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Medals and Ribbons

A Salute to our Valiant Warriors

(ENGLISH QUARTERLY)



The Rafales Land

A Much-Awaited Induction



The Air Chief with the Rafale Air Warriors

Helistrikes On Kargil Heights
Reliving the First Strikes on Tiger Hill - Tololing

Air Defence Command
Is this Contemplated Step Wise or Not?

Fostering Peace Through Education
The Sunbird Trust - A Retired Colonel's Passion Project

Dedicated to one of the finest pilots and heroes of the Indian Air Force





Wing Commander Karun Krishna 'Jumbo' Majumdar, DFC and Bar

Jumbo Majumdar was an ace pilot, and was amongst the pioneers of the Indian Air Force, having graduated from the Royal Air Force College, Cranwell in December 1933. Because he was over six feet tall and well-built, he acquired the nickname Jumbo. He attended St. Paul's School, Darjeeling.

He reckoned amongst the 12 best pilots in the Allied Air Forces during the Second World War. He carried out several bombing missions in Burma from a modified reconnaissance aircraft. On one occasion Majumdar was forced down in the Shan jungles due to engine failure and managed to return to Lashio after a harrowing journey through dense forests. Majumdar was the first Indian to be awarded the Distinguished Flying Cross, gazetted in the London Gazette of 10 November 1942. He was the first Indian Pilot to be promoted to Wing Commander.

Majumdar volunteered for the European Theatre, and was assigned to Royal Air Force Base, Gatwick in early June 1944. In his first operational flight ex Gatwick on 10 June 1944, he made a reconnaissance of the Seine River and carried out ground-strafing of enemy targets. His operational tour ended on 20 September. During this period of 100 days, Jumbo flew 65 sorties in Mustangs and Hawker Typhoons - he preferred the former to the latter, writing in his diary "She is no lady like the Mustang, but is pretty hot stuff." He successfully completed two outstanding low-level photo-recce missions, one of the bridges over the Seine ("I went through an absolute hail of flak to get photographs of the rail bridge on the Seine at Rouen", he wrote), and another of the Falaise Gap in Normandy. His Falaise photographs were later used by Field Marshal Bernard Montgomery in the Battle of the Falaise Pocket. On one occasion he got shot up and force-landed in enemy territory, but was luckily rescued. The Bar to his DFC was gazetted on 23 January 1945, the citation specifically mentioning the Seine missions. Thus he became the most highly decorated Indian pilot of World War 2. Because of his superb piloting skills and indomitable spirit, Life magazine featured him in its issue of 15 May 1944 among twelve of the world's most outstanding airmen.

On the afternoon of 17 February 1945, Majumdar took part in a flying display at Walton, near Lahore in a Hawker Hurricane. The aircraft he chose had a past history of snags and malfunction and he was warned by Flying Officer Harjinder Singh. During a dive in the aerobatic routine, the aircraft developed a snag and it crashed headlong into the ground. Jumbo Majumdar died instantly. He was 31.

FOUNDER'S NOTE

Col David Devasahayam



Our motto in the Radiant Group is Redefining Excellence, and I am happy to see that Medals & Ribbons is maturing in line with our ethos. Frankly, each issue has been a splendid experience, evolving more like "collector's items", with a variety of readable topics, stories and insights.

Renuka, my wife, as an air force officer's daughter was born and brought up in Air Force Stations. Being from the National Defence Academy we naturally have deep ties with the Air Force as we all became men in that cradle for leadership, together. Besides, Air Chief Marshal Rakesh Bhadauria, the Chief of the Air Staff, is not only a Coursemate, but the couple have also been our good friends. We are grateful to him for the support in some of the compilations in this issue. We are truly glad to gaze at the flyboys ruling the skies, this quarter. I am sure our Air Warriors will be happy to read these tributes to them.

The recent Aero India Show at Bengaluru has given a strong push towards indigenization. It is good to see the aeronautics and space sector open up to private players and it will undoubtedly boost aircraft manufacturing and other ancillary industries. The overall orientation is in favour of developing our defence industrial base, which in turn will boost our national power, security and may be even exports. As an entrepreneur, and former military officer, I know that we are on the right track.

We are really grateful for the overwhelming response from our readers and we will continue to strive to maintain the quality of content in the forthcoming issues.

CONTENTS

Vol.01 • Issue 03 • Apr'21 - Jun'21



12 Fledgling Force to a Formidable Foe
by Lt Gen J S Sandhu (Retd)
Recalling the early years of the Indian Air Force as it gained in strength and capability.

14 The Mystique of Kamikaze
by Lt Col L Manongba (Retd)
The Kamikaze attacks by Japanese pilots in the Second World War give an insight into their levels of patriotism, loyalty and indoctrination.

17 Helistrikes on Kargil Heights
by Air Cmde Anil Sinha (Retd)
A narration of the first rocket attacks on Tiger Hill and Tololing in May 99 by Mi 17 gunships.

20 Foxbat – The Eagle Eye in Kargil Operations
by Wing Cdr PJ Thakur (Retd)
The Foxbat revealed enemy positions – enabling the airstrike elements to change from 'Grope and Strike' to 'Know and Pulverise'.

24 The Rafales Land – A Much Awaited Induction
by Air Marshal Harish Masand (Retd)
A lot of hype was created when the Rafales arrived. An 'Air Superiority' evaluation, alongwith a professional **Q and A with the Chief of Air Staff.**

32 Flying Instructors' School, Tambaram
by Lt Gen J S Sandhu (Retd)
A recap of the growth and calibre of training at this premier institution.

35 Air Defence Command
by Air Marshal Anil Chopra (Retd)
A functional integrated Air Defence Command is on the cards.
Its pros and cons.







40 The Eagle and the Albatross - Joint Maritime Airpower

by Rear Adm SY Shrikhande (Retd)
A discussion on synergizing the air and sea mediums to meet future threats in the maritime domain.

44 The Munthodhalo Airstrike

by Air Vice Marshal Mohan Rao (Retd)
Precision bombing of a small tented camp in stark mountains required skilled interpretation of imagery, phenomenal visual acuity of the pilots and tremendous 'josh'.

48 Mid Flight Heroism

by Group Capt AK Chordia (Retd)
An exciting account of a tremendously risky in-flight rectification of a stuck nosewheel landing gear in a Fairchild Packet.

52 Guardian Angels in the Skies

by Group Capt Vivek Kapur (Retd)
An interesting description of a providential avoidance of a possibly fatal aircrash.

54 Runway to a Billion Opportunities

by Air Marshal Harpal Singh (Retd)
A rundown on Aero India 2021, a major event in the defence and aerospace arena.

60 Remembering a Hero
Col B Santosh Babu, MVC (Posthumous)

by Brig Sanjay Chawla (Retd)
While recalling the valiant action in Galwan, a tribute to the dynamic leader of 16 BIHAR.

63 The Lone Survivor of Skardu

by Lt Gen Baljit Singh (Retd)
The author recounts events leading to the fall of Skardu, and the good fortune of Lt Col Sher Jung Thapa, MVC, the sole survivor.

65 Fostering Peace Through Education

by Neeti Jaychander
Col Christopher Rego and his friends and family set up the Sunbird Trust to promote education in the remote villages of Northeast India. A ground report.







70 Systemisation in Mutual Funds
by Colonel Raj Rakesh (Retd)
An explanation of mutual funds, asset management, transfer and withdrawal plans.

74 Nuances of Officer Selection
by Col MP Singh (Retd)
An overview of Services Selection Board tests, for the benefit of young candidates planning to join the Forces.

78 WhatsApp Groups Limerick
by Air Marshal Harpal Singh (Retd)
Our social media addiction brings forth light humour.

79 Bonding in Barakhanas
by Lt Gen J S Sandhu (Retd)
A quintessential part of Fauji life is the essence of this light chat.

80 Weight and Watch
by Dr. Renuka David
Our Wellness Expert talks about the Battle of the Bulge and Covid vaccination.

82 Reflections on Pilots Training
by Air Marshal Harish Masand (Retd)

Medals and Ribbons
A Salute to our Valiant Warriors (English Quarterly)

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EDITOR'S NOTE



Lt Gen J S Sandhu, (Retd).

The tank and the aeroplane – both emerged on the battlefield during the First World War, about a century ago. Both became potent battle winning armaments during the Second World War, with Panzer and Sherman tanks playing decisive roles in the battles. But, ultimately the Air Force became the decisive combat arm. The Germans and the Japanese could not churn out adequate fighters and bombers to counter the large number of American planes. Post the Second World War, both armour and airpower improved in combat capability, but airpower is clearly the superior element. In the last few decades, the battlefield has become more transparent, precision weapons have increased, weapon ranges and lethality have increased – it is difficult for the tank to hide and survive, and a stealth tank is not economically viable. Last year's Nagorno- Karabakh conflict has pointed towards the future 'game changers'. The drone swarms, unmanned aerial vehicles and the "air medium" may possibly sound the death knell for the military battle tank.

It is hence apt for us to focus on airpower as our primary theme in this issue. After prolonged discussions, negotiations and hurdles, the Rafales landed in Ambala last year – a major technological force multiplier for the Indian Air Force (IAF). Deservedly, the Rafales take pride of place on our cover page, and Air Marshal Harish Masand has analysed its systems and capabilities comprehensively. The Air Chief has been associated with the Rafale's induction, we have appropriately included a Q and A session with him.

In addition, there are several articles bringing out experiences of pilots during the Kargil Conflict and other exciting flying incidents. A functional integrated Air Defence Command is on the cards, we hence requested Air Marshal Anil Chopra to evaluate its pros and cons. We also travelled back in time to recount the early days of the IAF when it was a fledgling force, and also looked at the Japanese Kamikaze experience. The flying skills and capability of pilots plays a crucial role to achieve victory in an air campaign. Accordingly, a photo feature on Flying Instructors School, Tambaram gives us an insight into the development of Flying Instructors. Air Marshal Masand has also reflected on training aspects and experiences on the Reflections Page.

