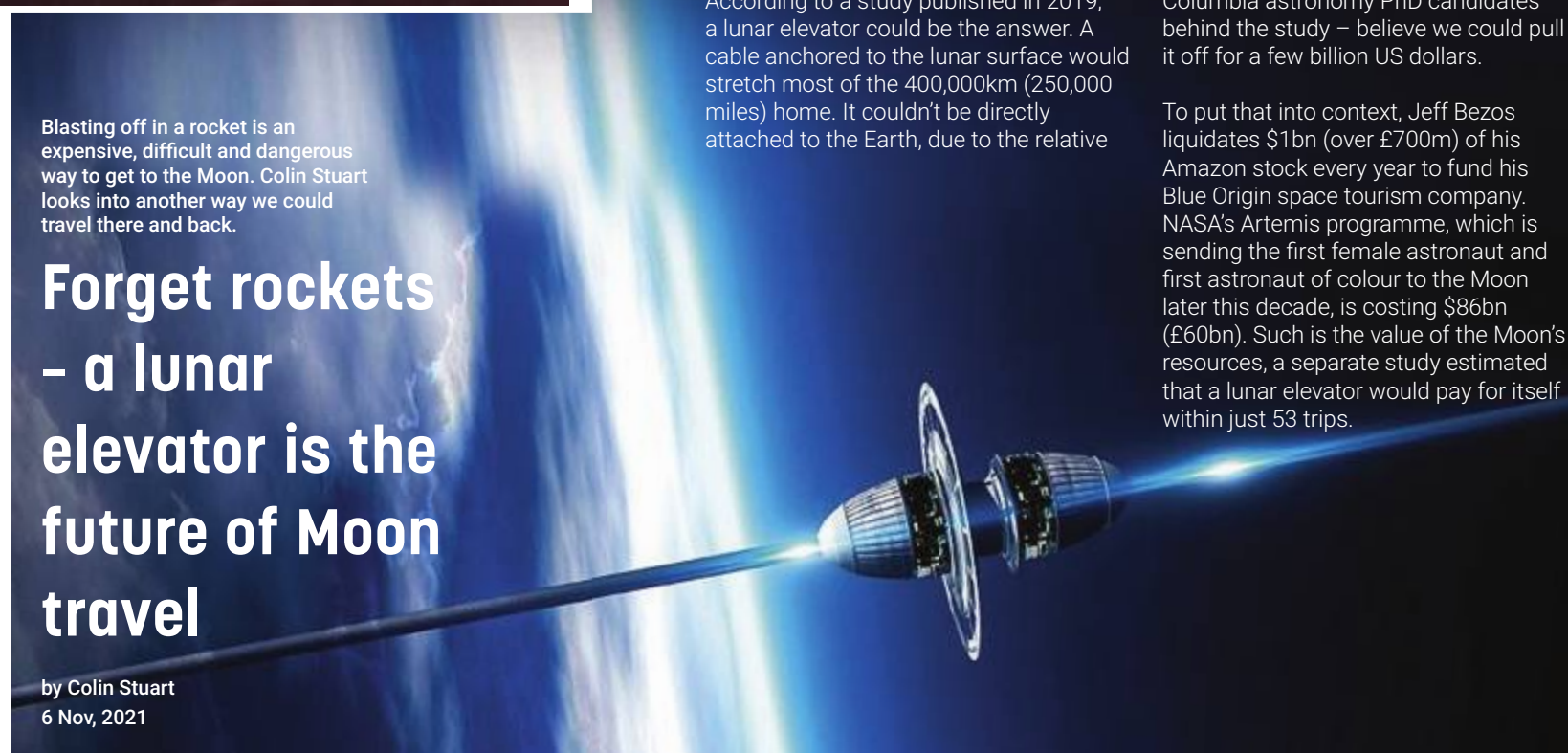
It may sound like an outlandish prospect, but Zephyr Penoyre and Emily Sandford – the two University of Columbia astronomy PhD candidates behind the study – believe we could pull it off for a few billion US dollars.

