

PAKISTAN AIR FORCE

1st ANNIVERSARY
EDITION

SECOND to NONE

January 2021 / Quarterly

EXCLUSIVE

'Salute to a MUJAHID'

Remembering PAF's First Fighter
Tempest-II

Analysis of Stealth Platforms
Now You See Me...

Always at the Crossroads of History
Drigh Road

Nazis' Nightmare
Night Witches



Past, Present and the Future....

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from the Editor-in-Chief

This issue marks a special occasion. It is the fifth edition of 'Second to None', marking the first anniversary of the magazine. In just one year, what started as a dream has spiralled into an anticipated literary achievement with a reader base that numbers into thousands. With the subscribers growing every single day and the mass appeal more than the team could possibly hope for, Second to None has made its mark. We thank our readers for showing overwhelming appreciation in such a brief period.

It is a proud moment for the team, indeed. These have been tough times; it hasn't been easy. With the onslaught of novel coronavirus pandemic, every single member of the team has had to pull their weight. Long hours and remote working arrangements presented obstacles at every turn. However, I am pleased to note that the team at Second to None has stayed true to its commitment. I also extend my gratitude to our worthy contributors who help us produce the quality content that our readers have come to expect.

I would also like to thank our worthy Chief of the Air Staff, Air Chief Marshal Mujahid Anwar Khan for his perpetual support and scrutiny to ensure that the publication lives up to its name. In an exclusive feature, the current edition chronicles his journey to excellence and shows how he has risen up to continue a legacy of his exemplary predecessors. We move on to discuss the enigmatic 'Tempest', Pakistan's first fighter aircraft. An entire generation of budding pilots, engineers and technicians learned the craft of aviation with this historic fighter.

Another episode taken from the annals of history is 'RAF Station Drigh Road' now renamed as PAF Base Faisal. The base has seen more than a century of action and is still standing tall to this day. Another very interesting page of history has been penned down by Wg Cdr Randhawa (Retd), wherein T-33 dual seat trainers were used as low-level bombers in 1971 war. We move on to discuss the journey of 'Eurofighter', an aircraft which is serving more than nine nations across the world. Almost two decades ago, the Eurofighter started as a formidable

aircraft and will continue to evolve well into the future. When pondering on the future of aviation, the impressive advancement of stealth technology cannot be ignored. We shall dissect the role of stealth in present day air warfare and how the technology is becoming exponentially more intricate and effective with each passing day. In a page from the history of WWII, we bring to you the tale of the uncanny, 'Night Witches'. The world is still intrigued by the unbelievable heroics of this all-female night bomber regiment of USSR which turned tables against Nazi Germany during the war.

It is apparent to all that technological advancement holds its dangers too. India's militarization of its ambitious space program is the perfect example, which is a threat to peace and stability of the entire region. This is not an idle speculation. India's brutal treatment of Kashmiris and endless human rights violations in the region are no secret, which we shall also shed light on. We also pay homage to two legendary personalities who spent their lives in service to the country, each in their own way. First is Air Marshal

Dilawar Hussain, a recently departed hero whose relentless bravery against the enemy in both wars will be remembered for decades to come. Second is Hugh Catchpole, a British national who spent his life in Pakistan, as an educationist. From the military to the judiciary and from bureaucracy to entrepreneurship, his pupils are serving the country in a befitting manner, worthy of his name. Towards the end, a colourful article showcases the real beauty of Pakistan and discusses the tourism potentials of this land of the pure.

It has been a tough year for all of us. Let's hope that the coming year and the years to follow bring to us prosperity and health. All we need is to stay strong!!

In the end, I wish all my readers a very Happy New Year and Happy First Anniversary of 'Second to None'. Go on and enjoy reading the Anniversary Edition.



Muhammad Ali

Air Cdre (R) Muhammad Ali, SI(M)
Editor-in-Chief



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Air Cdre (R) Muhamamd Ali, SI (M)

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SALUTE TO A MUJAHID

“ The last three years were highly challenging for the Pakistan Air Force. The year 2019 saw arch rival India making a misadventure, only to be responded by PAF. 2020 even more so as a dangerous pandemic spread across the world like the unstoppable wild fire. The mental and physical demands were so enormous that all those involved had to push themselves to the very limit. A great nations' heart beat tumultuously as long days passed and odds looked almost insurmountable. Pakistan Air Force as well as the nation needed a leader who was organized, had foresight and was armed with preplanning. A thinking man who knew that winning peace was more difficult than winning wars. Air Chief Marshal Mujahid Anwar Khan fought brilliantly at all fronts, not once showing he was carrying the world over his shoulders. God knew where we would have been without him but God knew where we would go with him...”

by Air Cdre (R) Muhamamd Ali, SI (M)

When Air Marshal Nur Khan took over as Air Chief, just weeks before the 1965 war with India, his challenge was sending young boys to certain death. However, as the war commenced, his biggest challenge became restraining them. More than five decades later, Air Chief Marshal (ACM) Mujahid Anwar Khan, Chief of the Air Staff, sitting in the war room faced a similar test. The cowardly Indian attack, which had stunned the world, had infuriated the entire nation, especially its air force. Did they not know the spirit of the PAF or the tough fibre of its airmen who have been trained to value freedom far above their lives?

There was no fear, no despair. Nothing but determination and high courage amongst the ranks. There could be no talks or deals with the adversary but only a fight to the finish without giving the enemy any breathing space. The entire force turned to their Air Chief to give the enemy a bloody nose. And what a bloody nose he gave.

Quid Pro Quo (QPQ) Plus

In the operations room, there was a surge of unity and anger. Pressure mounted on ACM Mujahid Anwar Khan for a counter-attack which would make Dante's



All Photos: PAF Archives unless stated.



inferno look like a picnic in comparison. The waiting became more stressful and pilots were on the edge. But, his words rallied the spirit of the airmen, "Have faith in God and confidence in your Air Chief." Their belief in their Air Chief is implicit. After due deliberations, he made up his mind; the response will come but at the time and place of his choosing.

The Indian raid on the morning of 26 February 2019 brought new words to the terrifying vocabulary of war. PAF response was going to be based on QPQ+ (Quid Pro Quo +) and "Operation Swift Retort" commenced. Keeping aspirations of the nation and PAF in mind, ACM Mujahid Anwar Khan, like a brilliant leader, conceived a strategy in every detail and ran it perfectly. After basing his campaign on meticulous planning, he returned home as usual. There are no signs of panic. He must appear indestructible.

Subsequently the pilots were briefed, ground crews loaded the weapons. It was a quiet night, but it would not be a quiet morning, that was for sure. On the frosty 27 February morning, the pride of the nation moved down the runways in regular order, in state-of-the-art, Fighting Falcons, Thunders, Mirages, along with all the required elements

Above: Unwavering in his faith, ACM Mujahid Anwar Khan sees nothing in way of PAF. To his men, he is more than just a successful military figure. A man of great personal warmth, uncompromising integrity and above all a compassionate leader.

Left Inlets: ACM Mujahid Anwar Khan was every where at once, interacting with the combat crew during his visit to forward operating air bases of Pakistan Air Force. Not many realized, how deeply he felt for his men.

Right Page: ACM Mujahid Anwar Khan delivers pep talk to combat crew after the success of Ops Swift Retort- giving credit, instilling pride, urging men to achieve even greater deeds.



A collage of news clippings of leading newspapers published on 28 February 2019.

of EW wizardry. As the raid built up like a thunderstorm, PAF's warriors, chosen for their intelligence and free thinking, but trained to conquer their inner fears to get to the edge, took off in their killing machines that could head-butt their way through oak doors. Time on target, 0930 hrs.

Just when India was sniffing victory that went to its head, PAF put the enemy on the ropes and cut it to its size. Indian ground radars saw an armada of PAF aircraft heading their directions. It not only cluttered their radar scopes but also the minds of their leadership. There was panic, seen everywhere in enemy quarters. The Mirage struck first by dropping stand-off weapons, without giving the enemy time to organize. Pride of the Nation, Thunders followed, with their state-of-the-art PAF's indigenously designed smart weapons.





1
Bottom: Along with ACM Kaleem Saadat (Ex Air Chief) inaugurating CENTAIC (Centre of Artificial Intelligence and Computing) at Islamabad.

Right Page Bottom: Along with the engineers and technicians during Roll Out Ceremony of indigenously overhauled JF-17 aircraft at Aircraft Rebuild Factory, Kamra.

EW aircraft jammed their communication & surveillance systems. The Fighting Falcons escorted. All went well as per planned. It appeared as a text book operation for the PAF warriors. However, the catastrophe of war fell on Indians when its modern SU-30 jet was put out of commission by the PAF fighters. The ill-fated aircraft along with many others was trying to challenge the PAF's resolve. Plunged into chaos, the Indian Air Force shot down its own helicopter confusing it for an intruding PAF aircraft. The PAF's top guns were not done yet. Next up, another IAF Mig-21 shot by PAF, went down, taking down the pride of IAF once for all. Engine smoking, the aircraft plummeted down and crashed into Pakistani territory. Its pilot, Wg Cdr Abhinandan, was taken prisoner. The enemy was demoralized and the success of Ops Swift Retort was immediately recognized worldwide as a masterpiece of modern air warfare.

It was a daunting time to be a leader during these testing times. In their cowardly attack,

Indian pilots decimated nothing more than a few pine trees. Although there were no casualties or loss of property, Pakistan's sovereignty had been violated and Air Chief's response had to be controlled and measured, one that would demonstrate Pakistan's resolve and capabilities. General areas in close vicinity of military installation were chosen as points of targets across the line of control inside IIOJ&K (Indian Illegally Occupied Jammu & Kashmir). PAF's response broke the Indian Air Force and the morale of the Indian nation went down the drain. The success of the massive blow to the enemy, was his incredible achievement. Whatever was to come, nothing could take it away from him. The entire nation showed its gratitude to the man whose courage had been an inspiration in the darkest of hours. All his past life had been a preparation for this hour and this trial.

Making of the Man

During 1970's, stories of the famous Pathankot strike and legends in the likes of Rafiqui and MM Alam, were fresh enough to excite the imagination of any boy and young Mujahid Anwar Khan was no exception. Looking back over the years it's hard to say the precise reason why Mujahid Anwar Khan decided to make the air force his profession, except for his love of flying. No one could deny the material of a pilot in him when he was a boy. Under

the shadow of his disciplinary father, a bureaucrat by profession, he showed extraordinary brilliance in studies at school in Islamabad College for Boys (ICB). It was the Pakistan Air Force Academy that provided the kind of environment, articulated to encourage a young man with ambitions. He was an honoured graduate at Risalpur, where the bright flight cadet began to prove himself. Mujahid Anwar Khan, was soon known as a dazzling all-rounder and gained the reputation of a courageous man who faced danger, completely unafraid.

On the graduation day, he was bestowed with all three coveted awards, the Sword of Honour, Best Pilot Trophy, and Chairman Joint Chief of Staff gold medal, which only

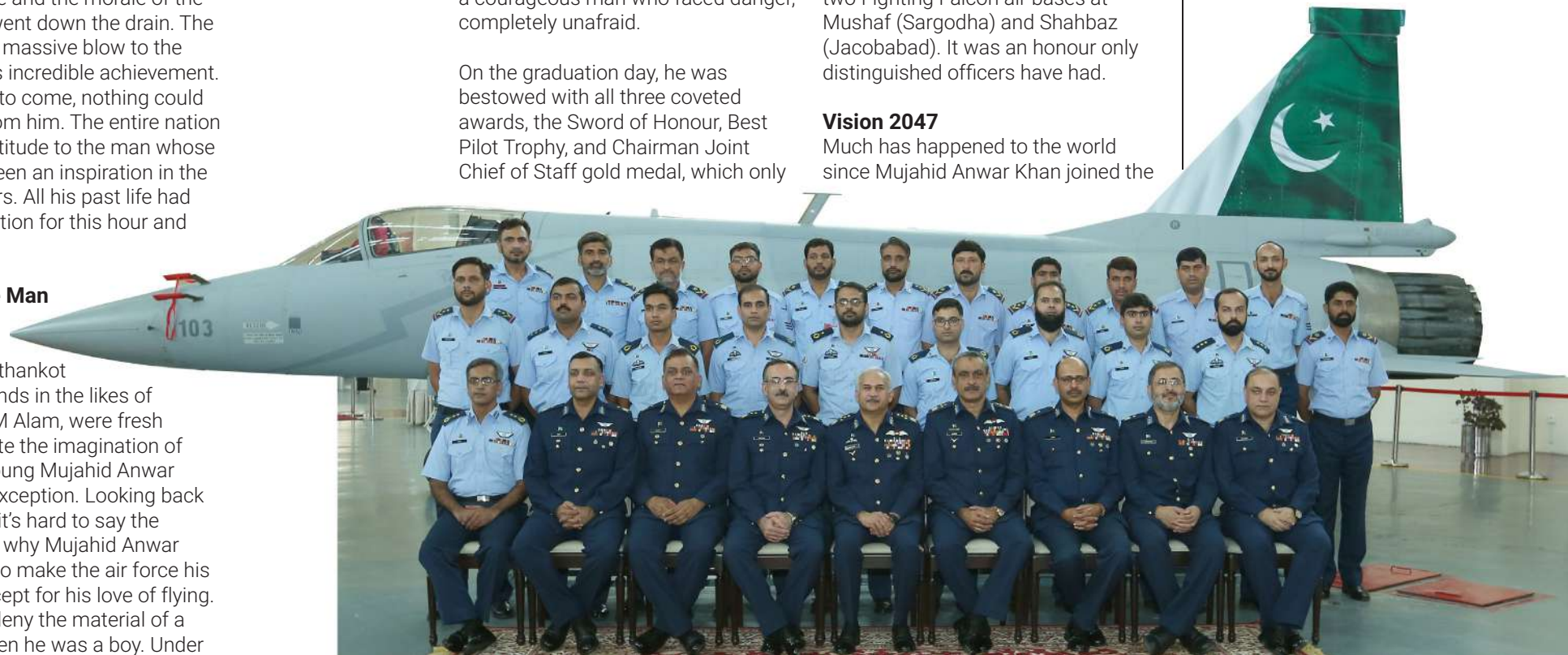
a handful of graduates have been able to achieve in the last 70 years. It was the beginning of an extraordinary career that brought duty with various flying squadrons and he soared as a fighter pilot. His reputation of being a thinking mind, was to follow him throughout his career. Emerging from the Academy as one of the most promising young officers and later well versed in the business of air warfare, Mujahid Anwar Khan, had the privilege of commanding two Fighting Falcon air bases at Mushaf (Sargodha) and Shahbaz (Jacobabad). It was an honour only distinguished officers have had.

Vision 2047

Much has happened to the world since Mujahid Anwar Khan joined the

Enhancing Diplomatic Relations:

- 1: Calling on Sir Lankan Prime Minister Mr Mahinda Rajapaksa during his visit to Sri Lanka.
- 2: Calling on Lieutenant General (Staff) Turki bin Bandar bin Abdulaziz Al Saud, Commander Royal Saudi Air Force at Royal Saudi Air Force Headquarters.
- 3: Receiving memento from Major General Francis Ogolla, commander of Kenya Air Force during his visit to Moi Air Base (Nairobi), Kenya.





PAF. It caught fire, ignited by a few global arsonists, who enjoyed their work. This war we are fighting today, is a war of the air. The whole world knows it and so does Pakistan Air Force. Wars of the future will be more dangerous than ever and threats to freedom and security will be hydra-headed. "Will we be ready?" was the overriding thought that played heavily on his mind.

After taking over the command of the PAF in 2018, ACM Mujahid Anwar Khan was determined to build PAF into a premier fighting force equipped with military technologies ahead of the enemies, ahead of times. And for that he had already envisaged a plan; a vision that materializes with the centenary of Pakistan and PAF. He knew that the PAF of 2047 would need a well-trained and well-honed personnel that could stand head-to-head against the challenges of that time. Not only human resource but also an infrastructure that could absorb the weapon system procurements envisaged for the future. And above all, he knew, that this was the time to nurture the mindset of the force to start thinking 'Futuristically'. Finalising the plan, he embarked upon a three-pronged strategy to meet the vision 2047 for PAF.

PAAK Stands Up

When Mujahid Anwar Khan took over the command, he found that much of the instructions and training imparted to airmen had fallen behind. The hard driving man, with passion for facts, was not satisfied to refight old wars. It was the present and the future, which concerned him. He knew that the pilots may be the spearhead of PAF but on the front line of every battle, are the airmen. He embarked upon a plan to propel PAF airmen into the future, adapting to a constantly changing high-tech world of air combat environment. He envisioned an air force drawing heavily on stealth technologies, next generation training protocols along with artificial intelligence by the year 2047, and for that airmen needed to be trained in the same vein. To accomplish this vision, he laid the foundation stone of PAF Airmen Academy at PAF Base Korangi Creek in April 2019. It was named as PAF Airmen Academy Korangi Creek (PAAK). In a brief period of less than a year the Academy started to function as per the envisaged plan. It is considered to be a paradigm shift in the domain of basic training for the airmen. It would promote standardization of the training regime, inter-trade harmony between the various airmen trades and above all comradeship. Moreover,

Inauguration of Various Projects:

1: Along with President of Pakistan unveiling the plaque of Fazaia Ruth Pfau Medical College, at Karachi.

2: Along with Mr Asad Qaiser, (Speaker of the National Assembly) laying the foundation stone of Alamabad Welfare Project at Swabi.

3: Along with Ambassador of China inaugurating the JF-17 Dual Seat Dynamic Simulation & Integration Facility at PAC Kamra.

4: Along with ex-Air Chiefs' unveiling the plaque of 'Centre for Aerospace and Security Studies'.

Right: Always in the Middle of Action- Getting ready for another combat operational training mission. (Photo: Awais Lali).

the organisational structure of airmen training in PAF was redefined by bringing together all basic training schools under one umbrella, thus paving the way for envisioned Next Generation Training program. The Air Chief is lucky enough to see his vision bear fruit, as the first batch of Aero Apprentices passed out from the new Academy in December, 2020. Addressing at the occasion, the Air Chief said that the event was a significant milestone towards achieving a new training paradigm under PAF's Next Generation Training Program. He further added that being first of its kind institution in the region, PAAK aims not only to produce proficient technicians but also develop "Thinking Airmen", capable to work in a technology-intensive environment.

PAF's Indigenous Programs

While the training remained under his radar for quite some time, the significance of indigenous manufactured state-of-the-art aerial platforms was also one of his top priorities. Much of his plans stems from experience and the fact that while battles will be fought on land and sea they will not be won without supremacy in the air. PAF's various indigenization programs bore fruit under his secure leadership. Formulating a proactive strategy that would bring an enemy to its knees, quickly and efficiently, there would soon be a new noise in the sky, rich, powerful and reassuring; the JF-17 Thunder Block-3. It represents a quantum leap in aerial warfare for the PAF, which is now acknowledged by the world as the combat-proven aerial platform. With enormous potentials including the superb Beyond Visual Range (BVR) capability, the new Thunder, is a real match for any modern jet. With its induction, the PAF has already entered the incredible world of 21st century aerial combat. Also during his command, the much awaited dual seater JF-17 'Bravo' joined the PAF fleet. Besides, PAF's indigenous and proud project by the name of 'Project Azm' to develop a fifth-generation fighter aircraft also remained on track under his able leadership.



1. A Compassionate Leader: Interacting with the special children during International Day of Persons with Disabilities.



2. Along with General Qamar Javed Bajwa, COAS, at AHQ Islamabad.



3. International Recognition: Being awarded with 'Turkish Merit of Legion' by Turkish Air Chief at Ankara, Turkey.



4. Wherever he went, he was greeted warmly, with smiles, such is his personality.



5. Promoting Cordial Relations: Being patched by Chinese commander during Shaheen-IX exercise at a PAF operational base.

6. A Leader Never Forgets the Sacrifices: Paying Tributes at Martyrs Monument at AHQ Islamabad.



7. Always on Target: Just as in the air, the Air Chief demonstrates what precision shooting can do, during a visit to home of SSW.



8. Taking Stock-First Hand: In the cockpit of JF-17 Bravo during an operational training exercise.



9. Always on the Move: Inspecting the far-flung PAF Base Qadri at Skardu.



10. Being Honored: Reviewing the guard of honor, presented by Sri Lankan Air Force, at Colombo Sri Lanka.



A Collage of Air Chief's Major Engagements

CENTAIC-Another Milestone

As a visionary leader, the Air Chief knows that Fighting Falcons may be the most advanced jets and that the future fighter, Thunder, may already be here, but they will not survive against enemies that have accelerated the use of Artificial Intelligence (AI) in aerial warfare. The global arms race in the backdrop of AI poses a new existential threat to the country's defence. He is cognizant of the fact that long before someone puts Pakistan to the test and exposes its Achilles Heels, we have to be prepared. That's why he wants to put PAF in the driving seat by planning and developing advanced capabilities instead of catching up later. Instrumental in leading the Air Force into the future, ACM Mujahid Anwar Khan established the Centre of Artificial Intelligence and Computing (CENTAIC), where AI will stress its existence for the coming years in combat platforms. As the manpower-centric strategies in warfare are replaced by technology-centric operations, learning is multifaceted gamut at CENTAIC. Here, software programming and AI centric applications will familiarise aircrew with a



multitude of battle systems required during air operations. With the objective of obtaining full spectrum of dominance, its roles will also extend to guarding military infrastructure against cyber-attacks.

Clean, Green and Compassionate PAF

While Mujahid Anwar Khan foresaw the need for a futuristic PAF that became capable of rapid expansion, he answered the call for duty again. This time PAF wore team jackets with the Government of Pakistan to save the country from the biggest challenges humanity has ever faced - climate change. As a little boy, he remembered how serene the woods were

Top: Along with Chinese Ambassador and officials at the roll out ceremony of JF-17 Thunder dual seat aircraft at PAC Kamra.

Bottom: Leading a group of combat crew at PAF Base Qadri at Skardu.



Top Left: Inaugurating the tree plantation drive in PAF as part of 'Clean, Green and Compassionate' campaign at AHQ Islamabad.



Top Center: During a bilateral exercise between PAF and TuRAF being held at an Operational Base.



Top Right: You cannot help but respect their cause and wish to make it your own - ACM Mujahid Anwar Khan raises slogans along with combat crew during visit to PAF Minhas.



Centre: Receiving guard of honour at PAF Academy Asghar Khan.

Bottom: Along with Mr Nong Rong, Chinese Ambassador, and other senior military officials during JF-17 Dual-Seat Completion & Block-III project commencement ceremony held at Kamra.





Above: As a visionary leader, Air Chief took proactive measures to curtail the spread of COVID-19 menace in PAF.

Top Left: Dream Comes True-Envisaged just an year ago, the PAF Airmen Academy becomes fully operational in December 2020. ACM Mujahid Anwar Khan along with faculty and award winning students at the PAAK, Karachi.

Bottom: You cannot take away the passion of fighter flying away from him for long-Air Chief poses in front of a JF-17 Thunder at an operational base.

Right Page: A Thinking Man: Always ahead of Times, ahead of Challenges.

and how trees kept out the noise. On school trips to Rose and Jasmine garden in Islamabad, he would often plant trees. Over the period he has not forgotten it at all. Soon after assuming command of the PAF, the Air Chief came up with the slogan of 'Clean, Green and Compassionate PAF'. Knowing well that there's no life without green, the PAF responded to his call. Saplings were planted in and around PAF bases across the

shade, and thank the trees for giving them clear air and water. As for him the 'Clean' not only means the cleanliness of the surroundings but also the cleanliness of minds, hearts and above all, to be clean while discharging routine duties. Besides clean and green, the organisation and its leadership has to be compassionate as well. This is what ACM Mujahid Anwar Khan has always believed in his life.

country so that future generations could enjoy their

Officers who have worked closely with him know that anyone occupying such an elevated



position would have been up right, exercising authority. But, one thing that impressed his team, was his humility. He urged those he led, to surround themselves with humble people, stay committed to the mission and regard humility as their biggest strength.

COVID-19 Trials

As the unprecedented Covid-19 pandemic engulfed the world, ACM Mujahid Anwar Khan was faced with one of the biggest challenges of his career. As the pandemic spread like a wild fire across countries, it increased the risk of the communicable virus spreading across the ranks of PAF as well. In December 2019, when the world leadership was still undecided on tackling the issue, as a visionary leader, he knew what to do. He raised his concerns in meetings while talking to his air staff and started to devise a proactive strategy to face the impending challenge. He ordered to revamp, restructure and revitalise the PAF medical facilities to cope with the pandemic. In March 2019, he decided to lockdown all bases across the country to ensure that PAF minimized the risk of the Covid-19 spreads.

PAF personnel were ordered to incorporate social distancing as much as possible. Strict protocols were introduced all across PAF to curtail the spread of this deadly disease. Negligible number of cases among the PAF personnel were reported during the first wave, which is the testimony of his successful proactive plan. Moreover, one of the salient feature of the strategy was to ensure that the PAF's mission of safeguarding the aerial frontiers of country always remain on track. While the training continued in a safe and effective manner with unwavering commitment and incomparable dedication, the Air Chief continued to review decisions, boldly rising to every challenge, taking proactive steps to control the spread of the deadly disease. Faithfully following his lead, the air force continues to drive results during the second wave of the deadly virus.

Pakistan Air Force has come a long way. Even with meagre resources and against staggering odds, it has

continued on its quest to develop cutting edge human resource, weapon systems and infrastructure, under command of intensely sincere and patriotic Air Chiefs. However, the PAF stood a little taller under the charismatic leadership of ACM Mujahid Anwar Khan, who has successfully raised its 'Second to None' image to new heights. He has trained, developed and inspired some of the finest airmen in the world. He forged PAF's readiness and lethality, moulding warriors, honing their skills, sharpening their minds and helping them reach their full potential as individuals, who have pledged their lives to defend their country. PAF personnel found in him what they were beginning to discover in themselves, a spirit of intense determination. An unremitting enemy of enemy aggression,

he always wished to be on the front besides his comrades.

During Operation Swift Retort, PAF's response was swift and calculated, one that reflected the awareness of a great commander and his understanding of both, war and peace, as a visionary leader.

Operation Swift Retort may have passed into history, but if PAF is ever compelled again to take up arms against the adversary, one thing is for sure; its service members, stronger in their purpose, will always be ready... thanks to the remarkable leadership of ACM Mujahid Anwar Khan.



Remembering PAF's FIRST FIGHTER 'TEMPEST' II

“Hawker Tempest was the first fighter aircraft of fledgling Pakistan. It played the most important role, when the country was being established, becoming the foundation of Pakistani fighter arm. For decades it remained in oblivion due to a rather unglamorous period of service, overshadowed by the feats of 1965 war. Nevertheless, apart from its early role as a combat aircraft, it also gave a necessary experience to a whole generation of Pakistani pilots, who were trained on the type for several years. This is the story of the first fighter aircraft and all the pilots, engineers and technicians of the nascent Royal Pakistan Air Force who remained associated with it.”

by Franciszek Grabowski

In the late 1930s the Royal Air Force issued specifications for induction of a new fighter aircraft. The selected aircraft was Hawker Tornado but numerous teething problems and snags of Rolls Royce Vulture engines ended the programme. An alternate version with Napier Sabre engine named Typhoon was developed in parallel, but it turned out to have poor performance at higher altitudes and

saw use for ground attack missions instead. To improve performance, a new wing with laminar flow was developed. A new aircraft called Tempest V entered service late in the WWII proving that it was a capable high performance fighter, able to cope with the early jet powered aircraft.

The next version to enter production was Mk II with over 53 litre, 18 cylinder twin

row radial Bristol Centaurus engine producing 2,520 hp. It could reach 440 mph (380 knots) at 17,000 ft. The aircraft was tropicalized for the service in the Far East, but arrived too late to see combat service against Japan. Thus Tempests soldiered on for a few years in various corners of the British Empire, gradually being replaced by more modern fighter jets. In 1947, when the sub-continent was rising to independence, the British offered the aircraft to the emerging countries, India and Pakistan.

The pre-partition Royal Indian Air Force operated a number of Spitfires. These aircraft were leased by the British and recovered from the RAF scrap yards in India, where they were dumped after WWII. Immensely popular Spitfires were a dream of any pilot at the time. Nimble, potent, easy to fly, with the glamour of the ever winning fighter with a particular fame of the Battle of Britain. They were loved by all Indian pilots, including Pakistanis to be.

Meanwhile, political developments led to a creation of sovereign India, and to separate its Muslim provinces to create a new state of Pakistan. Although, initially the British insisted that both states should keep undivided armed forces, this soon became utopia. Negotiations started to divide military assets including the two airforces. An internal discussion to choose best available aircraft from the assets of RIAF commenced in the RPAF leadership. It seems Spitfire was favoured, and Pakistan wanted to take over ex-RAF Spitfire XVIII's stored in crates at Karachi. Nonetheless, Air Cdre Mohammad Khan Janjua (Service No 1561) single-handedly changed the



decision in favour of Tempest. Although controversial, it seems it was a wise decision.

Tempest, although not as pleasant to fly as Spitfire, was a high performance and heavily armed fighter. Moreover, the radial air cooled engine was much better suited for hot weather, and less complicated in maintenance than liquid cooled engines of Spitfires. The latter were known to have problems with overheating, despite being fitted with larger tropical radiators. Thus, following lengthy negotiations it was agreed that Pakistan will take over 35 Tempest IIs out of Royal Indian Air Force's inventory inherited from the RAF. Units also had to be shared, and it was agreed that Pakistan would take over two RIAF fighter Squadrons. No 9 was a favourite of the then Sqn Ldr Mohammad Asghar Khan (Service No

1653), who led it for a while in 1945, but this caused no controversy. Nonetheless the fact that Pakistan had to take over the prime Squadron of India, No 1, caused a lot of dismay in the RIAF. Seemingly by a gentlemen's agreement, only physical assets were taken over, while all the regalia was returned to India. The Squadron was then duly renumbered as No 5 Squadron RPAF. Both Squadrons were formally established on 15 August, 1947, at Peshawar, then one of the main Bases of RPAF, although without the aircraft that had to be delivered at a later date.

The day before, at a maintenance Base at Drigh Road, Karachi, a small number of RAF Tempest IIs from 320 Maintenance Unit (MU) were painted in temporary RPAF markings. These included the MW419,

Inlet 1: Tempest A128, the very first Tempest of the batch ordered at Hawker Aircraft Limited in 1948. (Photo: Chris Thomas).

Inlet 2: Line up of aircraft believed to belong to anti-aircraft co-operation or target towing flight. In front, Tempest A147 target tug with striped black-yellow undersides. Then A143/Z and A125, ex-RIAF, apparently repainted in the desert scheme locally. Down the line Sea Furies of No 1 Fighter Bomber Wing are visible. It is likely that the photo was taken during Independence Day parade of 1951 at RPAF Mauripur. (Photo: Turowicz family).



Newly delivered Tempest A132 poses for camera, somewhere around mid 1949. The aircraft was assigned to No 9 Sqn and was flown there by a Polish pilot Flg Off Kazimierz Kozak between July and September of the year. It was slightly damaged when flown by Flt Lt Julian Żuromski on 6 August. (Photo: Chris Thomas).



Aircrew of No 9 Sqn during live bombing exercises around June 1950 pose in front of their Officer Commanding's Tempest, appropriately coded M for Mirza. From left: Plt Off Mohyuddin Pir (991), Plt Off Frederick Alan 'Fred' Isaacs (981), Flt Lt Abdur Rahim 'AR' Khan (2927), Sqn Ldr Nawabzada Haider 'Bertie' Mirza (3171), Flg Off Trevor Harold Gotting (802), Flg Off Mohammad Zafar 'Mitty' Masud (3314), Plt Off Kabir Khan (958). One pilot, Plt Off Mohammad Aslam Janjua (987) missed the photo being in the air at the time. (Photo: Salaar Masud).

PR653 and PR713. They flew past during Pakistan Independence celebrations by the RPAF pilots, including Sqn Ldr Zahiruddin Ahmad (Service No 1672), a newly appointed Officer Commanding of No 5 Sqn.

The exact date of the type to be introduced the RPAF is not known. In the books, the aircraft were

passed from the RAF to the RIAF on 25 September 1947, and immediately after, the RIAF handed over part of them to the RPAF. In reality, the process of selection of aircraft and establishment of squadrons started even before the official declaration of independence, in August 1947. They were then flown to RPAF Peshawar, which became the main station of the air force.

Each Squadron had to have one Flight of 6 pilots and 8 aircraft (4 in use and 4 in the immediate reserve), this was due to shortage of both aircraft and personnel. They formed the Fighter Bomber Wing, and maintenance was provided by the Maintenance Wing at the base. The maintenance centres for both airframes (No 101 MU) and engines (No 102 MU) were based at RPAF Drigh Road in Karachi, more than 800 miles south of Peshawar. Here the aircraft taken over from RIAF stocks were overhauled, as they were in reasonably good condition following a few years of RAF service



A pair of Tempests of No 5 Sqn with A116 in foreground. This is one of the earliest photos of Pakistani Tempests being taken in early 1948. Both aircraft in the standard RAF camouflage of Dark Green & Ocean Grey disruptive pattern and Medium Sea Grey undersides. RPAF serial, standardised RPAF markings and quick recognition markings of two white diagonal stripes on tail and wing roots were introduced in December 1947. (Photo: Syed Masood Ahmad).

and subsequent storage. By early 1949, only 28 Tempests were returned to service with serials A100-A127. Initially all the RPAF aircraft wore original RAF serials, but they were gradually replaced through the remaining months of 1947. Apart from aircraft assigned to combat units, few were assigned to a Conversion Flight at RPAF College, Risalpur for pilots' training, and the rest were kept in reserve.

Although Tempests were not deployed in Kashmir against India, in December, 1947, they received quick identification markings in form of white stripes on wings and fuselage. The same order was officially introduced as RPAF markings. At the same time, RIAF Tempest wore the same camouflage scheme as the RPAF aircraft, with a disruptive green-grey pattern. Also the early 'Chakra' roundels were not easy to recognise from Pakistan's white-green roundels in high stress conditions.

After the Independence, the Tempests were almost immediately deployed for operations against tribesmen in Waziristan, who continued their so-called Faqir of Ipi rebellion that started during the British rule. In December 1947, No 5 and No 9 Sqs provided air cover to the army withdrawing from Razmak during Operation 'Curzon', making 47 sorties out of Miranshah. Other operations included patrolling of rebellious

areas, and attacking targets of opportunity and those indicated by army units. For such operations, an independent detachment of two aircraft was established at Miranshah, operated by the pilots seconded by each squadron in turn.