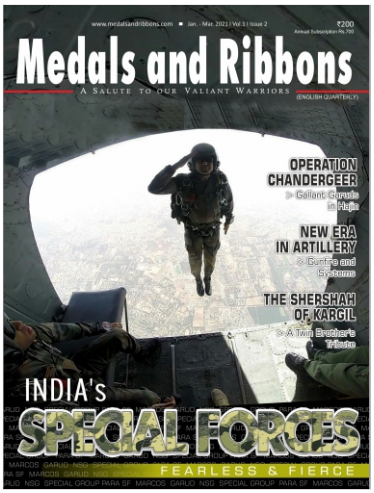
Recently, on Republic Day, Colonel Santosh Babu and the Galwan martyrs were conferred with gallantry awards. We pay homage to Santosh in our 'Lest We Forget' series, and recall some aspects of his life. We also pay tribute to the sole survivor of Skardu, Brigadier Sher Jung Thapa, MVC who determinedly held off the Pakistani Forces for months in adverse conditions at Skardu in 1947-48. The war crimes committed by Pakistani regular and irregular forces at Gilgit, Bunji, Skardu and other places in Pakistan Occupied Kashmir in 1947-48 are crystal clear. While the Germans and Japanese were made accountable in front of War Tribunals, Pakistan was not made to face the heat. Even in the Kargil Conflict of 1999, they have not had to answer for the treatment meted out to Major Saurabh Kalia and his mates. A sad indicator of a condescending or laissez faire attitude in the world community, where human rights violations are played up only if they suit a 'national interest' agenda of the world powers.

The Sunbird Trust led by Colonel Christopher Rego is fostering peace through education in the remote and difficult villages of North East India. We bring forth their story and salute their socially vital initiative. Our regular coverage on Money Matters, Wellness and a defence career are also interesting to read. We have covered the Aero India Show too.

I was pleased to read and hear positive responses on our earlier issues, and subscriptions are steadily increasing. I am sure you will find many good, fascinating stories and articles in this issue too. We intend to cover the Navy and the maritime domain as the primary theme in the next issue. The Editorial Team looks forward to your valuable feedback, your content contributions, and we will ensure quality in contents. The Editorial Team remains indebted for your support, as Medals & Ribbons grows to become a worthy product on your book shelves.

Several defence subscribers (about 30+) have transferred the subscription electronically to our account, which is reflected as transferred from Public Fund Account or Library Grant, etc. The unit or establishment details are not shown, and we are unable to trace the concerned establishment. May I hence request those units who have not sent us their UTR number or bank transaction details, to kindly send us the same urgently, by email to info@medalsandribbons.com

LETTERS TO THE EDITOR



Jan. - Mar. 2021 ISSUE

My Dear General,

1. Profound thanks for your letter dt.Sep 2020.
2. Thank you very much for sending a copy of the Medals & Ribbons, Oct-Dec 2020, Vol.1, Issue 1. It is, a very interesting magazine and very thoughtfully packaged.

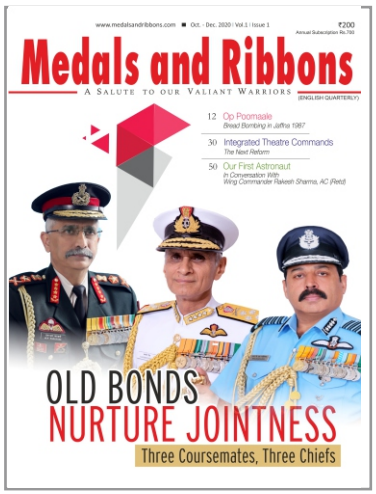
My compliments to the Editorial Team for the excellent job done.

With best wishes and warm regards,
Yours sincerely
Lt.Gen. Anil Kapoor, AVSM, VSM
Director General EME & Sr. Col Comdt
Directorate General of Electronics and Mechanical Engineers
MGOs Branch
Integrated HQ of Mod (Army)
Delhi Cantt - 110010.

Col. David Devasahayam,
Dear Sir,

1. Ref your magazine Medals & Ribbons Oct-Dec 2020, Vol-1, Issue -1
2. At outset my heartiest compliments for such a wonderful, well researched, intriguing & informative magazine representing the glory & pride of Armed Forces.
3. **I am sanguine that your team will bring more laurels & success in future to the group & to Armed Forces.**

With warm regards,
Col. Sachin Jain,
Commandant
Pioneer Corps Training Centre
Pin : 900493
C/O 56 APO.



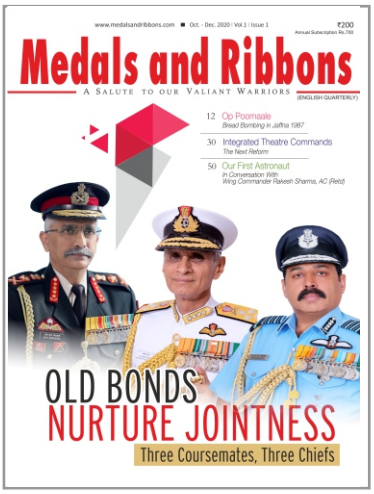
Oct. - Dec. 2020 ISSUE

LETTERS TO THE EDITOR

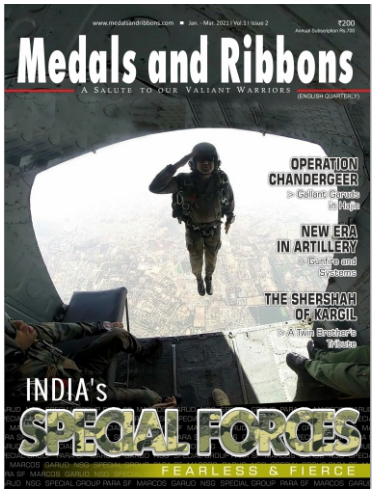
Respected General,

1. Please refer your DO letter addressed to the COAS.
2. The COAS conveys his thanks for presenting a copy of the inaugural issue of Magazine titled 'Medals & Ribbons'. **The Magazine is well compiled, informative and interesting to read. Please convey compliments of the COAS to the Editorial Team for brining out such an outstanding magazine.**

With warm regards
Yours sincerely
Brig. Vikrant Naik
MA to COAS
Integrated HQ of MoD (Army)
New Delhi - 110011.



Oct. - Dec. 2020 ISSUE

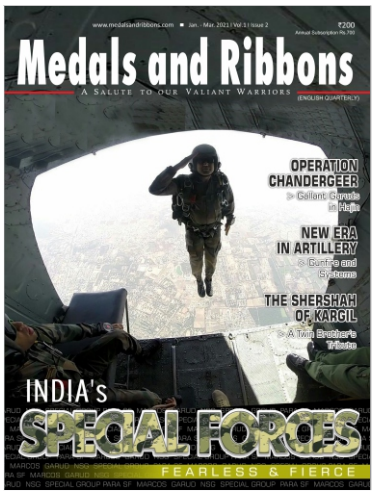


Jan. - Mar. 2021 ISSUE

Dear David Sir,
1. To begin with my heartiest congratulations on the well thought of initiative on 'Medals & Ribbons' to reach out to the civil community.
2. There is no question that the Men in Uniform are held at the highest pedestal in this country and your outreach will definitely assist the younger generation. My advice would be to develop an outreach, in terms of advt & campaigning and making the articles / magazines available on a e-platform, for today's generation. **Accessibility is the key for the success of the magazine. The same may be on platform like kindle / Magzter.**

With warm wishes & regards,
Brig.Prashant Chauhan, SM
Commander
Headquarters
Chhattisgarh & Odisha Sub Area
PIN - 901124
C/o,56 APO

LETTERS TO THE EDITOR



Jan. - Mar. 2021 ISSUE

Dear Lt.Gen JS Sandhu,

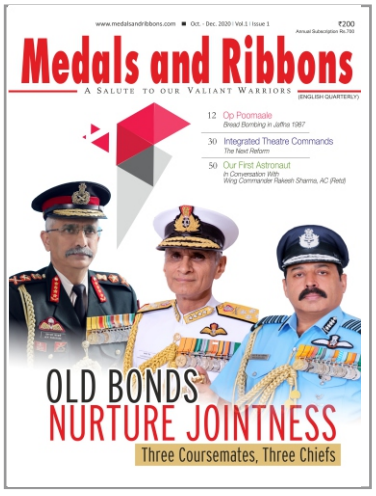
1. Thank you for your letter and a copy of the inaugural issue of 'Medals & Ribbons'. The journal has been very well conceptualised and presented. Many services veterans have written interesting articles on national security, service experience, generic issues over time, which have been published in newspapers / magazines. **It is my recommendation that such articles, relevant to the times, may be re-published (post permission) for readership by the larger community.**
2. HQGD & D would most certainly subscribe to Medals & Ribbons on an annual basis for the Area Library.

3. Warm Regards
Yours sincerely
Rear Admiral Puruvir Das NM
Flag Officer Commanding Gujarat
Naval Area
Headquarters
Gujarat Daman & Diu Naval Area
c/o Navy Office. P.O.Box No.66,
Bokhira, Porbandar, Gujarat 360575

Dear Gen.Sandhu,

1. Please refer your letter dated 17 Sep.20.
2. I have personally enjoyed going through the inaugural issue of 'Medals & Ribbons'. The magazine has a unique mix of interesting anecdotes, important aspects in strategic policy planning and certain very unique aspects of historic importance. **I am confident that this magazine would enhance the image and reputation of the defence forces.**
3. We have retained the inaugural issue in the Station Library of Air Force Station, Trivandrum. The feedback has been extremely encouraging and, I wish to subscribe for four issues (annual) for our Station library. The annual subscription amount would be forwarded as per details mentioned in your letter.

With wam regards & best wishes
Yours sincerely
Group Captain Bhuvan Mathur VM
Station Commander
Air Force Station,
Thiruvananthapuram,
Sanghumugham, Beach P.O.
Kerala - 695007



Oct. - Dec. 2020 ISSUE

LETTERS TO THE EDITOR

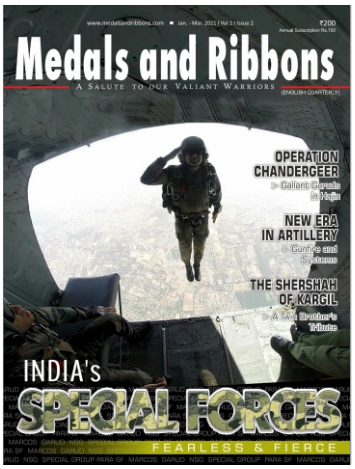
Dear Sir,

Have the greatest regard and esteem for both valiant Gurkha Tigers at the helm of this venture, yourself, whom I've had the privilege to serve with at Poonch and David, at Belgaum. The total commitment and dedication that you both have demonstrated to our Organization is awesome and worthy of emulation. Tiger Gnanaprakasham on your team is my classmate from School and an old friend.