To put that into context, Jeff Bezos liquidates \$1bn (over £700m) of his Amazon stock every year to fund his Blue Origin space tourism company. NASA's Artemis programme, which is sending the first female astronaut and first astronaut of colour to the Moon later this decade, is costing \$86bn (£60bn). Such is the value of the Moon's resources, a separate study estimated that a lunar elevator would pay for itself within just 53 trips.

Blasting off in a rocket is an expensive, difficult and dangerous way to get to the Moon. Colin Stuart looks into another way we could travel there and back.

# Forget rockets – a lunar elevator is the future of Moon travel

by Colin Stuart  
6 Nov, 2021





## Longest tunnel flight world record broken in Turkey

by dailysabah.com  
4 Sep 2021

A handout photo made available by the Red Bull Press Office shows Italian pilot Dario Costa in action as he flying through the Çatalca Tunnel in Istanbul, Turkey, Sept. 4, 2021. (EPA Photo).

Italian stunt pilot Dario Costa didn't seek the heights Saturday but the depth of a tunnel.

By flying through the two tunnels on the Northern Marmara Highway in Istanbul's Çatalca district he broke the world record of longest tunnel flight by plane.

His flight through the tunnels T1 and T2 lasted for a total of 43.44 seconds. The daring pilot soared staggeringly low with merely a meter (3.28 feet) above the ground and had only 4 meters on either side of his specially made plane. The whole length of the flight was 1,610 meters.

## The quiet supersonic airplane that could let you fly faster than ever

by Claire Reilly  
7 Jul 2021

With the X-59, NASA and Lockheed Martin want to do the seemingly impossible - build a jet that flies faster than the speed of sound, without the explosive boom.

In a windowless hangar in the California high desert, the final touches are coming together on an aircraft that could reshape aviation. A needle-nosed airplane that looks more like a futuristic sketch from a 1950s sci-fi comic -- all sweeping lines and unbroken curves, a narrow cockpit concealed in the centre. Designed and built by NASA and Lockheed Martin, this is the supersonic airplane of the future. And when it takes to the skies, NASA and Lockheed are hoping you won't even notice it flying by.

I'm at the Armstrong Flight Research Centre, just outside of Lancaster, California, to see the X-59 QueSST (short for Quiet SuperSonic Technology) - a demonstrator aircraft designed to fly faster than the speed of sound without generating an explosive sonic boom.



## NASA Begins Air Taxi Flight Testing with Joby

by J.D. Harrington  
1 Sep 2021



Joby's all-electric vertical takeoff and landing (eVTOL) aircraft is pictured at the company's Electric Flight Base, located near Big Sur, California. NASA began flight testing with the aircraft as part of the agency's Advanced Air Mobility (AAM) National Campaign, Monday. This test runs through Friday, Sept.10. Credits: Joby Aviation.

NASA began flight testing Monday with Joby Aviation's all-electric vertical takeoff and landing (eVTOL) aircraft as part of the agency's Advanced Air Mobility (AAM) National Campaign. This testing runs through Friday, Sept.10, at Joby's Electric Flight Base located near Big Sur, California. This is the first time NASA will test an eVTOL aircraft as part of the campaign. In the future, eVTOL aircraft could serve as air taxis for those in cities and surrounding areas around the country, adding another mode of transportation for moving people and goods.

NASA's goal is to collect vehicle performance and acoustic data for use in modeling and simulation of future airspace concepts. This test will help identify gaps in current Federal Aviation Administration regulations and policies to help incorporate AAM aircraft into the National Airspace System. This multi-event campaign to advance airspace mobility in the U.S. will take place at multiple locations over several years.

"The National Campaign Developmental Testing is an important strategic step in NASA's goals to accelerate the AAM industry timeline," said Davis Hackenberg, NASA AAM mission integration manager. "These testing scenarios will help inform gaps in current standards to benefit the industry's progress of integrating AAM vehicles into the airspace."

During this round of testing, NASA will collect data from Joby's eVTOL aircraft, which is intended to serve as a commercial passenger service in the future. Analyzing that data readies the AAM National Campaign to execute the first set of campaign tests, known as NC-1, slated for 2022, with more complex flight scenarios and other industry vehicles.