Later, a deployment of each squadron, consisting of two to four aircraft operated from there approximately for three months. Miranshah could hardly be called an airbase. It was limited to a short airstrip, and a pilots' hut (or rather roof) just next to the walls of Fort Miranshah. Pilots and ground crew lived in the Fort, and aircraft were rolled inside the walls of the Fort for protection against any hostile element. Still, service there was considered an attraction, for the young officers, especially bachelors, without a watchful eye of senior officers. The flying was nevertheless quite intense. During the period of May-July 1948, 60 operational sorties of 39 hours 50 minutes were flown. Over 70 bombs were dropped, as well as over 100 rockets and 4, 600 20 mm rounds were fired.

Apart from combat duties in North West Frontier Province (NWFP), flying at air displays and parades around the country was another important activity. These events were morale boosters and helped to promote the RPAF amongst the people of Pakistan.

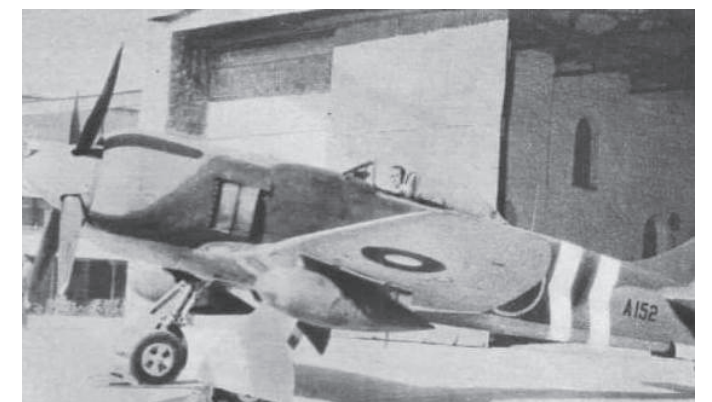
“ Tempest, although not as pleasant to fly as Spitfire, was a high performance and heavily armed fighter. Foremost, the radial air cooled engine was significantly better suited for hot weather, and less complicated in maintenance than liquid cooled engines of Spitfires. ”

No 5 Squadron Falcons

S/L Zahiruddin Ahmad (1672)	Aug 1947
S/L Syed Inam-ur-Rehman Bukhari (2379)	Oct 1948
S/L Mohammad Mazhar Jaffery (3177)	Feb 1950
S/L Julian Kazimierz Żuromski (835)	July 1950
S/L Fuad Shahid Hussain (3002)	Nov 1951



Believed to be Tempests of Conversion Squadron in early 1950s. The aircraft in the foreground, coded E bears an unusual personal emblem, only rarely seen on RPAF aircraft. (Photo: Turowicz family)



A Tempest fighter equipped with long-range fuel tanks. (Photo: PAF Archives).



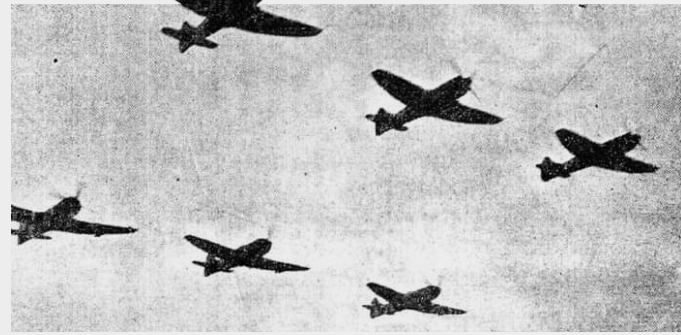
Newly delivered Tempests are being armed with rockets during a photo session done in the Spring of 1949. (Photo: PAF Archives).

Noticeably, No 9 Sqn took part in an air show in Lahore on 21 March 1948, with Flt Lt Abdul Naeem Aziz (Service No 1907), Flt Lt Abdur Rahim Khan (Service No 2927), Flg Off Masroor Hosain (Service No 3001) and Flg Off Fuad Shahid Hussain (Service No 3002) making the formation. Few weeks later, on 13 April 1948, the squadron presented a smartly turned out guard of honour to the visiting Governor-General, Quaid-i-Azam Mohammad Ali Jinnah, at Peshawar. Two days later the squadron pilots participated in a fly past in the honour of the Quaid's visit to Risalpur, where he called upon the RPAF to be 'Second to None'. In a similar vein, on 14 August, 1948, No 9 Sqn carried out a fly-past over Karachi during celebrations of the first anniversary of Pakistan's independence. Interestingly, the radio set in the aircraft of formation leader, Sqn Ldr Abdul Naeem Aziz failed, but the display was performed according to schedule.

Soon after independence, the developing conflict in Kashmir led to an expansion plan envisioned by AVM Allan Perry Keene, the first C-in-C of the RPAF. It seemed obvious that the conflict would escalate, and that the RIAF will try to take control of the airspace over the disputed territories. Two new fighter squadrons were to be formed, No 14 and No 15. No 11 was reserved for Brigand Squadron, and No 12 for Halifax Squadron, with

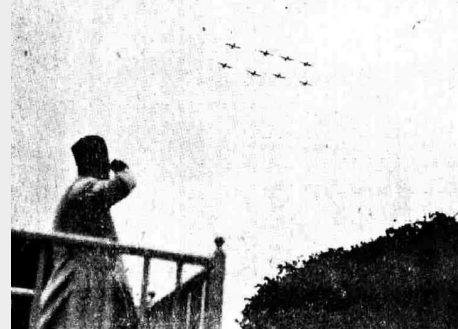
No 13 omitted for obvious reasons. Such an expansion was not possible without sufficient aircrew. Although the

RPAF desperately tried to train as many pilots as possible, the training period of one year for each class did not allow to quickly fill vacancies. The solution was to hire Polish aircrew, who remained in exile after Poland was taken over by communists backed up by the Soviet Union. Having limited possibilities of employment in crisis ridden Britain, they enthusiastically responded to the Pakistani offer. During December 1948, nearly 70 ex-Polish Air Force airmen and aircrew started to arrive. Few of the pilots were assigned to fighter squadrons. At the same time Pakistan acquired 24 Tempests that were struck off RAF charge and overhauled by Hawkers. This was a necessity, as the available aircraft did not allow to cover the needs of the expanded RPAF. Awaiting new arrivals, on 1 November 1948, No 14 Squadron was formed at Peshawar. Just four days later the first encounter between RIAF and RPAF aircraft took place, when two RIAF Tempests attacked a lone No 6 Sqn Dakota flown by Flg Off Dogar. Later, No 14 Squadron was disbanded on 15 January, 1949, and number plated. The reason was the fact that the unit lost two Tempests during



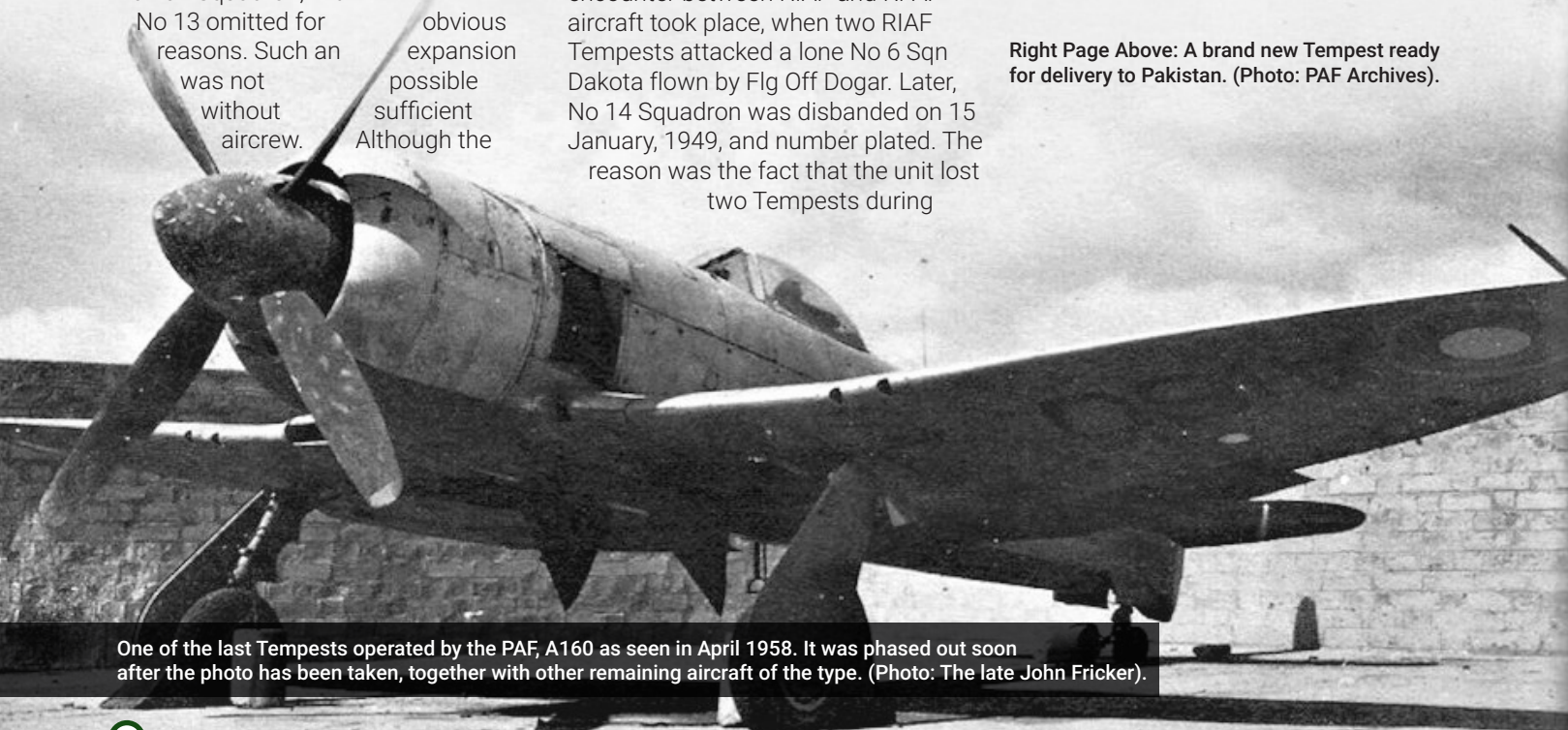
No 14 Sqn Shaheens now Tail Choppers

S/L Mohammad Khyber Khan (2133)	Oct 1948
S/L Julian Kazimierz Żuromski (835)	Nov 1949
S/L Ronald Duncan Rollo (1864)	July 1950
S/L Masroor Hosain (3001)	Nov 1951



Above Inlets: Prime Minister Nawabzada Liaquat Ali Khan receiving ceremonial salute from the formation of RPAF Tempest aircraft during Independence Day Celebrations at Karachi, 1950. (Photo: PAF Archives).

Right Page Above: A brand new Tempest ready for delivery to Pakistan. (Photo: PAF Archives).



One of the last Tempests operated by the PAF, A160 as seen in April 1958. It was phased out soon after the photo has been taken, together with other remaining aircraft of the type. (Photo: The late John Fricker).



1: Tempest A165 force landed following a test flight at Forward Maintenance Unit, RPAF Chaklala, probably late Summer 1952. The aircraft belonged to the last batch of Tempests bought from the RAF stocks in Malaya in 1951. (Photo: late Jacek Stański).

2: Tempest A137 of Conversion Squadron of RPAF College Risalpur being recovered following a tip over in the Summer of 1949. The exact date, pilot nor circumstances are known. The aircraft was assigned to the Squadron just after delivery, in March 1949. (Photo: late Mike Gorzula)

3: Tempest of Conversion Squadron of RPAF College Risalpur following a belly landing in the Summer of 1949. The exact date, pilot nor circumstances are known. (Photo: late Mike Gorzula).

December, and with no replacement aircraft, the situation became critical. The freshly acquired Tempest aircraft started to arrive only in March, 1949, and were immediately assigned to combat units. They were given serials A128-A151 and were easily distinguishable by their Desert Scheme. Recognition stripes were not applied.

The new commander, AVM Richard Atcherley, stressed upon rigorous training of aircrew. Extended courses had to be undertaken at all the training units. Each graduate was trained on Tempests in the Conversion Squadron at RPAF College of Flying Training, Risalpur, regardless of future assignment to fighter squadron or not. The Conversion Flight was upgraded to a squadron level, operating three Tempests. One of the results of the policy was that only a few Polish airmen made it to fighter units, against the initial plan. The rest were dispersed between various units to fill vacancies. Most of them left Pakistan by the end of 1949. Additionally, AVM Atcherley arranged to have a single Tempest assigned for





his personal use and was based at RPAF Drigh Road. He was often seen flying over Karachi boosting the morale of both civilians and RPAF personnel.

In May, 1949, the contest for the first Inter Squadron Armament Trophy known as Perry Keene Trophy took place. In a rivalry between No 5 and No 9 Squadrons, the latter had the upper hand. The victorious team consisted of Sqn Ldr Aziz ur Rehman Khan (2358), Flt Lt Fuad Shahid Hussain (3002), Flg

Off Imtiaz Hussain Khan Agha (3406), and a Pole, Flg Off Stefan Tronczyński (841).

Gradually, the situation of the RPAF improved. Induction of new aircraft allowed for increased training and operations, and vacated positions were gradually filled with newly trained pilots. At least four of the remaining ex-RIAF aircraft were returned to service during 1949. They were assigned serials following the Hawker's batch aircraft, the highest known being A156.

“ At the time of Independence, No 5 and No 9 sqns were the first and the only fighter sqns of RPAF which were equipped with Tempest aircraft. No 14 sqn was the next unit that was raised within a year and received these fighters. ”

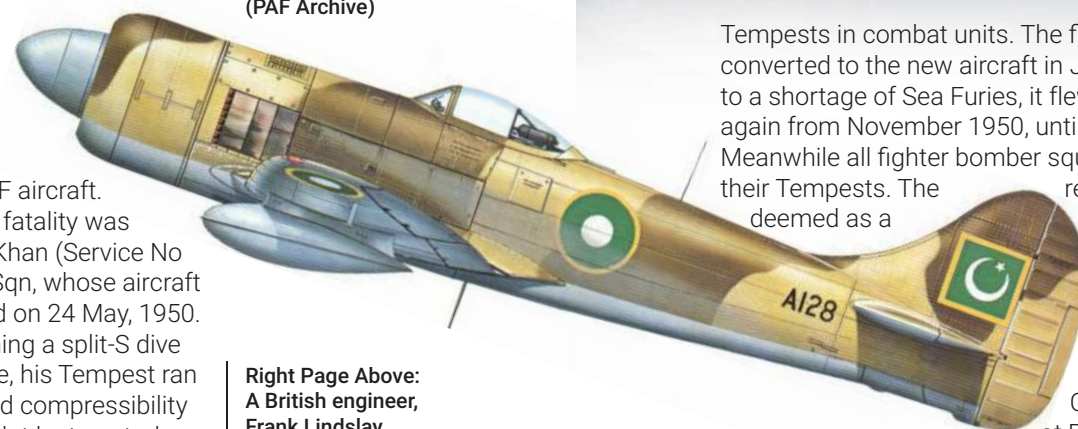
It seems they were overhauled using newly acquired spares, and possibly cannibalised parts of written off aircraft, prior to being assigned to combat units.

With an improved technical and personnel situation, No 14 Sqn was reactivated on 16 December, 1949, under the command of Squadron Leader Julian Kazimierz Żuromski (835). The squadron left for Miranshah on 24 March, 1950, on its first operational deployment against insurgency of the Faqir of Ipi.

There is very little information available on accidents and losses of RPAF aircraft. One identified fatality was Plt Off Ghani Khan (Service No 865) of No 9 Sqn, whose aircraft fatally crashed on 24 May, 1950. While performing a split-S dive at high altitude, his Tempest ran into high speed compressibility effects. The pilot lost control, and the aircraft broke up.

Starting from October, 1949, Pakistan took delivery of the first batch of 50 Sea Fury fighters. These planes ultimately replaced

Left: Nawabzada Liaquat Ali Khan, Prime Minister of Pakistan, is inspecting fighter arm of the RPAF, accompanied by AVM Atcherley and W/C Nur Khan, during Independence Day celebrations of 1950, RPAF Mauripur. Tempests, likely of No 14 Sqn, are visible, down the line are newly introduced Sea Furies of No 5 and No 9 Squadrons. (PAF Archive)



Right Page Above: A British engineer, Frank Lindsley, extreme right, with overhauled Tempest A123. No 102 Maintenance Unit, RPAF Drigh Road 17 August 1950. (Photo: Nick Lindsley).

No 9 Sqn Dragons now Griffins	
S/L Mohammad Ibrahim Khan (1748)	Aug 1947
S/L Balwant Kumar Dass (1673)	Dec 1947
S/L Abdul Naeem Aziz (1907)	Mar 1948
S/L Aziz ur Rehman Khan (2358)	Feb 1949
S/L Abdul Majeed Khan (1913)	July 1949
S/L Nawabzada Haider Mirza (3171)	Dec 1949
S/L Abdur Rahim Khan (2927)	July 1950
S/L Zafar Ahmad Chaudhry (3095)	Sept 1950



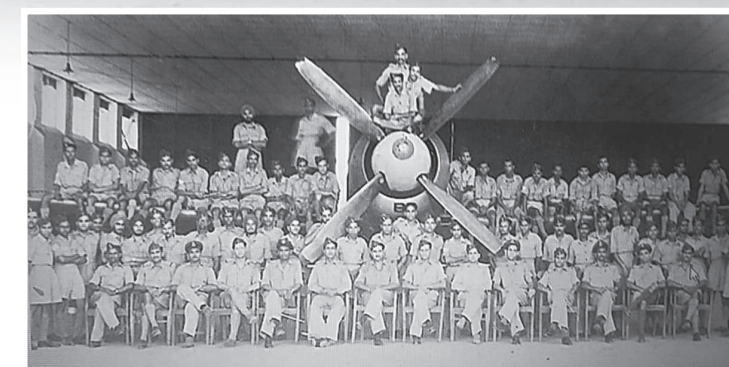
Bottom: Another shot of target towing flight aircraft displayed at RPAF Mauripur A139/T, former PR809, closest. Possibly the former aircraft of Flg Off Trevor Harold Gotting (802) of No 9 Sqn. (Photo: Christer Landberg).



Tempests in combat units. The first Squadron, No 9, converted to the new aircraft in July 1950, but due to a shortage of Sea Furies, it flew Tempests once again from November 1950, until February 1951. Meanwhile all fighter bomber squadrons phased out their Tempests. The remaining aircraft, deemed as a reserve, were stored at Equipment Depot, RPAF Chaklala. Some of them continued service for a while in the Conversion Squadron at Risalpur, and were then relegated to second line duties like target towing or as instructional airframes.

The delivery of the final batch of 21 Tempest aircraft, acquired from RAF stocks in Malaya, started in November 1951 and continued for an year. Following a long period in storage the aircraft were in bad condition and at least three were lost during the delivery flights. It is not known if all of the remaining aircraft were restored, or if a part of them were reduced to spares, the highest known serial being A165.

In September, 1953, No 12 Heavy Bomber Squadron was converted into Composite Squadron. In the new establishment, the Squadron had three flights: Air Headquarters Communication Flight operating Dakotas and a single Viking, Target Towing Flight with Tempests, and Heavy Bomber Flight flying Halifaxes. The last target towing Tempests were struck off charge in 1958. Unfortunately none survives to the present day.



Above: No 1 Squadron RIAF during their Tempest Conversion at Peshawar in April 1947. The Squadron was later handed over to Pakistan and renumbered as No 5 Sqn. Ldr Ranjan Dutt is seen sitting below the nose of the aircraft to the right. Flt Lt G K John, flight commander is slightly to the left under the nose. Others in the photo include Plt Offrs L M Katre (later CAS IAF), S R Power, (Photo: Ulrich D'Cruz).



No 5 Sqn RAF during the pre-partition period. Their aircraft later ended up in a pool distributed between India and Pakistan. (Photo: PAF Archive).

Tempests, the first combat aircraft of Pakistan, was somewhat tricky to fly. Its agility and maneuverability made it a favourite of many pilots but its high performance did not come without a price. It was tricky to fly due to the tendency to swing on landing. Some pilots complained about the condition of the aircraft and crude finish of wartime production standards. Centaurus engines turned out to be temperamental and caused a lot of problems, partly due to a lack of spares and proper servicing. The replacement Sea Fury was found to be a superior aircraft in all respects. The last surviving Sea Furies remained in combat use until 1964.

Colours & Markings

The original 35 aircraft inherited from RAF stocks were painted in RAF colours. At the same time the RAF used two schemes: the Day Fighter Scheme, with Dark Green and Ocean Grey disruptive patterns with Medium Sea Grey under surfaces. The second was the Silver scheme with all surfaces painted silver. However, there is no evidence of the use

of the Silver scheme on Pakistani Tempests.

National markings consisted of the Pakistani roundel, white and green with yellow outline on wings and fuselage. On the tail was a green square with yellow outline and a white crescent with star. On both sides of the aircraft, the crescent faced to the rear. Serials were painted in black on fuselage sides and on wings under surfaces in a typical RAF pattern of that time. They were introduced on 6th December, 1947.



Left: Wing Commander M Akhtar Station Commander, RPAF Peshawar, presenting the Air Commanders' Trophy to Squadron Leader A R Khan, leader of the winning No 9 Squadron. (Photo: PAF Archive).

Inlet: 60 lb rockets were a popular weapon used against tribal insurgents. The whizzing sound of fired rockets provided an additional psychological effect. (Photo: PAF Archive).

Bottom: A146, previously PR897, photo taken during the delivery. (Photo: hawkertempest.se).

Right Page Above: A formation of RPAF Tempests during a Independence Day Parade. (Photo: PAF Archives)

roots, but it is uncertain if it is a variation of the above marking or unrelated. Starting from 1949 those markings were gradually removed.

The 24 aircraft that were delivered from Hawker were painted in Desert Scheme of Dark Earth and Middle Stone disruptive pattern with Azure Blue under surfaces, and Azure Blue spinner. They did not receive identification stripes. Due to infrequent painting, repairs, and routine maintenance, aircraft started to look rather worn towards the end of their service.



It seems, after 1950 following the withdrawal of Tempests from operational units, the aircraft were gradually repainted in silver. Target tug aircraft had under surfaces painted in a single colour, possibly yellow or red.

Spinners were painted in squadron colours, No 5 Sqn dark blue and No 9 Sqn - red. The colour of No 14 Sqn is not confirmed. It should have been yellow, but photos suggest it was white or Azure Blue. Due to frequent movement of aircraft

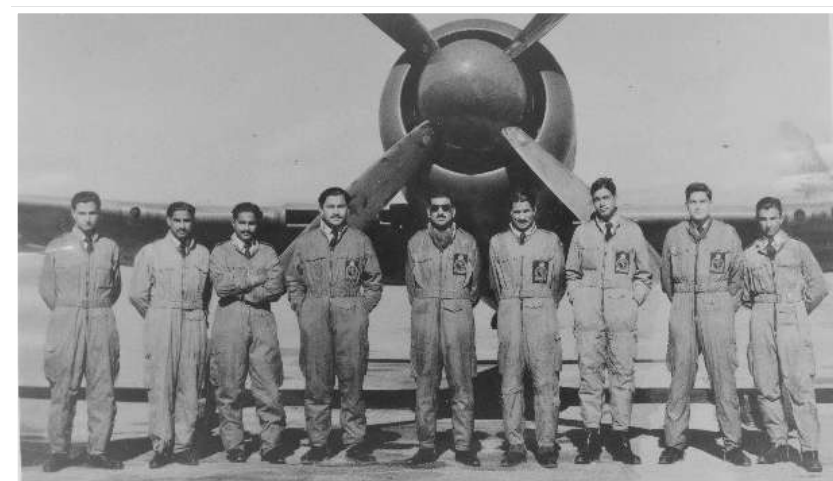
between the units, 'wrong' colours may have been seen. No squadron emblems, popular on Sea Furies, were noticed on Tempests. There is a single photo of a Tempest showing an emblem on the cowling, which cannot be tied with any unit, possibly a personal marking.

Squadrons used code letters in white in front (to nose) of the fuselage roundels and in black on front bottom cowling. Later, in 1949, with the removal of identification stripes from the tail, code letters

“ The delivery of the final batch of 21 Tempest aircraft, acquired from RAF stocks in Malaya, started in November 1951 and continued for an year. Following a long period in storage the aircraft were in bad condition and at least three were lost during the delivery flights. ”

moved after the roundel (gradually on old aircraft, and immediately on newly delivered ones). It seems that white section on the bottom of the front cowling was added as a background to the code at the same time, but no clear rule could be deduced. Only some aircraft received codes, probably those assigned to particular pilots, even if flown on an availability basis. Favourite letters were used, e.g. **M** for Sqn Ldr 'Bertie' Mirza, **H** for Flt Lt F S Hussain or **Z** for Flt Lt Zafar Chaudhry.

Whether the Tempest evoked strong affection or profound dislike in the pilots who flew it, it was a deadly partner of the Hurricanes, Spitfires and Furies of those times. This front line aeroplane had the armour and the firepower, qualities which made the Tempest deadlier in the hands of the PAF, determined to resist to the last man. It gave a new lease of life to a nascent Royal Pakistan Air Force and thus has acquired a significant place in the history of PAF.



No 9 Sqn pilots around January-February 1951, when the Squadron briefly reverted to Tempests. From left: Plt Off Zulfiqar Ali Khan (1088), Plt Off Zahir Massey (1091), Plt Off Nazir 'Bill' Latif (1081), Flt Lt Syed Muhammad 'Boss' Ahmad (2880), Sqn Ldr Zafar Ahmad Chaudhry (3095), Flg Off Saeed Ullah Khan (3241), Plt Off Trevor Harold Gotting (802), Plt Off Frederick Alan 'Fred' Isaacs (981), unkn. Quite prominent are patches worn by Red Dragons aerobatic team members, which made its debut on 2 May 1951 already on Sea Fury aircraft. The name of the team originated from the Squadron emblem and call sign, as well as red spinners. (Photo: PAF Archive).

Analysing Stealth Platforms

NOW YOU SEE ME...

NOW YOU DON'T

“ Since 1903's rise of the Wright Flyer, next big thing was the 'invisibility' cloak. It has been a rough road with more failures than success. At the juncture of history, where we stand today, success of high-tech military aviation jets are dictated by the Low Observable. This article glides through the ebbs and flows of Stealth maturity phases.

by Fahad Masood, MRaE Squadron Leader (R)

Doing Mach 1.4 at 50,000 feet, heading 074 degrees, time 0549 local, I can see the first twilight on the eastern horizon. Securely strapped in ACES 5 Next-Gen ejection seat, I feel safe. It seems like nothing can disrupt my 'inner' peace within my two and a half feet office of JF-47 Stealth Condor. While pondering upon the magnificence of the cosmic intelligence, my golden silence was disturbed by the MAWS and SPJ of my avionics suite blaring indicators on my single screen MFD and sirens in my Gentex HGU-55/P helmet. Looking at

my two o'clock, through my sensor-fused, integrated day/night camera, active matrix LCD HMD/S, I pick contact with two incoming SA-21 Growlers from S-400 SAM batteries vectoring towards me. "How in the heavens did they track me?" is the thought ringing in my head as I take evasive maneuvers, switch-tasking my way from upping my ECM pod to snapping into the incoming volley of projectiles. Few crucial seconds pass in my RPD (Recognition Primed Decision-making), briskly revising the kinematics of the probable incoming launch is on the dot.

The Northrop B-2 Spirit, also known as the Stealth Bomber, is an American heavy strategic bomber, featuring low observable stealth technology designed for penetrating dense anti-aircraft defenses. Designed during the Cold War, it is a flying wing design with a crew of two.
Photo: Aviation picture DAN Foster

SAM launches up to this point have been more or less standard protocol, recommending a pull to an orthogonal flight path 04 seconds prior to missile impact to overshoot the missile and create sufficient miss distance to negate the effects of the detonating warhead. Followed the training by the book! And well! **It worked!**

Deliberation on 5th Gen fighter aircraft (FGFA) has been doing its rounds on variations of media. The all-important differentiating facet of 'Stealth' has been at the fore-front of all other features. Let's start off by clarifying that 'Stealth' means 'Low Observable' (LO). Till date there is no aircraft which

"Knock it off!" call rings out on guard channel and the whole training exercise is over. All done in a canned environment made to look as real as possible to attain maximum training benefit with a fully integrated EWTR (Electronic Warfare Testing and Training Range). Once back on ground, debrief done, valid lessons learnt, **NOW** the MISSION is over!

is completely invisible to the naked eye nor to any and all radars. Since surfacing of F-117 Nighthawk to B-2 Spirit 'Flying Wing' to present-day F-35 Lightning II to Su-57 Felon, all boast of stealth features. Let's have a brief purview of how did it all began and its effect on the fighter arena on a global scale.

A Time Long, Long Ago

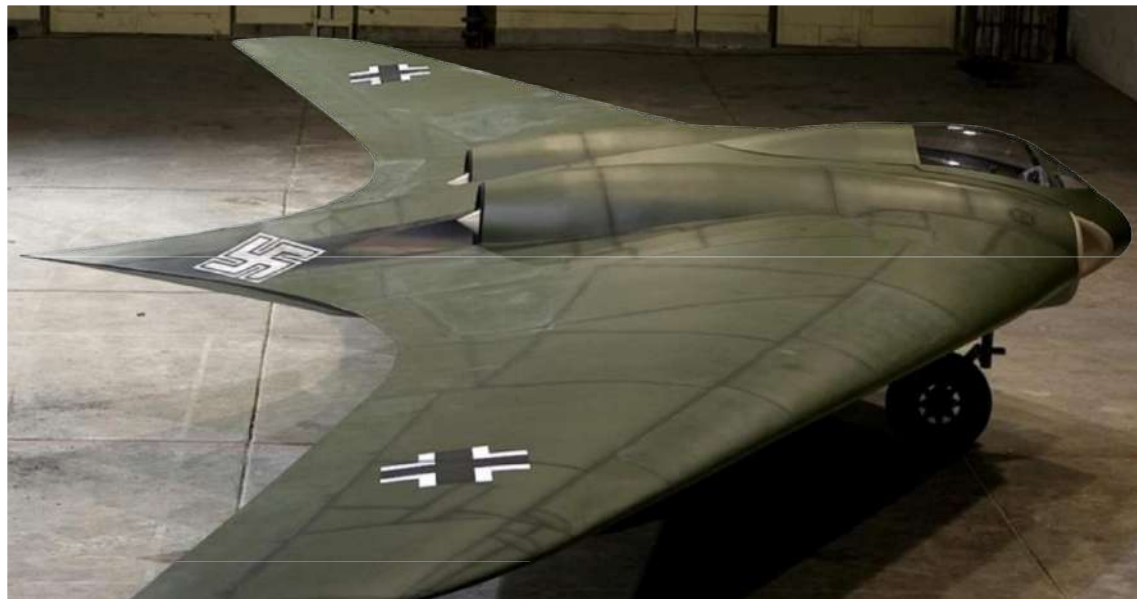
From earliest attempts made by Germans post WW-I with 'Cellon' for visual stealth on Horten Ho 229 flying wing fighter-bomber (Probable progenitor of B-2) with aim to reduce radar tracking, none have been as successful as Skunk-works F-117 Nighthawk.

Basic Types of Stealth Technology

There are two main roads to achieving Low Observability...

1. Stealth by design
2. Stealth by material

Both have been used in coherence by designers and manufacturers to attain



Right Page: The Lockheed SR-71 "Blackbird" is a long-range, high-altitude, Mach 3+ strategic low observable reconnaissance aircraft developed and manufactured by the American aerospace company Lockheed Corporation. It was operated by both the United States Air Force and NASA. (Photo: hotcars.com)

the objective. It is not a singular, isolated technology but a wide array of technologies, used in combinations, that can greatly reduce the distances at which an aircraft can be detected; more so RCS (Radar Cross Section) reductions, but also acoustic, thermal, and other aspects.

Skin to manufacture stealth is made up of or corners covered with RAMs (Radar Absorbent Materials). There are also RAPs (Radar Absorbent Paints) which are coated on fighter aircraft. Both are used in confluence to attain desired objective. Polymer matrix of ferromagnetic particles are used by militaries globally. Another type is neoprene sheet containing ferrite or carbon black particles used in early

versions of F-117A. At present, computational technology has raised the bar to an even greater level. Echo 1 seems like stone-age tech for the likes of artificial intelligence architectural algorithms employed in computational fluid dynamics (CFDs) of today. Synergistic effect of present day technological competencies enable ease of designing, manufacturing, trial and testing.

Past Challenges Overcome

Two major challenges to becoming LO:

1. Reduced RCS to avoid radar detection. Altering general configuration like introducing the split rudder helps. Unknown to most, the 'forwardness' of trailing edge of the F-22 wing is

2. Reduced Thermal signature to avoid IRST (Infra-Red Search and Track) detection. Exhaust thrust emission reduction.

All this is now possible with improved accuracy and relative secrecy as well.

Leader of the Pack-The Nighthawk

Product of the Lockheed's Echo 1 computer program creation named 'Facets' – flat surfaces to refract and not reflect waves to radar receiver – F-117 is an even more unstable platform then the Viper, unable to fly without the onboard micro-computers. Thought to be retired & discontinued as a program, but very recently it has been brought back from the 'dead' by USAF.

Its predecessor flew on December 1, 1977, resembling the 'Hope Diamond' more than any aerodynamic aircraft. Nicknamed the 'Hopeless Diamond', it had been flown out to Groom Lake – famously known as Area 51 – in parts aboard a Lockheed C-5 Galaxy cargo plane.

Hopeless Diamond – first of two technology demonstrators

Left: The Horten H.IX, RLM designation Ho 229 was a German prototype fighter/bomber initially designed by Reimar and Walter Horten to be built by Gothaer Waggonfabrik late in World War II. It was the first low observable flying wing to be powered by jet engines. (Photo: flying-tigers.co.uk)

Bottom Left: The Northrop "Tacit Blue" was a technology demonstrator aircraft created to demonstrate that a low-observable stealth surveillance aircraft with a low-probability-of-intercept radar and other sensors could operate close to the forward line of battle with a high degree of survivability. (Photo: aerotime.aero)



– was originator of F-117 Stealth. Defense Advanced Research Projects Agency (DARPA) had initiated the 'Have Blue' program to counter Soviet's increasingly fused air defense systems. This was forty years ago—constructed on trivial funds by Lockheed's Skunk Works—when it roared into the skies of the Nevada desert marking an epoch antipasto. Mil-tech evolution has not stopped over the past almost half a century, with advanced F-35 Lightning II and F-22 Raptor's RCS (Radar Cross Section) reducing designs making them look as big as 'an eagle's eyeball' on contemporary radar consoles. Skunk works was responsible for the U-2 surveillance, not 'design stealth' but was coated in radar absorbent material (RAM). A-12 'Oxcart' / SR-71 'Blackbird' and D-21 supersonic

reconnaissance drone also had reduced RCS and painted with radar absorbing 'iron ball' paint (RAP).