It would be wonderful if those at the helm could initiate measures to restore the sanctity of our Medals and Ribbons which symbolize Valour, Honour and Dedicated Service in active areas....

Looking forward to your next issue

Col KK Arun, SM
(Retd)



Jan. - Mar. 2021 ISSUE

Dear Sir,

The opening two articles (Jan - Mar 2021 issue) lucidly validate the common belief that the passage of each decade ushers visible enhancements in the progression of mankind, in all walks of life. Now when I was commissioned in mid 1956, the Indian Army's total arsenal of Artillery guns per se comprised just THREE calibres; few Field Regiments of 25 Pounder, fewer of 5.5 inch Mediums and just 18 guns in all of 7.2 inch heavy calibre! But three generations later that meagre inventory had mushroomed to gun regiments of NINE different calibres (further bolstered by rockets and missiles), as stated by Lt Gen R S Salaria. And four decades hence he was witness to a greater, mindboggling transformation of "potent mix.... Artillery emerging as... deadly and devastating Combat Force Multiplier"!

Similarly my generation would be simply astounded by the current battlefield skills of our S F teams in stealth, precision handling of weapons and supreme self-confidence in homing on and eliminating their assigned target, from more than 400 meters distance, "in a minute or so" (!) as recounted by Lt Gen J S Sandhu. **The subsequent eight articles are a further exciting exposure to that fascinating, daring-do world of the Special Forces.**

But then the Indian Army are the proud inheritors of the spirit of soldiering honed over generations by dedicated leaders the likes of Lt Col John Masters, DSO, OBE so nostalgically narrated by young Rohit Deshpande. Perhaps not remembered today, Masters was among the S F pioneers as he was the B M to Brig W D (Joe) Lentaigne, CB, CBE, DSO (both from the Fourth Gorkha Rifles) in Wingate's Chindit Force and the basis of one among Masters gripping books "Road Past Mandalay". Any one read Kipling's romantic poem "Mandalay"? Please do, if you haven't.

Post WW II, Maj General Lentaigne laid out and commanded the DSSC, Wellington but Lt Col Masters after a stint in the MO Directorate dropped anchor in the USA, settled for a career in Fiction writing with a prolific output of 24 titles many of which were adapted by Hollywood & the BBC! Not all of us may have read all of Masters Books but the veterans would surely remember the Hollywood adaptation of "Bhowani Junction" with the green eyed sensation, Ava Gardener in the lead role!

God bless the Indian Army.

Lt Gen Baljit Singh, AVSM, VSM (Retd)
House 219, Sector 16 – A,
Chandigarh - 160015.



(photo credit aviationcentral.co.za).

Westland Lysander Aircraft at IAF Museum, Palam.

FLEDGLING FORCE TO FORMIDABLE FOE

The Early Years Of The Indian Air Force

Aeroplanes were the new craze in the 1920s and 1930s. The powerful nations were developing 'Air Forces' to use this new technology in warfare. Under British Rule, the Indian Air Force was established and nurtured, to play a crucial supportive role in the Second World War. A glance back in time is worth the effort.

The Indian Air Force (IAF) was officially established on 8th October 1932 in British India as an auxiliary air force of the Royal Air Force (RAF) with the enactment of the IAF Act 1932. 08 October is hence celebrated as Air Force Day across the country. IAF's first flight came into being on 1st April 1933 with four Westland Wapiti II A biplanes at Drigh Road, Karachi. Five Indian pilots were commissioned as Pilot Officers in 1932 at the RAF Flying College Cranwell in Britain and joined the A Flight in 1933. These pioneers were Harish Chandra Sircar, Subroto Mukerjee, Bhupendra Singh, Aizad Baksh Awan and Amarjeet Singh. J N Tandon too was commissioned into IAF along with these pilots but was placed on logistics duties. Flight Lieutenant CA Bouchier, DFC from the RAF was the first Commanding Officer of the Squadron.

The raising years had their trials and tribulations, with the first aircrash occurring on 8th January 1935 at 11.30 a.m. during military manoeuvres a few miles north of Karachi, on the banks of the Hub River. A Westland Wapiti Mark II A piloted by H C Sircar crashed into a military column. The pilot and observer escaped with injuries, but at least 15 soldiers were killed and 11 injured. Some were badly mutilated by the propeller. Later the pilot, Flying Officer H.C. Sircar, was court-martialed and dismissed from the force. Subroto Mukerjee went on to become IAF's first Indian Chief of Air Staff (CAS) on 1st April 1954.

No 1 Squadron IAF

The A Flight's first action was in Miranshah, North Waziristan in 1937, when it supported Army operations against Bhittani tribesmen. Meanwhile, B Flight had been raised in April 1937 with Wapitis, C Flight followed suit in June 1938, and thus No. 1 Squadron IAF came to full strength with three flights. The personnel strength of this squadron had also increased to 16 officers and 662 men. The first batch of six officers were later joined by AM Engineer, DFC (later Air Marshal and the second CAS), KK Majumdar, DFC & Bar, Narendra, Daljit Singh, R H D Singh, H U Khan, Henry Runganadhan, "Baba" Mehar Singh, Prithipal Singh, SN Goyal and Arjan Singh (Later Marshal of the Air Force, and the third CAS).

Harjinder, the ingenious engineer converted 12 slow - moving Lysander planes into deadly bombers.

The Second World War

No 1 Squadron was the sole IAF formation when the Second World War commenced in 1939. The war resulted in IAF expanding steadily, and five Coastal Defence Flights (CDFs) were raised on a volunteer basis, to assist in defending the principal ports. No 1 CDF was raised at Madras (present day Chennai), No 2 CDF was raised at Bombay, No 3 CDF at Calcutta, No 4 CDF at Karachi and No 5 CDF was raised at Cochin. Aircraft availability was a problem, and these flights were provided vintage Westland Wapitis, which were relinquished by No 1 Squadron IAF or from RAF squadrons. Training of pilots however gained impetus, RAF flying instructors were assigned to flying clubs in India. 364 IAF Volunteer Reserve cadets were trained at 9 Flying Clubs by the end of 1941. These Volunteer Reserves were inducted into the regular IAF, as it expanded to meet the operational needs of the War.

Aircraft improvements also took place with No 1 Squadron receiving 12 Westland Lysander aircraft. No 2 Squadron had also converted from Wapitis to Audax aircraft and was thereafter equipped with Lysanders by end 1941, while No 3 Squadron was raised at Peshawar with Audax aircraft.

One of the interesting stories of the early years is of IAF engineer Harjinder Singh, who was a wizard in repairing and modifying planes. Harjinder had joined the IAF as a Hawai Sepoy after graduating as an engineer from the elite MacClaghan Engineering College in Lahore.

Warrant Officer Harjinder, a passionate nationalist, wasn't convinced that Indians should fight for the British during the World War. His commander, Jumbo Majumdar's response was insightful. *"Harjinder, if we do not fight in this war for the damned British, we shall be nothing better than a flying club when the war ends. We must fight, and we must aim to expand the IAF while the going is good. After the war is won, India will be a Dominion, and we shall have to run our own Air Force."*[i]

In February 1942, their base in Toungoo, Burma was hit by a Japanese bombing raid. Jumbo and Harjinder conferred and felt they could bomb the Japanese air base after modifying their reconnaissance aircraft. Harjinder, the ingenious engineer converted 12 slow-moving Lysander planes into deadly bombers.

"The missions were flown un-escorted by Indian pilots who carried out daring dive bombings and pin-point attacks. Jumbo personally led a series of successful offensive strikes against numerous Japanese airfields. The IAF squadron also supported the Chinese army operations in the campaign. The squadron performed so well that in appreciation they were presented a "Gold Wing" by the Chinese – a rare honour indeed. While Jumbo became the first Indian pilot to be awarded the Distinguished Flying Cross in World War II for his exploits in Burma, Harjinder was awarded an MBE (Member of the Order of the British Empire) for his incredible effort and ingenuity.[ii]

In 1942, No 1 and No 2 Squadrons converted to Hurricane II B fighters. As the war progressed, more squadrons were raised and newer aircraft were inducted. By end 1944, IAF had nine squadrons with Nos 1, 2, 3, 4, 6, 7, 9 and 10 Squadrons flying Hurricanes, and No 8 Squadron had Spitfires. In 1945, No 4, 9 and 10 Squadrons also converted to Spitfires.

The IAF was involved in Strike, Close Air Support, Aerial Reconnaissance, bomber escort and pathfinding missions along with the RAF and US Army Air Force. RAF pilots were embedded in IAF units and vice versa to gain combat experience. IAF pilots performed commendably, and KK 'Jumbo' Majumdar was rated as one of the 12 best pilots of the Allied Air Forces. The IAF played a stellar role during the World War and its personnel received 22 Distinguished Flying Crosses, besides other decorations. The Force was also bestowed with the prefix "Royal" on its title in March 1945.

Undoubtedly, the fledgling Force of the 1930s rose to glory and prominence in the 1940s. Today, the IAF has carried forward this legacy, as it has grown to become the fourth largest Air Force. It is indeed a formidable foe, with modern aircraft, armaments and support systems. We are proud of IAFs track record, professionalism, calibre and capability.

Inputs for this article have been collated from official websites of IAF and Wikipedia.



Lt Gen J S Sandhu,
PVSM, UYSM, AVSM, VSM (Retd) was commissioned into 6/5 GR (FF) in June 1980. He has vast operational experience having commanded his unit and formations in Jammu & Kashmir including the Srinagar Corps. He has also been an instructor in institutions of the defence services and retired as Military Secretary in Army Headquarters in 2019. He was a leader of great repute within the army. He is now the Editor of this magazine.

i. https://www.thebetterindia.com/70596/first-officers-indian-air-force-harjinder-singh-jumbo-majumdar/
ii. Ibid.



USS Bunker Hill burns after 2 Kamikaze strikes in April 1945 in Battle of Okinawa. (photo credit US Navy).