# Indonesia Signs Up for A400M Airlifters

by David Donald  
18 Nov 2021



An artist's impression shows an A400M in notional TNI-AU colors, depicted over the kind of volcanic island landscape that dominates much of Indonesia. (Photo: Airbus)

Following on from the order placed by Kazakhstan for two aircraft in September, Airbus Defence and Space's A400M airlifter program received another welcome boost on November 18 with the announcement of an order for two aircraft from Indonesia. At the same time the country's defence ministry lodged a Letter of Intent to buy four more.

When the contract comes into effect next year, Indonesia will become the 10<sup>th</sup> nation to buy the A400M, and the second in Southeast Asia after Malaysia. The deal includes a complete maintenance and training support package. The Tentara Nasional Indonesia-Angkatan Udara (TNI-AU, Indonesian air force) will receive the aircraft in multirole transport and tanker configuration, not only boosting the nation's airlift capabilities but also being able to expand its inflight refueling capacity, which currently relies on a single elderly KC-130B Hercules.

An effort to modernize and increase the TNI-AU's transport capability was launched in 2018 in the aftermath of the magnitude 7.5 earthquake and subsequent tsunami that struck Sulawesi. During the relief effort, the A400M was the first airlifter that could land on the damaged and short runway at Palu, bringing in vital excavators, fuel trucks, food, clothes, and medical supplies. Disaster relief was a prime consideration in the decision to buy the aircraft for the nation, which sits atop the "Ring of Fire" tectonic plate boundary.

"The A400M is a truly multi-role platform and will greatly enhance the Indonesian Air Force's tactical air-to-air capabilities. This aircraft will play a key role in other key missions including paratrooping and heavy cargo transportation," said Prabowo Subianto, Indonesia's defence minister. "We are also looking at additional A400M acquisition in the near term, with future A400M developments such as firefighting an important capability we are exploring jointly with Airbus. The A400M will become a national asset and the cornerstone for human assistance and disaster response missions, beyond its tactical and air-to-air refueling capabilities."

# Malaysia keen on buying Kuwait's Hornet fighter jets

by Mike Yeo  
23 Dec 2021

A Royal Malaysian Air Force F/A-18D Hornet is pictured following a mission during Exercise Pitch Black 2018 in Darwin, Australia. (Mike Yeo/Staff)



The United Arab Emirates has become the sixth international customer for Dassault Aviation's Rafale fighter jet. © Stephane de Sakutin, AP

MELBOURNE, Australia – Malaysia is hoping to buy Kuwait's entire fleet of Boeing F/A-18 Hornet multi-role fighter jets, although discussions between both governments over the sale have yet to begin.

Speaking during a question-and-answer session in Malaysia's parliament, the country's deputy defence minister Ikmal Hisham Abdul Aziz said the southeast Asian country is seeking to purchase the Kuwaiti Air Force's fleet of 33 jets "lock, stock and barrel."

He noted the Kuwaiti Hornets are still in good condition with relatively low flight hours and adding them to the Royal Malaysian Air Force, or RMAF, inventory "will definitely increase the level of preparedness and capability of the RMAF in safeguarding the country's [air]space."

He also added the country is planning on operating the type till 2035.

Malaysia currently operates a fleet of eight F/A-18D twin-seat fighters in the air defence and strike role, serving alongside 18 Russian-built Sukhoi Su-30MKM Flanker-H jets. The Hornets were acquired in 1997 and have been upgraded over the past decade.

The incremental improvements include the integration of the Joint Helmet Cueing System, AIM-9X Sidewinder air-to-air missile and satellite-guided Joint Direct Attack Munitions as well as the addition of the Link 16 datalink.



# With billions in new deals, France's Rafale fighter makes a comeback

by Sébastien SEIBT  
12 May 2021

The sale of 80 Rafale fighter jets to the United Arab Emirates was not only deemed "historic", but it also seemed to confirm the continuing commercial success of the French fighter, a twin-jet aircraft able to operate from either land or an aircraft carrier.