With big names from the defense manufacturing industry, like that of Nothrop, DARPA, Lockheed, McDonnell Douglas, Hughes Radar Systems group, the project had to be a success sooner than later. 'Have Blue' team went on to design an aircraft called 'Tacit Blue' for another DARPA program which became the basis for another stealth aircraft: the B-2 Spirit bomber.

Have Blue was built from a mix of a lot of old school aircraft from USAF inventory. Flight control system (FCS) from General Dynamics F-16 design, nose gear & engines from Northrop T-38, main gear from F-104, ejection seat from F-16 and to put it all together, tools were pulled from Lockheed's C-5 cargo plane line. Out of the lot, F-16's 'fly-by-wire' (FBW) FCS was the keystone, due strange nature of Have Blue design made it inherently unstable in flight, more than any human pilot could cope with. And this was not all,

the Vipers side-stick control column was also borrowed.

F-117 was based largely on the same math that created Have Blue, but it was bigger in size due to two internal weapon bays in order to function as a combat plane. Side-stick resumed its place in the center. Vertical control fins pair on aircraft's tail increased size and went from inboard to outboard canting. These were officially first time used in 1989 Panama conflict before being successfully employed in 1991 Operation Desert Storm. Missions of suppression of enemy air defense (SEAD) and destruction of enemy air defense (DEAD) were efficiently achieved by the stealth where earlier Tornados from Royal Air Force were shot down by the Iraqi Integrated Air Defense Systems (IADS) at the onset of activities. Softening of Iraqi defense infrastructure was and is directly linked to F-117 Night Hawk.

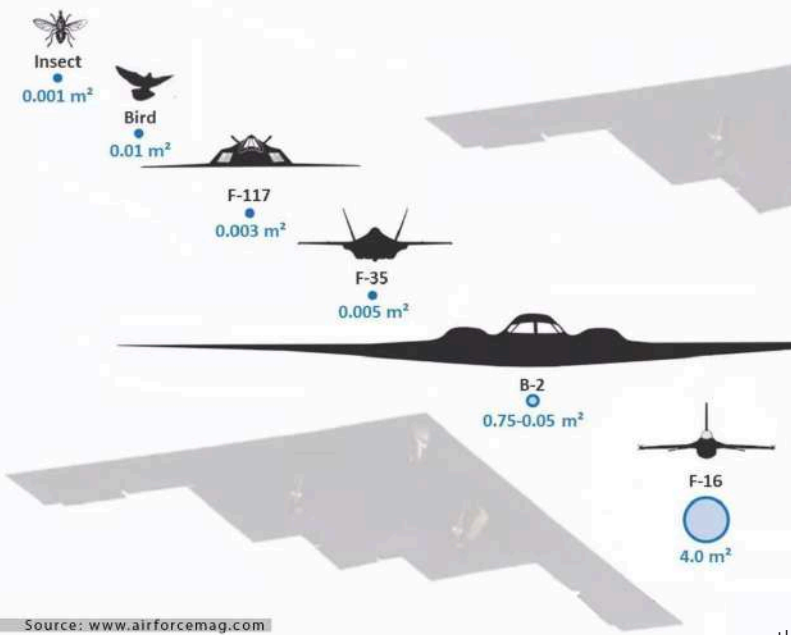
Latest Stealth Capable Fighter Aircraft

Stealth fighter aircraft will continue to play a valuable if not a pivotal role in air



RADAR CROSS SECTION

Radar cross-section (RCS) is a measure of how detectable an object is by radar. An aircraft's RCS depends on its physical shape, materials, antennae, and other sensors. Onboard sensors can also play a role in determining RCS as materials and design.



combat with USA using F-22 Raptor & F-35 Lightning II. The Raptor took to the skies over Syria in September 2014 as part of US-led coalition to defeat ISIS. Whether it was successful or not is still debatable because of confidentiality of information.

In February 2018, in the same battlezone, Su-57s ferried from mainland Russia to Russian Khmeimim air base in Syria to bolster four Sukhoi Su-35 fighters, four Sukhoi Su-25s, and one Beriev A-50 AEW&C aircraft. Rumored to

have been armed with cruise missiles. Although no active engagements or employment of the Felon have been reported. But their presence certainly makes the game a bit more interesting.

In 2018, a report surfaced noting that Israeli F-35I stealth fighters conducted a number of missions in Syria and supposedly even loitered in Iranian airspace without detection. In May 2018, Major General Amikam Norkin of IAF reported that Israeli Air Force F-35I stealth fighters carried out

the first-ever strike in combat over Syria. With approval of Lightning II for sale to United Arab Emirates Air Force by US congress, the already volatile regional dynamics are ready for the head-spin.

China started flight testing J-20 Mighty Dragon stealth multirole fighter in 2011 and made its first public appearance at Airshow China 2016. The aircraft entered service with the People's Liberation Army Air Force (PLAAF) in March 2017. Another

Top Right: The Sukhoi Su-57 is a stealth, single-seat, twin-engine multirole fifth-generation jet fighter being developed since 2002 for air superiority and attack operations. The aircraft is the product of the PAK FA, a fifth-generation fighter programme of the Russian Air Force. Sukhoi's internal name for the aircraft is T-50. (Photo: nationalinterest.org)

Right: The Lockheed F-117 Nighthawk is an American single-seat, twin-engine stealth attack aircraft that was developed by Lockheed's secretive Skunk Works division and operated by the United States Air Force (USAF). (Photo: Wikimedia Commons)

Bottom Right: The Lockheed D-21 is an American supersonic low observable reconnaissance drone. The D-21 was initially designed to be launched from the back of an M-21 carrier aircraft, a variant of the Lockheed A-12 aircraft. (Photo: nationalinterest.org)

The Lockheed U-2, nicknamed "Dragon Lady", is an American single-jet engine, high altitude low observable reconnaissance aircraft operated by the United States Air Force and previously flown by the Central Intelligence Agency.



fifth-generation stealth multirole fighter from China, the FC-31 Gyr Falcon is also under flight testing. Both these programs require time to mature and when apropos, will be favored weapon of choice of Pakistan Air Force as well. With India attempting to politically destabilize the region, China pushing the envelope with CPEC/BRI/OBOR in the region along with emerging blocks of the world, the external security matters will need to be kept a scrutinizing eye on.

Future Challenges
Contemporarily, Moore's Law has hit military aviation more than anything else. Radar and IRST technology is growing by leaps and bounds. From LPI (Low probability or Intercept) radars doing its magic with power management, high duty cycle, ultra-wideband, frequency

agility/frequency selection, advanced/irregular scan patterns, coded pulses, high processing power and low sidelobe antennas, LO technology is finding it 'challenging to hide'. Reducing radar detection when aircraft opens its weapons bay or when gears are put down needs a deep look into.

IRST, being a passive detection system, does not spike the RWR (Radar Warning Receiver) of the enemy aircraft. Heat signature of stealth fighters need to be even more veiled so that there is no micron infra-red values to track and launch against. Like the Eurofighter Typhoon can engage a target from 50 to 90 km with the Pirate IRST for fighter size target depending on altitude and atmospheric conditions.

Radar Technology

The aura of invincibility has been at a decline with the advancement of Radar tech. USAF in general and F-117 stealth program in particular had a rude awakening in Yugoslavia in 1999 when it was shot down by a SAM. Sooner or later, stealth's 'invisibility cloak' is likely to be pierced by razor-sharp Air Defence (AD) radars.

Targeting radars, operating in higher frequency X (8-12 GHz) and S (2-4 GHz) bands, are challenging to dupe. Another core function of stealth is to render 'noisy' radar returns to be considered as clutter. Optical sensors such as IR or visible band imaging devices is still a better contemporary bet.

Lower frequency radars are a different ball-game. VHF (50-330 MHz) or UHF (300-1,000 MHz) bands spawn longer wavelength. 'Step change' resonance becomes causal factor as any feature on the flying machine is eight times smaller in size of a particular wavelength, more often being the vertical stabilizer. To ensure survivability of a stealth strike package, it needs to have an Electronic Warfare (EW) proponent to generate good enough signal to noise ratio.

V/UHF radars signal is echoed by a resonant effect that is unaffected by stealth shaping or RAM coatings. Previously unpopular because they had poor resolution, picked up anomalous propagation (AP) likes of big flock of migratory birds, heavy downpour, clouds. Solution to this equation leads us down the same alley... Network

“ There is methodology to the madness if only we persevere. It is here and now that we have to focus on the upcoming challenges. But as said, “Before there is science... there is science fiction!” To reach from TRL-1 (Technology Readiness Level-1) to TRL-9 of IADS or Stealth jets, we have been there-done that against all odds before. ”

Centricity or Data Fusion of V/UHF Active Electronically Scanned Array (AESA) radar systems, high-speed data-links, thermal sensors and visible band imaging devices. Interceptor aircraft vectored in by Integrated Air Defence System (IADS) to launch their IR homing AAMs (Air to Air Missiles). Even if shielded engines against heat emissions, heat generated by friction when the jet passes through the atmosphere, can help a heat-seeking missile to home on to the target.

Conclusion

There is methodology to the madness if only we persevere. It is here and now that we have to focus on the

The Lockheed Martin F-22 Raptor is an American single-seat, twin-engine, all-weather stealth tactical fighter aircraft developed for the United States Air Force. (Photo: nationalinterest.org)



Top: The Lockheed Martin F-35 Lightning II is an American family of single-seat, single-engine, all-weather stealth multirole combat aircraft that is intended to perform both air superiority and strike missions. It is also able to provide electronic warfare and intelligence, surveillance, and reconnaissance capabilities. (Photo: defensenews.com)



Center: The Chengdu J-20, also known as Mighty Dragon, is a single-seat, twinjet, all-weather, stealth, fifth-generation fighter aircraft developed by China's Chengdu Aerospace Corporation for the People's Liberation Army Air Force. (Photo: thedrive.com)

upcoming challenges. But as said... "Before there is science... there is science fiction!" To reach from TRL-1 (Technology Readiness Level-1) to TRL-9 of IADS or Stealth jets, we have been there-done that against

all odds before. Starting from maintaining force under the Pressler Amendment to ongoing evolution of JF-17 blocks, progression of technology and its employability tactics and stratagems are a continuous process. This

is doable by any measure of smart-hard-work with correct magnitude and direction. FGFA will materialize with or without 'Azm'.



Bottom: The Shenyang FC-31, also known as the J-31 or J-35 is a twin-engine, mid-size fifth-generation jet fighter developed by Shenyang Aircraft Corporation. (Photo: Piotr Butowski)

Always at the Crossroads of History: DRIGH ROAD (NOW PAF BASE FAISAL)

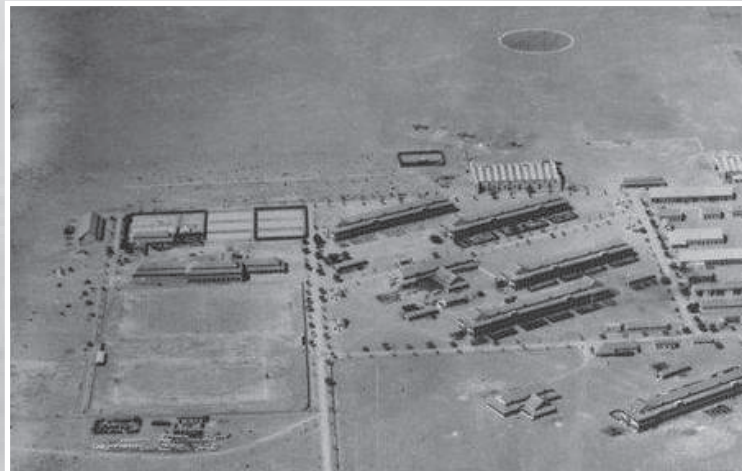
“Today, as they walk past PAF Base Faisal, a very few realise that they are crossing the the birthplace of aviation in the Sub-continent. Almost a hundred years ago, it dominated the bare plains, where aircraft were assembled, adventurers stopped by, and trainee pilots honed their flying skills before being posted to the Far Eastern Front and where the control tower and hangars are part of a heritage now. While many airfields were decommissioned and faded into obscurity after the WWII, at Drigh Road, things were different. A hundred years on, it continues to be on the forefront in the fight against enemies.

”

by S.Khalil

When the sun sets on PAF Base Faisal, there is something very special about the way its beams lands on this historical landmark, on memories of those who served here and who were just passing through. Everyone that mattered has gone through here, emperors, conquerors, explorers and the curious. There is something about this land that captures the imagination and interest, a place that continues to amaze, a country that inspires yearning.

While every city is a cultural capital, the British, like many invaders also left their mark,



Title Picture: Hawker Hurricanes, Vultee Vengeances and North American Harvards lined up for flight testing after assembly at No 1 Maintenance Unit, Drigh Road. (Photo: Wikimedia Commons)

Inset: An aerial view of RAF air station, Drigh Road during 1920s. Some of the infrastructure seen in this picture is still standing tall, telling the story of its glorious past. (Photo: rafcommands.com)



preserved in schools, hospitals, churches, office buildings, roads, railway tracks, and airfields. Nearly 80 years ago, when the British were on the cusp of WWII, new airfields were built not just in England but even across the colonial sub-continent. While some became surplus to requirements after WWII ended, others thrived well. Drigh Road was surely one of the latter.

The history of RAF Drigh Road is almost a century old. The base was established in 1918 with the formation of the India Command of RAF. Initially, aircraft repair depot was established here with a port depot at Bombay. In 1922, it started to function as an indigenous unit with Wg Cdr Charles D Breese as its first commanding officer. The selection of Karachi was obviously beneficial to RAF as it provided a port with all logistics facilities to spring board the RAF





Vultee Vengeance fuselages, newly arrived from the United States, under inspection at No 1 Maintenance Unit, Drigh Road. (Photo: Wikimedia Commons).



of initially. In early 1927, among a draft of Royal Air Force airmen, who arrived from the UK, was TE Shaw, famously known as 'Lawrence of Arabia'. Working as an aircraft technician, Mr Shaw was deputed to ERS (Engine Repair Shop) at Drigh Road. From his letters, which he also wrote to his mother, can be gained an authentic description of what Drigh Road was like over 90 years ago. He mentioned in his letters to her mother that the place was hot and humid, however the food was excellent at Karachi city which was seven miles away from the base. In evenings he would roam around in the surroundings to listen to camel bells which fascinated him a lot. Describing the infrastructure at the base he wrote that the camp was newly built, spacious with stone built buildings.

Right Inlet: IAF takes birth at Drigh Road: 1 April 1931-Official parade held at RAF Drigh Road, on establishment of 'A' Flight of Indian Air Force. Seen in first row (centre) is Flt Lt AB Awan, taking the salute at the inaugural parade. (Photo: History of Aviation in India).

Left Inlet: Maintenance work being carried out on a transport aircraft at Drigh Road. (Photo: RAF Commdads.com)

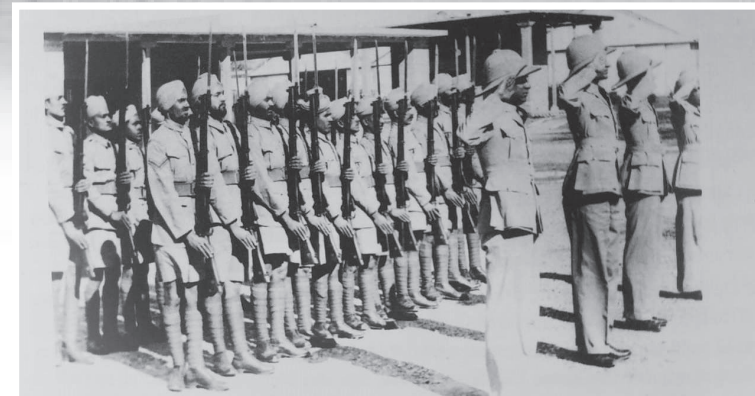
Bottom: Newly erected infrastructure at Drigh Road during 1920's. (Photo: www.telstudies.org).

fighters towards its Far East theatre. The vast open expanse of level land and continuous Karachi sunshine were another factors which played an important role in its selection as a port side air base.

Diaries and reminiscences provide an insight into the life at Drigh Road, and suggest that it wasn't particularly well thought



Amelia Earhart's Lockheed Electra 10E Special, NR16020, being serviced at Karachi, India, 16 June 1937. (Photo: Purdue University Libraries, Archives and Special Collections).



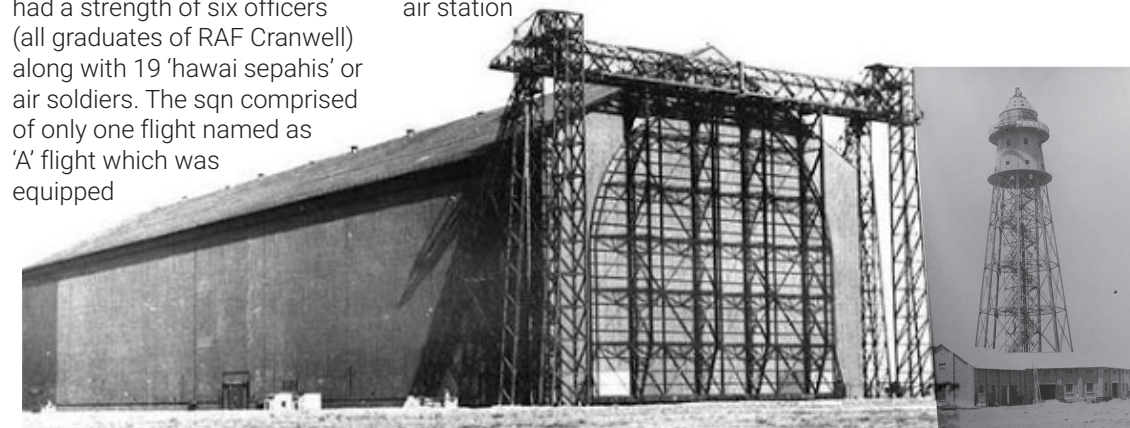
Officers of No 320 MU with Gp Capt Holland in centre at Drigh Road, 1947. (Photo: RAF Commdads.com)

The war readiness rooms and the hangers at Drigh Road Karachi, give us a window into the past. While Imperial Airways was one of the first airlines to fly to Karachi in March 1929, it was also the birthplace of the Indian Air Force. The pioneering and the very first sqn of IAF, the No 1 Squadron was raised here on 1 April, 1933. The sqn had a strength of six officers (all graduates of RAF Cranwell) along with 19 'hawai sepahis' or air soldiers. The sqn comprised of only one flight named as 'A' flight which was equipped

with Westland Wapiti IIA biplanes. In next couple of years a No 4 IAF VR (Volunteer Reserve) flight, with a mission to defend the coastal areas of Karachi was also established at Drigh Road. Flt Lt AB Awan (later retd as Wg Cdr), the first Muslim pilot and air force officer of IAF, also remained at this prestigious air station



Test & Despatch Flight, Drigh Road, April 1927. (Photo: RAF Commdads.com)



Left: Large black coloured airship hangar and a mooring station was constructed for the British HMA R101 (at the time, the largest ever hanger constructed in the world) at Drigh Road. (Photo: RAF Commdads.com)



Air Force and became its Chief of the Air Staff.

Another competitor for the prize on this occasion was JRD Tata from Bombay. He later became famous as a businessman and is considered father of civil aviation of India. The third competitor was Manmohan Singh from Rawalpindi, who took off from Croydon on 8 April 1930 and did not reach Karachi within the stipulated period but still became the first Indian to fly solo. He later joined Royal Indian Air Force and succumbed to a Japanese attack in Australia during World War II. On 15 October, 1932, JRD Tata, also made the maiden



Left/ Centre: Flt Lt Turowicz (OC Jet Conversion Unit) along with fellow officers and technicians in 1948 at Drigh Road. (Photo: PAF Archives)

Bottom: Newly erected infrastructure of No 1 Maintenance Unit at Drigh Road. (Photo: telstudies.org)

Right Page Top: Building work at RAF Depot Drigh Road, Karachi 1922. Building seen in this picture is part of the present day Officers' Mess at PAF Faisal. (Photo: telstudies.org)

Right Page Inlet: T.E. Lawrence (famously known as Lawrence of Arabia) stayed for few months at Drigh Road. (Photo: telstudies.org)

Right Page Bottom: Flt Lt AB Awan, the first Muslim pilot of Sub Continent, (Centre) along with officers of RAF Drigh Road, 21-9-1938. (Photo: Asad Awan)

voyage from Juhu Aerodrome in Bombay (now Mumbai) to Drigh Road airstrip. He was carrying mail in a Puss Moth aircraft.

At the heart of the Drigh Road Airbase was the runway, the launchpad for crucial war missions and stop over points for adventurers. In the year 1937, Amela Earhart and Fred Noonan, made a pit stop at Drigh Road Airfield, where their Lockheed

during 1930's and commanded one of the flights at Drigh Road.

Drigh Road had always played host to those who were not afraid to take a risk or two. Some 86 years ago, three Indian pilots came forward to participate in an ultimate race. They were responding to a challenge set by the Aga Khan in 1929, through the Royal Aero Club. A special prize of £500 was announced for

the first Indian to fly solo flight between British India, Karachi to London, England. The Aga Khan Prize went to Aspy Meherwan Engineer, an 18-year old from Karachi, who had studied at DJ College (1929-30). He took off from London on 25 April 1930 and reached Karachi on 11 May. On commissioning, Aspy Meherwan's first posting was at Drigh Road. Later, he rose to the rank of Air Marshal in the Indian



“ In the year 1937, Amela Earhart and Fred Noonan, made a pit stop at Drigh Road Airfield on their Lockheed Electra 10E Special, NR16020 in preparation for the next leg of the Around-the-World flight. ”



Aspy Engineer (wearing garland in centre) on his arrival at Drigh Road on 11 May 1930 after winning the competition of England to India flight. Jamshed Mehta, Mayor of Karachi, in centre. (Photo: History of Aviation in India).

Electra 10E Special, NR16020, was fuelled and serviced in preparation for the next leg of the Around-the-World flight.

Drigh Road was the nerve center in the sub-continent during the British Raj. Every structure, here, is like a jewel in the crown. Practically every new aircraft destined for these fronts would have passed through Drigh Road. During the late 1920s and early 1930s, there was a large black coloured airship hangar at the site of Karachi Airport. It was constructed for the British HMA R101, at the time, the largest and the most luxurious airship ever built. It was Britain's answer to Germany's zeppelin. Only three hangars were ever built in the world to dock and hangar Britain's fleet of passenger airships. However, the R101 never finished the

journey to Karachi, which it was expected to complete in five days. Although it promised British dominance of the air, the R101 was too failed to fly all the way to India. It crashed and exploded just eight hours into its maiden flight over Beauvais, France, killing all but 6 of its 54 passengers and crew.

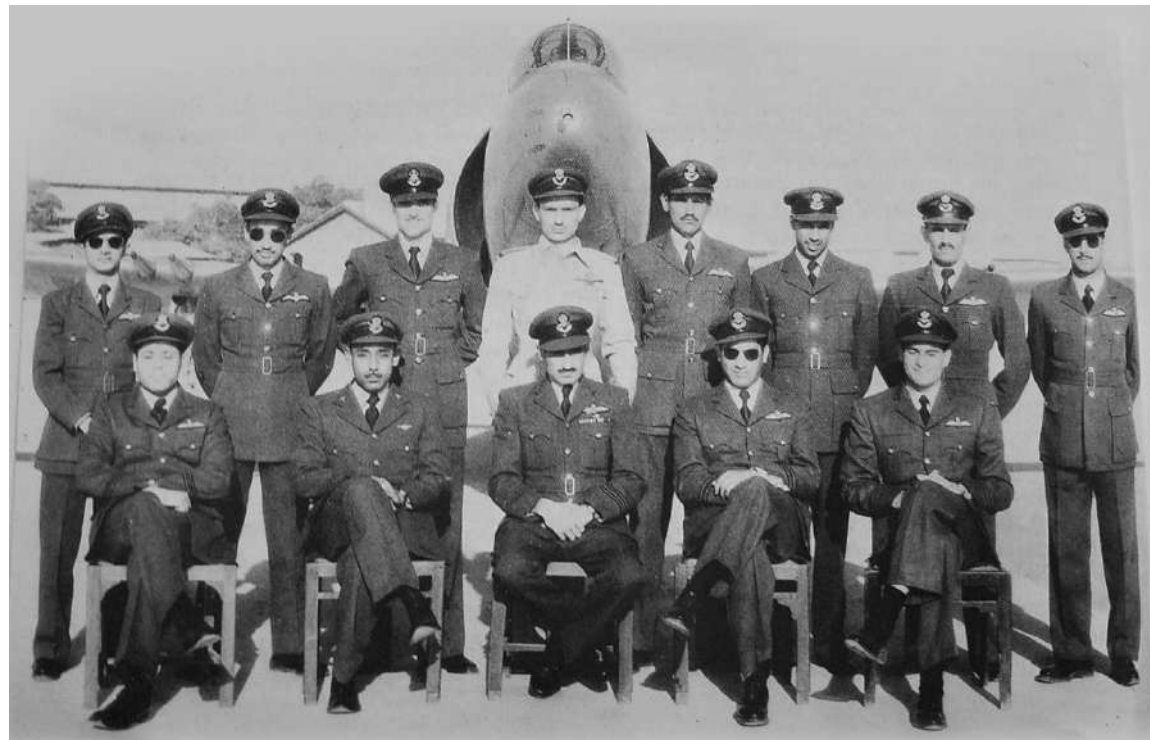


Locally known as 'Kala Chapra', the hangar was so huge that pilots often used it as a visual reference while attempting VFR landings at Karachi. Over the years, the hangar became known as the landmark of Karachi, until it was demolished in the 1960s.

During World War II, Drigh Road was a major transshipment base for United States Army (Air Force) units and equipment being used by Tenth Air Force in eastern India, Burma and the Fourteenth Air Force in China. Several operational bomber and fighter units flew into Karachi for short organisational periods prior to their deployment. On 24 February, 1942 the Aircraft Depot at Drigh Road was upgraded to No 1 Maintenance Unit (India), which meant that it was not only the main supply base for RAF but also for all the squadrons and units engaged in campaigns in the Far East. Air Technical Service Command had extensive facilities where aircraft were received, assembled and tested before being flown to their combat units at forward airfields. It also functioned as a major maintenance and supply depot for both air forces. In addition, Air Transport Command of USAF flew numerous cargo and passenger flights to the Middle East and to points within British India and China.

In August 1943, the first Spitfires reached Drigh Road. Wing Commander RLF Boyd, Air Headquarters Bengal, reported to the unit with nine other pilots to collect the first consignment of Spitfires. The arrival of these aircraft in India proved to be a decisive factor in the air campaign against the Japanese.





Left : Officers of RPAF's first jet squadron, No 11 sqn, in front of Submarine Attacker with first Squadron commander, Sqd Ldr Rahim Khan (later C-in-C PAF) in center, at RPAF Station Drigh Road, 1952. (Photo: PAF Archives)

Below: A panoramic view of newly constructed maintenance units at RAF Drigh Road during 1930s. (Photo: telstudies.org)

Right Page Top: P-40 fighters being assembled at Drigh Road Airfield, 1942-1945. (Photo: defence.pk)

Right Page Bottom: A group of Shaheen Air Cadets along with their Polish instructor at Drigh Road. (Photo: Turowicz Archives)

Left Center: Flight Lieutenant A B Awan leads three Westland Wapitis of "A" Flight, No 1 Squadron, IAF from Drigh Road (now Faisal) air base on a coastal patrol in the Arabian Sea. (Painting by SMA Hussaini).



A year later, 37 P-47 Thunderbolts arrived from the United States and soon after another 111 planes arrived from the UK. "The year 1944 finished up with 1,660 aircraft having been dispatched from Drigh Road for operations on forward air bases," according to the book titled, "The Story of the Pakistan Air Force: A Saga of Courage and Honour".

After having being an RAF station for nearly 25 years, the Drigh Road Station was handed over to newly formed RPAF in 1947, with Gp Capt S C Elworhty as its first commanding officer. Technical Training School (TTS) and Recruits Training School (RTS) were the first units established after partition. Later these were shifted to Kohat. In December 1947, a

contingent of 100 trainees under the command of Sqd Ldr Omer participated in combined military parade held at Karachi polo ground, where the Quaid was the chief guest. Three years later, on 15 August 1950, some 150,000 in the audience witnessed the first of its kind air display. It was a demonstration of the highest order, precision bombing, rocketry and supply dropping. The best item was the aerobatics display by Flt Lt FS Hussain in his Fury fighter plane. Then Prime Minister Liaquat Ali Khan, praised the officers and men of the nascent Royal Pakistan Air Force (RPAF) of great technical advancement.

To introduce the young nation's youth to the joy of flying, glider pilot training was introduced through the "Shaheen Air Troops", established on 2 September 1949. In November



1949, Flg Off Jan Zbigniew Mikulski, became the setter of glider activity in Karachi. In the eternal quest for higher performance, he was posted to RPAF Drigh Road to organize Central Gliding School. Besides the joys of several hours of free flight by riding invisible currents, the school was to provide glider training to Shaheen Air Scouts. Additionally, four Glider Training Units were established at Lahore, Chaklala, Peshawar and Dhaka, followed by another three at Chittagong, Kohat and Quetta. The Central Gliding School was officially established at the soaring capital, Drigh Road on 1 May, 1950, and Flg Off Jan Zbigniew Mikulski became its first Officer Commanding and Chief Pilot Instructor.

Amongst the instructors was his wife, Civilian Gazetted Officer Maria Aniela Younga-Mukulka, one of the first Polish female pilots of engineless aircraft. She was also the first

“ In early 1927, among the contingent of Royal Air Force airmen, who arrived from the UK, was TE Shaw, famously known as 'Lawrence of Arabia'. From his letters, which he also wrote to his mother, can be gained an authentic description of what Drigh Road was like over 90 years ago. ”

Polish female glider instructor since 1935, and held several Polish National Soaring Records. She was joined by the wife of Sqd Ldr Wladyslaw Turowicz, CGO Zofia Szczecinska-Turowicz, another experienced sailplane pilot. Together they made significant contributions to the glider flying in Pakistan.

At about this time, foundations were laid for the growth of major units. Maintenance Unit 101 came up and Air Maintenance Depot 102, that dates back to 1921, was also upgraded. This depot continued its original role of assembly of new aircraft and maintenance after Independence.

After 1955, jet planes such as the T-33 started arriving from the USA. During 1956, more modern jet aircraft were inducted in the PAF and the 102 AMD was provided with new facilities to repair and massage these aircraft and their engines into life.

By this time, No 102 AMD had become the most important maintenance unit of the PAF and considered its backbone for providing support to all types of aircraft such as the F-86, T-33 and B-57.





Behind the razzmatazz of the flying in the RPAF, was the rarely seen world of skill and inventiveness at the No 102 AMD. Over the years, 102 AMD was issued with a variety of tasks ranging from receipt of new types of aircraft to carrying out local modifications. From restoring 30 assembled F-86 to airworthiness in 1956, to modifying a Bristol Freighter to spray over one of the worst locust attacks in 1961, to organizing depot level maintenance of the Chinese F-6 aircraft, the No 102 AMD always rose to the challenge. Modernization of the unit continued and new equipment and machines were installed to stay abreast with the workload of a modern PAF.

Despite the several key stages in its development, a lot of Drigh Road airfield is still there, including the original maintenance hangers. The old hangers, just yards from the runway, look the same from the outside. These buildings that used to house WWII warplanes, are still in use, but look a little different from inside. The propeller planes like the Moths and the Spitfires, have been replaced by more modern aircraft.

In 1974, the base was named after late King Faisal of Saudi Arabia. The place still attracts former pilots, with special connections to the past. Its stories live on into the future. "Drigh Road feels like stepping back in time," said a senior retired PAF officer who had served at this base for years. It continues to this day as PAF Base Faisal, and aircraft operations can be seen throughout the year. Today, it is home to No 21 Sqn, equipped with mighty C-130 Hercules. It is also the site of PAF's Southern Air

Command HQ and PAF Air War College. Sharing the runways with the Pakistan Navy, the base is playing an important role in the aerial defence of the country.

At its peak, Drigh Road was home to hundreds of personnel. Those who served here could not have known that decades on, their stories would be so closely followed and celebrated. The PAF Museum, at PAF Base Faisal ensures that their sacrifices are never forgotten. At the PAF Museum look out for the Dakota and the Harvard, aircraft from those days that stand as memorials to the aircrew that served at Drigh Road. Wide gardens, a digital archive, exhibitions, and a cafe make the museum a great place to learn the stories and pay respects.

"PAF Faisal Airbase is like a diamond in the rough and provides good place for airmen to raise families and entertain themselves, as they serve their country," said a serving PAF officer.

Above: A formation of Submarine Attackers from No 11 Sqn fly during a Independence day celebrations of 1952. The sqn remained stationed at Drigh Road for a few years. (Photo: PAF Archives)

Below: Jeeps tow US fighter P-47 aircraft across the streets of Karachi for their final destination to RAF Drigh Road, 1940. (Photo: defence.pk)



Above: Liaquat Ali Khan, First Prime Minister of Pakistan, inspecting the line-up of RPAF's first jet aircraft at Drigh Road in 1950s. (Photo: PAF Archives)

Right: Khawaja Nazimuddin and Liaquat Ali Khan witnessing the Independence Day Air Show at Drigh Road. Flt Lt F S Hussain (the solo aerobatics pilot, sitting extreme left) can be seen in conversation with dignitaries. (Photo: PAF Archives)

Bottom: An Impressive line up of Submarine Attackers and Hawker Fury fighters during Independence day show held in 1952. (Photo: PAF Archives)

“ Drigh Road is the birthplace of the Indian Air Force. The pioneering and the very first sqn of IAF, the No 1 Squadron was raised here on 1 April, 1933. ”



Past, Present and the Future....

EUROFIGHTER TYPHOON



“Taking three decades to develop, the Eurofighter Typhoon became operational in the early 2000s. Already a formidable aircraft when it made its debut, the Eurofighter has the capability to evolve and improve for years to come. It presents a case study of inter-state collaboration which is very relevant for future reference, especially when it comes to developing aviation assets. Almost 20 years after its first flight, let’s delve deep into the aircraft’s journey and find out what made the Typhoon the success that it is today.”

by Vincent Martens.