THE MYSTIQUE OF 'KAMIKAZE'

The kamikaze attacks by Japanese pilots in the Second World War give an insight into their levels of patriotism, loyalty and indoctrination. Such indoctrination has emerged again in the last 2 to 3 decades in the form of suicide bombers.
L Manongba evaluates the mystique and mission of these Samurai.

The Empire of Japan entered World War - II on September 27, 1940, by aligning with Germany and Italy. The USA entered the conflict on December 7, 1941, when Pearl Harbour was attacked. Many battlefronts all over the world saw the brutality of war; it also gave birth to innumerable shades and descriptions of heroism on both the sides – The Allied and Axis Forces. It taught humanity harsh lessons. One of these has been the 'Resolve to Retain Sanity & Embrace Peace'. One such symbol of reconciliation is the framed calligraphy of the word 和平 (Heiwa, Peace) unveiled by Mr. Abe Shinzo, the former Prime Minister of Japan, at the Red Hill Peace Museum, Imphal.

An equally heady phrase that caught imagination of many then and is still a mystique is - 'Kami-Kaze' 神風 which is associated with the potent and electrifying world of Japanese patriotism and sacrifice. There is something mystical about these 'Bushidos', the neo Samurais of Nippon. A book titled "Kamikaze: A Japanese Pilot's Own

"Special Attack Units consisting of pilots who were initiated for suicide attacks for the Empire against Allied naval vessels were set up".

Spectacular Story of the Famous Suicide Squadrons" by Yasuo Kuwahara and Gordon T. Allred, gives a fair insight into the mind of a 15 year old pilot, trained, skilled and prepared to 'Die for the Emperor'.

The war against Japan rolled on, major milestones were:

- **May 1942.** The Japanese failed at the Battle for Coral Sea.
- **June 1942.** In the Battle of Midway, the Japanese Navy lost four fleet carriers. It proved to be the turning point of the war. They lost offensive strategic capability and never regained their powerful fleet of carriers and well-trained air groups.
- **July 1944.** The fall of Saipan islands, considered as the last line of defence for the Japanese homeland. Japan lost 30,000 troops, 20,000 civilians and 920 Japanese soldiers were taken prisoners.1000 soldiers jumped to their death from the 'Banzai Cliff'.

Better aircraft with the Allied Forces resulted in loss of air parity. Japan lost pilots faster than it could train. Japan's unwillingness to surrender made the situation grim. As allied forces advanced towards the Japanese home islands, it led to the desperate use of Kamikaze tactics. *The Japanese word Kamikaze is translated as "Divine Wind"*[I] . Kami means spirit / divinity; Kaze stands for wind. The word originated in 1274 CE and referred to a typhoon that dispersed and defeated the mighty Mongol fleet of the 'Khan of khans - Kublai Khan', grandson of Genghis Khan. He had set out with a formidable fleet of 3500 ships and 100,000 warriors to conquer civil war torn Japan.

In August 1944, Domei news agency announced that a flight instructor, Takeo Tagata was training pilots in Taiwan for suicide missions. Colonel Motoharu Okamura, of Tateyama Airbase in Tokyo was the first officer to officially propose to Admiral Takijiro Onishi about kamikaze attack tactics. He stated, *"In our present situation I firmly believe that the only way to swing the war in our favour is to resort to crash-dive attacks with our planes. There is no other way. There will be more than enough volunteers for this chance to save our country, and I would like to command such an operation. Provide me with 300 planes and I will turn the tide of war"*[II]. The desperate situation compelled the Japanese military leaders to venture into such an attempt to turn the 'Tide of War' in their favour. The military leadership was banking on unquestioned loyalty for such an unthinkable and audacious military plan, where pilots would be ordered to take flight in their single-engine land-based tactical fighters. The aircraft were named Hayabusa which meant "peregrine falcon" a bird that often serves as a metaphor for speed due to its vertical hunting dive, or stoop, with a speed of 290 to 325 km per hour, the fastest in any bird. In 1944 – 1945 CE, Tokubetsu Kōgekitai (abbreviated to tokkōtai) 'Special Attack Units' consisting of pilots who were initiated for suicide attacks for the Empire against Allied naval vessels were set up. They were trained to destroy warships more effectively than possible with conventional air attacks.

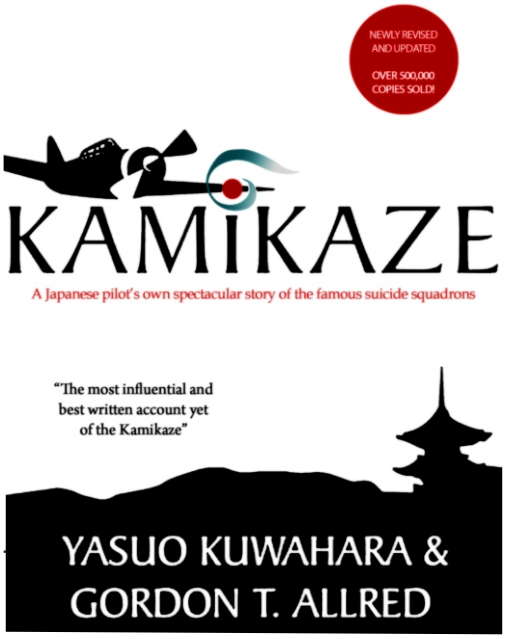


Kamikaze Attack on USS Yorktown. (photo credit worldwar2database.com).

After July 1944, the Imperial Japanese Army, zeroed onto probable 'volunteer' boys who were handpicked from schools. They were mesmerised with the Japanese decree of loyalty unto the Empire. These boys of 14/15 years were put through extremely rigorous basic training for 3 to 6 months - a regime of nightmarish days and nights. *Irrespective of how flawlessly these boys completed each task, the dreadful Hancho (head of the squad), would find the invisible speck of dirt in the dustless floor. Punishment was an integral part of their basic education. They claimed it created unwavering discipline and developed an invincible fighting spirit. The curriculum included lessons on acquiring necessary skills and lessons for survival, undoubtedly essential for such demanding responsibilities and tasks, but the methods of brutality used were extreme*[III]. The Hancho used wooden ball bats extensively to influence the minds of these young boys. (Excruciating details are described in the book by Yasuo Kuwahara and Gordon T. Allred). The minds of the future Bushido were ingrained not to worry about the reasons for any instruction, no matter how strange it may seem. *'All instructions were given because they were correct. Do you grasp my meaning?' – was the summing up ritual of the Hancho. Young voices would yell out "Yes, honourable Hancho dono"*[IV].

Kamikaze tactics were in tune with the "Imperial Rescript to Soldiers and Sailors" issued by

i. Chapter 14, 16 & 24, Kamikaze: A Japanese Pilot's Own Spectacular Story of the Famous Suicide Squadrons by Yasuo Kuwahara, Gordon T. Allred.
ii. Chapter 14 ibid.
iii. Chapter 5 ibid.
iv. Page 34, Chapter 5 ibid.



the Emperor Meiji in 1882, which was regarded as sacred; every military man had to learn, absorb its complex rules and philosophy as The Grand Way of Heaven and Earth. Each had to be fully convinced with the doctrine of individual expendability and acquire unwavering loyalty called for in the Imperial Rescript[v]. Such extreme form of training, mixed with nationalism and the expendability of the individual produced the best of Kamikaze pilots. The advance course involved lessons of gunnery, formation flying, and aerial manoeuvres. The most unusual was suicide practice and involved diving from specified heights towards a large oval 20 feet diameter target painted on the airstrip. This used to be the most difficult part of flying classes since it involved a psychological aspect - the very idea of practicing to die. It was ingrained into the minds of these young pilots to take it for granted that any pilot with a disabled plane would do his best to die in true samurai tradition provided he couldn't make it back to home territory. Given such an opportunity, he would dive into an enemy ship or plane, taking as many of his adversaries with him as possible. The young pilots were convinced that the Pilot is the Samurai; his aircraft the sword, ultimately becoming his soul. This was the crescendo that was built up by people like Colonel Motoharu Okamura of Tateyama Air Base and Vice-Admiral Takijiro Onishi, Father of the Tokkotai.

At 1045 hours on 25 October 1944, the Japanese General Headquarters announced Japanese success in a surprise attack against the enemy task force, including four aircraft carriers, thirty nautical miles northeast of Philippine Islands. It was a young lieutenant Yukio Seki who became the world's first official human bomb when he led the famed Kamikaze attack on Leyte Bay. When asked by the superiors before the kamikaze mission, if he would accept the honour, Lieutenant Seki who had married a short time ago, readily responded – 'Hai', that he was profoundly honoured to be considered worthy. That was the way of the Bushido, of the Kamikaze - The Divine Wind. However, the Japanese failed to inflict serious damage to the Allies aircraft and ships. By the end of the war, the Imperial Japanese Naval Air Force had sacrificed 2,525 kamikaze pilots and the Imperial Japanese Air Force had sacrificed 1,387 pilots. Okinawa saw the peak period of kamikaze attacks in April–June 1945. Overall, the kamikazes were unable to turn the tide of the war.

On 15 August 1945, Emperor Hirohito gave a recorded radio address across the Empire announcing the surrender of Japan. Yet, Vice Admiral Matome Ugaki, the commander of the Imperial Japanese Navy's 5th Air Fleet, participated in one of the final kamikaze attacks on American ships, hours after Japan's announced surrender. Such was the covenant with death these Bushidos swore.

History has no known records of such massive and premeditated self-destruction, as done by the Warriors of the Divine Wind. For two years, thousands of young men were trained for their own annihilation; learning skills, training minds and priming themselves spiritually to respond to the call of supreme duty. When the final order from his Commanding Officer came – 'You are destined' the instantaneous, unshakeable 'Hai' was predestined; driven by the Imperial Rescript – *"One's duty was indeed weightier than the mountains, that death was lighter than a feather."*[vi]

The mystique of a Kamikaze has again emerged in recent decades in the form of suicide bombers, brainwashed and used effectively by the Liberation Tigers for Tamil Eelam (LTTE). The 9/11 terror attacks in New York and in Washington D.C were a form of Kamikaze attacks, and various suicide attacks by terrorists also indicate extreme levels of brainwashing and indoctrination by Islamic fundamentalist groups, using Jehad as a Holy Diktat. The simple yet powerful message 和平 (Heiwa – Peace) at Red Hill Peace Museum shall hence always remain relevant, if mankind has to recover from the fallouts of such monstrous resolve. 'Heiwa' to all!!