A December 3 agreement for France to sell 80 Rafale fighter jets to the United Arab Emirates (UAE) was hailed as "historic" by French Minister of Defence Florence Parly. The CEO of Rafale manufacturer Dassault Aviation, Éric Trappier, also proclaimed his delight at the deal, which he described as the "most important contract ever obtained by the French military aeronautics industry". Trappier was understandably euphoric as the Crown Prince of Abu Dhabi, Mohammed ben Zayed al-Nahyane, signed the €16 billion agreement (including €2 billion for weapons), a record for the French aircraft manufacturer.

For Dassault – and also for Thales (the company that supplies all the Rafale's internal electrical systems), Safran (which provides the engines) and several hundred other subcontractors – the deal means guaranteed business for more than six years. It takes at least one month to manufacture a Rafale.

80 Rafale. Signature d'un contrat historique avec les Émirats arabes unis. Un partenariat stratégique plus solide que jamais. Fière de voir l'excellence industrielle française au sommet.



## China shows off new drones and jets at Zhuhai airshow

by Beiyi Seow  
28 Sep 2021

China showcased its new air power at Zhuhai, with a range of drones on display including the WL-10 (AFP/Noel Celis).

China on Tuesday showed off its increasingly sophisticated air power including surveillance drones, with an eye on disputed territories from Taiwan to the South China Sea and its rivalry with the United States.

The country's biggest airshow, in the southern coastal city of Zhuhai, comes as Beijing pushes to meet a 2035 deadline to retool its military for modern warfare. China still lags the United States in terms of tech and investment in its war machine, but experts say it is narrowing the gap.

A US intelligence report this year flagged China's growing influence as one of America's biggest threats. On Tuesday, the air force aerobatic team left colourful vapour trails as it manoeuvred in formation, while visitors inspected new jets, drones and attack helicopters on the tarmac.

## China to speed up research into new strategic weapons for air force: J-20 chief designer

by GT staff reporters in Zhuhai  
27 Sep 2021

Yang Wei, chief designer of China's J-20 stealth fighter jet, said that during the country's 14<sup>th</sup> Five-year Plan (2021-25), Aviation Industry Corporation of China (AVIC) will develop the capability of H-6 series bombers and will speed up research into new strategic weapons and equipment, to further strengthen long-range strategic strike capability for the People's Liberation Army (PLA) Air Force.

Yang also said there were more than J-20 fighter jets in the air during the flight performance for the ceremony to mark the 100th anniversary of the founding of the Communist Party of China on July 1, and "there were more on the ground." Yang, who is also executive vice president of AVIC, made the remarks at a press conference held by AVIC in Zhuhai, South China's Guangdong Province on Sunday, one day ahead of the China Airshow 2021. During the 13th Five-year Plan period, AVIC has achieved a series of goals, including building the advanced J-20 fighter jet for the air force and improving the H-6 series bombers, giving the PLA Air Force greater long-range strategic strike capability.



## China reveals upgraded J-15 fighter jet; key aircraft carrier roles expected

By Liu Xuanzun  
16 Dec 2021

A J-15 carrier-borne fighter jet takes off from the flight deck of the aircraft carrier Liaoning during a maritime training exercise on July 1, 2017. The Chinese aircraft carrier Liaoning and its carrier strike group carried out realistic training in an undisclosed sea area on July 1, 2017. (eng.chinamil.com.cn/Photo by Li Tang)

China recently revealed an upgraded version of the J-15 ship-borne fighter jet that has just wrapped up test flights, with reports saying the new aircraft received enhancements in its missile pylons, the infrared search and track system, the radar and the wings. The upgraded J-15, potentially capable of operating with catapults, will play key roles on both China's old and new aircraft carriers, experts said on Thursday.

Shenyang Aircraft Co, under the state-owned Aviation Industry Corp of China, on Tuesday published photos on its social media account, introducing its production work as the end of the year approaches. One of the photos, showing a J-15 fighter jet taxiing on a runway under the assistance of a tug truck, attracted the attention of the media and netizens.

This J-15 has many differences compared with previous ones, and this means it is an upgraded version, eastday.com, a Shanghai-based news website, reported on Wednesday.