Anatolian Eagle 2012, another opportunity to visit one of the biggest military exercises. This F-2000A from the ITAF on its way to another mission in the afternoon with on the right wing an ACMI pod.



In the late 1970s, the United Kingdom began to realize that it needed a new state-of-the-art fighter and it needed it fast. The evolving nature of warfare and decentralized conflicts made it inherently clear that the desired aircraft needed to be technologically superior. It needed to be adept at air-to-air combat while simultaneously possessing the ability to engage on-ground targets. The Royal Air Force (RAF) named the concept of designing such type of air superiority fighter as AST-403 and several companies were tasked to come up with draft designs. Finally, all the designs and sketches lead to the P.96, a conventional aircraft. Later, its design was presented to the RAF in the late 1970’s. Although the initial designs somewhat came up to the expectations of the RAF, the British aviation industry were sceptical as the aircraft had glaring similarities with the Mc Donnell Douglas F/A-18 Hornet. That is why the idea was shelved, later on.

The History:

During the early 1980’s the British Aerospace (BAe) consortium started the Agile Combat Aircraft (ACA) programme which later developed into EAP (Experimental Aircraft Program). It was designed to research all kind of technologies that could be used in a future European Combat Aircraft (ECA). Initially, it was intended to be a multinational effort but West Germany and

Italy did not have the intention to financially contribute the whole program. Eventually the program was funded by a combination of British and European private and public companies. The aircraft sections were manufactured across facilities in UK and the sole EAP aircraft rolled out in April 1986 at BAe Warton. Its maiden flight was held on 8 August 1986, and a total of 250 sorties were flown by the aircraft. It also made its maiden appearance at the Farnborough Air Show in 1986, participating in both the static and flying displays. Having achieved all its envisaged targets and purposes, the aircraft was later retired on 1 May 1991.

Around the same time, West Germans and French were also looking to upgrade their aviation arsenal. The Germans were searching for a replacement for their Lockheed F-104 Starfighters and the French for their SEPECAT Jaguar strike fighters. Germans, in 1979, started with the design of the TKF-90 (Taktisches Kamp Flugzeug), an delta-wing aircraft with canards placed underneath the cockpit for control and stability. The German Air Force required an air superiority fighter in the air defencerole, however, the TKF-90 also gave them an air to ground strike capability. The German Air Force was planning to induct the aircraft in service by 1992, however it never materialised.

All Pics by Vincent Martens unless stated



source of thousands of jobs, substantial wealth and technological advances for all participating partners. It is still looked upon as an excellent case study for dos and don'ts of developing aircraft in collaboration with other states.

The construction of the first Eurofighter Typhoon prototypes began in 1989 and it was agreed that each of the four nations would have a production line to assemble their own aircraft but also the final assembly for components of the aircraft including export. Negotiations started and looking at the percentage of the amount of expected sales, Dasa (Deutsche Aerospace AG) was given 33%,

British Aerospace 33%, Aeritalia 21% and CASA (ConstruccionesAeronauticas SA) 13%. The company Premium Aerotec to build the main centre fuselage, EADS Casa the right slat, BAE Systems the front hull, dorsal, tail-fin, inboard flaperons and rear hull section. Whereas Leonardo decided to produce left outboard flaperons and rear hull sections. Initially each participating country decided to order some number of aircraft; UK 232, Germany 180, Italy 121, and Spain 87 aircraft.

During 1990s, the participating countries had to make a selection for the Eurofighters radar. The UK, Italy and Spain supported the Ferranti Defence Systems, which is an English firm that offered the ECR-90 (European Collaborative Radar). This radar was based on the British build Blue Vixen airborne radar, designed and build for the Royal Navy and the Sea Harrier.

The Headquarter to pursue this endeavour was established in Munich, Germany. The official title of the team was Eurofighter Jagdflugzeug GmbH, which was tasked with the design, construction and evolution of the aircraft. Another collaboration, Eurojet GmbH—linking Rolls-Royce (the U.K.), MTU Aero Engines (Germany), Fiat/Avio (Italy), and ITP (Spain)—was established to develop the fighter's powerful EJ200 engines. A third consortium, EuroRADAR, would develop the radar system for the fighter.

Traditionally, such partnerships are a tricky business and are prone to eventual inefficiencies and inadequacies. The states involved sour their diplomatic relations, fulfilling the needs of every partner becomes difficult and some partners often get the short end of the stick. At times, commitments are broken simply owing to the fact that economic conditions can change drastically in such time-heavy projects. On the other hand, though, there are several benefits that nations can incur when they partake in multi-state projects. The Panavia consortium, although far from perfect, became the

Meanwhile, the English EAP design financially became a nightmare crossing 180 million pounds in 1986. To keep it running MBB, BAe and Aeritalia invested some 100 million but it appeared that it would never see the light of day. Eventually the EAP formed the basis for the Eurofighter Typhoon project. It was also decided that the design, information and data collected by the test flights so far, would be used for the upcoming Eurofighter-Typhoon project.

Resultantly, in 1983, the consortium came together to form the "Future European Fighter Aircraft" (FEFA) programme. It was envisaged that the aircraft would have short take-off and landing (STOL) capability and be BVR (Beyond Visual Range) equipped. Two more major players were added to the mix, Spain and France. However, France quickly started having misgivings about the project.

Essentially, France wanted to be the majority partner, with the design of its choice, to be developed and manufactured by a consortium led by the French manufacturer Dassault. Eventually, France opted out of the program, deciding instead to develop its own fighter aircraft, the Rafale.



Prototypes of Eurofighter

DA1	Built by DASA, first flight on 27 March 1994.
DA2	Built by BAE, first flight on 6 April 1994.
DA3	Built by Alenia, first flight on 4 June 1995.
DA4	A two-seater, built by BAE, first flight on 14 March 1997.
DA5	Built by DASA, first flight on 24 February 1997.
DA6	A two-seater, built by CASA, first flight on 31 August 1996.
DA7	Built by Alenia, first flight on 27 January 1997.

Germany instead preferred the MSD2000 based on the APG-65 radar. The MSD2000 was a radar developed by the American company Hughes with support of West Germany AEG and GEC Marconi. Especially developed for the US Navy F-18 Hornet, it based on the AN/APG-65 fire control radar systems. Excessive cost was one of the reasons that Germany did not prefer the Ferranti radar. Moreover, they were interested in using the Hughes radar to upgrade their F-4F Phantoms so that these aircraft could be equipped with the same weapons as the Eurofighter. Meanwhile the Ferranti Company had financial issues and the British government eventually supported the GEC Marconi Electronic Systems.



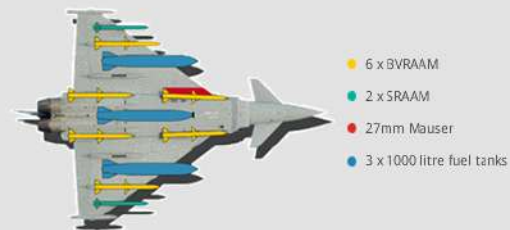
Inlet: The first German-built prototype of the Eurofighter was the DA1. The aircraft 98+29 was assembled in 1992 and flew for the first time in 1994. After the testflights and several trials ended the aircraft was put on display at the German museum Oberschleissheim, which is located near the city of Munich. Photo: wallpapercave.com

Left Page Above: Engine covers from the 731 and 732 squadron taken in 2009 during an anniversary of one of the German Air Force squadrons.



The Taktisches Luftwaffengeschwader 73 (TLG 73) was the first squadron within the German Air Force that received the EF-2000/EF-2000T

AIR-TO-AIR WEAPONS



- 6 x BVRAAM
- 2 x SRAAM
- 27mm Mauser
- 3 x 1000 litre fuel tanks

AIR-TO-SURFACE WEAPONS



- 4 x Laser guided bombs
- 4 x BVRAAM
- 2 x SRAAM
- 27mm Mauser
- 2 x 1000 litre fuel tank
- Laser designator pod

In 1994, the Chiefs' of Air Staff of the four countries agreed on the advance requirements of the aircraft. This led to the production of Eurofighter Typhoon DA (Development Aircraft) namely the DA1 and DA2. DA1 started flying in Germany and its main role was to evaluate handling characteristics and engine performance. The first flight took place on 27 March 1994 and it was flown by the DASA chief test pilot Peter Weger. The aircraft later got retired in December 2005. DA2 flew on 6 April 1994 in the United Kingdom for the first time. It undertook trials for flight control assessments and load bearing. The flight control assessments included the development of the Eurofighters "Carefree Handling" technique. The technique meant that the pilot has full liberty and could perform whatever action he wants with the control stick,

rudders and throttle. Moreover, the basic purpose of these carefree trials was to evaluate the Flight Control System (FCS) on the aircraft. During these tests, the aircraft was fitted with the most demanding weapons configuration as well. The trials were needed to clear the Eurofighter Typhoon for the Initial Operational Clearance. The DA2 was the only Eurofighter that could undertake these Carefree Handling Trials. It continued to fly various trials until January 2007 after which it was retired and put on static display in the Royal Air Force museum in Hendon, London.

In 1997 the 500th test flight took place in Manching, Germany. During the late 1990's and early 2000's the Eurofighter Typhoon undertook extensive environmental, weapon firing, in flight fuelling and supersonic speed tests.

Eurofighter: The Capabilities

The Eurofighter Typhoon has evolved to be an extremely flexible and efficient multi-role aircraft. With an ability to carry an impressive arsenal of weapons, the Eurofighter Typhoon can quickly sway over any given operation. One of the major advantages that the aircraft boasts is its well-designed architecture and construction, which provides ample room for upgradation and evolution. This ensures that the fighter will continue to be relevant and operational for a substantial number of years to come. Built from materials that maximize stealth, and equipped with state-of-the-art sensors and weapons systems, make the Typhoon a formidable foe in both close range and BVR (Beyond Visual Range) combat environments.

The Airframe:

With carbon fibre composites at the helm, the Typhoon is built with modified materials that makes it hard to detect by radar. With

Bottom: The Italian Air Force participated in the Cobra Warrior exercise with four aircraft which came from all the different squadrons within the air force. This particular Typhoon F-2000A is from 18 Gruppo which is part of the 37 Stormo normally stationed at Trapani.



veteran pilots a constant part of the process, the Eurofighter's airframe has been paradoxically designed to be deliberately unstable while being easily manoeuvrable, even at supersonic speeds. Usage of the likes aluminium, titanium and glass reinforced plastic has reduced the weight of the aircraft by 30% compared to conventional materials.

The Engine:

The Eurofighter has been fitted with a EJ2000 engine. It features a 2-spool design with single-stage turbines which runs the 3-stage fan and 5-stage HP compressor with annular combustion with vaporising burners. This gives the lightweight engine the thrust that the Typhoon needs while maintaining its high strength and high temperature tolerance. The engine can go without unscheduled maintenance for about a 1000 flying hours owing to its advanced integrated Health Monitoring.

The Sensors:

The Typhoon has been fitted with several high-tech sensors that perpetually scans the battle space and integrates it with data acquired to provide the pilot with actionable intelligence. The Typhoon features a Captor-M mechanically scanned radar and a Captor-E electronically scanned radar. The roomy aperture of the aircraft allows the placement of an array which has a field of regard 50% wider than traditional fixed-plate systems. This means that the Typhoon offers several superior features in both Air-to-Air and Air-to-Surface operations which includes:

The Cockpit:

As mentioned, the development of the Typhoon has always involved

“ Eurofighter-Typhoon started its operational career in 2003. Presently, this state-of-the-art fighter combat aircraft is proudly serving the air forces of Austria, Italy, Germany, the United Kingdom, Spain, Saudi Arabia, Oman, Kuwait and Qatar. ”



Typhoon FGR4 ZK353 was painted in these special markings since it was part of the Typhoon Display Team in 2015. But it also commemorates the 100 years of 29th Squadron.



This RAF Typhoon was given some D-Day Stripes because of the 70 year anniversary of the D-Day operations. Just below and behind the cockpit is the code TP-V, the squadron code of a Hawker Typhoon that flew on this D-Day during the second WW.



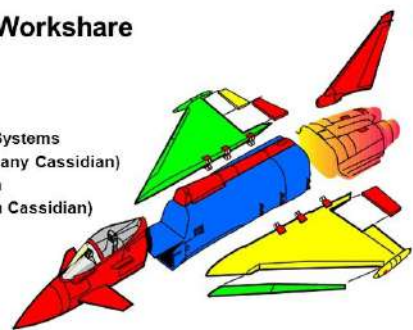
Based on the World War II scheme worn by the Spitfire and Hurricane aircraft, this camo scheme was applied in memoriam of pilots who lost their lives during defending the country and as part of the 75th Anniversary of the Battle of Britain celebrations.



This particular TLG31 aircraft was painted in special colours commemorating the 125 years of Oswald Boelcke. The squadron is named after this German flying Ace, credited with 40 victories during the First World War. He was killed in a crash following a midair collision.

Typhoon Workshare

■ BAE Systems
■ (Germany Cassidian)
■ Alenia
■ (Spain Cassidian)



	U.K.	Germany	Italy	Spain	Total
Baseline	232	180	121	87	= 620
	37.5%	30%	19.5%	13%	

veteran pilots. This remains true for its upgradation, as well, with constant consultation from operational air force pilots who have been flying the Typhoon. The cockpit has been designed to optimize single-pilot operation. The upgrades have been made after a series of formal assessments in a rapid prototype facility. Installations such as the Direct Voice Input (DVI) and Hands-On Throttle And Stick (HOTAS) control functions have ensured that the Typhoon can function with a single pilot in the toughest of combat scenarios.

The cockpit's Head Up Display (HUD) allows the pilot a stable, low-latency eyes-out guidance, which features night vision and laser protection goggles. The Multi-function Head Down Display (MHDD) is used for the bigger picture, presenting combat scenario and format,

map displays and system status displays. The Typhoon also boasts a unique Helmet Mounted Symbology System (HMSS). HMSS provides the pilot with constantly updated flight and weapons aiming data through the visor. The helmet also features optics blast, upgraded oxygen mask, night vision enhancement camera and a head position tracking system. These displays also integrates the exchange of real-time data and flight information from the air force, naval, ground and any other relevant sources using the state-of-the-art Multifunctional Information Distribution System (MIDS). The Typhoon also has several advanced systems and sensors for navigation and flight stability. The sensors fitted within the aircraft allows for covert operations as low as 100ft, with automation playing a heavy role.

The usual Global Positioning System comes with a digital interface with individual satellite tracking channels and anti-jam capabilities. The plane also features a well-rounded inertial navigation system, allowing for 3D situational awareness at all times. Typhoon's Flight Control System (FCS) is another complex and useful add-on which allows the pilot significantly better handling and free manoeuvring.

The Weapons Systems:

The Eurofighter Typhoon quickly dominates the battlefield with its impressive and versatile arsenal of weapons capabilities. From Beyond Visual Range (BVR) Air-to-Air technology, such as the METEOR advanced long-range missile to Short Range Air-to-Air Missiles (SRAAMs) and 27mm Mauser Cannon, the Typhoon always has something up its sleeve. When it comes to Air-to-Surface combat, the Laser Designator Pod (LDP) allows the Typhoon precise location of targets. It has been armed with Paveway IV and Brimstone to undertake a number of versatile operations effectively. The veteran dual-mode guidance system, complimented by height of burst and penetrating capability, enable the



Bottom: One of the three single seat Typhoons from the RSAF that flew missions during Green Flag, photographed taxiing back to the flightline.

Right Page: The Typhoon aircraft can be armed for the air to air and the air to ground role. The picture is showing an Typhoon in a typical air to ground configuration. Carrying the SRAAM (Short Range Air to Air Missile) on both the outerwing pylons, and several Enhanced Paveway II Dual Mode GPS/ Lacer Guided Bombs. The hardpoints underneath the fuselage are showing the BVRAAM (Beyond Visual Range Missile). Photo: wallpaperaccess.com



pilot to make decisions upto the moment of release.

The Flight of the Typhoon:

The Typhoon saw action in 2011 in Libya. The United Nations Security Council passed resolutions to protect Libyan citizens from Colonel Muhammad Qaddafi's militia, which was fighting a rebel uprising. The UN forces were ordered to restrict themselves by not putting any troops on ground. Later the same year, Britain was part of a coalition of 11 NATO members who began an aerial campaign against Libyan military. The British effort was titled Operation Ellamy. 6 Typhoons were part of the 32 aircraft that flew to target Libyan targets. The Typhoon squadron were led by Wg Cdr Jez Attridge, a veteran who was an adept at flying Tornados, Typhoon's predecessors.

In an interview, Attridge explains how the Typhoons which were meant to fly out to Libya were converted from air superiority fighters to an aircraft which would specialize in engaging targets on the ground. The fact that an aircraft could be converted from one role to an entirely different one in a matter of days was impressive. "It went to multi-role in a weekend." said Attridge,



adding that the crew just had to make some software modifications in the cockpit displays. The Typhoons, currently, are being used in combinations with other fighters, usually the Tornados. The Tornados have been equipped with Paveway IV, also called Brimstone and the longer-range Storm Shadow, which can demolish anti-craft and bunkers from 100 miles away. As discussed before, the Eurofighter will soon be fitted with these weapons systems, with the addition of the Meteor, a BVR air-to-air missile which is being developed, and upgraded with laser and infrared targeting systems. "One Typhoon doing the same job as two aircraft, an air defence and an air-to-surface Tornado," as Attridge explains it. "It's the most capable aircraft we've ever had."

IPA: An Over View

IPA1 (United Kingdom) : Defensive Aids Sub System (DASS). This system should protect the Eurofighter Typhoon against air-to-air and surface-to-air threats. It contained Electronic Support Measures like missile warning, on board electronic countermeasures and towed radar decoys.

IPA2 (Italy) : Air to Surface weapons integration.

IPA3 (Germany) : Air to Air weapons integration.

IPA4 (Spain) : Air to Surface weapons integration and environmental development. On December 9th 2004 Eurofighter Typhoon IPA4 started Cold Environmental Trials (CET) on an airbase in Sweden. Purpose of this three months testing was to check the aircraft behaviour and it systems with temperatures between the minus 25 degrees to plus 31 degrees.

IPA5 (United Kingdom) : Air to Surface and air to air weapons integration.

IPA6 (United Kingdom) : Converted production aircraft (BS031) used for Tranche 2 computer system upgrade.

IPA7 (Germany) : Converted production aircraft (GS029) used for Full Tranche 2 Standard. The aircraft flew for the first time on January 16 2008 at Manching.

Countries	Tranche 1	Tranche 2	Tranche 3A
Germany	33	79	31
Italy	28	47	21
Austria	15	-	-
UK	53	67	40
Spain	19	34	20
Saudi Arabia	-	72	-
Kuwait	-	-	28
Oman	-	-	12
Qatar	-	-	24

Sales:

The Eurofighter is now in service with all four Eurofighter member nations. Each air force is obtaining aircraft from its local manufacturer. This statement, however, is a bit misleading. To be specific, the construction of sub-assemblies is parcelled out to each country, one after the other, essentially forming an assembly line of sorts between the countries. It was recognized early on that the erection of full manufacturing facilities in each partner nation would be excessively wasteful and tedious. So, factories in each

Eurofighter member nation provide parts for a "kit", in the form of major sub-assemblies; each factory then obtains all the sub-assemblies and fits them together. The sub-assemblies are designed in a modular fashion to ensure that they can be pieced together with relative ease.

Eurofighter-Typhoon Tranches:

The Typhoon was rolled out in segments or 'Tranches'. Till date, the aircraft has 3 tranches. Each tranche has more capabilities than the last. Early Tranche 1 aircraft were intended for training purposes, which is usually the protocol. It did not feature datalinks or DASS and the weapons systems were also limited. Advanced Tranche 1 Typhoons had upgraded air-to-air



combat capabilities, capable of supporting AAMs the likes of AIM-9L Sidewinder, the ASRAAM, and the AIM-120B AMRAAM. This tranche also featured limited air-to-ground capabilities.



Early Tranche 2 planes rolled out in 2008. It had superior air-to-air capabilities. Later Tranche 2 Typhoons were finalized in 2010 and had both air-to-air and air-to-ground capabilities, making it a formidable multi-role aircraft.

Tranche 3A is still being delivered. It integrates advanced weapons systems such as Meteor BVRAAM, the Storm Shadow standoff missile, and the SPEAR series of air-to-ground munitions. It also includes improvements on the radar, engine and fuel tanks.

Above: Typhoon cockpit configuration with the three Head Down Displays. Together with an Wide Angle Head-Up Display the pilot has a variety of screens that will give him all the necessary information. The cockpit layout also contains an Multi Function Information Distribution System, Aircraft Warning System with dedicated Warning Panels and an Helmet Mounted Symbology System. Photo: eurofighter.com

Right Page Above: Spanish Air Force organized DACT exercise in 2014 at Gando Air Base. This EF-2000 from ALA-11 is photographed during a late return of the afternoon mission. The aircraft carries an IRIS-T air to air guided missile.



A Tranche 3B was originally planned but was effectively abandoned later on. In 2019, a "Long-Term Evolution (LTE)" plan was announced. It will include studies to improve mission system architecture, defensive aids, the human-machine interface (HMI), operational flexibility, and engine performance. An Eurofighter official commented "The LTE will support the generation, transmission, and utilization of increasing amounts of

digital data both on board (via advanced multispectral sensors) and off board (via high-performance tactical datalinks), whilst countering new and emerging threats, including cyber. This will maintain the Eurofighter's ability to operate in the highly contested and congested future operating environment."



One of the countries that is also flying the Eurofighter Typhoon is Austria. They fly

“ One of the major advantages that the aircraft boasts is its well designed architecture and construction, which provides ample room for upgradation and evolution. This ensures that the fighter will continue to be relevant and operational for a substantial number of years to come. ”

with fifteen Typhoons all with the Tranche 1 standard. Austria is already looking to replace these aircraft which they bought in 2003. They would like to replace them with an aircraft that is cheaper to operate.

On 18 November 2020, the Eurofighter company officially offered the Typhoon to Switzerland which is looking for a replacement of the aging F-5E/F. If the Swiss government decides to choose the Typhoon, Germany will be interested in improved joint training. Meanwhile the Germans signed a new contract for 38 Typhoons with the latest Tranche 4 Standard.

Although, details have not been announced, there is no doubt that the upgraded version of Eurofighter-Typhoon will continue to evolve and play a significant role in aerial warfare in the decades to come.



Typhoon FGR4 from the Royal Air Force seen on its homebase RAF Coningsby wearing the squadron markings of 11th squadron.

Nazis' Nightmare Night Witches

“In the dead of the freezing night during WWII, a Nazi soldier on night watch is trying to keep himself awake. The entire base is asleep, complacent in its slumber. All of a sudden, the soldier hears a faint but unmistakable whooshing sound. His eyes widen as he realizes what’s about to follow. ‘Nachthexen!’ He yells in terror as he sounds the alarm. The entire base scurries to save themselves, shaken out of their stupor in seconds. Their panic comes with good reason. The Nazi’s worst nightmare, the Night Witches are on the attack.”

by Muhammad Khan.



“We bombed, we killed; it was all a part of the war.” : Nadezhda Popova

You would assume this brutal yet blasé statement came from a desensitized, disillusioned butch soldier with years of battles under his belt. You couldn’t be more wrong. This quote belongs to one Nadezhda Vasiliyevna Popova, a gorgeous yet deadly Russian maiden who rose to defend her motherland. Popova was just one of the pilots of the all-female 588th Night

Bomber Regiment of USSR, an unrelenting bunch of women pilots and navigators. They soared through the icy-cold skies in open-cockpit planes which were never intended to be used in combat roles. In addition to facing hails of enemy gunfire and frostbite, the unconquerable women had to stand their own against rampant sexism and cynicism from male colleagues.

In spite of such odds, the 588th regiment was able to

Left: Nadezhda Popova, a commander of the squad who flew 852 missions. (Photo: Wikipedia Commons)

Bottom: A group of Night Witches, with Popova in centre, after the end of WWII. (Photo: Wikipedia Commons).



strike piercing dread in the Nazis. It is safe to say that during WWII, the Germans had a very real fear of witches. As the women destroyed their targets relentlessly, night after night, the Germans started referring to them as “Nachthexen”, literally calling them ‘Night Witches’. The women of the 588th regiment adopted this title proudly and, in time, did it justice. The Night Witches completed 30,000 bombing raids and dropped thousands of tons of bombs. To say that they had a hand in chasing the Germans back to Berlin, would be an understatement.

The Birth of the Night Witches:

Maria Raskova was the first and the most prolific female navigator in the Soviet Air Force. She had several accolades and accomplishments to her name. Once, after crashing in the



Above: A duo of Night Witches getting ready for the bombing mission. (Photo: Wikipedia Commons).

“Adolf Hitler launched the devastating Operation Barbarossa. 4 million troops entered Russia and initiated the most horrific military actions in the war, with endless atrocities committed against the Russian people. Joseph Stalin was desperate, with the Germans pressing on Moscow.”

”

“I saw the German aircraft

desolate Siberian landscape, she and her crew endured the elements and walked for miles until they were rescued. This ensured her celebrity status and Established her as a liberating icon for women in the country who wanted to be on the frontlines of the war effort. Raskova received droves of letters from these women, stating their agitation and desire to contribute. Many had lost brothers or sweethearts, or had seen their homes and villages ravaged.

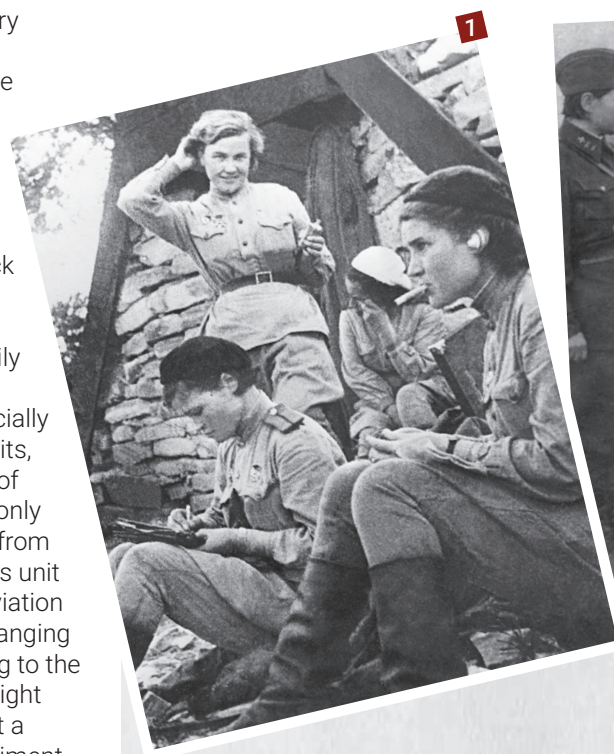
flying along our roads filled with people who were leaving their homes, firing at them with their machine guns,” Nadezhda Vasiliyevna Popova reminisced in one of her later interviews. “Seeing this gave me feelings inside that made me want to fight them.”

However, using females in combat roles was unheard of at the time. They were usually deployed to transport planes and technical jobs, at the most. Then Adolf Hitler launched the devastating Operation Barbarossa. 4

Bottom: Russian PO-2 aircraft, the weapon of choice of the deadly Night Witches. (Photo: Wikipedia Commons.)



million troops entered Russia and initiated the most horrific military actions in the war, with endless atrocities committed against the Russian people. Joseph Stalin was desperate, with the Germans pressing on Moscow. It was the perfect time for Maria Raskova to strike. She approached Stalin with the stack of letters she had received and petitioned him to form an all-female combat squadron. Luckily for Raskova, Stalin was a fan. On 8th October, 1941, Stalin officially formed 3 all-female air force units, appointing Raskova as colonel of all 3 regiments. Out of these 3, only 1 remained exclusively female, from the pilots to the mechanics. This unit was titled 588 Night Bomber Aviation Regiment, with young women ranging in age from 17 to 26 transferring to the small town of Engels to begin flight training. The recruits underwent a highly compressed Training regiment, with a course originally 2 years in length boiled down to 6 months. Recruits were expected to juggle between the roles of pilots navigators, maintenance and ground crew. Raskova grilled them hard. The fearless colonel also prepared them for the cynicism and sexism that the regiment was sure to encounter from their male colleagues. The women of the 588 regiment did not have it easy. The top brass had no time to make special arrangements for their femininity or separate requirements. As the graduates began their careers, they were supplied with men's uniforms. Oversized and not made for feminine figures, the uniforms were a substantial deterrent to good performance. The boots were also standard military size 42. The girls had to stuff them with rags torn off their beddings to keep them from slipping off. A similar improvisation was required for the wide-waisted trousers, tying them tightly with belts. The girls improvised and altered their uniforms to the best of their abilities. They were made to cut their



hair short. As one of the pilots would reminisce in an interview years later, "We didn't recognize ourselves in the mirror—we saw boys there."

'Coffin with Wings':

They were not even provided with the standard combat equipment that every male soldier received. Flying out for multiple sorties every single night, they had to face death without parachutes, guns, radios or radars. Navigating with compasses and maps, these the 40 or so two-woman crews flew 8 or more missions every single night. However, the plane selected for these young aces, the rudimentary Polikarpov Po-2, a two-seated, open-cockpit biplane, overshadowed all of these problems. Constructed from plywood and covered by canvas, these planes were repurposed crop dusters, never intended to fly in combat roles and obsolete even then. The planes had open cockpits, which meant zero fortification against the elements. Since the Night Witches were a night-time raid force, this meant the pilots flew in sub-zero temperatures, ice-cold winds and the constant risk of frostbite. Some veterans of the regiment later revealed that a number of new recruits had torn their skins off by touching the exterior of the icy plane without gloves. Nadezhda Popova remembers, "In winter, when you'd look out to see your target better, you got frostbite. Our feet froze in our boots, but we carried on flying."

Ironically, even in these freezing conditions, the 100 HP biplanes were highly flammable, bursting into flames instantly if hit by tracer bullets. It had zero armour and the Germans' predominant tactic of dealing with the intruders was firing as much as possible from as many guns as possible. Add to that the fact that the

“ Nadezhda Popova - a indomitable commander of the squad who flew 852 missions - once successfully ran 18 missions in one daring night. ”

biplanes Po-2 could fly on low altitudes when armed, the Night Witches had to sail through a wall of enemy fire almost every single night. The Germans initially dismissed the Night Witches' Po-2s as "Nähmaschinen" - "Sewing Machines" because of their silent flight. Once, after a successful flight, a pilot of the regiment counted 42 bullet holes in her tiny plane. There were even bullets in her map. Not even her helmet was spared. "Katya, my dear," the pilot confided to her navigator, "We will live long."

For all its flaws, the Polikarpov Po-2s had a few surprising and devious advantages over the German combat planes. The biplanes were so tiny in scale that radars could not detect them. Another double-edged sword was

Left Page 1: Ms. Popova, standing, with other Soviet pilots in World War II. "We bombed, we killed; it was all a part of war," she said in 2010. Credit...RIA-Novosti, via The Image Works

Left Page 2: Four of the Night Witches in 1943.

Left Page 3: Night Bomber Regiment, the Night Witches preparing for mission

Right: On a mission: Captain Maria Dolina poses for a photograph in front of her fighter plane during the Second World War





Yevdokia Bershanskaya (588 NBAP commander) and the crew of Yevdokia Nosal and Nina Ulyanenko 1942

the lack of radios, which meant radio locators could not detect them either. They were relatively silent, especially so when their engines were turned off. Their size also meant that they could be taken off from and landed to any small clearing. However, the advantage that tipped the odds in favour of the Po-2s was the fact that their maximum speed was slower than the stall speed of the Nazi planes, particularly the 'Messerschmitts'. This meant that the little planes could outmanoeuvre their opponents, which was no small cause for frustration for the Germans, whose planes had to take long, tedious turns. The little unforeseen factor worked for the Night Witches beautifully, making their tiny little biplane much harder to shoot.

Beware of the Night Witches:

The biplane had the capacity to carry only two bombs at a time, one under each wing. To do as much damage as possible to the Germans forces, the regiment curated an itinerary, which comprised of 40 two-person crews undertaking 8 or more missions every single night. They flew back to re-arm between sorties. The main objective of the 588 Regiment was unconventional warfare. They were to ensure that the German never felt secure, not in their own bases, not even at night. They were assigned to drop as many bombs over German front lines as possible, with the objective of making them lose sleep and killing enemy soldiers in the process.

The tactic they employed was as dangerous as it was effective. Three planes would take off at midnight, flying barely above treetop level. Two of these planes would go in first as decoys, attracting attention and fire towards themselves. They would then twist wildly to avoid enemy fire. During this commotion, the third plane would kill its engine and glide towards the target, to avoid detection. It would deliver its payload and disappear into the darkness. The



planes would then rotate roles until all 3 had delivered their payloads. It was a regular occurrence during these raids that one of the crew would have to physically climb onto the wing of the plane to dislodge a bomb or pull a stuck release wire to drop it.

The plane which would turn off its engine and glide to its target made a subtle yet iconic 'whooshing' sound. This infamous sound was likened by the German soldiers to the sound of a broom of a witch flying in the wind. Thus, the Germans started referring to them as "Nachthexen" which literally translates to 'Night Witches', a title which the women eagerly adopted

“ This infamous sound was likened by the German soldiers to the sound of a broom of a witch flying in the wind. Thus, the Germans started referring to them as “Nachthexen” which literally translates to ‘Night Witches’, a title which the women eagerly adopted with pride. ”

with pride. The Germans came up with outrageous stories to rationalize the 'Night Witches' prowess, speculating that the Soviet injected them with serums which gave them the night vision of cats or that they were hardened criminals recruited from prisons. In Albert Axell's book 'Greatest Russian War Stories: 1941-1945' a former Night Witch dismissed the claims, saying, "This was nonsense, of course. What we did have were clever, educated, very talented girls."

Achievements:

Around 500,000 Soviet women served in the war. They proved themselves to be paramount Snipers, the likes of Lyudmila Pavlichenko, still thought of as the deadliest female sniper in history. They proved to be excellent tank commanders and even operated anti-aircraft artillery. However, as a group, the Night Witches were unparalleled in their contributions. 89 women from various services were awarded the highest accolade of the Soviet Union. Out of these 89, 22 were proud members of the Night Witches of the 588 Night Bomber Regiment. By the time the war came to

an end, the 588 Regiment had under their oversized belt a total of 30,000 bombing raids, dropping almost 23,000 tons of explosives on German targets. 30 Night Witches lost their lives to the cause.