Lt. Col. L. Manongba (Retd) was commissioned into 6/ 11 GR on 07 June 1980, and took premature retirement in November 2003. In his second innings he was witness to epochal events, where he saw the birth of a new nation, i.e. South Sudan. At that time he was working as General Manager of a Petroleum Company in East Africa (South Sudan). He was elected as an Executive Member of the 1st Commercial Association of South Sudan (Petroleum Association of South Sudan). Since 2016, he has been overseeing the ECHS Polyclinic in Imphal, and is in the forefront of Veteran Affairs in Manipur.

v. Page 46, Chapter 6 ibid.
vi. Last line, Page 46, Chapter 6 ibid.



Mi 17 Helicopter at Siachen Base Camp.

HELISTRIKES ON KARGIL HEIGHTS

Air Commodore Anil Sinha, the Task Force commander for armed helicopter operations during the Kargil Conflict, narrates the challenges and preparations that were done for striking targets on steep slopes at rarefied atmospheres in high altitude, wherein all weapon systems need to be re-calibrated. And simultaneously the strike force has to evade heat-seeking missiles.

The greatest honour for any soldier is to be bestowed with an opportunity to fight for his country. Right from my early childhood I had read and heard stories of great battles, glorious freedom fighters and gallant soldiers who fought for our country. Like most men of the Indian Armed Forces, patriotism runs in my blood naturally.

My tenure as an active combat pilot was almost coming to an end. I was the Commanding Officer of the 'Nubra Warriors', 129 Helicopter Unit (HU) when Kargil happened. On 17 May 1999, I rushed to Chandigarh to be airlifted to Srinagar as the Task Force Commander (TFC) of an Armed Helicopter operation. The IL-76 fully loaded and started up, was waiting just for me. To my surprise, strapped in the Captain's seat and raring to take-off, was none other than Wing Commander SRK Nair, my coursemate. Soon after I boarded, the IL-76 was on its way to Srinagar.

The enemy was well entrenched on the mountain peaks and had a clear view of the Dras River valley below. Vehicular movement along National Highway 1A, the crucial road connecting Kashmir with Ladakh through which all vital supplies are transported, could easily be disrupted by these enemy troops. In the initial strategy of the Indian Air Force (IAF),



Mi 17 Helicopter coming in for landing in the mountains (photo credit wikimedia.org Creative Commons Attribution).



Mi 17 gunships pulverizing enemy positions in the Dras Mountains (photo credit getty images).

helicopters were to be used as the main strike force supported by the fixed wing fighters, due to its inherent advantage of better target acquisition owing to lower speeds. Later, Mirages with precision targeting capability were deployed.

The Kargil War was quite unique and different from the previous ones in that armed helicopters and fighter aircraft were employed in combat by the IAF at the icy heights of 15000 to 18000 feet. It was a daunting situation since the aircraft and weapon systems were not designed to be used at such altitudes in considerably rarefied atmosphere. There was a huge challenge of executing strike missions where in the machine and weapon systems were to be deployed well beyond their operational flight envelope, that too without any data available. Time was at a premium too. Improvisation and innovation had to be resorted to. Intelligence on enemy positions was also very scarce making the situation even worse. We were all fully aware that slow moving armed helicopter formations are easy targets for a well-entrenched enemy perched on dominating heights and equipped with deadly anti- aircraft weapons. All of us realised the risks and difficulties, but were confident that we would be able to rise to the occasion.

I was one of the most experienced pilots in high altitude operations and in the Siachen sector operational flying. My strike team comprised of highly motivated and committed youngsters from Nubra Warriors and Mighty Armours (152 HU). We put our heads together and devised our own tactics. We improvised a high altitude firing range in the western mountain ranges of Kashmir valley, modified our Mi-17 helicopters by fitting GPS on site, calibrated the gun sights, mounted CMDS (IR flares to deceive heat seeking missiles) and armour plated the helicopters. Since there was an acute paucity of this operational equipment, all helicopters could not be modified. We simulated targets at altitudes of 15000 to 16000 feet and practiced attack profiles with live ammunition and studied aircraft behaviour, obtained weapon trajectory data and its effective range. Based on these crucial findings, we fine-tuned our attack methodology and thereafter trained other pilots of the team.

In the afternoon of 25th May 1999, Air Chief Marshal AY Tipnis, the Chief of the Air Staff (CAS) landed at Srinagar airbase. Group Captain AR Oak, Air-1 HQ AOC J&K and I were at the Base Commanders Office. Both of us briefed the CAS about the improvised strike strategy. He was convinced that our plan was practical and executable. On reaching Delhi, he was to brief the Prime Minister, which he indeed did that very night.

Later the same night, we got the eagerly awaited 'GO AHEAD' from the CAS. The intervening night of 25th/26th May was the most stressed and tense night of my life. It was unbelievable that we would actually be firing on the enemy and not on simulated targets at practice ranges. The 'D DAY' had come. Our entire team, including technicians and administration component, were charged up – adrenalin high…..... Preparations were done in total darkness. Helicopters were armed with 128 rockets and 128 IR flares each. Gun sights were harmonized using improvised harmonization boards. Chocolates were procured as emergency rations. Aircrew were busy preparing maps. Personal weapons pistol Browning, AK-56 automatic rifles, bullet proof vests and headbands were readied. Last but not the least, all of us wrote one 'Last Letter' to our wife/family and kept them in a sealed envelope in our respective rooms.

Time on Target (TOT) was 0650 hrs. Two targets to be engaged were Tiger Hill at 18000 feet and Tololing at 16000 feet. The night was over in a blink, and it was already time for mission briefing. As the



(photo credit clker.com/clipart).

The Srinagar – Kargil Highway visible from positions occupied by Pakistan.

Strike Leader of a slow moving and vulnerable formation, I had to motivate my youngsters. I tried to be as fearless as possible and put up a brave front and summed up my briefing with the famous quote.... "Cowards die many a times in their lives, but a Brave dies once and lives forever". We were expected to fearlessly pierce through the volley of enemy fire and deliver devastating salvos of rockets to annihilate the enemy defences. It was amazing to see the youngsters bubbling with energy and enthusiasm. Their morale was over the roof...This Day was going to be an acid test of our life-long training and love for our country. We were not to fail.... come what may...!!!

Both the armed Mi-17 formations lifted off at the designated time. Approaching Tiger Hill, my formation flew low and hugged the mountain slopes of Sumdo Nala to mask our approach and popped up abruptly short of the target with the rising sun behind us. Simultaneously, as part of the coordinated tactics, the MiGs roared above the target and made a deafening sound. I acquired the target on my gun sight and pressed the trigger to let go the salvo of 64 rockets. I pressed the trigger again to release another salvo of 64 rockets. It was a treat to watch this celestial event. The scene was like the TV serial Ramayana in which one arrow becomes a hundred during its flight to the target. The effect was very intimidating and brought about large scale degradation of the enemy defences. I can never forget this wonderful sight. There was joy and ecstasy. The mission was accomplished and the enemy was pulverized. The crew members immediately congratulated each other and shared a chocolate to celebrate. At the same time, salvos from the other formation rained destruction on Tololing mercilessly. Later in the evening we got confirmed reports and pictures of the targets, post attack. Our strikes were successful. There was also an enemy intercept – "ab hum capture hone wale hain..." (We are about to get captured...)

We repeated these devastating attacks on these locations on 27th and 28th May. We were lucky to be alive, however my formation member 'Nubra 3' – Squadron Leader Pundir, Flight Lieutenant Muhilan, Sergeant Prasad and Sergeant Sahu were not so lucky. They were hit by an enemy Stinger missile in the target area on 28th May, a possibility we had not ruled out. They were not as lucky as the others. Enemy had fired more than 20 Stinger missiles at the formations during our attacks.

Kargil War taught me that there cannot be any better sense of achievement and fulfilment in life than making some contribution for our country. Being ready to sacrifice one's life for the nation is indeed a noble deed. Akin to 'Team Nubra Warriors' our country too is 'Team India'. We all need to be united and contribute in our own way. I am sure that our country will rise to greater glory amongst the powerful nations of the world. Jai Hind!



Air Commodore Anil Kumar Sinha, *Vir Chakra (Retd), an alumnus of National Defence Academy, Pune, has extensive operational flying experience. During his service career he commanded the prestigious Air Force Station Palam, flying and conducting flights for the President, Vice President, Prime Minister and Heads of State of other countries. He has been part of the United Nations Mission in Sierra Leone in 2000-01 and functioned as the Chief of Air Operations at UN HQ. During Operation Khukri, he flew a Mi-17 with British SAS Chinooks to extricate UN Observers and a company of UN troops from RUF rebels held area of Kailahun. Success of this Operation was widely appreciated at the UN HQ in New York. He has been the Head of Faculty of CLABS, Centre for Leadership Training and Behavioural Science at College of Air Warfare, Hyderabad in 2006-08. He has been actively involved in Counter Terrorism / Insurgency Ops in J&K and North East, Siachen air maintenance, and other flying military and civil operations. He is a Qualified Flying Instructor and has been the Chief Flying Instructor at Helicopter Flying School, Secunderabad. He was awarded 'Vir Chakra' for the Helicopter Gunship Air Strike during the Kargil Operations.*



MiG-25R Foxbat taxiing for take-off. (Photo credit rbth.com).

THE FOXBAT

The Eagle Eye In Kargil Operations

Unknown to the enemy and many, there was an eagle that flew high above the towering mountains and picked up the specks of bunkers and enemy positions during the Kargil Conflict. The pilot who flew the missions recalls the experience.

The Kargil conflict was an unconventional war fought in the high mountains of Kashmir. The Indian Air Force (IAF) rapidly adapted to the air campaign's unique operational challenges, which included enemy positions at elevations of 14,000 to 18,000 feet, a stark backdrop of rocks and snow that made for uncommonly difficult visual target acquisition, complicated further by the small size of the enemy troop positions dispersed against a vast and undifferentiated snow background. Complicating matters further, the Pakistanis' individual troop positions were small and generally well-concealed, making them often resistant to visual acquisition and targeting by the IAF's pilots. Rugged terrain folds in the Himalayas tended to obscure the enemy from aerial observation and masked the effects of bomb detonations, rendering even near misses ineffective.[1]

Reconnaissance (Recce), Air-to-Ground Strike and Bomb Damage Assessment (BDA) are critical activities carried out sequentially for locating targets, attacking them with ordnance and assessing the extent of damage caused, through post-attack imagery. The first activity of Reconnaissance is to gather information about likely targets, which entails

1. Airpower at 18,000 ft – The Indian Air Force in the Kargil War by Benjamin S. Lambeth.

photographing the likely targets and fixing their coordinates, to enable target analysis and thereafter, targeting by fighter aircraft.