## First Typhoon Fighters Delivered to Kuwait

by David Donald  
15 Dec 2021

Following their first flight in October and official handover in Italy on December 7, the first two Eurofighter Typhoons have been delivered to the Kuwait Air Force (KAF). The pair of two-seat aircraft arrived in Kuwait on December 14 at the end of a "trail" ferry flight refueled by two Boeing KC-767 tankers operated by the Aeronautica Militare Italiana (AMI, Italian air force) from the 14<sup>°</sup> Stormo (wing) and escorted by two Typhoons from the 4<sup>°</sup> Stormo.

Kuwait signed for 22 single-seat and six two-seat Typhoons in 2016 as part of a split buy—alongside Boeing F/A-18E/F Super Hornets ordered in 2018—to replace its F/A-18A/B legacy Hornets. Italy led the Kuwaiti sales campaign on behalf of the four-nation Eurofighter consortium, and its air force and industry lead the support effort as part of a wider framework agreement that includes training and maintenance support.

As part of that agreement Kuwaiti pilots train with the AMI, including initial training up to the gaining of military wings, and operational conversion to the Typhoon, which is performed by the 4<sup>°</sup> Stormo's 20<sup>°</sup> Gruppo at Grosseto.





## Austria To Replace Alouette IIIs with Leonardo AW169s

by David Donald  
28 Dec 2021

This is one of the two UH-169Bs that have flown more than 1,000 hours with the Italian army at Lamezia Terme as the service prepares to introduce the AW169M-based LUH in 2023. (Photo: Esercito Italiano via Leonardo)

The government of Austria signed a deal with Italy on December 20 to procure 18 Leonardo AW169/169M helicopters, plus spares, training, and support, with an option for a further 18. The decision to buy the militarized version of the AW169 was announced in September 2020 by Austrian defence minister Klaudia Tanner.

The helicopters will replace Austria's long-serving fleet of Sud SE3160 and SA316 Alouette IIIs, the first of which entered service with the Bundesheer (armed forces) in 1967. To be delivered from 2022—in time to meet the Alouette's planned 2023 out-of-service date—the new machines are reported to comprise 12 full-military specification AW169MAs and six AW169Bs that will primarily be used for training but will be available for operational duties if needed. The current Alouette III fleet is headquartered with the Verbindungshubschrauberstaffel at Aigen im Ennstal, which operates several detachments around the country. Training is conducted by a dedicated unit at Tulln-Langenlebarn.

## Northrop Grumman To Repurpose EQ-4Bs as Range Hawks

by David Donald  
16 Dec 2021

Fire crew stand by to provide the traditional water salute as an EQ-4B lands at Grand Forks at the end of the variant's last flight in Air Force service on July 29. (Photo: U.S. Air Force)

Northrop Grumman has been issued a task order to begin engineering and planning work for the repurposing of four EQ-4B Global Hawk high-altitude, long-endurance (HALE) unmanned aircraft. Formerly used for carrying the Battlefield Airborne Communications Node (BACN) payload, the Block 20 machines were retired from U.S. Air Force service at the end of July and have been handed over to the Department of Defence's Test Resource Management Centre (TRMC), which already has a number of RQ-4 Global Hawks.

Once modified with new sensors and communications equipment, the aircraft—dubbed Range Hawks—will be assigned to TRMC's SkyRange program. This initiative employs remotely piloted aircraft such as the RQ-4 and MQ-9 Reaper to perform data collection and range clearance duties in support of long-range missile tests.



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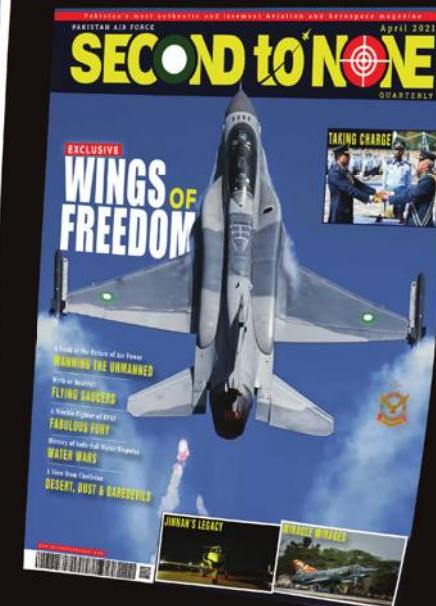
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