The Night Witches flew their first mission on 28 June 1942. They dropped their last bomb on 4 May 1945. Three days later, Germany surrendered. Maria Raskova, the mother of the regiment, lost her life in a crash on the front lines on 4 January, 1943. She was honoured with the first state funeral of World War 2. Despite being highly decorated and winning hearts across the Soviet Union, the regiment was disbanded 6 months after the war. Sadly, they were also overlooked in the victory-day parade which took place in Moscow. The official reason; their planes were just too slow.

Nobody can deny the part they played in ensuring victory for the Soviet Union and heavy physical and psychological damage they did to the German forces. After they had done their part, they did not seek fame or even spoke publicly of their achievements.

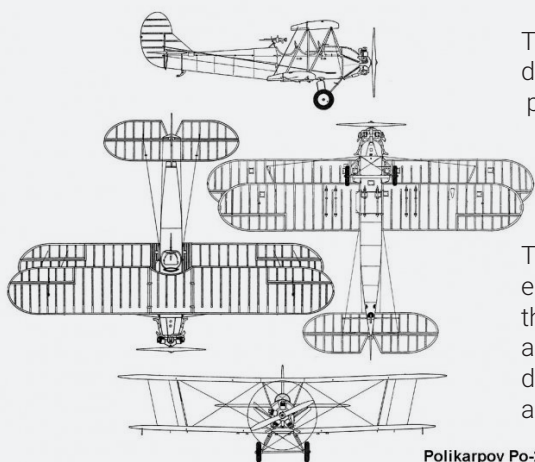
They regarded what they had achieved as something that had to be done and that they simply responded when the Motherland called. Most of them resumed their lives as homemakers and started families. Some went to achieve amazing feats in careers in aerospace and other fields. The feats that these women accomplished can and shall never be forgotten. With their navigational pencils which doubled as make-up and their little Polikarpov Po-2 biplanes with flowers drawn on them, they are the prime example of what women can achieve if given the chance, whatever may be the odds against them.



Above: Nadezhda Popova during an interview. (Photo: Wikipedia Commons).

Bottom: Women pilots of the "Night Witches" receiving orders for an up-coming raid. (Credit: Sovfoto/UIG via Getty Images)

"I look up into the dark sky," narrates Nadezhda Popova, "close my eyes and picture myself as a girl at the controls of my bomber, and I think, 'Nadya, how on earth did you do it!'"



Polikarpov Po-2



INDIAN SPACE PROGRAM: A Threat to Regional Stability

“India's space program has evolved over decades into a formidable entity with a huge potential. However, with technology like the kinetic anti-satellite missile, which holds the ability to destroy small satellites in space, it has become increasingly clear that India won't just stick to peaceful applications for its program. The Saffron giant has been peddling a soft image through its collaborations such as its satellite launching services. However, now, the truth is becoming clearer than ever that it is ready to dive headfirst into hardcore militarization. This is a dangerous foray which will disrupt the already out of control arms race in the region.”

by Abdullah Rehman Butt

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India's space program is considered as one of the fastest growing space programs in the world. Especially, during the last three decades, it has evolved at a rapid pace. Incipiently, the purpose of India's space program was to develop space-based technologies and infrastructure to bolster national development, for instance, the development of communication satellites in remote areas, and the development of remote sensing satellites to provide necessary

data and support to the agriculture sector of India. But as time went by, India started to shift the focus of its space activities from developmental purposes to space exploration and other distinct high-level missions including “Mangalyaan (Mars orbiter mission)” and “Chandaryaan (Moon landing mission)”.¹ Besides, India also aspires to undertake its first crewed space flight mission in 2022, named “Gaganyaan”. Such ambitious missions will not only increase the magnitude and visibility of India's space

program but in the long run, the derivatives of these missions will enhance the scientific and technological base of the country in this domain.² India has also been exploiting the dual-use potential of space technologies for its regional power ambitions, and shifting the utilization of its civil space assets for military purposes animatedly. By projecting its civil space program in front of the world through aforementioned prestigious space exploratory missions, India attracts cooperation and support from

Bottom: A rocket of the Indian Space Research Organisation carrying IRNSS-1E satellite lifts off from the Satish Dhawan Space Center in Sriharikota, Andhra Pradesh, India, Jan. 20, 2016.
(Photo: XINHUA NEWS AGENCY)

other advanced space-faring nations for its civil space program. However the services and technology acquired from foreign sources is being diverted to enhance its military space capabilities. Additionally, in March 2019, India has demonstrated its offensive counter-space capability by successfully testing its anti-satellite weapon that poses a grave threat to the peaceful uses of space by other countries in the region.³ This increase in militarization of India's space program is highly destabilizing for the strategic equilibrium of the region and a major source of concern for Pakistan.

This paper peruses India's space program, its existing civil and military space capabilities, the militarization of the program, and the implications for Pakistan.

India's Space Program

India's space program has undergone a rapid expansion in recent decades, largely as a result of the country's growing economic power and influence. However, like its international peers, the history of India's foray into space can be traced back much farther. India commenced its space program back in 1962. In its initial phase, India's space program was a part of the Department of Atomic Energy (DAE). However, a separate body named the Indian Space Research Organization (ISRO) was constituted in 1969 to conduct research in this field and develop space-based technologies as well as their application. In 1972, the government of India set up a Space Commission and formed the Department of Space (DOS) to administer Indian space activities, and brought ISRO under its jurisdiction.

India formally set foot into outer space in 1975 by launching its first satellite named 'Aryabhata'. Since then, India's space program has grown significantly and now has become one of the largest national space programs in the world.⁴ India has launched 118 satellites of different types and roles, and according to the database of “Union of Concerned Scientists”, currently India has 49 operational satellites in outer space.⁵

Moreover, India has also developed its capabilities and ground stations to launch and operate satellites on its own.

Vision and Objectives of India's Space Program

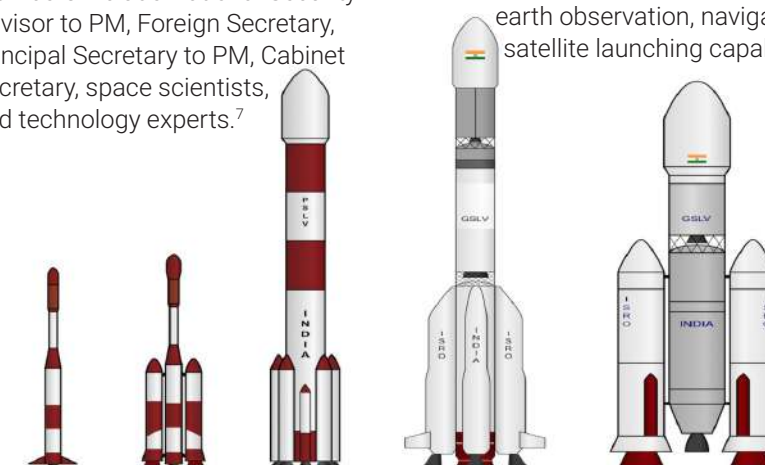
The principal objective of India's space program, like other space faring nations, is to utilize space-based systems and their applications to fulfill national needs. However, ISRO has pronounced the vision of India's space program i.e. “Harness space technology for national development, while pursuing space science research and planetary exploration.”

In order to achieve this vision, ISRO also has set some objectives:

- Design and develop satellites for communication, navigation, earth observation, and space exploration
- Design and develop advanced launching facilities
- Promote the use of space technologies for societal and national development
- Capacity building and education
- Focus on Research and Development
- Foster international cooperation⁶

Institutional Structure of India's Space Program

The Prime Minister of India oversees India's space program through a top body of professionals called Space Commission. Space Commission of India consists of eleven members and is headed by the Secretary of Department of Space (DOS). Other members include National Security Advisor to PM, Foreign Secretary, Principal Secretary to PM, Cabinet Secretary, space scientists, and technology experts.⁷



Launcher's used by ISRO from left to right – SLV-3, ASLV, PSLV, GSLV, and GSLV Mk-III

“India's progress in the space domain and its acquisition of the latest weapon systems have triggered a new arms race in the region.”

The Department of Space (DOS) of the Indian Government is responsible for managing and administering the various civil and commercial organizations, institutes and agencies associated with space activities and space-based technologies.⁸ There are two “Public Sector Undertaking (PSUs)”, named ANTRIX and New Space India Limited (NSIL), serve DOS for commercial space activities. The PSUs are corporations instituted by the Government of India for commercial projects that are not profit-oriented but serve country's economy and national development.⁹

ISRO is the space agency of the Government of India that operates under DOS and responsible for the scientific and technological development of India's space program. There are around fourteen centers, laboratories, educational institutes, facilities, and units with different roles and specifications who work under ISRO. (Figure 1)

India's Existing Space Capabilities and Satellite Systems

India's space-based capabilities and satellite systems are broadly classified into four categories: communication, earth observation, navigation, and satellite launching capability.

Communication

India maintains a vast satellite communication system with 15 operational satellites placed in the Geo-stationary satellites making it the largest satellite system in Asia-Pacific. The Indian National Satellite System (INSAT) was established in 1983 with the launch of INSAT-1. The INSAT series comprises the following in its series: INSAT-3A, 3C, 4A, 4B, 4CR. India's GSAT series joined the constellation of the INSAT communication satellites comprising of GSAT-6, 7, 8, 9, 10, 12, 14, 15, 16, and 18. Furthermore, 200 signal-receiving units which are located in the Ku, C, extended C, and other frequency ranges serve in Television broadcasting, telecommunication, digital satellite newsgathering (DSNG), and search and rescue operations. Considering the tremendous potential offered by satellite communication for national development, ISRO has also undertaken some important initiatives regarding societal development, for instance, satellite-based disaster management systems, village resource centers (VRCs), Telemedicine, and Tele-education.¹²

Earth Observation

The Indian Remote Sensing (IRS) system is the world's largest

civil earth observation satellite system consisting of 13 earth observation satellites namely Resourcesat-1, 2, 2A, CARTOSAT-1, 2, 2A, 2B, RISAT-1, and 2, OCEANSAT-2, Megha-Tropiques, SARAL, SCATSAT-1, INSAT-3D, Kalpana & INSAT 3A, INSAT -3DR. According to ISRO's website, "the imaging sensors of earth observations satellites have been providing spatial resolution ranging from 1 km to better than 1m; repeat observation (temporal imaging) from 22 days to every 15 minutes and radiometric ranging from 7 bit to 12 bit, which has significantly helped in several applications at the national level."¹³ The data acquired from these satellites play a crucial role in many sectors such as National Natural Resources Management System (NNRMS), urban planning, environment, forestry, agriculture, ocean resources, mineral prospecting, and disaster management. ISRO is also aiming to launch 10 more earth

observation satellites in the year 2020 including the first Geo-imaging satellite.¹⁴

Navigation

ISRO has developed the "Indian Regional Navigation Satellite System (IRNSS)" which is an independent satellite-based navigation system. The IRNSS consists of a constellation of eight satellites, named NavIC (Navigation with Indian Constellation). It provides fairly good timing, positioning, and navigation services to the country as well as its neighborhood.¹⁵ The IRNSS provides accurate real-time location, navigation, and positioning services, and enables the Indian satellites to have access to critical information that the GPS does not provide them. India has also developed its "GPS Aided GEO Augmented Navigation (GAGAN)" that provides navigation services to civil aviation for better air traffic control.¹⁶

Satellite Launching Capability

India is not only capable of launching its own satellites in space but also providing satellite launching services to other countries. In 2017, it has made a world record by launching 104 satellites of several countries in a single launch. India has two

Bottom: GSAT-17 is being loaded to cargo aircraft at HAL airport to be transported to Kourou, French Guiana
Photo: ISRO

Right Page Above: ISRO's GSLV MkIII-D2 mission was launched from Satish Dhawan Space Centre SHAR, Sriharikota.
Photo: ISRO

satellite launch vehicles in use with operational supporting infrastructure: "Polar Satellite Launch Vehicle (PSLV) and Geosynchronous Satellite Launch Vehicle (GSLV)."¹⁷

Analysis of India's Space Program

India's space efforts, including exploratory missions to Mars and Moon, regional coverage of its indigenous navigation system, the launch of South Asia Satellite (GSAT-9) to provide assistance to the neighboring states in communication and meteorology, a world record launch of 104 satellites of different countries on cheaper rates, and its technological prowess in space, have significantly contributed to India's soft power projection on the global strategic chessboard. Moreover, India has also been exploiting its accomplishments in the space domain as a tool of diplomacy in its bilateral as well as multilateral relations with other states. Resultantly, the soft power projection through space assists India in enhancing its international cooperation with developed states as well as increasing its influence on other states to achieve its national interests.

Military Dimension of India's Space Program

Because of India's aspirations to challenge China and assert itself as a global power, its space program has

now been focusing more on military applications rather than civil developmental applications. On one hand, Indian experts associate this policy shift with their ASAT test, code-named "Mission Shakti", undertaken in 2019. On the other hand, they claim that India had already acquired this capability in 2012.¹⁸ However, it is now fully evident that India's space program is "increasingly militarized".

India's communication, remote sensing, and navigation satellites facilitate its armed forces to apply real-time knowledge, precision, and speed in warfare and strengthen their "Command, Control, Computers, Communications, and Intelligence, Surveillance, and Reconnaissance (C4ISR)" capabilities. Moreover, these satellite systems are also aiding Indian armed forces to develop their Network Centric Warfare (NCW) capabilities. Electronic warfare sensors and jammers are being integrated into the remote sensing satellites to enhance the capability and range of reconnaissance and monitoring activities. Apart from these dual-use satellite systems, Indian



armed forces are keen to acquire dedicated military satellites to fulfill the C4ISR needs of each military service. For instance, GSAT-7 is a dedicated military communication satellite, developed by DRDO in 2013, which is providing communication services to the Indian Navy.¹⁹

Paradigm Shift from Space 1.0 to Space 2.0

Space 1.0 approach refers to "develop large, expensive, and complex satellites for both civil and military purposes". While Space 2.0 approach refers to "commercial space activity centered on small, cheap, and many. A paradigm that is based around low-cost small satellite constellations."²¹ The launch of 104 small satellites (smallsats) by a single launching vehicle marks a critical shift in India's approach towards space-based systems, and it becomes evident that India has started pursuing the Space 2.0 approach. India has adopted

“ Indian ASAT test has created huge debris in space that is still moving at very high speeds and is a threat to the satellites in orbit. ”

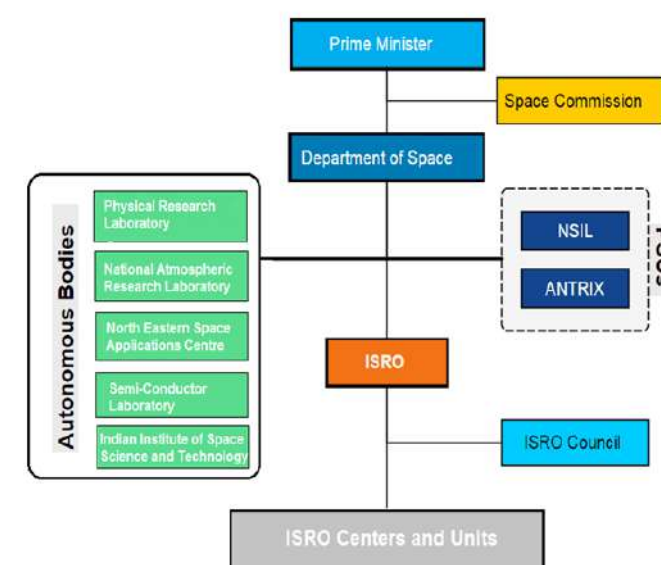


Figure 1: Organogram of India's Space Program¹¹

Indian Air Force (IAF) already employs the data obtained from satellite systems for communication,

Space 2.0, because, this approach enables quick mass production and low-cost solution in the design and manufacturing of smallsats. Moreover, it is difficult (near to impossible) to carry out a “decisive counter space attack” against a large number of smallsats in a constellation, in a military conflict.

Therefore, with a constellation of smallsats, it is easier to recover the space-based services close to the pre-attack level.²²

Threat to South Asian Strategic Stability

India’s increasingly militarized space program is posing a serious threat to the strategic stability of South Asia. Indian space-based capabilities along with ballistic missile defense (BMD), hypersonic and supersonic missiles, anti-radar weapons, enhanced UAVs and AWACS are giving India



Left: On 27 March 2019, India tested an anti-satellite weapon during an operation code named Mission Shakti. Photo: Wikipedia

a false sense of security, and have hugely tilted the strategic balance of the region in India’s favor. India could detect Pakistan’s both conventional and strategic assets, especially, during deployment. India will also be able to detect and intercept conventional and strategic missiles and this capability will help India in the development of its indigenous ballistic missile defense system. The combination of space assets and stand-off weapons will give India the capability for precision engagement and enable it to think of counter-force operations

against Pakistan, which will not only be detrimental to the deterrence stability of the region but also serves to the crisis instability in case of any post-Balakot like military crisis.

In March 2019, India has also demonstrated its kinetic anti-satellite capability by successfully testing a ground-based missile that destroyed one of its own satellites in space. This capability has enabled India to destroy adversary’s satellites and disrupt its satellite services in case of any military conflict. This act of weaponization of

space by India has made its deterrence relationship with Pakistan even more complex, as termed as multi-domain deterrence. Moreover, the Indian ASAT test has created hundreds of debris in space that are still moving at a very high speed. As per the report by American technology news website ‘The Verge’, “If the debris were to collide with another satellite at such high speeds, it could do significant damage and potentially render a spacecraft inoperable.”²³ Yet there have been no notable concerns shown by the international community regarding space congestion and pollution rendered by India.

Conclusion

India’s space program has marked significant growth during the last three decades, even with its limited resources. The program commenced with its focus on civil developmental projects but later on, it became “a symbol of national prestige and an element of soft and hard power”²⁴ for India. India is fully exploiting the dual-use potential of space-based systems both for its economy as well as military. India’s progress in the space domain and its acquisition of the latest weapon systems have triggered a new arms race in the region as well as put a delicate strategic balance of power in South Asia in peril. Due to its fragile economy, Pakistan cannot compete with India in the development of space technologies and services. However, to maintain the strategic equilibrium in the region and to ensure its national security, Pakistan must enhance its international cooperation in the space domain, especially, cooperation with China and other friendly countries. At the same time, Pakistan should also focus on the development and indigenization of its national space program to reduce and ultimately avoid dependency on the space-based services provided by foreign actors.

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KASHMIR: CLOCK IS TICKING!!

International Community turns a Blind Eye.

The plight of the Kashmiris is one that Pakistanis are well aware of. From state-sanctioned abductions to outright executions, the Kashmiri people have no semblance of a safe existence. India's atrocities in Kashmir have been documented and spoken about by countless human rights organizations from all over the world. However, India, instead of rectifying its tyranny, has shed any pretence of a conscience in Modi's government and gone on a blood-soaked spree of new atrocities. The world needs to acknowledge and address the grim situation before it is too late.

by Omer Aamir

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The state of Jammu & Kashmir has drifted from international attention time and again due to geopolitical and geostrategic developments in the region. However, after the 1971 Simla Agreement, the international community decided to relegate and leave it as an issue between the two South Asian nuclear powers. The horrifying results of the war in East Pakistan seriously undermined Pakistan's standing at international fora. However, as time went on and Indian atrocities in the disputed region increased incrementally, the international community was forced to review and take serious note of the historical dispute once more. United Nations Human Rights Office published a detailed report in June 2018 by Jordanian jurist Prince Zeid Raad al Hussein outlining the violations (including mass killings, kidnappings, forced disappearances, etc.) by the Indian forces in the region. They conducted these abuses unfettered with impunity due to the legal cover provided by the state of India. This cover was aided through the Armed Forces Special Protection Act

(A.F.S.P.A.), extended to Kashmir since 1990.

The colonial-era state of Jammu & Kashmir was a unique case during the partition of the sub-continent. It was one of the few places where a Hindu ruler held sway over a majority Muslim population. However, culturally, linguistically, ethnically, economically, and geographically, Jammu & Kashmir was integrally connected with the territories that now form part of Pakistan. Kashmir's main connections to the outside world were the Indus River and the Srinagar-Rawalpindi road, linking it to Pakistan. (i) At the time of partition, the Indian state adopted the stance that a ruler could not join a dominion without its people's consensus (ii). This stance put the Indian state in an unenviable situation concerning Kashmir's accession.

According to neutral observers, it could not annex Kashmir without taking the majority Muslim populations' desires into consideration, which would have been in favour of joining Pakistan. This claim is backed by the account of Kashmiri scholar Bazaz, who observes "Speaking generally and from the bourgeois point of view, the Dogra rule has been a Hindu Raj. Muslims have not been treated fairly, by which I mean as fairly as the Hindus. Firstly, because, contrary to all ethics of treating all classes equally, it must be candidly admitted that Muslims were dealt with harshly in certain respects only because they were Muslims" (iii). This helps explain the Pakistan Movement's widespread appeal in the 1940's to most Kashmiris living under oppressive autocratic-fiscal conditions. Unfortunately, Maharaja Hari Singh was bent on changing

the demographics of the Kashmir state. He did this by enabling a mass Muslim genocide in the territories that constitute present-day Poonch, starting August 24th 1947. Sensing discord in his dominion, the Kashmiri Maharaja requested Indian armed intervention. This unpopular action by the Maharaja resulted in an open revolt by the state's inhabitants against the ruler. Prime Minister Mahajan of Jammu & Kashmir in negotiations with Mountbatten-led Indian government-asked for the 'Mysore-model'- in which a princely state remained a separate entity in the Union of India while the ruler became the constitutional head (iv). However, a compromise was reached between the parties to chalk out a tailored arrangement for the Jammu & Kashmir state. This consensus led to the insertion of Article 370 in the Indian constitution. Jammu & Kashmir issue had been taken up by the United Nations Security Council and the resulting stay was creating delays in the drafting of the Indian constitution. Therefore, the idea of Article 370 was floated, and it came to the fore as the clause of the Indian constitution on which the state of Jammu & Kashmir acceded to India. As part of the arrangement, Indian occupied Jammu & Kashmir was allowed its own constitution. The idea behind insertion of article 370 was that India would exercise limited legislative powers over Jammu & Kashmir and not enlarge its sphere of influence (from the specified subjects of Defence, Communications, and Foreign Affairs) without the people's consent.

Nevertheless, Article 370 has been hollowed out over time as noted by renowned Indian journalist A.G Noorani in his book. The 'hollowing out of Article 370' has been undertaken through "ninety-four of the ninety-seven entries in the Union List being extended to Jammu and Kashmir as well as 260 of the 395 articles of the constitution being extended to the state" (v). In the State Bank of India vs. Santosh Gupta case dated December 16th 2016, the "Court reiterated that the President cannot issue an order ceasing to make Article 370 inoperative without the recommendations of the constituent assembly of Jammu & Kashmir" (vi). The constituent assembly of Jammu &



Illegal use of pellet guns is the testimony of Indian Army's brutal use of force against innocent Kashmiris, especially the youth. (Photo: Dawn.Com)

Kashmir had already been dismissed in 1957. To overcome this complexity, the B.J.P. government came up with a legal innuendo designed to make Article 370 inactive while simultaneously retaining it in the constitution, thereby, in essence, abrogating it. The resulting situation created unforeseen issues for the right-wing B.J.P. government and its obstinate leaders. More importantly, the abrogation brought the dispute back to international attention. It also attracted China's ire, which has led to a border standoff between the two Asian giants since 5 May, 2020.

To put things in context, Jawaharlal Nehru had earlier held negotiations with Sheikh Abdullah to win his support to join the Indian Union. In one instance, Nehru had also been arrested by Maharaja's administration while on his way to meet Sheikh Abdullah. The Congress supremo was keen to resolve the Kashmir dispute expeditiously, in part, due to his Kashmiri roots. However, soon, he realized that Sheikh Abdullah was not budging from his stance of maximum autonomy for Kashmir. Then the British hastily withdrew in 1947, and sensing an opportunity, the Indian Prime Minister took advantage of the state of affairs. Subsequently, Nehru had the Kashmiri populist leader arrested in 1953. This antagonizing move initiated the rift between the Kashmiris and the Indian state, which continues to haunt the present-day South Asian geopolitical and geostrategic dynamics. The irony lies in the fact that in the early years, Indian leaders had even gone

to the extent of suggesting that a plebiscite would be held at a future date when Pakistani armed personnel would withdraw from the state, which would give Kashmiris' the right to even secede from the Union of India (vii). India objected to Pakistan's decision for not pulling back its troops from Kashmir and obstructing the plebiscite's conduct. In response, Pakistan reprimanded India to decline to a neutral withdrawal and instead focus on the plebiscite (viii). However, in the pre-partition days, the same Nehru made untiring efforts to secure the Kashmiri populace's support by political promises of autonomy and self-rule.

In the backdrop of these events/ circumstances, the international community attempted to resolve the seemingly intractable Kashmir dispute. Global powers' efforts to resolve the Kashmir issue began only weeks after the conflict erupted in October 1947(x). The Kashmir dispute seemed tailor-made for the United Nations. It had all the ingredients that would garner international powers' interest: colonial history, territorial ambiguity, and two states with powerful militaries seeking international community's aid in resolving an issue regarding self-determination. However, it soon dawned upon global powers that the dispute could not be decided amicably. If Washington kept on promoting a role for the U.N., it was to keep its new ally Pakistan reasonably happy, and not because it believed that progress could be made.(xi) New Delhi, on the

other hand, resisted internationalizing the issue and rejected Washington and other global powers' offers.

The U.N. passed eighteen resolutions to help resolve the Kashmir dispute in the timeframe between 1947 and 1971. It established the United Nations' Military Observers Group for India and Pakistan (U.N.M.O.G.I.P.). Several special rapporteurs, including Czech-American Josef Korbel and Australian diplomat Sir Owen Dixon held lengthy discussions with both sides to find an amicable solution to the enduring issue. Different out-of-the-box proposals were floated, including the Dixon plan, which called for a limited plebiscite in the Kashmir valley. Similarly, the Chenab formula was put forth by Pakistan, calling for demarcation of the state between the two South Asian neighbors along the Chenab River.

However, India saw no role for international intervention even though, ironically, it had initially gone to the United Nations' Security Council itself, i.e., during the 1948 border war between the two states. After the Simla agreement succeeding the 1971 war, Kashmir-according to India's interpretation-was to be treated strictly as a bilateral dispute between Pakistan and India.

If the dispute is positioned in the current geopolitical times, it can be safely said that it is solely the United States which has the economic and diplomatic clout to mobilize and channelize efforts to resolve this seemingly perennial dispute.[xiv]



However, according to Professor Schaffer, despite its improved relations with the United States, India will always be warier of an outsider's role than Pakistan. The dispute on Kashmir is emotive across the divide for various reasons. It garners support in Pakistan because of religious and cultural affiliation. Pakistan's state narrative is that the Instrument of accession was a falsified document. On the Indian side, the territory is seen as an 'integral part' of secular India. India's curfew and stranglehold in the region have resulted in the inhabitants' inability to access necessary supplies such as medicine, food, and fuel. This has turned Kashmir into a mass concentration camp where more than 900,000 Indian security forces are deployed. Moreover, Indian use of the latest technologies for surveillance of Kashmiris is violation of their civil and personal liberties. It can also ominously be concluded that the recent turn of events indicates that the international community has turned its face away from the Kashmir dispute and relegated it to only an 'informal consultative session' at the United Nations' general assembly due to intense Indian lobbying. This does not bode well for the lives and fates of more than ten million people and the future trajectory of two nuclear powers who are at daggers drawn, with each nation exhibiting significant International clout. Indians have also been, to some extent, been successful in linking the Kashmiri freedom movement with a broader Islamic terrorism agenda of transnational extremist organizations. This is a significant setback to the Kashmir cause similar to the one in the '70s

when, after the Simla agreement, the international community viewed both sides as agreeing to manage it as a bilateral dispute. However, the seemingly dormant Kashmir conflict flared back into global powers' attention after the South Asian nuclear tests of May 1998 and the subsequent Kargil conflict that ensued. The international community took cognizance of the matter as the two rivals detonated atomic weapons within the span of one month. Internationally, the Kashmir dispute was highlighted as one that could lead to a possible nuclear exchange during the Kargil conflict, thus stoking global powers' attention. However, Indian obduracy prevailed under mounting international pressure-particularly post-Kargil conflict- to reach a durable settlement. Thereafter, the focus on the dispute once again proved to be fleeting.

Kashmiris should not only be taken as images of unfairness: they are genuine individuals carrying on lives in horrendous torment. They have rights under International law, rights which are in essence easily disregarded. Regardless of how the regional issue of Kashmir is settled in the long run, there is a human aspect to Kashmir. This isn't only a dry lawful question to be bantered in course readings and workshops. The Indian government's recent legislation regarding changing the domicile law and repealing the special status of the region indicates ulterior motives of the present Bhartiya Janta Party (B.J.P.) government to irreversibly alter the demographics of the only Muslim-majority in the Indian Union. In theory, India could argue that Kashmir is not an "armed conflict" of the type to which war laws apply. However, that debate misses the point: what India has deliberately and consciously adopted as a state policy in Kashmir is so cruel and so inhumane that it would constitute a war crime even if that type of armed conflict existed in the region.

India's stubbornness in keeping the Kashmir dispute a bilateral matter and in recent times, turning it into a unilateral one creates hindrances for the international community to proactively take up the dispute. Indian



government attempts to shift the global attention to terrorism whenever the Pakistani diplomatic corps tries to raise the issue at the global stage. However, linking a legitimate movement for self-determination to terrorism can not go on for so long. In time, Kashmiris' rightful struggle for self-determination will continue while the terrorism narrative by India and its proxies (as exposed by EU DisInfoLabs) will die down. Suppose we decipher India's contention that it exercises undisputed sovereignty over Kashmir. In that case, it follows that Kashmiris are entitled to the full range of human rights afforded to them under international law (including the right not to be shot at random with pellet guns [read:shotguns]).

International human rights law on policing and the use of lethal weapons is articulated most plainly in two documents approved by the U.N. General Assembly, i.e., the Code of Conduct for Law Enforcement Officials (1973) and the Basic Principles on the Use of Force and Firearms by Law Enforcement Officials (1990). Each of these is now regarded as declaratory of the customary law. According to Feisal H.N, writing for TRT world, "The content of these two documents amounts to basic common sense: that the use of force should be limited to the extent necessary, that it should not be disproportionate, that it should be backed by law and that there should be an effective means of accountability if this force is used."(xvi) However, the way that the territory of Kashmir is disputed has nothing to do with the undisputed human rights of Kashmiris. What is essential is that it is time that the global powers stop

choosing to disregard Indian state's infringement of those rights.

In conclusion, it can be stated that there is no easy road out of this dispute. However, the two sides need to get the assistance of international experts who carve out an unbiased assessment while taking into consideration the historical nuances surrounding the dispute. International conventions and agreements regarding self-determination form the bedrock upon which this conundrum ought to be solved. Mediation efforts involving the good offices' of global powers should be utilized in order to reach a bilateral settlement. Experts and analysts often ponder whether the Kashmir dispute would still have consumed the time, resources, and attention of the two poverty-stricken South Asian neighbours had the British decisively resolved the territorial dispute between India and Pakistan?[xvii] If the answer is not in the affirmative, then it creates a definite legal and historical obligation on world powers and multilateral institutions to bring forward their expertise and resources to undertake the arduous work required to resolve this seemingly perennial dispute. The Kashmir conundrum has consumed endless human lives from both sides, and a perpetual state of suffering exists in the highly-militarised occupied state. Probably, the time has come that the international powers and key world players should give up their hypocrisy and abandon their dual standards towards this very real and burning issue. On the other hand, the clock is already ticking and it may lead into an armed conflict between the two arch rivals any time..

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By mid-1971 it was known that the politically disturbed situation in East Pakistan would tempt India to take its advantage. It was in early August 1971 when PAF entered into a preparation phase for a possible war with India. PAF was well aware of the serious limitations of its bomber force. Since the induction of B-57s in the PAF, we had not been able to acquire any replacement aircraft that had been lost in peacetime training and 65 war. Resultantly, PAF had been left with only a dozen B-57s for night raids. I was commanding No 2 Fighter Training Squadron at Mauripur, now Masroor air base. The squadron at that time was equipped with T-33A aircraft also known as Shooting Star. This was a two seat version of a single seat fighter P-80/F-80 that was the first jet fighter of USAF or US Army Air Force at that time. Since I had flown this aircraft in USA in 1956, in combat crew training, I proposed to the AHQ that we use it in a night bomber role. I felt that its modest weapon load of 2 X500 Lb bombs and two guns could create sufficient effect. Owing to its low speed and dual cockpit, I considered it especially suitable for night bombing as it presented a small target and when piloted by experienced crew, it could sneak in at low level and deliver its weapon load accurately. Though not able to inflict much damage, at least it would keep the enemy airfields under pressure during nights and degrade their offensive capability.

The Idea

PAF Air Headquarters was formally proposed to consider enhancing the night bomber capability of the PAF through induction of T-33 in this role. The proposal met no resistance at AHQ as this was the only help B-57s could get.

Title Photo: A pair of T-33 aircraft, painted in usual PAF livery and markings, seen flying over Karachi coastline. (Photo: PAF Archives).



“The book titled “The Gold Bird” by Air Cdre (Retd) Mansoor Shah aka Poly Shah, has been read by many and also reviewed in many publications. He has written very kind words in this book for me and my family for which I am very grateful. Further he has praised my actions which saved Pakistan from a great humiliation in 1971 war with India. Whereas I am pleased with his good wishes for us, I feel not worthy of his praise. This is because I strongly feel and believe that Allah and Allah alone determines the destiny of His creations and guides them to those acts, which change the course of history. I was the one who was guided on that fateful night to perform this deed. Many of my friends have asked me to pen down this mission in detail for all to know and understand as to what and how it happened. I am not an expert narrator but will try to explain the operations of T-33 aircraft as were proposed, planned and actually executed during the war. Also, how this particular mission became a mission of great importance.”

by Wg Cdr Asghar Ali Randhawa (Retd)

IT WAS HIS DAY
or Night!



Left: A lone T-33 aircraft parked at the tarmac of PAF Base Masroor. (Photo: PAF Archives).

Below: The author in front of a Sabre at PAF Base Masroor. (Photo: PAF Archives).

Right Page: A line-up of T-33 trainer aircraft at PAF Base Masroor. (Photo: PAF Archives).