In Operation Safed Sagar, (the name given to the air war in Kargil) , the IAF used a variety of resources such as satellite imagery, Jaguar aircraft with their onboard Long Range Oblique Photography (LOROP) systems, Canberra aircraft, for gathering information on enemy locations and dispositions. A Canberra aircraft tasked to conduct a recce of the operational area sustained a direct hit on one of its engines by a shoulder fired Surface-to-Air Missile (SAM), when descending to 22,000 feet close to the Line of Control (LC). While the aircraft returned to base safely, the event highlighted the real threat of shoulder fired SAMs, if flying in proximity to the mountain peaks where such missiles were deployed.

The coordinates obtained from these resources appeared to be inaccurate, going by the number of strike missions that were unsuccessful in finding the targets. In the absence of accurate coordinates, the strike force was actually reduced to doing "Search and Strike" missions, or, in the words of a creative course mate, "Grope and Strike" Missions. The narrow Field of View of the Laser Designation Pod (LDP) carried by fighter aircraft, the mandate to the strike aircraft to operate at or above 10 km altitude (due to the threat of shoulder fired SAMs), the vast mountainous terrain and the stark background made it extremely difficult to see, or in the parlance of military aviation, 'visually acquire' targets on the ground. The fact is, if you cannot visually acquire the target, you cannot designate it by the LDP; if you cannot designate, you cannot deliver your Laser Guided Bomb (LGB). PERIOD! The need of the hour was therefore to be able to get accurate target locations. It was in this kind of scenario that the MiG-25R Foxbat made an entry into Operation Safed Sagar, in an innovative Tactical Recce role.

A little bit about the MiG 25 Foxbat. Originally designed by the Soviet Union for high level, supersonic interceptions, it was among the fastest aircraft to enter service. It was one aircraft primarily made of stainless steel, and weighed about 20 tonnes empty, with full internal fuel of around 14,600 kgs it weighed around 35 tonnes. The Foxbat had some amazing performance, from the time you released brakes on take-off it would climb to 20 km and in the process also accelerate to 2.4 Mach in 7 minutes and 30 seconds. This was with the restrictions of not going supersonic below 10 kms altitude. The landing approach would commence from a distance of 300 kms from touchdown at a height of 20 kms at 2.4 Mach. During this descent it would decelerate to subsonic speed till 10 kms with idle throttle settings, so as to cool down the airframe which would have been around 300 degrees Celsius, then open full throttles to warm up the engines before continuing the approach for landing. The workload in the cockpit was high through out the mission. The IAF inducted the MiG 25R version of the aircraft in its fleet in 1981 for Strategic Reconnaissance purposes. 102 Squadron Air Force of the IAF, aptly named "Trisonics" implying thrice the speed of sound, was raised to operate the MiG 25R. The version of the MiG 25R for the IAF was purely meant for reconnaissance and did not carry any armament. It also did not have any countermeasures against hostile missiles. Its safety lay in its high, stratospheric cruising altitude and its speed to out-climb and out-run any threat.



Multiple Targets detected by MiG-25R in the Dras area.

The MiG 25 is in her element when she is 'high and fast' - above an altitude of 20 kilometres and above a speed of 2.4 Mach. To ensure that there are no gaps in the photographs, the sortie has to be flown at the correct Velocity / Height ratio. Such a flight profile is suitable for imaging larger targets, but in Operation Safed Sagar, it would have been impossible to pick up small targets the size of bunkers, in which the enemy was holed up.

Clearly, there was a need for exploring other 'lower and slower' options. A few sorties were undertaken over the hills north of Bareilly to evaluate how we could achieve these requirements. Two profiles were tried out, one at 14.0



Foxbat flying through clouds (Photo credit bharat-rakshak.com)



Foxbat Takes Off – A Powerful Machine Indeed (Photo credit militarywatchmagazine.com).

Km altitude and a speed of 1.4 Mach and the other at 10.0 Km altitude and a speed of 0.95 Mach.

While selecting the flight profile it was necessary to decide on an altitude at which small targets such as bunkers could be imaged with clarity and accuracy. Another factor was the speed which the Mirage-2000 escort aircraft could maintain. At that time the Mirage-2000 was restricted to a speed of 0.95 Mach in Air Defence configuration, hence they would not have been able to escort the Foxbat, if she were to fly at 1.4 Mach.

Fuel was another critical factor against the first profile. Even if the speed restriction was not adhered to, the Mirage-2000 would have been able to escort the Foxbat only up to the first 'way point', since they would have to be using the "afterburner" to maintain 1.4 Mach. Which practically meant that the escorts would be with the Foxbat only inside our own territory; for the crucial portion of the actual Photo Recce mission along the LC, the Foxbat would have no escorts for its protection, making her vulnerable to enemy interceptors.

Therefore, it was decided to fly the sortie at 10 Km altitude and 0.95 Mach. However, this was not without its own problems. For one, the Foxbat simply guzzled fuel at this altitude. In normal operations, the Foxbat would get airborne for a strategic recce mission from a base located deep inside the country, far away from the International Border. A forward base was designated where the Foxbat would land after the mission. After essential technical activity and replenishment of fuel and other consumables, she would return to home base. In the case of Operation Safed Sagar, an Operational Location was selected in Punjab, which had to double up as the launch base as well as a forward base, primarily due to the complex logistics required for MiG 25 Operations. After flying a recce mission, the Foxbat would be operating at the limits of its 'endurance', implying that it would have just enough fuel to land back at the forward base.

Another issue was the vulnerability of the Foxbat to enemy interceptors, since it had no Radar Warning Receiver (RWR) to warn against any threat, no passive defence measures to protect herself against missiles and carried no guns or missiles. Practically, a flying elephant! This was addressed by providing a patrol of MiG 29 interceptors in an 'Area Combat Air Patrol (CAP)' role in the Kargil sector and two Mirage-2000 escorts dedicated to fly along the Foxbat as 'tied escorts', whenever a recce mission was to be undertaken. The stage was set for the Foxbat to enter Operation Safed Sagar. I ferried to the forward base in Punjab on 18th June 1999.

After briefings and interaction with the planners and the strike squadron, the first mission was undertaken on 21st June 1999 in the Drass – Kargil sector along the LC. It was a comforting thought that the escorting Mirage-2000 aircraft were being flown by my NDA course mates. To ensure secrecy, the mission was flown as a 'Nil R/T Mission', meaning we were to maintain silence on our Radio /Telephony, unless there was a dire necessity, such as on detection of an enemy aircraft. In case a credible 'threat' was to develop, the escorts would break R/T silence and warn me of the threat. I would immediately turn southwards, engage maximum 'afterburners', climbing and accelerating to my sanctuary of 20 Kms altitude / 2.4 Mach and return to base. The Mirages and MiG 29 would deal with the threat.

The initial part of the sortie went flawlessly. About 10 minutes in the photo run, there was a spot of excitement, as the Mirage leader broke R/T silence and called out, "PJ two bogies 2 O'clock reciprocal, no threat presently, continue". At this, the MiG 29s who were capping in the valley, also pulled up and switched on their radars. After about two minutes, the Mirage leader called that hostiles had turned North and were going away. The rest of the photorun was completed successfully, and I quickly returned to the forward base. After landing, the films were quickly downloaded from the MiG 25 and taken for processing. When the processed films came back to Western Air Command (WAC) Operations Room, the



The author standing in front of a MiG 23 BN and on top, a MiG 29 aircraft.

effect was electrifying. It was as if a fog had lifted. All uncertainties melted away and there was euphoria in the echelons of the IAF and in crew rooms.

Crystal clear imagery of targets like Tololing, Marpo La, Muntho Dhalo, Tiger Hill and many others was now available, and with accurate target coordinates. When enlarged, it even showed targets as small as bunkers. It was now possible for the planners and the strike squadrons to carry out detailed analysis of the targets, visualise what the targets would look like from their release altitude (since the Foxbat had carried out the target photography from the same altitude), plan the most appropriate attack direction and attack them with accuracy. As the same creative course mate quipped, the strike missions were now in the "Know and Pulverise" mode. And did they pulverise!

The Foxbat was tasked with four missions in the Kargil –Dras sector. The excellent imagery was used extensively, not only by Mission Planners in Command HQ and pilots of the strike squadrons, but also to brief the media on television. It also provided excellent Bomb Damage Assessment as well.

Photo recce missions have unique challenges and difficulties. One notable incident needs to be elucidated. The Jaguars, after a LOROP mission, came back excited that they had picked up a huge enemy base on our side of the LC, with a huge Helipad, two helicopters, about 30-40 tents and a large number of vehicles. They wanted permission from Command HQ to engage it. The LOROP film showed all that as stated above.

I had done two missions already and had photographed the whole LC till about 9-10 Kms across, and no such camp showed up on my photographs. I was certain that this base was nowhere close to the LC. I was to undertake a mission in a day or two, so I requested Command to await the result of my mission. Command HQ agreed to my reasoning. I got airborne for the mission as planned. Once I turned left to commence my photo run, I altered course so that the Foxbat would be flying a track 3-4 Kms North of what was flown on the previous mission. After landing and developing the film, the same target was picked up on my film as well. The only difference was, the target was approximately 13 - 14 Kms beyond the LC on the Pakistani side, identified as Gultari Camp. A major fiasco was averted, with the Foxbat proving that she was worth its (considerable) weight in gold.

I returned to my home base on 01 August 1999 after successfully completing my assigned task. Pushed into a tactical recce role, the Foxbat operated way outside the operational envelope it was designed for. However, there was not a single skip in any of the photographs; they were seamless. The role of the Foxbat in Operation Safed Sagar was priceless. That she did not receive the attention that it so richly deserved, is another matter.