Furthermore, in those days UK had supplied additional Canberra aircraft to India, which had further increased the strength of their bomber force. Soon, I was tasked to go ahead with the proposed modifications and develop a plan for using T-33 aircraft as night bombers. From then onwards, there was no looking back. First we started to search for the bomb racks, which were luckily found at the depot at Drigh Road (now PAF Base Faisal). With little modifications, the bomb stations were established and racks were installed on one aircraft. Initially, the aircraft was flown with minimum fuel and

two bombs. Later, different fuel loads were used with bombs to ensure that aircraft got safely airborne, performed positively in the air and also during landing, should the bombs not drop. The aircraft behaved like a baby during flight testing and weapon deliveries. At the conclusion of the test and trial phase all available bomb racks were installed on the T-33s. All this was achieved while the squadron continued its regular training missions. Additional effort was generated for the trials and for subsequent training of all pilots in low level tactical strike and bombing at night.

Tireless Training

We as fighter pilots generally do a lot of practice bombing missions but primarily during day time, with a few missions at dawn and dusk. However, night bombing was never a task assigned to fighter squadrons. So, the initial task was to develop a tactical bombing technique for T-33 aircraft, fly this profile during the day and then move into night time. Few meetings with B-57 pilots on what parameters they were using for bombing, information on enemy air defences such as ack ack, normal or radar controlled, and their effective ranges. We scrutinised the data was available on Indian surface-to-air missiles and their deployment pattern etc. Having collected the required information, the squadron worked on developing its flight profile to target and the tactical bombing delivery technique. Two airfields were identified as primary targets for the squadron which fell within the reach of our aircraft, which were Bhuj and Uttarlai. Mission planning was done keeping in view area terrain, and the most suitable routes to targets and the best approach for final attack phase was worked out so as to ensure accuracy of navigation. The post-attack exit route was planned with an aim to reach Pakistan border in minimum time in case of battle



damage and for safe recovery at home base. The squadron prepared certain simulated runs by picking airfields of similar distances and flew missions at night under very strict constraints of time and fuel. Nothing was left to chance and it was soon obvious that the team was ready to fight and would ensure most effective bomb deliveries against the enemy keeping losses at zero.

T-33, being a two seater aircraft, provided a good opportunity to fly at extremely low altitude, thus the front seat pilot flew real low and the rear pilot kept track of navigation and height maintenance by monitoring the instruments. As we gained experience the bomb delivery technique was reviewed and an entirely new approach was worked out in view of the possible presence of radar guns and SAMs. Being a trainer aircraft, the T-33 was fitted with a modestly powered engine. As such, with 2X 500 lbs bombs it could not accelerate to very high speed in the final run to be able to zoom and reach the planned bomb delivery height in a short time. On the other hand, to gain the entry height one would have to start climbing from a long distance which would expose the aircraft to the enemy night interceptors, radar controlled guns or SAMs. Thus, it was decided to work out a specific low level bombing technique for these missions. A pattern was planned and few missions were flown with practice bombs. The results were very encouraging. After careful considerations live bombs were loaded one day and bombs were dropped

singly. On recovery, no damage was seen to the aircraft. Subsequent missions were flown dropping both bombs in salvo and it was seen that aircraft sustained no damage. Thus the minimum pull-out height of 500 ft AGL was finalised for tactical live bombing on T-33 aircraft. Then, the unit started to practice night missions on simulated routes terminating at the firing range. Primary concern was to begin acceleration in time and achieve maximum speed before pull-up, because failure to get to correct speed prior to pull-up would not give the entry height and subsequently the drop speed. On the other hand to get to correct height an early climb was required, which would expose the aircraft to terminal defences thereby jeopardising mission success.

Bombing techniques were perfected to the extent that I was confident that every mission would be a success. The procedure was adopted to start final run with full power about three minutes before pull up attaining a speed of 300 +/-5 Knots. Reaching the pull up point, the pilot punches clock and pulls up to gain height of 3500 feet and roll in to attack. It was to be ensured that the aircraft was never flown above 1500 feet AGL for more than 40 seconds to ensure that absolutely no chance was given to enemy radar controlled guns or SAMs to get a lock-on. The bombs were dropped at 1000 ft and recovery was made by 500 ft AGL. It did appear unsafe but my repeated live bombing missions at range proved that it was indeed very safe for T-33 as this aircraft presented a very small

“ In a flash I realised, why I had drifted off track, why I had been able to see the tanks concentration, why I had missed the primary target Uttarlai and why I had stumbled onto these trains, troops and logistics concentration. ”

target and also chances of picking any ricochet were none. Every pilot was given very exhaustive and professional training which included real low level night flying and navigational runs for rear seat pilots without looking outside, almost like flying under the hood. Landings at own airfield were practiced with runway lights off and without the use of landing lights. Sufficient Bombing and gunnery missions were given to each pilot to ensure very accurate weapon delivery.

Soon, all the training and hard work started to show results. The instructor pilots of the squadron were now really turning into aggressive bunch of low level bombing devils. Their skill in low level night flying, navigation, landing at airfields with runway lights and without use of landing lights had given them tons of confidence to operate in any weather conditions during day and at night. Our maintenance officers, senior NCOs and men were working day and night to meet our aircraft requirements. The Flight Line Chief under the superb leadership and guidance of Flying Officer Younas (Who remained 24 hours available) was not only generating flying effort for training



missions of young pilot officers but also producing aircraft for operational missions whenever required.

The D-Day

Finally, the D day came. The Base Commander called and informed that we were to attack that night. We arrived from our houses for a routine night flying activity, however, departed for attack against our targets at 30 minutes intervals. The operations on the first night were great success and all our aircraft returned safely. Just when we had recovered all our aircraft, the radar alerted us that IAF bombers were heading for Karachi. I returned home when the air raid sirens were blazing. So I took my family in the bunker built for this purpose in my lawn. My wife asked, "Has the war started?" My response was, "We have been there and now they are coming". "But you said it was normal night flying tonight". "Yes, it was normal, only we dropped bombs on Indian airfields". I think that from that night to end of the war we saw very intense bombing over Mauripur. But in spite of such concentrated bombing the enemy could not disrupt our operations from Mauripur. Our bombing missions continued with every night hitting the Indian airfields at Uttarlai and Bhuj. The weather for two nights became very mucky and visibility became poor with hardly any reference points in Bhuj area and while flying over Rann of Kutch. This resulted in disappearance of one of our B-57s. But the T33 aircraft operated with complete confidence, which was the result of very demanding and aggressive training conducted in our pre-war operations.

Divine Intervention

The fateful night, for which I am writing this article, started with the usual briefing about weather,

“ I recollect AVM C R Nawaz telling me later, “We had an Indian report that said that the night attack of yours was what saved Pakistan from total collapse”. ”

airfield status and operation brief on the mission which was to attack Uttarlai airfield with four T-33s at 30 minutes intervals. I took the first mission with Flt Lt Najam in the rear seat. When we arrived at the aircraft the Line Chief was there to greet us with other ground crew. While we did pre-flight, Line Chief was always seen

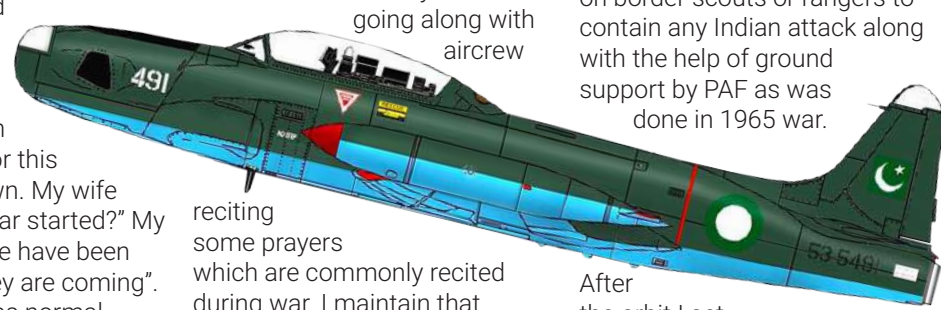
going along with aircrew reciting some prayers which are commonly recited during war. I maintain that such people were a great help not only in keeping the morale high but also in solidifying the faith in our cause. The start-up, taxi-out and take-off were normal, after which I headed for target area. Although, the weather report did not predict strong winds at 20,000 feet, at Kotri Bridge I noticed that we were off track by 8 miles so correction was made to get back on track. When I descended to low level, I still found myself off track by 12 miles near Khipro town. Running at 200 feet above

ground, I could see the outlines of the hill which was my turning point to start my final run to the target (Uttarlai air field). I suddenly saw a well-lit area on my right about three miles, a sight I had not seen during my previous missions. I took a turn to check, and found an area of about one km square that was lit with flood lights and there were men moving around tanks. I was really surprised to see such a large tank concentration so near to our border as there was no mention of such enemy activity in southern sector by our army briefers. We knew, Pakistan army did not have regular troops in this sector and was relying on border scouts or rangers to contain any Indian attack along with the help of ground support by PAF as was done in 1965 war.

After the orbit I set course again for the target but marked the location of this concentration of tanks on the map and decided to come back for this target, later on. I pulled up on time and went in to dive for dropping bombs. As I came close to the drop range I did not see anything, which could justify the bomb drop. I abandoned my attack and quickly made a steep turn to see any area of interest but nothing was visible such as the outline of the airfield or other structures. I then switched 'ON' my navigational lights which

Below: Painted in an eye-catching livery, a PAF T-33 trainer takes-off for a training mission from PAF Base Masroor. (Photo: PAF Archives).

Right Page: A four-ship formation of T-33 aircraft, minutes before departure for a routine training mission at PAF Base Masroor. (Photo: PAF Archives).



also did not attract any ack ack fire by the enemy. I was little disappointed, as it had never happened to me during all my fighter operations that I missed a target as leader. I eased up to 1000 feet and on my second turn I found a well-marked area with lights which I immediately identified as Uttarlai railway station. I saw there were three trains and a large number of personnel busy in unloading them. In a flash I realised, why I had drifted off track, why I had been able to see the tanks concentration, why I had missed the primary target Uttarlai and why I had stumbled onto these trains, troops and logistics concentration. It is will of Allah that this force be destroyed! So, I dropped my first bomb on forward portion of the trains and the second on the middle area. The trains started to explode generating huge fireworks, after I set course for home. I called Badin control to advise my pilots following behind to avoid flying over or near Uttarlai railway station, since there were a lot of explosions going on over there. Badin control asked me what had happened in that area, as they were hearing the IAF Canberra crews talking to each other, as to what has happened, 'Our desert is burning!' Thereafter, the return to base was normal and I was greeted by my Line Chief. Smiling I said, "Prepare four aircraft, I will need them in one hour". He was pleased to know that the strike was successful, as I explained to him.

Delivering the Decisive Blow

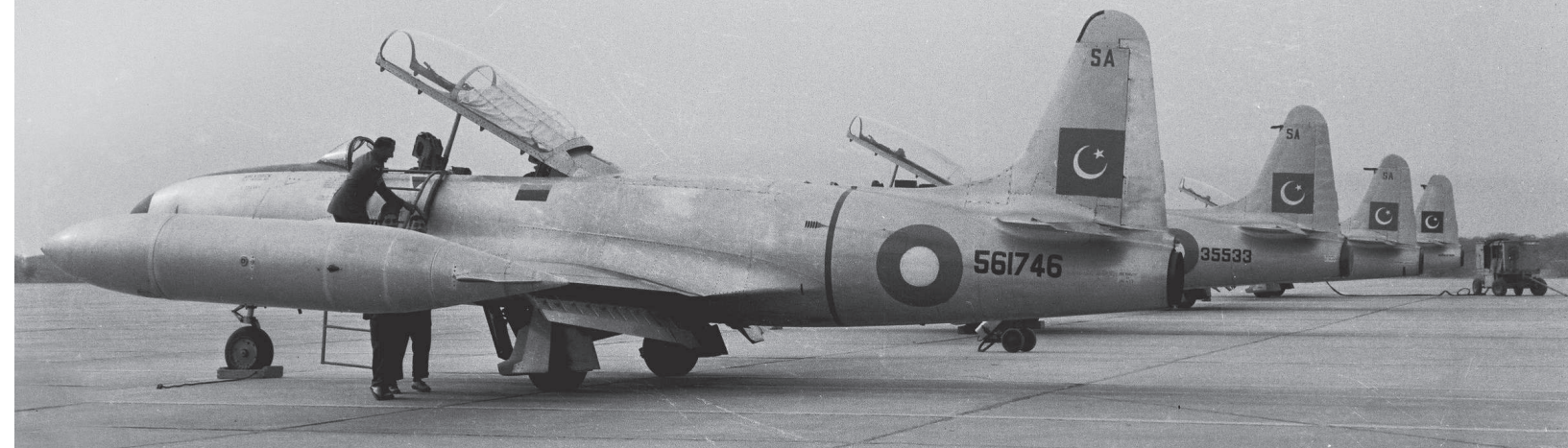
On arrival in the Ops Room the mission report was filed. Then the whole situation was discussed with army liaison officer who was deployed with ack ack unit. He was really thrilled

and agreed with me that the tank concentration be attacked immediately, which we estimated to be at least 30 to 40 tanks. I explained my whole mission to the Base Commander "Bill" Latif, and suggested that I take four T-33s adding that they had already been ordered and would be ready in one hour. He said he would ask Operation Command at AHQ for their permission for this mission. He called and spoke with Air Cdre "Polly" (Mansoor Shah) and sought clearance to go ahead with this mission. I could make out that Air Cdre Shah had not approved this follow up mission and he was not budging from his stance. I heard the Base Cdr plead with him saying that this was very important mission that they must undertake and that it would have no impact on the availability of aircraft the following day. He didn't agree. After taking permission from Base Cdr, I called Air Cdre Polly Shah myself and pleaded for the clearance of subsequent missions. He got convinced but with a condition.

Later on Base Cdr received a call from Operations. Putting the phone down he said, "Randhawa, they have agreed to launch attack against the tank concentration". I said, "Good Sir I would take four T-33s". He said, "No, you see what Air Cdre Shah has said is to send two B-57s but not that mad man!" I said that it was fine with me as long as we got them and that it did not matter whether it were T-33s or B-57s. The B-57 crew were provided the map reference and two B-57s were dispatched to target area. The Indians had not anticipated this attack and were still busy with their preparation with full lights 'ON' when B-57s arrived on target. It showed

that the news of the attack on Uttarlai railway station had not reached the tank group. Furthermore, they had not noticed me circle overhead or did not consider me as a PAF aircraft. The two B-57s dropped their bombs with great ease and to their full satisfaction. Thus the very secretly planned mission of Indian army to make a surprise attack and capture Hyderabad ended in total destruction of their tank units in Monabao and Uttarlai area.

I recollect AVM C R Nawaz telling me later, "We had an Indian report that said that the night attack of yours was what saved Pakistan from total collapse". Many years later a retired soldier of Indian army whom I met in Riyadh confirmed the same during my visit to a Company Al Arafee, in 1981. This young man brought tea for me and while striking a conversation I asked him about his nationality and past experience. He said that he was from Rajasthan and was in the army before coming to Saudi Arabia. I asked him where he was in 1971 war. He said that he was at Uttarlai sector. I asked him to tell me about the attack on railway station and the tank unit in that area. He said, "It was like hell, killed many people, all petrol and ammo and other stores at the railway station were destroyed. I was lucky to survive. Similarly, we heard the tanks were almost all damaged". I was reassured once again that Allah had indeed helped Pakistan because Indians were sure of a great victory in that area.



From snow-capped mountains to vast coast lines, Pakistan checks off every box needed to be a tourism hot spot. You'll travel to vast highways thousands of feet high, in the shadow of mountains unbelievably massive. You'll see small slices of heaven hidden amidst cloud-kissed valleys. The cuisine is as diverse as the people you'll encounter. Here is a list of must visit locations that's we've compiled for you. The cherry on top – you'll do it all in a tiny fraction of the amount that you'd spend in any other country. So, pack your bags for an adventure of a life time.

by Falak Sher Khan

A Quest INTO THE Dreamland!

The pages of the subcontinent's history have very interesting anecdotes about the raw beauty that Pakistan holds within. Mughal Emperor Jahangir, for instance, was passing through the Potohar bowl towards the North East and spotted a beautiful water stream gurgling near a mountain range. The Emperor exclaimed in wonder: "Wah!" That place has since been called Wah and has developed into a Cantonment settlement. Jahangir also stepped into the wondrous realm that is Kashmir, and wrote a prose: If there is Heaven on Earth, it is here!

Even in the colonial era, by the colonising British, there are historical instances that unearthed hidden treasures at the greener end of the Subcontinent. Major Abbot, a British Royal Army Officer, was stationed in the North West Frontier Hazara valley where he lost his heart to a hill station and spent the rest of his life developing what has since been known as the city of Abbotabad. His farewell ode wrote: Oh Abbottabad we are leaving you now To your natural beauty do I bow, I bid you farewell with a heavy heart Never from my mind will your memories thwart!

In leaps and bounds as time went on, Pakistan's heavenly Northern Valleys, Punjab's lush green fields Balochistan's fruit-bearing plains and Sindh's breezy coast captured attention and

hearts around the world. Visitors thronged the country through the decades, capturing their memoirs with film and ink, spreading the word of a dreamland in South Asia, with hospitality like they'd never known.

The turn of the 21st century brought with it turmoil, with the enemy seeping in to set fire to the heaven that is Pakistan. The valiant people and the armed forces fought bravely and defeated the infestation. The battle zones were inhabited again, laughter returned, festivities resumed. Bullets and shards were discarded but the war of narratives wages on. The Western Media, aided by our Eastern foe's media and soft narrative tools, demonized Pakistan and labelled it as hostile, for political, strategic and ulterior gains.

Here's the crux of the folk: Pakistan's peace and serenity don't need validation. There are thousands of tourists coming in every year to enjoy what Pakistan has to offer. Pack up your bags and fly in, and here are all the places you need to breathe in when you get here:

Naltar Valley

Since mid-2019, Naltar has become a hot spot for tourist activities, garnering attention for its unparalleled scenery. Your journey to Naltar will begin with leaving the Karakorum Highway by Gilgit. The track is a little bumpy and adds to the travel time. It will take you almost a 2-hour jeep ride to get up there. Please avoid taking cars (your own or rental); that's neither safe nor viable. Plus, you will miss out on the 'jeep-thrills'! You might think the two-hour ride is too long and tiring but, it is worth every single.

What's Naltar like? Well, imagine a land with air so crisp, grass so green and skies so blue, they look right out of a fairytale! The valley is surrounded by clear lakes and dense forests. The three lakes are collectively known as Bashkiri Lakes.

The path that leads to the lakes is covered with abundant green plains. On the way, you will find herds grazing on the grassland. Stop and take a picture holding a baby goat, because why not? This place is filled with social media worthy nature. The first of the three lakes is Satrangi of 7 colours. The second is Lakepari, and the third is Lake Firoza. The splendour of Satrangi Lake is beyond words, especially if you haven't visited any lakes before. Also, the name Satrangi is quite meaningful. The still waters of the lake reflect a colourful palette painting a vibrant canvas of its own!

Lakepari is bigger than Satrangi and provides boat service as one of the many fun options available to visitors. There's also a campsite along the lake site.

To visit Lake Firoza, you would have to set out on foot. No paved road leads you to it, and no vehicle would help. The only option is trekking all the way up to the lake. The 45 minute-walk would pass like a breeze. The 360-degree view of snowcapped mountains will offer all the distraction that you need.

While trekking, you might want to pause after every few steps. Breathe deeply as the air gets colder the higher you climb. Once you reach Firoza Lake, the beautiful landscape surrounding it will take your breath away.

Sit on the top of the mountain slope and watch the tranquil lake. Being in nature and away from the concrete jungle allows your mind to wander. Who knows, on this journey you might even discover yourself all over again!

Muzaffarabad Azad Kashmir requires no lengthy descriptions; its

beauty speaks for itself. It is the city of panoramic landscapes with a bonus – the exquisite Kashmiri Cuisine. With so much that Kashmir has to offer, Neelum Valley deserves a special mention. Neelum Valley stretches out from the north of Muzaffarabad (the capital of Azad Kashmir), from the Chela Bandi Bridge to Tau Butt. It expands over 240 kilometres.

One of the most beautiful valleys of Azad Kashmir, Muzaffarabad boasts freshwater streams, brooks, a river, and snowy mountains. 'Neelum Valley' is literally translated as the 'Blue Gem Valley' and the name pretty much sums it all. The flowing waters of the Neelum Valley run along the roads until they finally merge with Baboon Valley.

Baboon Valley tops the charts as of the most popular tourist destinations. How to get there? It takes around 4 hours to reach Muzaffarabad from Islamabad, which is basically a gateway to Azad Kashmir. From

Muzaffarabad, you proceed to Kutton, Khillun, and finally, you reach Baboon Valley. The highlight of Baboon Valley is the thicket of tall trees reaching out towards clear blue skies. You will get to see grazing cattle in the backdrop of snowy white patches. Take in the ambience, stroll in the meadows, and experience the time of your life. Baboon is one of those places where you can sit with your thoughts and practice mindfulness. It is beautiful as well as peaceful. If you are lucky enough, you may even come across a few horses running through the plains. It's like a scene straight out of an adventure flick. Due to a surge in popularity of these

tourism spots, locals have innovated what we can call a 'Desi – Air BnB'. Many residents have started to host tourists in their houses. They charge some amount, depending on the number of people and the duration of stay.

Any discussion of Kashmir is incomplete without raving about its scrumptious cuisine. If you travel all the way to the country's north, don't hesitate to try out the traditional tastes of the town. Don't go looking for options easily available everywhere. For a truly immersive trip, treat yourself to the culture's unique flavours. You might not find a crispy

chicken burger on the mountaintop, but you won't eat a better roast in your life!

The mouthwatering aroma of Kashmiri cuisine complements its taste. Some of the delectable food includes Goshtaba, Wazwan (a multi-course meal), Kashmiri Kulcha and the famous Tea.

Goshtaba is a complex dish in terms of its flavour, but it's easy to make and consume. It consists of a mix of different spices not known to the general public, and it is prepared over long hours. Another souvenir of this magical land is its famous Namkeen

Tea, made from dried up tea leaves, almond, salt and other ingredients. Kashmiri Kulcha is available throughout Muzaffarabad as a bakery item.

Dudipatsar Dudipatsar is next on our list of the most stunning attractions of Pakistan. Sitting in Kaghan Valley, Khyber Pakhtunkhwa, Dudipatsar Lake



Hunza Valley



Peer Chanasi



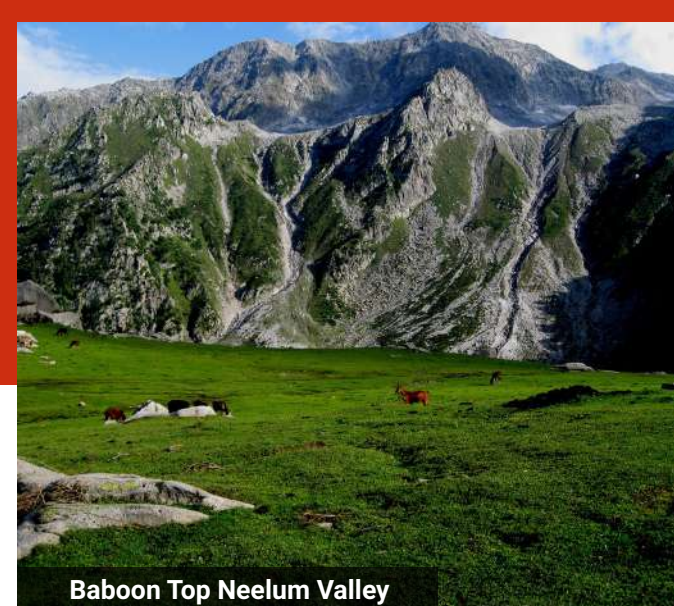
Naltar Valley



Chitral Valley



Dudipatsar



Baboon Top Neelum Valley

circles the Lulusar Natural Park. The park and lake are both accessible only during specific periods from June to September. To get to the lake, you may need a jeep again. An ordinary vehicle might not be able to deal with the upper tracks.

Let's decode the name. 'Dudi' translates to milky, 'Pat' means Mountains and 'Sar' is a lake in the local language. You will absorb much more than the sights when you travel. You will learn a thing or two about the rich dialects and cultures concealed in the far-off areas of Pakistan.

To witness the full charm of Dudipatsar, I would advise you to visit it in July. The landscape with its azure lake, snowcapped mountain peaks and cold crisp air is like a calendar portrait. If you thought Lake Saif-ul-Mulook is the most beautiful, wait till you visit Dudipatsar. You'll find that it gives Saif-ul-Mulook a run for its money!

For safari enthusiasts, the park consists of exotic breeds of animals rarely found in the world. This includes the marmot, lynx, snow leopards, black bear and more. Wetlands and wildlife are vital for maintaining the ecosystem. Plus, they make for matchless sights on offer for committed adventurers!

Hunza Valley Pick any piece of writing about Pakistan's magnetic natural vistas, and you will find Hunza securely placed on all the lists. But don't be confused by the word 'valley' as Hunza is a vast district consisting of several valleys and small villages.

Let's walk through some of the most breathtaking sites of Hunza: **Passu Cones** Passu Cathedral is one of the most recognized – and if I may say, iconic – tourist destinations of Pakistan. Why am I singing its praises? You'll have to see it to believe it! I cannot recommend it highly enough because in Passu, you'll find nature at its most incredible.

Though tourists are no longer allowed to stay overnight in Passu Village, you can enjoy the splendid view from Karakoram Highway (about an hour's drive away from Gilgit). Even if from a

Karimabad Karimabad is regularly listed amongst the top 5 tourist attractions of Pakistan, and you'll be bound to agree. You can travel there by bus, but it will drop you outside the city – why? Well, as a preventive measure to protect the city from pollution.

The central valley is surrounded by mountains and is divided into several levels. It hosts some of the biggest and most famous peaks such as Ghenta Peak (7090 m) and Rakaposhi (7788 m).



Eagle's Nest Hunza Valley

distance, the cones are still beautiful to look at and admire!

Eagle's Nest Visit Eagle's Nest to experience the most spectacular sunset of your life - No exaggeration! Another notable mention is Lake Attabad – a place where you can glimpse Mother Nature's unlimited bounties.

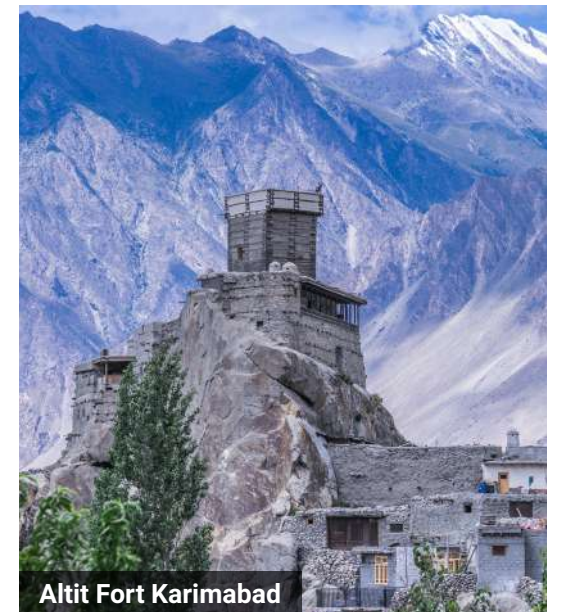
The town offers a wide range of facilities, from checking into your hotel to a car rental to food and every other service for your comfort. Hotels are readily available so you won't have any difficulty finding one according to your budget. After checking into your hotel, you can set out and look around this magnificent place. The valley is surrounded by houses, some of which

date back to thousands of years. As you view the historical sites, you will feel like you've stepped back in time. Apricots are the staple in this region. You will find different delicacies made of apricot every 100 steps. This place is a unique tourist attraction all around the year, especially during summers. The valley boasts dense orchards of apples, apricots and walnuts. It is a beautiful smorgasbord of tradition, nature, culture and civilization. One of the recent developments of this place is the newly built Luxus Luxury Hunza Hotel. If you can stretch your budget a little, you'll find this hotel to rival those Instagram honeymoon destinations you've probably drooled over.

Paye is emerging as a high-tourist-influx spot, retaining its strong attraction as a green plateau on the top of the Hindukush. The several activities it offers include horse-riding, wandering in the blooming flower fields, or just enjoying the clouds and fog. In Paye, many travellers are enticed to rendezvous with nature. Coming down, you will have to stay in Islamabad, reputed as one of the top three most beautiful capital cities in the world. The rainforests of the Margala Hills provide a perfect hiking trail. You can admire the city's elegance from the vantage of Daman-e-Koh. The city has endless green stretches and mini-forests, sure to impress even the most diehard nature-lovers. Describing the charms of Islamabad will take up another article altogether! This is what a renowned international luxury and lifestyle travel magazine, Conde Nast Traveller, has to say about



tourism spots in Pakistan: "This remarkable country is finally getting the focus it deserves. Because this is a place of exquisite landscapes, where green spaces are overlooked by towering mountains. In fact, Pakistan has more peaks taller than 22,965 feet than China and Nepal combined, making it an almost magnetic spot for adventure travelers and intrepid hikers." Pakistan is an excellent place for tourism, as it offers an array of awe-inspiring natural views. Snowcapped mountains, rainforests, plateaus or deserts – take your pick – every attraction delivers an unforgettable experience. Due to its rising popularity, Pakistan Tourism



Development Corporation (PTDC) has set up three restaurants and 27 new motels for the convenience of foreign tourists. In addition, Pakistan was declared the world's third-highest potential adventure destination for 2020 by the British Backpackers Society. All the news and media headlines highlighting Pakistan's topographic features only reinforce what locals have known all along about the country's under-explored wonders. Pakistan has also grabbed the attention of many international tourists since the past couple of years. We can expect more attention in the years to come as the infrastructure develops.



Ratti Galli Lake, Azad Kashmir



Naran Kaghan Valley

A True Patriot

Hug(e)h Catchpole:

A Bachelor Wedded to One Cause-Education



“This is the story of an Englishman who has deeply touched the lives of many Pakistanis. An educationist who devoted his entire life for a singular cause- imparting education, whose students are spread across many nations including UK, India, Pakistan and Bangladesh. Some of them has held the top positions of power in both civil and military domains; Generals, Air Chief Marshals, politicians, bureaucrats and many more. And above all, being the true patriot, served this country till his very last and chose to be buried in the country he held allegiance to. Mr Hugh Catchpole, you will always be remembered!”

by Muhammad Khan

During the 1965 war, the two air forces were led by Air Marshal Nur Khan from PAF and Air Marshal Arjan Singh from IAF. These two men were both students of Prince of Wales Royal Indian Military College (RIMC), Dehra Dunn and despite being on opposing ends of the war, maintained a semblance of a cordial relationship. In the words of Arjan Singh “Asghar (Air Marshal Asghar Khan) was and is a close friend of mine, so is his successor Nur Khan. They were both good colleagues and first-class officers.” After the war ended, Air Marshal Nur Khan, in a display of austerity and professionalism, sent a plane to fetch Arjan Singh to Peshawar air base as his guest. His intentions were to discuss the war and to gain insight now that the conflict had ended. However, he

needed a mediator who could preside over the debate. A mediator who needed to be unbiased, who had immense integrity and an equally impenetrable intellect. He also needed to be a person who both of them held in high regard. The choice was obvious. He invited Hugh Catchpole, the enigmatic British teacher who had taught him and Arjan Singh both in RIMC, Dehra Dunn. Hugh Catchpole was immensely revered by both of these military giants. To Hugh Catchpole, despite the fact that the two were opposing each other during the war, they were still his beloved boys.

The night of 24 October, 1947 was one of the most difficult times Royal Indian Military College, Dehra Dunn had ever witnessed. The seeds of separation had not yet breached its walls. The

teachers and students, from all faiths and creeds, enjoyed life in tranquillity, oblivious of the bifurcation outside. Hugh Catchpole was a teacher at the time. His accepting demeanour had enabled him to foster an environment of tolerance amongst his students and teachers. On the said night, after he had retired to his quarters, he received an urgent message which would leave an effect on him for the rest of his life. “The saddest occasion during my 25 years at the RIMC was the night of 24 October 1947. At 10 pm that night, I received an urgent message that the Muslim cadets were to be evacuated at 4 am in trucks sent from the IMA.” Wrote Catchpole in his article ‘Reminiscences 1928-53’, “Although I was in charge at the time, the movement was so hush hush that even I was kept in the dark until the message arrived.”

Owing to the nature of its administrative mechanics, cadet colleges exist in self-sustained macrocosms. RIMC was no exception. The

order to transport all Muslim students at such short notice was the first disillusionment that Catchpole underwent about the dire state of affairs outside. With an immensely heavy heart, Catchpole moved to the dorms and ordered the Muslim boys to be woken up. By midnight, the time when the institution was usually deep in slumber, it was now in submissive anguish. These boys knew little about religious differences and politics. Their tender minds were unable to grasp the necessity of the affair. They were being ordered to be parted from their brothers with whom they had broken bread, shared countless memories with. Principal Hugh Catchpole was moved with empathy for these boys. There was a great hustle. Improvised boxes and containers were arranged for the Muslim students to pack their belongings. Tearful promises to keep in touch and to reconcile were made. Hugh Catchpole knew the boys had little time but he did not interfere, eager to grant them some semblance of closure. He arranged an early breakfast, after which the boys exchanged parting gifts. At 4 PM, the trucks arrived and the Muslim cadets boarded them.

“The cadet captain called for three cheers for the Muslim cadets who returned the cheers for the friends they were leaving behind. What a heart-rending moment it was!” writes Hugh Catchpole in his memoirs.

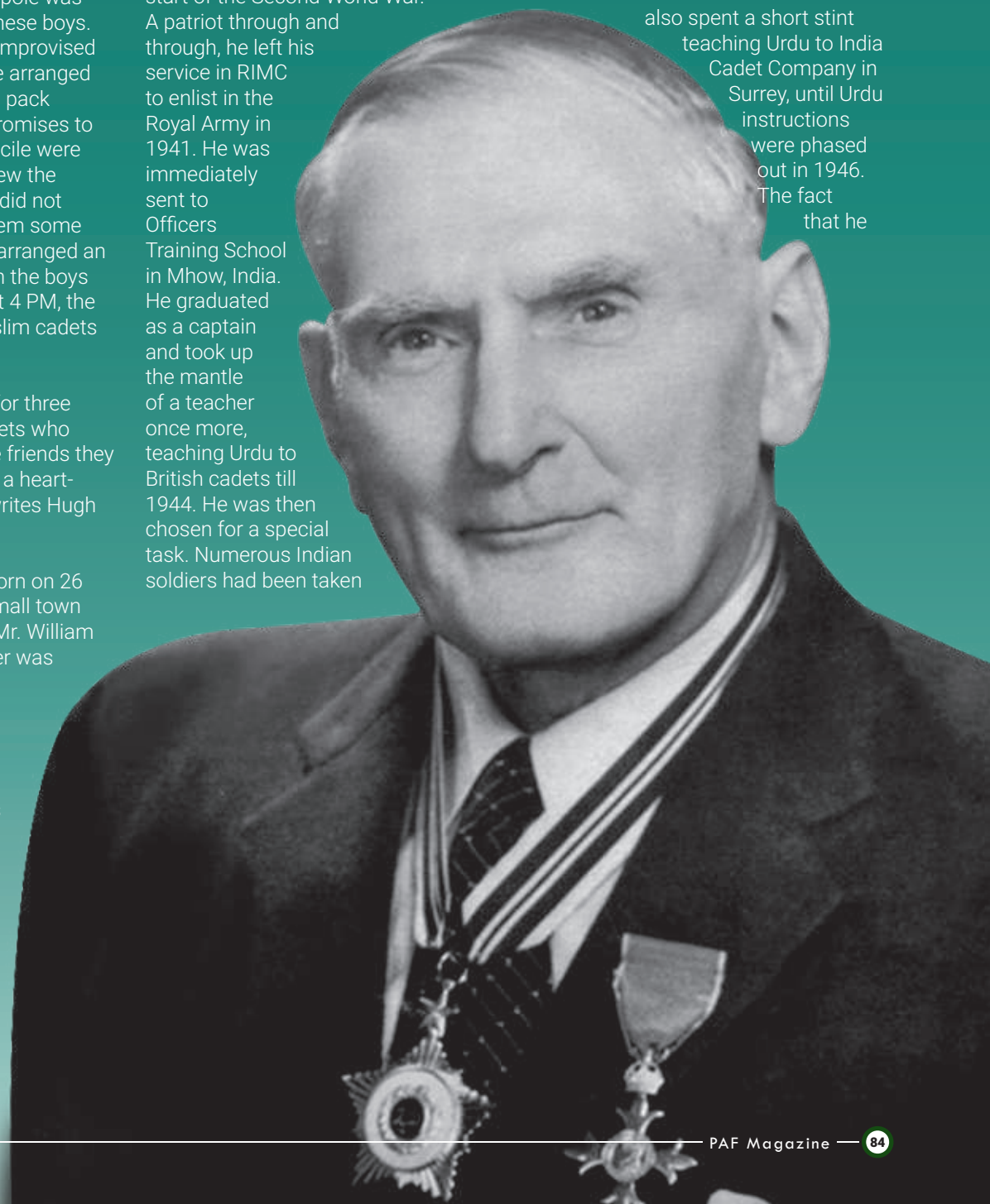
Mr Hugh Catchpole was born on 26 May, 1907, at Ipswich, a small town of Suffolk in England to a Mr. William Henry Catchpole. His father was the head of a construction business in Suffolk.

He received his early education From Ipswich School; passing his exams with distinction. He also had a remarkable record when it came to sports, possessing an infallible interest in cricket till his last. He went on to attain his Masters in History from the prestigious Oxford University. He

attained the preliminary program in 1926 and proceeded to Honours in Modern History in June 1928. Besides hockey and squash, he played cricket for Suffolk County. Pondering on his younger years during a casual conversation with ex-Air Chief, Air Chief Marshal Abbas Khattak (his student at Cadet College Hassanabdal) in 1993, Hugh Catchpole reminisced that he delved into Indian history during his time in Oxford, which eventually fermented into his decision of taking up a teaching job in RIMC as an Assistant Master in 1928. He settled well in India and remained a well-assimilated part of the faculty till the start of the Second World War. A patriot through and through, he left his service in RIMC to enlist in the Royal Army in 1941. He was immediately sent to Officers Training School in Mhow, India. He graduated as a captain and took up the mantle of a teacher once more, teaching Urdu to British cadets till 1944. He was then chosen for a special task. Numerous Indian soldiers had been taken

“More than Rs 8 million was donated by Hugh Catchpole to different institutions including Ipswich School, Suffolk, UK, Rashtriya Indian Military College Dehra Dun, Cadet College Hasan Abdal, PAF Public School Sargodha and Abbotabad Public School.”

captive by the German forces. Some of these soldiers had managed to escape. Since most of these soldiers did not know English, Hugh Catchpole was tasked with interrogating these soldiers to make them divulge what they had revealed to the Germans. He also spent a short stint teaching Urdu to India Cadet Company in Surrey, until Urdu instructions were phased out in 1946. The fact that he





Left: AM Asgahr, the then C-in-C, PAF along with Mr Catchpole at the graduation ceremony at PAF College Sargodha. (Photo: PAF Archives).

Bottom page: Hugh Catchpole along with the Cricket team of Cadet College Hassan Abdal. (Photo: Cadet College Hassan Abdal).

returned to RIMC in 1946 is testament to the fondness he had for the subcontinent. Owing to his dedication and competence, he was appointed Principal RIMC on 1 October 1948. He kept on teaching during the tumultuous years of the independence.

Hugh Catchpole was not concerned with the political, social or theological differences between his diverse array of students. However, even he could not remain unaffected by the ensuing chaos. The abrupt removal of the Muslim cadets moved him deeply. One of his favourite students, Col (R) Qayum narrates an instance. "I still remember when I left Mr. Catchpole. Very stern man externally, fighting back tears. He presented me with a transistor radio wrapped in a towel. 'Qayum...the other teachers must not know that I gave this to you!' reminisces Col (R) Qayum.

He treated them equally, being considerate and sensitive to their individual beliefs. And this

sensitivity he instilled in his students, as well. Lt Gen Javed Ashraf Qazi remembers an anecdote.

It was 1965. The Suez Canal crisis had just occurred and the British had invaded Egypt. When Hugh Catchpole discussed the matter in his class, Javed Ashraf and another student Khizerullah became riled up, cussing the British to no end. Hugh Catchpole listened patiently. After the class was over, he called both the students in his office.

"I want to tell you something, for your future lives. You people were insensitive. I am British and you were cussing my country. Be always mindful wherever you go that who is the person opposite to you." narrates Javed Ashraf Qazi, who went on to become a Lieutenant General "We felt ashamed and said 'We are very sorry, sir, we shouldn't have done it.' He replied 'No, no, it does not matter, you are children, but remember (this) for your future lives.'"

After his contract ended with

RIMC in 1954, Catchpole arrived in Pakistan, all ready to be part of Aitcheson College in Lahore. At the time, Major General Sher Ali believed that there was dire need of an institution which groomed pupils for the military. To this end, he



was orchestrating the establishment of a cadet college in Hasanabdal. The army had insufficient funds to construct the school and he had to convince Punjab government to cover the expenses. Despite of these obstacles, Major General Sher Ali actualized his vision. When he came to know that Hugh Catchpole was in Pakistan, he pounced upon the occasion and offered him the post of founding principal of the college. Sher Ali was joined by other legendary 'Rimcolians', Air Marshal Asghar Khan and Air Marshal Nur Khan, who knew there was no better



man for the job. Catchpole happily agreed to take up the mantle and set about overlooking the establishment of a residential school in Hasanabdal. As 1953 neared its end, the school was ready to induct its first batch. Its name at the time, as decided by Hugh Catchpole, was Punjab Cadet College. Hugh Catchpole served as the principal till 1958. He remained a bachelor his entire life. He was an educationist, humanist and philanthropist. He devoted his life to his students and his work. He was well-aware of the fact that in order to be a good custodian, he needed to know his students inside out. This he demanded from his staff, as well. Col (R) Qayum of RIMC, who still

possessed his prized transistor gifted to him by Catchpole, received a call when Hasanabdal Cadet College was being established. Apparently, Hugh Catchpole had transferred to Pakistan and he had specifically asked for him to be a part of the cadet college personally. Col (R) Qayum happily consented.

"Qayum, if you don't know these boys better than their mothers do... you are not fit to be the master." Col (R) Qayum proudly narrates the instructions given to him by Hugh Catchpole.

In 1958, Hugh Catchpole left Cadet College Hasanabdal and took up the mantle of principal at PAF Public



A Photo Collage of Mr Hugh Catchpole during various times. (Photos: Cadet College Hassan Abdal).



Cadet College Hassan Abdal



School, Sargodha on the request of his beloved student, Air Marshal Asghar Khan, who was commanding the PAF at that time. Hugh Catchpole was a strict disciplinarian. However, he also knew how to be immensely charming and make his students grow fond of him. His sense of humour was rich and led to his success as a teacher. He commanded respect but his students were also well-aware that he could never be unfair. General Ehsan ul Haque was a student of Hugh Catchpole in Sargodha. He narrates an incident wherein he and two of his friends were returning from the PAF cinema. 'Double-riding' on a bike was strictly forbidden and the friends were riding three on a bike. As soon as they entered the gate, they heard a loud 'Stop!'. It was the principal, Hugh Catchpole. He berated them for double-riding and told them to report to him the next morning. They went to his office the next day and Mr. Catchpole enquired why they were there. "We started to remind him and he interrupted us 'I remember you boys but I have checked the school rules. They dictate that double-riding is not allowed. Since you were not double-riding but triple riding, that's not an offense.' Mr. Hugh catchpole told us with a smile." General Ehsan

ul Haque remembers fondly. Being a native English speaker, Hugh Catchpole had an advantage when it came teaching English. However, this advantage merely complimented his already unique and effective teaching style. Air Chief Marshal Tanvir Mehmood Ahmed was his student in Sargodha and remembers the first day in his class. Hugh Catchpole narrated to them the tale of 'Ali Baba and 40 thieves' and asked to paraphrase the entire narrative in their words. Once this was done, Hugh Catchpole gave each and every one of them detailed critique about his work. This method of hands-on instructions was unheard of in those days. Another instance that Air Chief Marshal Tanvir Mehmood recalls is Hugh Catchpole's intrinsic ability to decipher personalities of his students thoroughly. He achieved this by studiously following the progress of his students. "When I completed my matriculation, I achieved very good grades, along-with all the others friends. By this time, Mr. Catchpole had left, gone back to England. But from there, he found our results, because he was keeping track of us. He



wrote me a letter, stating that he was aware of our results and he was very pleased to see (our results)." reminisces Air Chief Marshal Tanvir Mehmood Ahmed. "Let me tell you, in those few years (in Sargodha), he knew all his students so well, that every 6 months, when parents used to receive the report from the school, it used to describe the personality of every boy very accurately in just two lines.", he further added. During the school days, ACM Tanvir Mehmood kept all the notes of English taught by him and found them to be very useful during his career. Later, when he became the Chief of the Air Staff, he compiled them into a notebook and published them with a title 'Reminiscences'. Catchpole retired from PAF School, Sargodha in 1967. The hot weather did not suit him in that age and he was looking to move to a cooler city. He had also figured out over the years that he much preferred teaching over administrative roles. These two preferences of his were met perfectly in Abbottabad Public School. He joined APS as HOD of the English department. APS was his final abode and he held office there till his last. Besides teaching, the Englishman also carried an undying love for sports. His passion for cricket burned

bright till his last days. This was evident in the fact that, even after the age of 60, he served as the cricket coach for 11 long years till he was 71. Cricket wasn't his only calling when it came to sports. In a letter to M. M. Karim, a former student, he writes "I shall probably go to London and see someone who specializes in hip operations. This seems to be the only chance of walking again and challenging Jansher Khan at squash." That statement embodies the work ethic of Hugh Catchpole. He was not a man after material things or fame or anything of such sort. He worked because it gave him purpose. "If I retire, I expire." His colleagues used to hear him say often. He accumulated little in terms of material wealth, and what humble sum he did manage to earn, he invested it back in the institutions he was a part of. Plaques of his title can be seen in all the institutions that he has served. He has donated a squash court and a guesthouse to RMC, Dheradun. He has made a handsome donation to Cadet College Hasanabdal. Even during his last days, he donated for a computer wing to Abbottabad public school. General Ahsan Hyat, a former student, used to visit him often. On one of these visits he asked Hugh Catchpole what other ventures he had besides teaching.

"I am financially supporting the schooling of a few very talented poor boys in Pakistan..., well, I mean, I earned my money here in this country. I might as well put it back into it". Hugh

Catchpole replied.

Hugh Catchpole received many awards, both while he was alive and posthumous. Hugh Catchpole was honoured twice by Queen Elizabeth. In 1971, he was awarded the Order of the British Empire (OBE). In 1980, the queen awarded him Commander's Badge of the Order of the British Empire (CBE) also called the Most Excellent Order of the British Empire. In 1979, the president of Pakistan, General Zia-ul-Haq, awarded Mr Catchpole "Sitara-e-Imtiaz" for his meritorious services in the field of education. On 15 June, 2007, then President General Pervez Musharraf conferred upon Mr Catchpole the highest civil award of Pakistan "Hilal-e-Imtiaz", posthumous, for his unparalleled, noble and single-minded devotion to the cause of education in Pakistan. The British Council, Pakistan erected a Sir Hugh Catchpole Library at Abbottabad Public School recently in great teacher's honour.

This Englishman, who had touched the lives of thousands across three nations and beyond, was taken away from us on 1 February, 1997. He was buried with the honours that are appropriate for great men. In his will, he wished



AM Asghar Khan, one of the students of Catchpole, addressing at his funeral at Hassan Abdal. (Photo: PAF Archives)

to donate all balances of his account to institutions he had been associated with. More than Rs 8 million was donated by him to different institutions including Ipswich School, Suffolk, UK, Rashtriya Indian Military College Dehra Dun, Cadet College Hasan Abdal, PAF Public School Sargodha and Abbotabad Public School. On 4 February 1997, since its establishment of Christ church Rawalpindi in 1842, it was for the first time that the congregation was mostly Muslim. Amidst the haunting notes of several army buglers, he was lowered into his grave, surrounded by Air Marshals, Generals, bureaucrats, colleagues, students and civilians. Most of these prestigious set of men were his students who were honouring him. Air Marshal Asghar Khan was one of the ones who laid a wreath during his funeral. He was laid in the grounds of Cadet College Hasanabdal, the college he founded in 1953 and of which he was the Principal. Hugh Catchpole proudly rests there to this very day.



Students pay tribute at the grave of the legendary educationist at Hassan Abdal. (Photo: Cadet College Hassan Abdal).

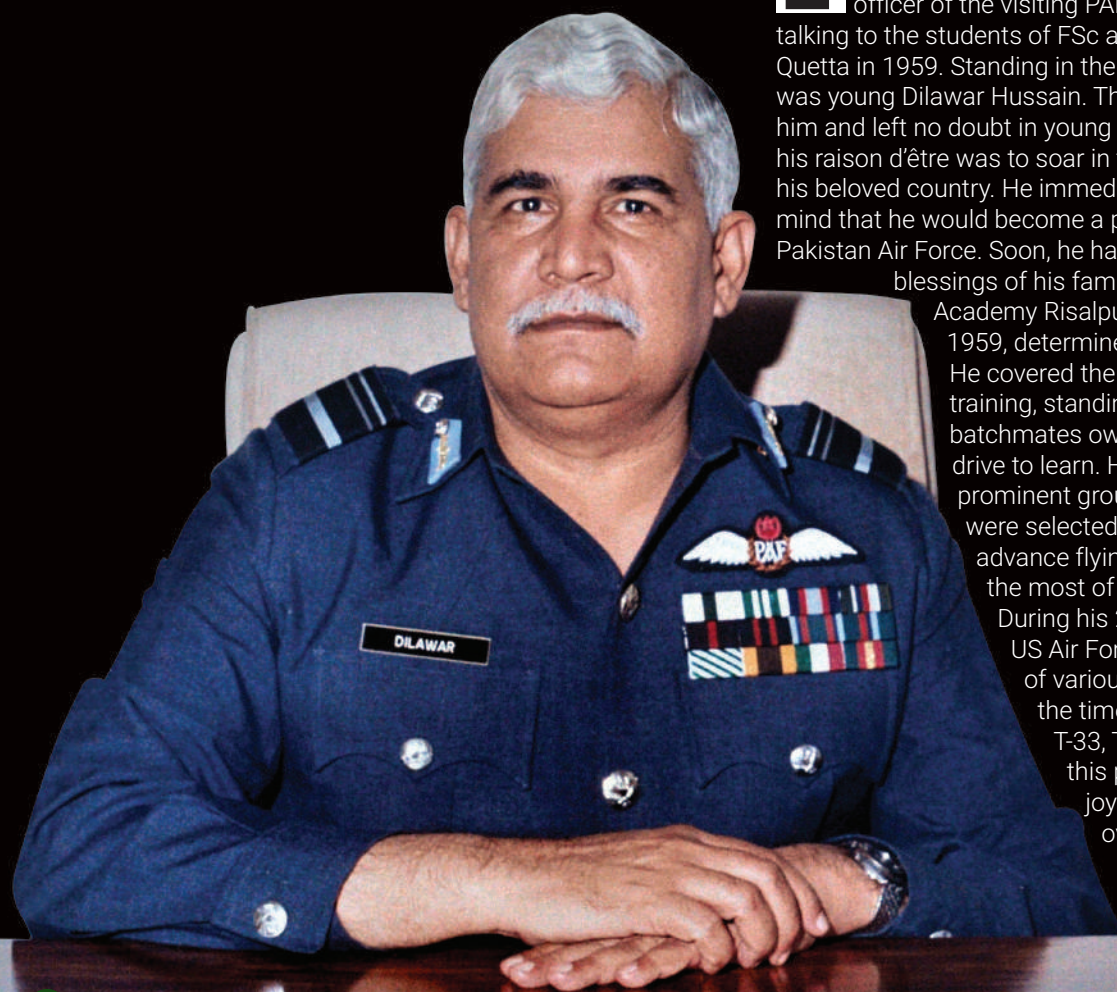
Farewell to a GLADIATOR

Air Marshal Dilawar Hussain ...You will always be Remembered!

“Men who have had the honour of defending the nation in both 65 and 71 are rare. These men are counted amongst the early heroes to whom the nation owes an immeasurable amount of gratitude. One of these enigmatic heroes was Air Marshal Dilawar Hussain, a bold and daring fighter pilot. It is safe to say that his exploits in both the wars significantly dented the enemy's ability to advance and thus saved the motherland from an aggressor. Owing to his outstanding achievement, the writers of military history on both sides hold him in high esteem. There is no doubt that officers like Air Marshal Dilawar Hussain have made PAF what it is today, a force to be reckoned with, a force 'Second to None'”

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

Life is a struggle and there is no better struggle than in the 'Air Force', uttered the recruiting officer of the visiting PAF selection team while talking to the students of FSc at Government College Quetta in 1959. Standing in the corner of the hall was young Dilawar Hussain. The words fascinated him and left no doubt in young Dilawar's mind that his raison d'être was to soar in the endless skies for his beloved country. He immediately made up his mind that he would become a part of the budding Pakistan Air Force. Soon, he had the approval and blessings of his family. He joined PAF Academy Risalpur on 13 August 1959, determined to make his mark. He covered the initial part of his training, standing out amongst his batchmates owing to his relentless drive to learn. He was part of the prominent group of flight cadets who were selected to fly out to the US for advance flying training. He made the most of this opportunity. During his 2-year stint with the US Air Force, he took the reins of various high-end aircraft of the time, including the likes of T-33, T-34 and T-37. During this period, he also had the joy of gaining mastery over the state-of-the-art F-86. At the end of his tenure abroad, he



was commissioned as Plt Off in PAF.

On his return to Pakistan, he was fortunate to be under the tutelage of Rafiqui, Munir and Sajjad Haider. Together they went on to accomplish legendary fighter pilots in the likes of together they went on to accomplish great feats in later years, especially during two wars against the arch rival, India. Initially, he joined No 5 Sqn under the command of legendary Sqn Ldr Sarfaraz Rafiqui and later joined No 19 Sqn, headed by another competent commander, Sqn Ldr Sajad Haider. This was here he was put on the path that would gain him the glory that he was known for the rest of his life.

Feats during 1965 War

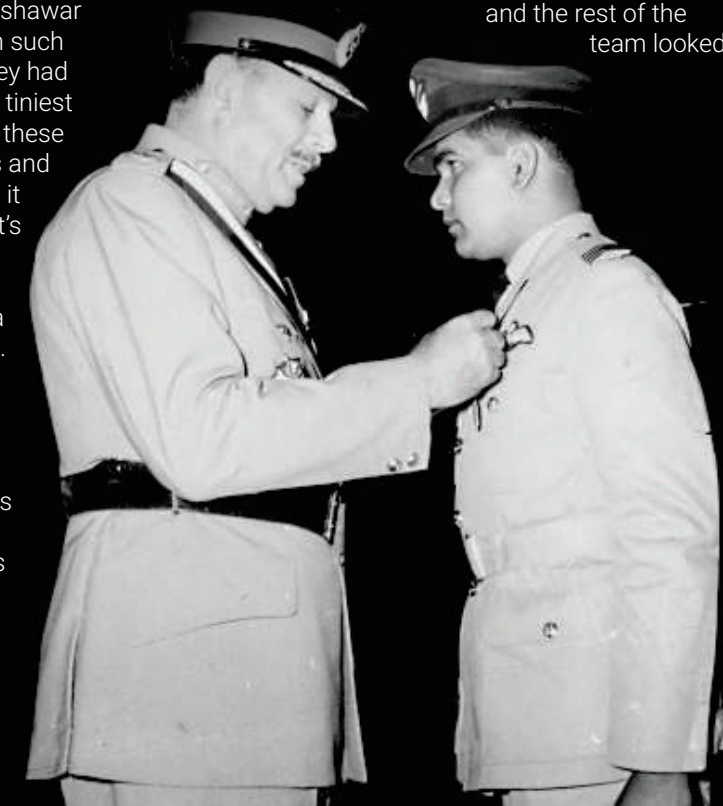
No 19 Sqn soared under the adept leadership of Sqn Ldr Sajad Haider, affectionately known as 'Nosey Haider' in PAF. Dilawar was part of that historic and remarkable mission which probably changed the outcome of the 1965 war and in turn resulted in the defeat of the enemy, five times bigger in size. In the morning of 6 September, 1965, Dilawar Hussain along with Sqn Ldr Sajad Haider and Flt Lts M Akbar, Ghani Akbar and Flying Officers Khalid Latif, and Arshad Chaudhry flew in a formation of six sabres with a call sign 'Zambus'. The night before, the orders had come in from then C-in-C, Air Marshal Nur Khan to fully load their Sabres with 5-inch rockets. The formation flew out at 0900 hours and flew as far as Amritsar. Meanwhile, the Air Defence Commander grew aware of the Indian Army's advance on Wagah and immediately diverted their formation to target the advancing Indian armour columns, which had grown to a substantial size by then. It was a sight to behold, as the Sabres emerged as angels of destruction to rain hellfire upon the invaders. The enemy scurried to abandon their vehicles, drivers jumping out to save their lives, happen what may to their doomed armour. Sqn Ldr Sajad Haider dived in for the first attack. Next came Flt Lt Dilawar Hussain, releasing a barrage of rockets on Indian armour. It was evident that the enemy had not anticipated retaliation of this scale. Frantic attempts at saving their lives

were all they could do in the face of the fireballs raining from the skies, one after another. The 'Zambus' made a total of 36 attacks incinerating several enemy armoured vehicles. In a mere 20 minutes of attacks, the Sabres had reduced what was an intimidating array of enemy armour to smouldering embers. The stretch of Grand Trunk Road was riddled with scores of burning tanks, armoured and support vehicles. The formation had exhausted their arsenal of 5-inch rockets. This mission went down in history as one of the most crucial missions in the 1965 war. After the devastating blow by PAF, the Indian Armour was not able to move even an inch from this day till the war came to an end. Along with this, the dream of Indian Army capturing Lahore and having drinks in Lahore Gym Khana also went down the drain.

Then came the most famous and memorable mission of 1965 war-Strike against IAF Base at Pathankot. When the strike orders finally rolled in, No 19 Sqn was ready. For months, Sajad Haider had trained his boys at the Jamarud Firing range near Peshawar to accomplish such a mission. They had rehearsed the tiniest details during these mock up drills and had perfected it for days. That's why when the day came, it proved to be a huge success. It was PAF's first strike in enemy territory and everybody was well-aware that there was no room for error. Every single pilot in the squadron wanted the honour and it became a bit difficult for Sqn Ldr Sajad Haider

“During one of those days in the 1971 war at Dacca, he was heading towards the aircraft for a mission, when his wing man remarked that they would be heavily outnumbered as their lone No 14 sqn was up against 10 IAF sqns. Sqn Ldr Dilawar smiled, took a deep drag on his cigarette, snapped his fingers and said in Punjabi, “Fayr ke hoya. Chal Chaliyay” (Then What, Let's Go).”

to finalize the strike team. In the end, the formation comprised Sqn Ldr Sajad Haider, Flt Lts Mohammad Akbar, Mazhar Abbass, Dilawar Hussain, Ghani Akbar and Flg Offs Arshad Chaudhry, Khalid Latif and Abbass Khattak. Tied escorts consisted of Sqn Ldr Tawab and Flt Lt Arshad Sami. After a thorough briefing and finalizing every single detail of the plan, Sajad Haider made an attempt at lightening the spirit of the pilots. He had somebody bring in a bucket of clean water. As Dilawar Hussain and the rest of the team looked



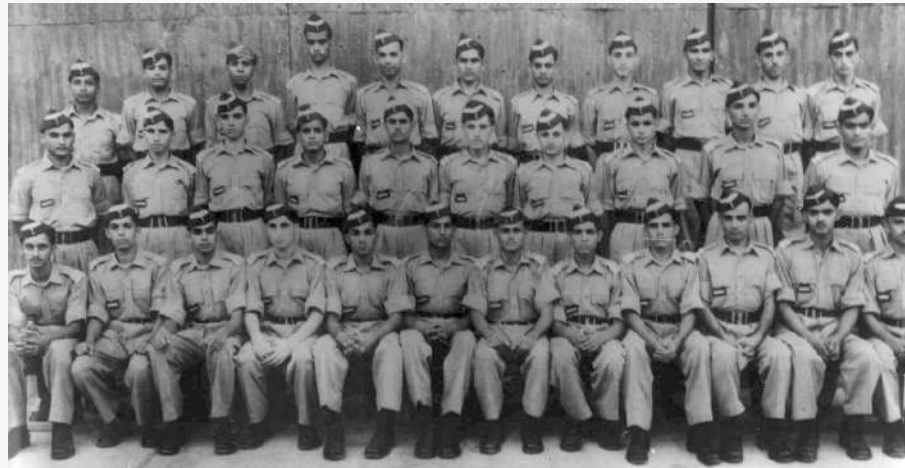
Being awarded with Sitara-e-Jurat by President of Pakistan. (Photo: PAF Archives).

amusement, he opened a bottle of cologne and emptied it into the bucket. He mixed it all up. Satisfied, he took handkerchiefs from the pilots and dipped them in the scented concoction. When the handkerchiefs were soaked thoroughly, he wrung them out and handed them back to his pilots.

"It's a raid!" he bellowed, "If we are shot down by enemy aircraft and meet our Maker, then by God, our bodies won't stink, atleast!". The pilots grinned, amused, and wrapped them around their necks. That was the spirit and motivation for which the PAF pilots are still known for.

The formation took off at 1630 hrs to make good on the Time over Target, TOT: 1705 hrs. They climbed to 11000 feet and, as practised, dove down to tree top level and turned towards the IP (Initial point) of the target. It will be interesting at this point to observe the happenings on the other side. A glimpse can be found on the Indian website 'Bharat Rakshak':

"Meanwhile, at the IAF Air Base at Pathankot, the Station Commander,



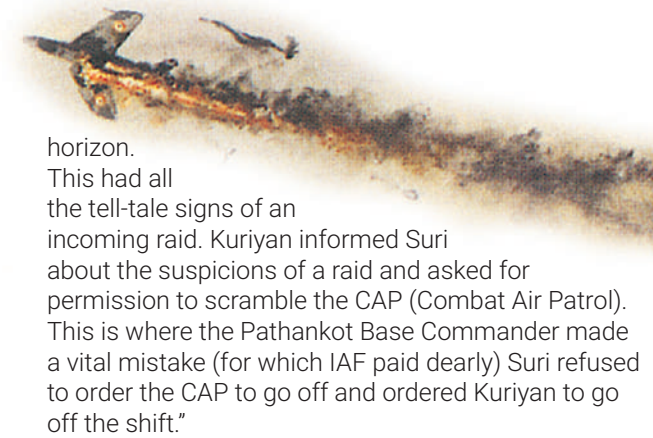
Group Captain Roshan Suri had just returned from a meeting of Station Commanders from Western Air Command. Suri briefed his Squadron Commanders of the impending Army move to cross the international border. As evening approached, Pathankot Airbase received an urgent phone call from Squadron Leader Dandapani at Amritsar Air Defence Centre. He spoke to Wing Commander Kuriyan and informed him that several Sabres had been observed

taking off and then go 'Off the Scope' as they all went below the radar

Above: Standing last row (centre) during training at PAF Academy Risalpur. (Photo: PAF Archives).

Bottom: Flt Lt Dilwar (Standing 2nd from right), alongside legendary Sqn Ldr Sajad Haider (Sqn Cdr 19 sqn), was the part of strike formation which attacked IAF airbase at Pathankot during 1965 war. (Photo: PAF Archives)

Right Page: Sqn Ldr Dilwar Hussain shooting down an IAF aircraft over Dacca during 1971 war. (Photo Painting: Gp Capt Hussaini).



horizon. This had all the tell-tale signs of an incoming raid. Kuriyan informed Suri about the suspicions of a raid and asked for permission to scramble the CAP (Combat Air Patrol). This is where the Pathankot Base Commander made a vital mistake (for which IAF paid dearly) Suri refused to order the CAP to go off and ordered Kuriyan to go off the shift."

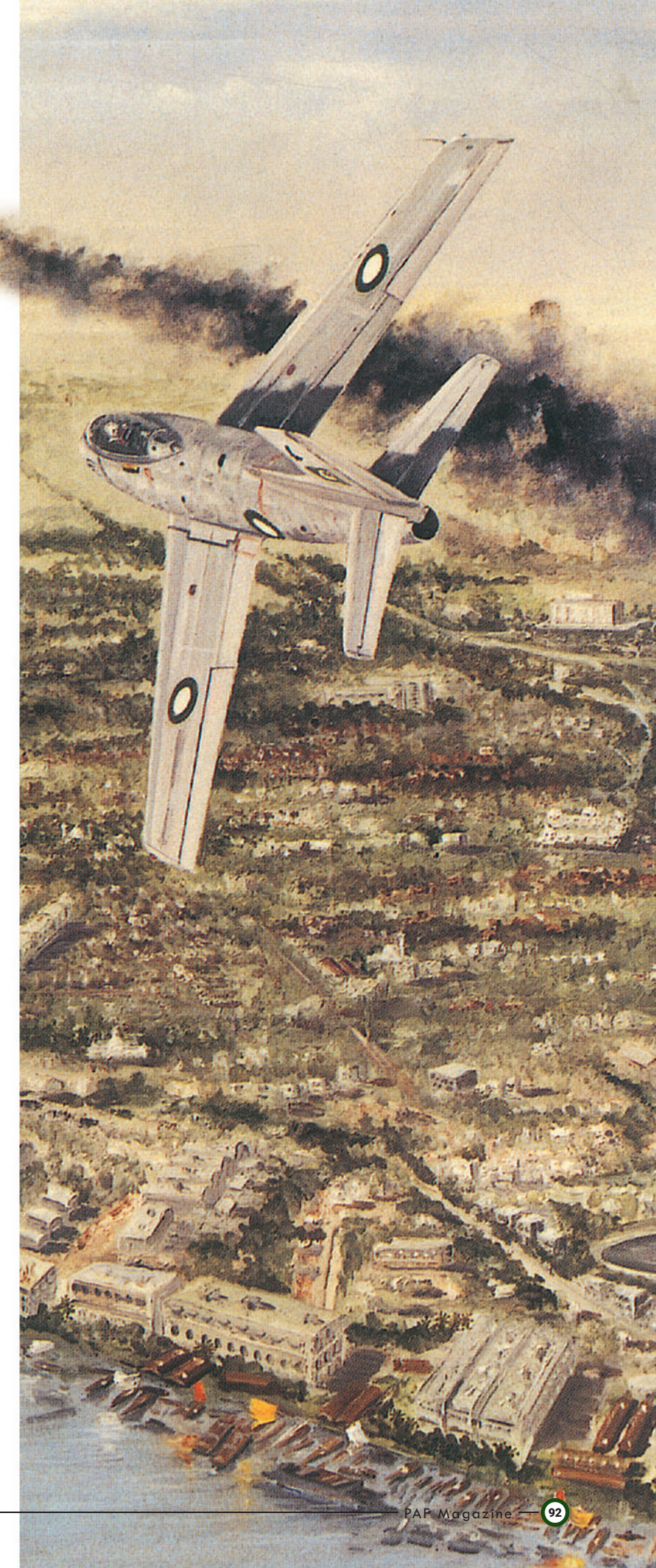
The formation reached Pathankot at precisely 1705 hrs. It was immediately apparent that they would face little resistance and the base was ill-prepared for the attack. The base had substantial number of Indian aircraft parked in protected dispersal shelters. The most tempting targets were the newly Soviet-supplied MiG-21s. With no air defence and very little retaliation from the ground, Sqn Ldr Sajad Haider made the first strike, following with four more, targeting individual aircraft for his gun attacks. Subsequently, Sqn Ldr Sajad Haider ordered Dilwar Hussain and the other pilots to concentrate on the MiG-21s.

Dilwar Hussain and his comrades complied immediately. The initial battleplan was for every pilot to make two passes each, to ensure safe return. However, facing no retaliation, each pilot made several passes. By then, the heavy ack-ack's were firing at full throttle but were largely ineffective. One after another, the Sabres delivered lethal blows to the Indian Air Base. Wg Cdr Tawab remained over the airfield, providing cover where it was needed. Later, in his account, he revealed that he had counted 14 aircraft carcasses.

Again, an excerpt from Bharat Rakshak covered the strike:

"Wing Commander Kuriyan was just then driving into his garage at his house, when he heard the ack ack guns booming. He looked towards the airfield to see four F-86 Sabres bore down the airfield at low level firing their machine guns, while two aircraft kept high altitude cover. As the four Sabres pulled out, another four dived in. The Sabres strafed military compounds, installations and aircraft on the ground. The Sabres

“ A fighter pilot par-excellence, he was a league of its own. One quality that surpasses many others, was his undaunted courage and boldness. Throughout his exciting career, he stood like a Gladiator, never ready to give-in. ”



attacked the row of MiGs and Mysteres along the blast pens in the airfield. The CAP was not scrambled. Two of the MiGs, which were being refuelled after returning from an earlier flight, went up in flames. Some Mysteres on the ground bore the brunt of the raid and were damaged as were the two MiG-21s. The Sabres slipped off unscathed as even the airfield defences were caught napping. For the PAF this raid was a cakewalk. All in all, one C-119, four Mysteres, two Gnats and two MiG-21s were destroyed in this highly successful raid by the Pakistan Air Force."