After doing yeoman service to the nation for 25 years, the MiG 25 Foxbat was retired from the IAF on 01 May 2006.

P.S. : For an interview of the author by Shiv Aroor on role of the MiG 25 in Kargil Operations, please watch "The Untold Story of the MIG-25" on "Live Fist".



Wing Commander Pradeep Jaswant Thakur *was commissioned in the Indian Air Force on 15 June 1980. During his illustrious career spanning 23 years he flew a number of fighter aircraft including the GNAT Mk-1, AJEET, MiG 23 BN and the MiG 25R Strategic Recce aircraft. A Qualified Instructor and a DSSC Graduate, he has been the Chief Instructor at the Institute of Flight Safety at Palam and Command Flight Safety and Inspection Officer at Eastern Air Command. He undertook all the Recce Missions during Operation Safed Sagar, flying the MiG 25R aircraft in an innovative tactical role for which he was Mentioned in Despatches. After his premature retirement in January 2004 he has worked in a number of Airlines as their Chief of Flight Safety and as GM Operations in an airline too.*



A Rafale fighter takes off" (photo credit Aatish Pillai, aviation enthusiast)

THE RAFALES LAND

A Much Awaited Induction

The arrival of the Rafales received a lot of hype. What will be the air superiority scene, consequent to their induction? Air Marshal Harish Masand evaluates.

July 29, 2020 would be marked as a red-letter day in the history of the Indian Air Force and, perhaps, the nation itself, going by the enthusiasm displayed even by the common man on that day when the first five Rafales arrived at Air Force Station Ambala. The ferry from France and their entry into Indian airspace, having taken off on their last leg of the ferry flight from Al Dhafra air base in the UAE, a little after 1 pm was extensively covered on most channels, particularly from the moment the two Su-30 MKIs joined the Rafale in their squadron's signature arrowhead formation and escorted the five new entrants to their designated base at Ambala. The first squadron to be equipped with the Rafale is 17 Squadron of the IAF, also known as the Flaming Arrows. I wonder if the meaning of 'Rafale' in French, which is 'burst of fire', was one of the considerations while resurrecting 17 Squadron to receive the Rafale. The event was telecast live over almost every TV channel in India and eagerly watched by millions in the country. The enthusiasm on their arrival was first signified by the welcoming radio transmission from the Indian Navy's guided missile destroyer, INS Kolkatta, when the Rafales flew high over it, with a transmission of 'May you touch the sky with glory, happy landings'. Promptly came the reply from the Rafale leader and the CO of the Squadron, Group Captain Harkirat Singh, who wished the

Destroyer of the sister service with 'fair winds and happy hunting'. The visuals of thousands of people on the streets of Ambala and on the terraces of houses to catch the first glimpse of these war birds further amplified the significance of the event.

After all, this was the first induction of a new fighter aircraft in the inventory of the Air Force after over 23 years when the Su-30 was inducted at Air Force Station, Pune in June 1997. Coming at a time when the Indian Air Force is at a depleted force level of around 32 combat squadrons against its sanctioned strength of 42, and in the midst of the standoff against China on the northern borders, the hopes and expectations of the Air Force were etched onto the faces of the man on the streets and rightly expressed by the tweets of the Prime Minister and the Defence Minister to give the new arrivals a rousing welcome.

Without going into the political controversy surrounding the contract for 36 Rafales, it does need to be highlighted that the requirement for 126 Medium Multi-Role Combat Aircraft (MMRCA), to equip six squadrons, was first projected by the Air Force in 2001 in view of the ageing and near-obsolescence of a large portion of its combat fleet. The subsequent saga of delays and breakdown in contractual/commercial negotiations has been widely covered by the media and need not be repeated here except to state that finally the contract for 36 aircraft, perhaps reduced from the originally planned 126 due to financial considerations, was signed in 2016.

The Dassault Rafale, a twin-engine delta wing with a canard, is a multi-role fighter aircraft with a wide array of sensors and weapons supported by a state of the art electronic warfare suite and is capable of performing a variety of missions. These range from air superiority, long-range air to surface strike, both on land and at sea, aerial reconnaissance and nuclear strike missions prompting the manufacturer Dassault to tout it as an Omni-role fighter. Be that as it may, this single aircraft type does perform the role of a multitude of specialised platforms in the



Front View of the Rafale – deadly power indeed. (photo credit Aatish Pillai, aviation enthusiast)

French Air Force including the Jaguar, Mirage III/5, Mirage F-1 and the Mirage-2000 and others in the French Navy like the Super Etendard and the American F-8P Crusader.

The F-3R version contracted by India is a 4.5-generation aircraft, though the manufacturer claims some fifth generation capabilities, and brings some unique capabilities to the table, some of which are not currently available even in the upgraded Su-30MKI or the Mirage-2000 and adds a significant punch to the IAF's offensive potential. It is a highly manoeuverable aircraft due to its delta wing design with a coupled active canard system controlled by a digital Fly-By-Wire (FBW) control system. This gives the Rafale an agility matching the best in its class which, coupled with its advanced sensors, electronic warfare suite and weapons, could be decisive in close combat or Within Visual Range (WVR) combat.

Apart from its aerodynamic design, the two Snecma M-88 engines also contribute to the agility of the aircraft by producing about 75 KN (17,000 lbs) of thrust each with afterburner at sea level while in dry power, these engines produce 50 KN each permitting the aircraft to supercruise, that is cruise at speeds above Mach 1.0, with one drop tank and four air to air missiles in dry power. This is a feature that is generally available only in 5-generation aircraft and permits the aircraft to get to the combat zone faster or evade adversaries in chase at lesser fuel consumption and, thus more economically. The supercruise in dry power also keeps the infrared signature of the aircraft relatively lower and makes evasion of infrared missiles easier. The engines are controlled by a Full Authority Digital Engine Control (FADEC) system that permits carefree use of the engines while reducing the possibility of surge or a flameout. It is not confirmed whether the IAF bought the aircraft with M-88-2 version of the engines or the upgraded and improved M-88-4E version, the latter producing greater thrust with reduced maintenance. In any event, the engine is of a modular construction for ease of maintenance and an upgrade to 4E standards is possible with replacement of certain sub-sections. Also notable is the



Formation flying by 3 Rafales. (photo credit Aatish Pillai, aviation enthusiast)

use of many advanced technologies in the engine that permit greater reliability, longer life and also reduced radar and infrared signature of the engine. These include use of non-polluting combustion chambers, which eliminate smoke emissions and thus visual pick of the aircraft, single crystal turbine blades with the ability to withstand higher exhaust temperatures and thus improved thrust and longer life. In addition, powder metallurgy compressor disks and certain other technologies coupled with the aerodynamic design, like kidney-shaped air inlets under the wing roots, reduce the radar and infrared signature of the engines.

The main sensor on-board the Rafale is the Thales RBE-2 AA multi-mode airborne Active Electronically Scanned Array (AESA) radar with a detection range on fighter class aircraft of around 200 Km. In the air superiority role, to give the aircraft the ability of a stealthy approach and engagement, the powerful radar is supported by a totally integrated passive front-sector electro-optical system known as Optronique Sectuer Frontal (OSF) operating both in the visible and infrared bands. This system can detect and identify airborne targets as well as targets on land and at sea at beyond visual ranges, which have not been specified, permitting the use of some of the armament from such ranges.

Coupled with such sensors, is the relatively low Radar Cross Section (RCS) of the aircraft, particularly from the frontal aspect, which would delay detection of the aircraft by adversaries when engaged in a battle for air superiority and closing in from frontal quarters at relatively high closing-in speeds. While not quite a stealthy aircraft and though the details of technologies used for this are understandably classified, the low RCS of the aircraft has been made possible by its design and extensive use of composites with radar absorbent materials and paints, apart from the special coating of the front windshield and canopy. It is estimated that about 70% of the aircraft's surface is composite with appropriate paints. The low RCS of the aircraft improves the survivability of the aircraft in all types of missions including air superiority, air to surface attack or reconnaissance in a hostile air defense environment. This is further improved and aided by an integrated and highly advanced Electronic Warfare (EW) suite named SPECTRA developed by Thales in collaboration with MBDA specifically for the Rafale. The suite consists of a number of elements including multi-spectral sensors operating in a wide electro-magnetic band from radar to IR to laser with data-fusion and integration through a number of special computers for detection, identification, location and initiation of appropriate counter measures that include deception jamming and decoying through an active phased array Self Protection Jammer (SPJ). The system is aided by an MBDA developed Missile Approach Warning System (MAWS) working in both the near and far infrared bands coupled with a Thales-developed Laser Warning System (LWS). The entire system is reprogrammable to cater to emerging new threats.

With this kind of survivability even in a highly hostile air defence environment, the aircraft gets an added advantage with a whole range of advanced weapons that can be carried on its 14 hard points in a mix of external fuel, reconnaissance or targeting pods, air to air and air to surface weapons with a total of nine tons of external load. In the air superiority role, the Rafale is equipped with, perhaps currently, the world's best Beyond Visual Range (BVR) air to air missile, the MBDA Meteor, which has even been termed as a 'game changer' by many. Notwithstanding such hyperbole, the Meteor certainly seems to have a greater range as well as a larger 'no escape zone' as compared to any other BVR missile in the inventory of any air force enabled by a throttleable, or adjustable, ramjet which permits it to maintain a high supersonic speed through its cruise phase and still have residual power to engage a manoeuvring target in the terminal phase. The missile is also network-enabled to permit its launch based on detection by a radar or sensor from another platform and the shared situational picture through a jam-resistant data link. Current maximum engagement range of this missile is classified but has been estimated at around 150 Km. This should enable the Rafale to take the first shot on its adversaries in BVR



IAF Rafales arrive in Indian Skies in end July 2020. (photo credit thefederal.com)

engagements. However, such BVR engagements with a longer-range missile must be treated with caution since in this ever-changing balance of offence versus defence, and advancements in technology with newer missiles, the situation could well change in favour of an adversary. For example, the Chinese are already touting an advanced BVR missile called the PL-15 which claims to have a longer range than the Meteor and would soon equip the PLAAF as also JF-17s of PAF. The BVR battle must, therefore, be fought innovatively as is expected of the IAF.