The pilots returned home unscathed. After debriefing this operation against Pathankot was credited with obliterating seven MiG-21s, five Mysteres and one Fairchild C-119 destroyed on the ground, plus damage to the Air Traffic Control building. Subsequently, Indian MiG-21s were not seen in the air for the remaining duration of the 1965 War.

For his heroics in the war, Dilawar Hussain was awarded Sitara-e-Jurat. His citation paid homage to his achievements in these words: "Fit Lt Dilawar Hussain was one of the greatest sources of inspiration for his squadron mates throughout the operation. He displayed great keenness to operate in the battle area with great commitment and determination in the face of heavy odds. He flew at all times in a manner that befits the best of the fighter pilots of the PAF. His personal score of enemy tanks and aircraft on the ground was three aircraft, and eight tanks destroyed; one aircraft and four tanks damaged; one armoured vehicle and thirteen others destroyed; nine vehicles and one gun damaged. He flew ten Air Defence sorties and 17 Strike/Close support missions. On one occasion, he continued his mission without being in the least bit apprehensive after

having been hit by ground fire. For his courage and high spirits in the performance of his duty, Flt Lt Dilawar Hussain is awarded SJ."

Heroics in 1971 War

Sqn Ldr Dilawar Hussain had a chance to shine during 1971 war as well. After his brief stint in Saudia Arabia where he took part in the Battle of

Sharoorra, he was sent to Dacca, to serve the No 14 Sqn. Once again, the odds were stacked against him. Despite being outnumbered by 10 IAF sqns to one of PAF's in the eastern sector, the morale of the air warriors of No 14 sqn was at its all-time high. They stood like Gladiators' against all odds till the very last and didn't budge under pressure. Especially, Dilawar was undeterred. One episode which exemplifies his courage during these testing times can be considered to prove this claim. During one of those days during the war at Dacca, he was heading towards the flight lines when his wing man remarked that they would be heavily outnumbered in the air by the IAF as their lone No 14 sqn was up against 10 IAF sqns. Sqn Ldr Dilawar, took a deep drag on his cigarette, snapped his fingers and said in Punjabi, "Fayr ke hoya. Chal Chaliyay". (So What, Let's Go). Such was the unmatched courage of this man which motivated others to stand tall.

On 4 December, at around 1600 hrs, Sqn Ldr Dilawar Hussain took off accompanied by Flg Off Sajjad Noor for the 3rd CAP of the day. Soon, he could detect two bogies on his radar at their 11 o'clock but to the pilot's bafflement, the enemy aircraft were nowhere to be seen. Sqn



Ldr Dilawar Hussain decided to undergo a belly check by banking to either side. Abruptly, he spotted an IAF Hunter, poised to shoot at him from about 1500 ft. Doing a rapid break, he not only managed to shake it off but was able to position himself behind the Hunter after it had overshot. He fired a short burst of canons which set the intruder's wing ablaze. The pilot, Flt Lt Kenneth Tremenheere, ejected immediately from his destroyed aircraft.

On the morning of 6 December, Sqn Ldr Dilawar Hussain did an air sweep with a formation of four F-86s to aid the Pakistani troops in Comilla Sector in south-east Dacca. During this mission, one of his formation member, Flg Off Shamshad shot down an IAF Hunter. Just as the formation landed at 1000 hrs, the feared attack on Tezgaon runway by IAF was undertaken. A 4-aircraft formation of MiG-21s dropped eight 500kg bombs along the entire length of the runway, damaging it significantly. The same night, almost all personnel at the base put in their all to repair the runway as best as they could. The repaired patch was half the length of a standard runway but was usable for the F-86s.

The next morning, Dilawar Hussain was on his way to the Air Defence Alert (ADA) Hut when he saw a MiG-21 approaching for attack. As he looked on in dismay, the MiG-21 bombed the repaired runway, bifurcating it into two unusable halves. With this, the PAF exploits in Dacca came to a tragic end.

Career until Retirement

After the war, Dilawar remained on various command and staff appointments, which included command of No 14 Sqn, command of No 32 Flying Wing, Director of Operations at AHQ, Officer Commanding CCS, Base Commander PAF Base, Sargodha, and ACAS (Operations) at AHQ. On promotion to a two-star rank, he was entrusted with the prestigious appointment of DCAS (Operations) at AHQ. As an Air Marshal, he served as the DG PAC Kamra as well.

Air Marshal Dilawar Hussain passed away peacefully on 24 November, 2020. He was laid to rest in PAF graveyard at Chaklala with full military honours. PAF Air Chief, Air Chief Marshal Mujahid Anwar Khan expressed his heartfelt grief on the demise of the war veteran. Acknowledging his glorious feats in 65 and 71, the Air Chief noted that he was an exceptional pilot who would always be remembered for his valour and professionalism.

Air Marshal Dilawar Hussain was a kind of a person who is hard to find during these materialistic times. A fighter pilot par-excellence, he was in a league of its own. One quality that surpasses many of his others, was his undaunted courage and boldness. Throughout his exciting career, he stood like a Gladiator, not ready to give-in. For his unparalleled courage, devotion to duty and above all love for the country, he would be remembered for decades to come...

Right: PAF paying homage to war veteran during his funeral parade at PAF Base Nurkhan. (Photo: PAF Archives).

Bottom: Gp Capt Hussain's painting depicts PAF strike over Pathankot during 1965 war.

Left Page: A historic picture of AM Dilawar Hussain during an interview with the author in 2015. (Photo: PAF Archives)



WHAT MAKES PAF SECOND TO NONE IS THE HIGH MORALE AND THOROUGH PROFESSIONALISM OF ITS PERSONNEL: CJCSC

12 October, 2020: Chairman Joint Chiefs of Staff Committee (CJCSC) General Nadeem Raza visited an Operational base of Pakistan Air Force. He was received by Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff Pakistan Air Force.

During his visit the Chairman oversaw the combat readiness of the base. He was given a brief on various operational aspects followed by a visit to No 39 Tactical Wing. The Chairman and the Air Chief flew fighter aircraft sorties to witness weapon system employment in a simulated air combat scenario.

While interacting with the base personnel, the Chairman lauded the professionalism and dedication of PAF and reiterated the importance of inter services harmony & synergy for the operational success. He further added that PAF's cutting edge aside, what makes it second to none is the high morale and thorough professionalism of its personnel.



COMMANDER IRAQI AIR FORCE VISITS AIR HEADQUARTERS

13 October, 2020: Major General (Pilot) Shihab Jahid Ali Shakarchi, Commander Iraqi Air Force, along with his delegation visited Air Headquarters, Islamabad.

Upon arrival, the distinguished guest was received by Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force. A smartly turned out contingent of the Pakistan Air Force presented Guard of Honour. The visiting dignitary paid homage to PAF martyrs by laying a floral wreath at Yadgar-i-Shuhada (martyrs' monument). The General also had a detailed meeting with Chief of the Air Staff. Both Commanders discussed various matters pertaining to security and mutual cooperation. Commander Iraqi Air Force lauded the professionalism of PAF personnel and the exceptional progress made by PAF over the years, through indigenization. The Air Chief highlighted the brotherly relations and collaboration between the two sides. Both the dignitaries agreed to further augment the already existing cordial relations between the two air forces.

Later in the day, Commander Iraqi Air Force also called on General Nadeem Raza, Chairman Joint Chiefs of Staff Committee, at Joint Staff Headquarters, Rawalpindi. Matters of bilateral professional interest and further strengthening of security and defence cooperation between the two countries were discussed during the meeting.



NEWLY APPOINTED CHIEF OF NAVAL STAFF CALLS ON AIR CHIEF AT AIR HEADQUARTERS



15 OCTOBER, 2020: Newly appointed Chief of Naval Staff Admiral Muhammad Amjad Khan Niazi, called on Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force at Air Headquarters, Islamabad. Air Chief Marshal Mujahid felicitated the Admiral on assuming the command of Pakistan Navy, and expressed his hope that Pakistan Navy would continue progressing under his able leadership. Both Chiefs reiterated to augment the existing synergy between the sister services and taking it to further heights. Various matters of mutual cooperation and professional interest were also discussed during the meeting.

Earlier, on arrival at Air Headquarters on his maiden visit, Admiral Muhammad Amjad Khan Niazi was presented guard of honour by a smartly turned out contingent of PAF. He also laid floral wreath at the Martyrs' Monument to pay homage to the Martyrs' of PAF, who laid down their lives for the defence of the motherland.

AIR CHIEF CONFERS NON-OPERATIONAL MILITARY AWARDS ON PAF PERSONNEL DURING AN INVESTITURE CEREMONY

22 OCTOBER, 2020: Non Operational Military awards were conferred upon PAF Officers, Airmen and Civilians during an Investiture Ceremony held at Air Headquarters, Islamabad. Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force was the Chief Guest on the occasion. Addressing the ceremony, the Air Chief felicitated the awardees for earning the honours and underscored the need to work with same zeal for operational preparedness of PAF. He also lauded the selfless services of PAF personnel who efficiently performed their duties during Covid-19 pandemic.



42 Sitara-i-Imtiaz (Military), 36 Tamgha-i-Imtiaz (Military) and 15 Tamgha-e-Basalat (including 03 posthumous) were conferred upon PAF Officers, while 01 Tamgha-i-Basalat, 01 Imtiaz Sanad and 20 Tamgha-i-Khidmat (Military) Class-I were conferred upon PAF airmen. The awards of Wing Commander Nauman Akram (Shaheed), and Flying Officer Israr Ahmed (Shaheed) were received by their mothers while the father of Flight Lieutenant Muhammad Tahir Akbar (Shaheed) received the award on behalf of his martyred son. 44 Special Chief of the Air Staff Commendation Certificates were also awarded to the personnel in recognition of their devotion to duty during Covid-19. A large number of PAF high ranking officers and personnel attended the ceremony. Similar ceremonies were also held at regional air commands of Pakistan Air Force.

PAF IS STRIVING TO MAKE COUNTRY'S DEFENCE INVINCIBLE : AIR CHIEF

24 OCTOBER, 2020: "PAF is ever ready for a befitting response to any misadventure by the enemy and is striving to make country's defence invincible", said the Air Chief, while addressing the students and faculty at Jinnah Auditorium, National University of Science & Technology, Islamabad. On his arrival, Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force was received by Rector NUST Lieutenant General Naweed Zaman, (Retd).

The Air Chief in his address, said that Pakistan was facing enormous challenges in the wake of 5th generation/ hybrid warfare, launched by the enemy with the evil designs. He emphasized the need to invest in technology and indigenization in order to achieve self-reliance in every field, particularly defence. He urged upon the students to pursue their goals with focus and play a pivotal role in making Pakistan a progressive country. He also appreciated NUST's contributions in spearheading scientific and technological advancements, which are imperative for the country's progress. A large number of students and faculty members attended the event. The address was followed by a comprehensive question & answer session.



COMMANDER QATAR EMIRI AIR FORCE VISITS AIR HEADQUARTERS ISLAMABAD

16 November, 2020: Staff Major General (Pilot) Salem Hamad Eqail Al-Nabet, Commander Qatar Emiri Air Force, along with his delegation visited Air Headquarters, Islamabad.

Upon his arrival, the distinguished guest was received by Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force. A smartly turned out contingent of the Pakistan Air Force presented Guard of Honour. The visiting dignitary also paid homage to PAF martyrs by laying a floral wreath at Yadgar-i-Shuhada (Martyrs' Monument). Later, the General had a detailed meeting with Air Chief. Both the Commanders discussed various matters pertaining to mutual interest. Commander Qatar Emiri Air Force lauded the professionalism of PAF personnel and the exceptional progress made by PAF over the years, especially through indigenization. The Air Chief highlighted brotherly relations and collaboration between the two sides. Both the dignitaries agreed to further augment the already existing cordial relations between the two air forces.



COMMANDER QATAR EMIRI AIR FORCE VISITS PAKISTAN AERONAUTICAL COMPLEX KAMRA

17 November, 2020:- Staff Major General (Pilot) Salem Hamad Eqail Al-Nabet, Commander Qatar Emiri Air Force visited Pakistan Aeronautical Complex, Kamra.

The distinguished guest was given a comprehensive briefing on the working of Pakistan Aeronautical Complex Board, Kamra. He admired the significant contributions of PAC towards the aerial defence of the country. He especially appreciated the production capability of the JF-17 Co-production Project. He lauded the milestones achieved by PAC Kamra and their role in strengthening of the operational readiness of PAF. The Commander Qatar Emiri Air Force also flew an operational training sortie on dual seater JF-17B fighter aircraft to witness weapon system employment in a simulated air combat scenario.

Earlier, on his arrival he was received by Air Marshal Syed Nauman Ali, Chairman PAC Board Kamra, who introduced the members of PAC Board and Managing Directors to the Commander Qatar Emiri Air Force. Pakistan Aeronautical Complex, Kamra being the leading Aviation Industry, has placed Pakistan among the world's prominent fighter aircraft manufacturing countries.



PAF GOLF CLUB ISLAMABAD WON 2ND CAS LADIES INVITATIONAL GOLF CHAMPIONSHIP 2020

21 November 2020:- 2nd CAS Ladies Invitational Golf Championship 2020 was held at the PAF Golf Club, Islamabad. Begum Viqar Un Nisa Bolani, was the Guest of Honour at the prize distribution ceremony. PAF Golf Club Islamabad won the championship, whereas, Margalla Greens Golf Club was the runner up. In Individual categories, Begum Faraz Ahsan, was the first in Net, while Begum Saima Irfan and Begum Farnaz Iqbal remained second and third respectively. First in gross was picked by Begum Bilquis Haseeb, while Begum Tazeen Mujahid and Wing Commander Nazia Masoom adjudged second and third. The prize for the longest drive was won by Begum Robina Paracha and nearest to pin was won by Begum Muneeza Rizwan.

A total of 27 lady golfers from 05 teams namely Rawalpindi Golf Club, Margalla Greens Golf Club, Garden City Golf Club, Islamabad Golf Club and PAF Golf Club Islamabad participated in team event as well as in individual categories.



24 November 2020:- Legendary PAF fighter pilot Air Marshal (Retd) Dilawar Hussain, who was awarded Sitara-i-Jura'at for his heroics in the 1965 War against India, breathed his last in Islamabad.

Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force has expressed heartfelt grief on the sad demise of the great War Veteran. While paying tribute to Air Marshal (Retd) Dilawar Hussain, the Air Chief acknowledged his heroics during the 1965 and 1971 Indo-Pak Wars. Air Chief further added that he was an exceptional fighter pilot who would always be remembered for his valour and professionalism.

Air Marshal (Retd) Dilawar Hussain was born in Quetta in 1940. He was commissioned as a fighter pilot in March, 1962. During 1965 War, he served in No 19 Squadron at PAF Base, Peshawar. Apart from inflicting heavy damage to Indian forces, his formation destroyed 14 aircraft on ground at Pathankot Airfield. For his outstanding bravery and devotion to duty in 1965 War, he was awarded with "Sitara-i-Jura'at".

AIR CHIEF PAYS TRIBUTE TO PAF WAR VETERAN AIR MARSHAL (RETD) DILAWAR HUSSAIN ON HIS DEMISE



ANNUAL GENERAL MEETING OF PSF HELD

26 NOVEMBER, 2020:- The 47th Annual General Meeting of Pakistan Squash Federation (PSF) was held on 25th November, 2020 at Air Headquarters, Islamabad. Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force who is also President PSF, presided over the meeting. Squash legends, representatives of provincial squash associations, affiliated members and Pakistan Sports Board were also present during the meeting. Addressing the general council members, President PSF thanked them for their participation and offered whole hearted support of PAF as well as PSF for the promotion of Squash. While showing his pleasure over PSF performance, the President PSF desired that there is still a need of collective efforts by the Provincial squash associations and affiliated departments of PSF to expand the game at gross root level. President PSF directed provincial associations & members departments to involve themselves in promoting squash by holding regular training camps and tournaments along with encouraging young players through different campaigns, sponsorship and scholarship programmes. He also urged the players to focus on the game and improve physical & mental strength for better results at national and international levels.

The performance evaluation of provincial associations for the year 2019-2020 was also carried out by the general council. The Punjab Squash Association was awarded Winner's Trophy for Pride of Performance; whereas, KP Squash Association stood runners up. President PSF presented trophies to the Reps of provincial associations and appreciated their efforts.



Elections of Vice Presidents were also held during the Annual General Meeting. The house unanimously elected both Mr Qamar Zaman and Mr Adnan Asad as Vice President of PSF for the next 04 years period. The meeting concluded with the hope to revive Pakistan's ascendancy in the international arena of Squash and that all provincial associations & affiliated departments would put in their best to generate adequate funds to sponsor their respective players.

COAS VISITS AN OPERATIONAL AIR BASE

09 December, 2020: General Qamar Javed Bajwa, Chief of Army Staff (COAS) visited an Operational Base of Pakistan Air Force to witness Pak-China Joint International Air Exercise "Shaheen-IX". He was received by Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force.

The Army Chief said, "The Joint Exercise will improve the substantial combat capacity of both the Air Forces and it will also enhance interoperability between them with greater strength and harmony." To face the emerging challenges in the wake of current Geo-strategic scenario, such joint ventures While interacting with the base personnel, the Army Chief lauded the professionalism and dedication of PAF and reiterated the importance of inter services harmony & synergy for the operational success. He further added that PAF's cutting edge edge, what makes it second to none is the high morale and thorough professionalism of its personnel.

FIRST BATCH OF AERO APPRENTICES PASSES OUT AFTER FOUNDATION AND ESTABLISHMENT OF PAF AIRMEN ACADEMY KORANGI CREEK AT KARACHI

11 December, 2020: 1st Batch of Aero Apprentices Passes out after foundation and establishment of PAF Airmen Academy Korangi Creek (PAAK) at Karachi. Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force was the Chief Guest at the occasion. A total of 1474 Aero Apprentices including trainees from Bangladesh, Sri Lanka, Nepal and Pakistan Navy successfully completed their technical training from PAAK.

Addressing the ceremony, the Air Chief said that the event was a significant milestone towards achievement of new training paradigm under PAF's Next Generation Training Program. He further added that being first of its class institution in the region PAAK aims not only to produce proficient technicians but also develop "Thinking Airmen", capable to work in a technology-intensive environment. He urged upon the graduating trainees to live up to the glorious tradition of Pakistan Air Force which is venerated as a combat-efficient, hard-hitting force. He also hoped that the Academy would emerge as one of the world's renowned training institutions and the first of its class in the region.



Referring to the regional situation, the Air Chief said that on internal and external security fronts, the PAF along with sister services is ever ready to thwart any threat to the country. Referring to the atrocities in Indian Illegally occupied Kashmir, the Air Chief assured Kashmiri brothers and sisters of our unflinching commitment and steadfast moral, political and diplomatic support in their freedom struggle.

The Air Chief also awarded trophies to high achievers. Air Officer Commanding Trophy for Best in General Service Training was awarded to Academy Sergeant Aircraftman Hussain Ali. Trophy for best foreign trainee was awarded to LAC MD Golam Rabani of Bangladesh Air Force. Chief of the Air Staff Trophy for Overall Best Performance was awarded to Aircraftman Sikandar Iqbal.



CHINESE MILITARY AVIATION TECHNOLOGY HAS FULL CAPACITY TO MEET THE CHALLENGES OF MODERN WARFARE: AIR CHIEF

22 December, 2020:- Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force has said that Chinese Military Aviation Technology is at par with contemporary requirements and has full

capacity to meet the challenges of modern warfare.

He was expressing his views after flying an air superiority sortie in a Hi-Tech Chinese fighter aircraft during ongoing exercise Shaheen-IX. Lauding the professionalism of PLAAF pilots, the Air Chief said that the outstanding air combat skills of PLAAF pilots are reflective of robust and modern combat training program of PLAAF. Expressing his satisfaction over the conduct of the exercise, the Air Chief said that it was heartening to see the two Air Forces inter-operating across a wide spectrum of airpower employment options.

He also said that in modern times competition in the air domain centers not only around mastery of technology, but also on its artful application in both strategy and tactics. He added that Shaheen series of exercises will go a long way in enhancing the professional skills and operational preparedness of both the Air Forces in addition to developing mutual understanding of each other's combat skills and promoting inter-operability. It is pertinent to mention that the joint Air Exercise Shaheen IX that commenced on 09 Dec, 2020 has now entered its last phase.

SECOND TRANCHE OF RELIEF ASSISTANCE ARRIVES AT NIGER FROM PAKISTAN

26 December, 2020: On the special instructions of the Government of Pakistan, second PAF C-130 aircraft arrived at Niamey to deliver relief goods for flood affected people of Niger. The two C-130 aircraft have airlifted more than 34,000 lbs of relief goods to the brotherly country.



The aircraft and crew were received at Niamey by caretaker Foreign Minister of Niger H.E Mr. Marou Adamou along with numerous government and military dignitaries. Mr. Ahmed Ali Sirohey, Ambassador of Pakistan was also present at the occasion who reflected over historical bonds of trust and amity between the two countries. The PAF transport fleet has a rich history of serving the nation and has been in the forefront of providing air transport to the relief efforts both within the country and to the friendly nations.



JF-17 DUAL-SEAT COMPLETION & BLOCK-III COMMENCEMENT CEREMONY HELD AT KAMRA

30 December, 2020: Pakistan Aeronautical Complex celebrated the completion of dual-seat JF-17 aircraft for PAF, and formally launched the production work of Block-III JF-17 aircraft in an inspiring ceremony held at Kamra. Air Chief Marshal Mujahid Anwar Khan, Chief of the Air Staff, Pakistan Air Force, was the Chief Guest of the ceremony while Ambassador of Peoples' Republic of China in Pakistan, H.E. Mr. Nong Rong attended as guest of honour.



Speaking on the occasion, Air Chief lauded the efforts of PAC Kamra in completing aircraft production targets for 2020 despite challenges posed by the Covid-19 pandemic. He emphasized the need of indigenization and self-reliance in military hardware and praised initiatives of PAC Kamra for design, development, manufacturing, and overhaul of aerial warfare assets. He also applauded the collaboration between aviation industries of Pakistan and China. Ambassador of Peoples' Republic of China in Pakistan, H.E. Mr. Nong Rong, highlighted JF-17 program as a shining example of cooperation between two countries whereby both countries have diligently collaborated over the last two decades to bring a joint venture from drawing board to successful materialization. He praised the project teams for overcoming challenges and achieving milestones over the years. He assured of continued support by China for ongoing and future joint ventures in all domains.

The dual-seat JF-17 aircraft are fully mission capable for entire spectrum of combat operations and will boost PAF's operational readiness besides fulfilling the training needs of PAF. Block-III is the most advanced JF-17 variant and represents the cutting edge of aerospace technology and will enable PAF to maintain credible deterrence under the evolving geopolitical environment. On the occasion, PAC Kamra also displayed JF-17 and Super Mushshak aircraft produced by its Aircraft manufacturing Factory for export to several countries. Chief of the Air Staff also formally inaugurated a purpose-built hangar built to overhaul JF-17 aircraft. Equipped with latest facilities and equipment, the hangar will assure in-country lifecycle support for the aircraft. The ceremony was held under strict Covid-19 protocols with social distancing at all events.



The first two F-35As for Australia are seen wearing the markings of 2 OCU, the type training unit at RAAF Williamstown. (Photo: Australian Department of Defence) source: ainonline.com



IOC for Australia's F-35s Ends

Covid-hit Year

by David Donald - December 29, 2020

Australia's ministers for defense, Linda Reynolds, and defense industry, Melissa Price, jointly declared that the Royal Australian Air Force's Lockheed Martin F-35 had achieved initial operational capability. The December 28 announcement means that Australia joins the U.S., Israel, Italy, Norway, South Korea, and the UK in reaching IOC for the type. Another two countries—Japan and the Netherlands—are operating F-35s on home soil.

Australia ordered the first 14 of a planned 72 F-35As in 2009 under Project Air 6000 Phase 2A, committing to the remaining 58 with Phase 2B in 2014. The first Australian aircraft, serial A35-001, flew in September that year. In December 2018 the first aircraft arrived in Australia, and by the end of 2020 33 F-35As had been handed over to the RAAF. More than 45 pilots and 600 maintenance technicians are assigned to the fleet, which has accomplished more than 8,780 flight hours.

No. 3 Squadron is the first operational unit, based at RAAF Williamstown in New South Wales, where the F-35A is replacing the F/A-18A/B Hornet on a nearly one-for-one basis. The base is also home to 2 Operational Conversion Unit, the type training unit, which is transitioning from Hornet to F-35, and will gain a second squadron, No. 77, which ended Hornet operations on December 11. A

third F-35A unit will be established at RAAF Tindal in the Northern Territory, and all 72 aircraft are scheduled to be fully operational by 2023.

A third Phase 2C batch of 28 F-35As to replace the current 24 Boeing F/A-18F Super Hornets is also under consideration, but a decision has been deferred to later in the 2020s. A few days prior to Australia's IOC announcement, an F-35A was delivered from the final assembly and check-out (FACO) facility at Cameri in Italy to the Italian air force. It was the 123rd and final F-35A to be delivered in 2020. Of these, 74 were for the U.S. Department of Defense, 31 were for international partner nations, and 18 were for Foreign Military Sales customers.

Under original plans, the Lockheed Martin-led industrial team was to have delivered 141 aircraft during the year but as the full effects of the Covid-19 pandemic took hold, the production target was revised downwards in May to between 117 and 123 aircraft for the year. Covid-related delays were primarily experienced in the supply chain. Among the measures introduced by Lockheed Martin to mitigate the pandemic's effects were accelerated payments to small and vulnerable suppliers. Highlights for the F-35 program during the year included the first fielding of the Operational Data Integrated Network (ODIN) to replace the troubled Autonomic Logistics Information System (ALIS). ODIN is expected to be fully implemented by 2022. The worldwide fleet continued a general improvement in mission-capable rates to above 70 percent, with deployed assets experiencing greater availability rates.

Recent unit news includes the declaration of IOC on December 1 for the F-35Cs of VMFA-314 at MCAS Miramar. The "Black Knights" are the first Marine unit to be ready to integrate into U.S. Navy air wings for carrier deployment, although the Navy's VFA-147 is earmarked to make the first such deployment for the F-35C next year.

U.S. Air Force Conducts Advanced Connectivity Trials

by David Donald
December 15, 2020



On December 9 the U.S. Air Force undertook inflight connectivity trials with the Lockheed Martin F-22A and F-35A fighters, each of which carried a GatewayOne payload. Thanks to this equipment, the two aircraft passed critical mission data between themselves and ground nodes.

Conducted by the Air Force Research Laboratory (AFRL) and Air Force Lifecycle Management Center (AFLMC), with the 46th Test Squadron from Eglin AFB, the trials took place over the Yuma Proving Ground in Arizona. They involved an F-22 from the Edwards AFB-based 411th Flight Test Squadron and an F-35A from the Nellis AFB-based 59th Test and Evaluation Squadron.

A GatewayOne-equipped Kratos XQ-58A Valkyrie—from the AttritableOne low-cost unmanned "loyal wingman" program—was also launched from Yuma as part of the trial. However, its communications payload lost connectivity shortly after takeoff and it was unable to participate fully in the trials, although it was flown semi-autonomously in formation with the manned fighters.

The GatewayOne trial was mounted to demonstrate the transformative nature of the open architecture underpinning the Air Force's Advanced Battle Management System (ABMS). This is part of a wider Department of Defense-led Joint All-Domain Command and Control program to securely connect all elements of the U.S. forces in a military "Internet of Things".

During the December 9 test the GatewayOne system was used to translate transmitted data into the hitherto incompatible native languages of the F-22 (Intra-Flight Data Link) and F-35 (Multifunctional Advanced Data Link), in turn allowing that data to be displayed using each type's organic systems. GatewayOne also allowed data that is typically only available on the ground to be pushed directly into the cockpits of the inflight aircraft. Other functions demonstrated included the passing of aircraft positional data to ground nodes to improve battle management, the passing of target tracks and cues from the ground, and also between the two aircraft types.

Top: Although an XQ-58A Valkyrie "attritable" unmanned vehicle could not take part in the connectivity aspects of the recent trial due to technical failure, it was flown alongside an F-22 and F-35. (Photo: U.S. Air Force)

Left Bottom: The U-2S employed in the Kubernetes test carries the "WR" tailcode of Detachment 2, Warner Robins Air Logistics Complex, based alongside the Lockheed Martin Skunk Works at Air Force Plant 42, Palmdale, California. (Photo: Lockheed Martin)



"Testing is all about pushing the limits of what's possible, finding out where the toughest challenges are, and adapting creative solutions to overcoming difficult problem sets," said Lieutenant Colonel Kate Stowe, GatewayOne program manager with the AFLMC. "The real win of the day was seeing the GatewayOne establish a secure two-way translational data path across multiple platforms and multiple domains. That's the stuff ABMS is all about."

Exclusive: AI Just Controlled a Military Plane for the First Time Ever

BY DR. WILL ROPER DEC 16, 2020



The U.S. Air Force flew an artificial intelligence (AI) copilot on a U-2 spy plane in California. The flight marked the first time in the history of the Department of Defense that an AI took flight aboard a military aircraft. The AI algorithm, developed by Air Combat Command's U-2 Federal Laboratory, trained the AI to execute specific in-flight tasks that would otherwise be done by the pilot. Source: www.popularmechanics.com

On December 15, the United States Air Force successfully flew an AI copilot on a U-2 spy plane in California, marking the first time AI has controlled a U.S. military system. In this Popular Mechanics exclusive, Dr. Will Roper, the Assistant Secretary of the Air Force for Acquisition, Technology and Logistics, reveals how he and his team made history. For Star Wars fans, an X-Wing fighter isn't complete without R2-D2. Whether you need to fire up converters, increase power, or fix a broken stabilizer, that trusty droid, full of lively beeps and squeaks, is the ultimate copilot.

You love badass planes. So do we. Let's nerd out over them together.

Teaming artificial intelligence (AI) with pilots is no longer just a matter for science fiction or blockbuster movies. On Tuesday, December 15, the Air Force successfully flew an AI copilot on a U-2 spy plane in California: the first time AI has controlled a U.S. military system. Completing over a million training runs prior, the flight was a small step for the computerized copilot, but it's a giant leap for "computerkind" in future military operations.

The U.S. military has historically struggled developing digital capabilities. It's hard to believe difficult-to-code computers and hard-to-access data—much less AI—held back the world's most lethal hardware not so long ago in an Air Force not far, far away.

But starting three years ago, the Air Force took its own giant leap toward the digital age. Finally cracking the code on military software, we built the Pentagon's first commercially-inspired development teams, coding clouds, and even a combat internet that downed a cruise missile at blistering machine speeds. But our recent AI demo is one for military record books and science fiction fans alike.

The U.K. will replace up to 30 percent (or 50 percent!) of fighter jet fuel with biomass. This fits into the larger U.K. goal of carbon neutrality by 2050. Biofuels are made from discarded cooking oil, processed waste products, and much more.

F-35s Will Run on Booze, Margarine, and Grass Clippings

BY CAROLINE DELBERT
DEC 15, 2020



Japan's New Fighter Jet Will Have Wild Tech, Like Microwave Weapons

The new fighter, tentatively referred to as F-X, will replace the older F-2 fighter shown here. TOSHIFUMI KITAMURAGETTY IMAGES
Source: www.popularmechanics.com

BY KYLE MIZOKAMI DEC 15, 2020

The U.K.'s Ministry of Defense has announced an ambitious plan to replace up to 50 percent of certain fleet jets' fuel with renewable, recycled "drop-in" fuel sources. This includes the Lockheed Martin F-35 and Eurofighter Typhoon fighter jets, as well as the AgustaWestland AW159 Wildcat military helicopter.

The Defense Minister announced the plan as part of the U.K.'s push to be carbon-neutral by 2050, an ambitious timeline shared by dozens of nations around the world. Jet fuel is "basically highly refined kerosene," It Still Runs explains. But that's a matter of habit more than a strict requirement—there are great incentives to use this fuel, not reasons we must use it. Kerosene is less volatile than gasoline, for example.

And jet fuel comes in the same range of quality, additives or not, and other factors that gasoline does. Monch elaborates:

"Known as 'drop-ins,' these sources include hydrogenated fats and oils, wood waste, alcohols, sugars, household waste, biomass and algae. Estimates are that substituting 30 [percent] of conventional fuel with an alternative source in a jet [traveling] 1,000nm could reduce CO2 emissions by 18%. As well as cutting emissions, using diverse and readily available materials such as household waste (including packaging, grass cuttings and food scraps) will prevent waste being sent to landfill."

Aviation, Monch explains, uses two-thirds of the fuel used in defense. So an 18% reduction in carbon emissions in this one sector will mean a 12% reduction in overall fuel emissions across the entire defense group—all by replacing just 30 percent of the fuel with these repurposed and biomass solutions. (Ethanol is technically a biomass fuel, although it's linked with the U.S. corn lobby in an inextricable way.)

Because of the Royal Air Force's (RAF) influence, affecting fellow Commonwealth nations for example, this decision could end up being far-ranging. Already, fuel partners are saying they welcome the chance to work on renewables for military use.

Japan will build its next-gen fighter jet with the help of defense contractor Lockheed Martin. The unnamed fighter will be designed primarily to shoot down enemy planes, but will also have the ability to strike ground targets. The jet will incorporate advanced technology not even seen in U.S. planes, including a virtual reality-style helmet and microwave weapon.

The fighter, according to Forbes, will be unveiled as a prototype in 2024, with the first flight in 2028 and full production commencing in 2031. Japan will spend \$48 billion on the project, including development and production costs, to build approximately 90 airplanes.

The fighter, variously known as F-X or F-3, will replace the older F-2 fighter in Japanese service. The F-2, also developed with Lockheed Martin, is basically a larger, more expensive version of the American F-16 Fighting Falcon. Developed in the 1990s, the planes will be ripe for replacing in the 2030-40 period.

The F-X will be an air superiority fighter first and foremost; Japan has had a requirement for world-beating air-to-air combat jets since the end of World War II. The devastation and millions killed in 1944-45 by Allied bombers demonstrated to the country's leadership very clearly what happens when a country loses air superiority over its own territory.

The sheer cost of modern fighters, however, means that no fighter-type warplane is purely air-to-air or air-to-ground, so F-X will have some ability to attack ground targets.

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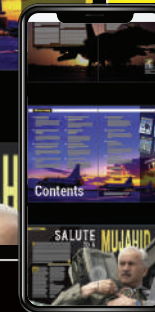


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