Another air-to-air missile MICA, also made by MBDA, supports the Meteor in air combat on the Rafale. MICA is currently the only missile in the world with two interoperable seeker heads, active radar and Imaging Infra Red (IIR), that make the missile highly resistant to countermeasures and thus highly effective in the near BVR and WVR combat. For close combat and situations below missile firing minimum ranges, the aircraft also continues to carry a 30 mm GIAT revolving cannon with a high rate of fire. The ejection seat, inclined rearwards at almost 30 degrees, helps in improving the g-tolerance of the pilots in close combat. Aiding in the employment of these sensors and weapons is a pilot-friendly glass cockpit based on the principle of data-fusion with ease of monitoring and control by the pilot. The entire range of information is presented to the pilot in easily interpreted formats, through a computer prioritizing the information, by a wide-angle holographic Heads Up Display (HUD), a Helmet Mounted Display (HMD) and sighting system, two large flat panel Multi-Function Displays (MFDs) and a central collimated display. Most of these displays work through a touch interface easing the human-machine interface. Information sharing with other airborne platforms and ground sensors or control stations is also provided for through a secure data link and V/UHF communication systems. In addition to the HOTAS (Hands On Throttle And Stick), where most of the control switches are placed in most modern aircraft like most cars now, a Direct Voice Input (DVI) system facilitates selection of a variety of sensors/systems and their functions through direct voice commands of the pilot thus greatly minimizing the workload and diversion of attention. Such systems fuse the machine and the pilot as almost one, which greatly enhance the effectiveness of the Rafale in fast-moving and demanding combat situations.

The entire avionics suite of the aircraft is integrated on the Integrated Modular Avionics (IMA) architecture to facilitate data-fusion and future upgrades or replacement of the modules in a plug-and-play system. Accurate and precise navigation information is provided by two Sagem SIGMA-95 Ring Laser Gyro (RLG) Inertial Navigation systems with an embedded GPS (INGPS) for continuous corrections and updates through Kalman filtering techniques. Coupled with the Automatic Flight Control System (AFCS), this permits the aircraft to navigate to selected points with great accuracy. For low-altitude operations, the aircraft also has automatic terrain following capability through the combination of the navigation and flight control systems while the radar provides for terrain avoidance through obstruction warnings to permit Nap of the Earth (NOE) operations when required. In addition to the two main sensors, radar and OSF, currently integrated on the avionics bus, the Rafale is also equipped to carry a number of sensor pods for both reconnaissance and air to surface attack operations. For reconnaissance, it carries a



Rafale, meaning 'burst of fire' appears menacing – ready to pulverise.

Thales Reco New Generation /Areos pod consisting of bi-spectral, both IR and optical, sensors for long-range strategic reconnaissance tasks. In addition, the pod also has an IR Line Scan capability for tactical reconnaissance particularly from low-altitudes. The Reco Management System permits a variety of reconnaissance functions, which fill more than just a vital gap in the IAF's current inventory created by the phasing out of the MiG-25R strategic reconnaissance platform. For target information as well as target designation, the aircraft also carries either the Thales Damocles XF, Talios or the Israeli advanced LITENING-G4 electro-optical and laser designation pods. Together with the IMA and a broadband data-link, these pods provide analysed real-time sensory information to other friendly platforms or a ground station for further processing and dissemination.

Apart from conventional unguided air to surface weapons or well-known PGMs like Electro-Optical (EO) bombs, Laser Guided Bombs (LGBs) or anti-radiation and anti-shipping missiles, the Rafale has been designed to carry some long-range precision weapons to give the aircraft significant standoff precision attack capability. The most notable of these is the 1300 Kg SCALP EG cruise missile with a range of more than 250 Km. Recent upgrades of the MBDA SCALP include the use of a data-link to relay target information just before impact for Battle Damage Assessment (BDA) or even retargeting mid-way through its flight. Another such weapon is the Sagem-developed AASM Hammer. Yet another cruise missile is the MBDA Taurus KEPD (Kinetic Energy Penetration Destroyer) 350 with a range beyond 100 Km. However, the most notable of these attack capabilities is, perhaps, the nuclear strike capability of the aircraft which may have been a major factor in the political decision making matrix for its selection by India, to add to the airborne nuclear deterrent option. The French Rafales carry the diminutive ASMP-A Land Attack Cruise Missile (LACM) which weighs 850 lbs and is just over five meters long. The LACM is a Mach 3 missile like our Brahmos with a reported range of 500 Km. Perhaps our Rafales would be capable of carrying the next-generation Brahmos.

Though the Rafale has significant capabilities in a variety of roles and can carry 9 tons of external loads, I must sound a cautionary note against all the hype surrounding the induction of this aircraft in the IAF. While the manufacturer, and some others, may claim that the aircraft is a 'game-changer' or an Omni-role for the aircraft, it certainly cannot be Omni-present in all combat zones. The aircraft has been inducted in limited numbers, just 36 to equip two squadrons. This is a number, which does not even cater for any reserves for major overhauls or losses. Also, as per the reports, one squadron would be at Ambala for the Western and Northern sectors while the second would be based at Hasimara in North Bengal, my old favourite base with lots of fond memories, to cater for the Northeast, from Sikkim to Arunachal Pradesh. Even if the squadrons are split into two or three detachments each when required, these cannot be expected to react in time to challenge any hostile movements or intrusions, particularly in the air defence or air superiority roles, in every sector. Keeping the aircraft on the ground in readiness for the air superiority role at various locations also reduces the number of aircraft available for other missions. In this regard, numbers become very



(photo credit zeenews.india.com)

important. As the famous saying goes, 'quantity has a quality of its own'. Maintenance facilities and logistics, particularly of storage of specialized and expensive weapons, at all likely locations would also pose their own problems.

With regard to numbers, it must be recalled that the initial package of 36 aircraft, including maintenance facilities initial spares and weapons, was purchased at just under 6 billion Euros or around Rupees 60,000 Crores at the prevailing exchange rates in 2016. Per unit cost of the aircraft itself was around 100 million Euros in 2016 prices. At such high prices, it is unlikely that the country would be able to afford more of these aircraft in the foreseeable future in view of the economic situation. Also, any additional purchases are likely to be at the cost of indigenous aircraft like the LCA Mk 1/1A/2. Considering the focus and efforts of the present Government on Atmanirbhar, it becomes even more unlikely that India would acquire any more Rafales, except a few for maintenance reserves or to make up for any losses. Once again, numbers become more important in view of the depleted combat squadrons of the IAF and we may well, and rightly, end up with a larger number of LCAs to get to 42 squadrons as soon as possible.

Also, while the aircraft itself is highly capable, it needs to be remembered that it is just the front end of a spear, so to say. For efficient employment of the aircraft, it still requires a number of combat support systems, like Airborne Early Warning and Control Systems (AEW&CS/AWACS), ISR and Air to Air Refuelling (AAR) etc. The IAF is already deficient in such combat support systems and many more need to be inducted to cater to the many fronts where these, as also other existing combat aircraft of the IAF, may need to be efficiently employed. These systems also need some allocations from an already stressed capital acquisitions budget.

The hype surrounding the induction and the aircraft is also not healthy, in my personal opinion. Such excessive hype, in an attempt to bolster morale, tends to raise the expectations of the general public as also the political and air force leadership from the Rafale squadrons. Such expectations and demands may well put unnecessary pressure on the squadron personnel who may then tend to become risk-averse or adopt a zero error approach that does not suit a combat unit. At the other extreme, some personnel may become over-confident and take on unnecessary risks with possibility of errors. The lower–level leadership would thus need to play a crucial role in the smooth and effective induction of such high-value assets and in keeping the right balance during training to achieve optimum combat readiness in the shortest possible time. Having personally inducted two new combat types in the IAF and being fully aware of the demands and pressures, I cannot overemphasize this aspect. We must keep in mind that the Rafale is not a silver bullet for all the security threats facing the country.



Air Marshal Harish Masand,
VrC, VM (Retd) was commissioned as a fighter pilot in December 1967. During the liberation of Bangladesh in 1971, he was awarded a Vir Chakra for gallantry while flying Hunter aircraft from Hasimara. In his distinguished career, he has inducted the MiG-29 as a Squadron Commander in 1987 and the Su-30s as the Base Commander in 1997. A DSSC graduate and a flying instructor, he has served as an instructor in most establishments. He is also an alumnus of the Air War College in USA. After retirement in 2006, he settled down in Mhow, writing and speaking on defence and national security matters.



Air Chief reviewing the Air Force Day Parade in Oct 20.





Air Chief Marshal RKS Bhadauria, PVSM, AVSM, VM, ADC.

Q & A with the CAS

The induction of Rafale aircraft into the IAF has commenced. With 11 Rafales having been inducted already, and with an inked contract for 83 LCA Mark I, it is evident that the combat potential of IAF is improving steadily. Which other major technological advances need to be developed to buttress our airpower and force capabilities?

With the latest addition of three more Rafales on 27 Jan 21, the strength has increased to 11 aircraft. Besides bolstering our combat potential, our strategic priority is to ensure that we operate home grown systems backed by an industrial ecosystem with expertise in cutting edge technology. Advantage over our adversaries in the long run is possible only if such capability is driven domestically. We are actively pursuing emerging technologies in the field of swarm drones, cyber, AI and big data handling. In the near future, the domain of Space is gaining increased significance. Development of space based assets, information superiority and capabilities in this domain will be a focus area for the IAF.

One of the contentious issues within the Services relates to ownership of attack helicopters. With the CDS in place, and considering old ties with the Army Chief, do you expect a mutually acceptable resolution, and what should be the possible way forward?

The Attack helicopter fleet of the IAF trains and exercises along with Indian Army formations thus ensuring co-ordination and synergy while undertaking roles in support of our ground forces. The rapid deployment of Apaches in Eastern Ladakh to counter enemy armour and troop deployments is an affirmation of the priority IAF accords to attack helicopter employment in the Tactical Battle Area. At the same time, we also need to acknowledge that attack helicopters like Apache are a versatile weaponised platform suitable for destruction or suppression of enemy air defence systems as well, and AI missions amongst many others. Locking these vital combat helicopters for only a strike corps support role is neither envisaged nor desirable. Particularly in this era of developing joint structures, the domain expertise of IAF must be utilized for their most optimal and

operational roles. With joint Commands in the offing, this debate is no longer relevant.

Space is likely to be a future arena for conflict. With our Anti-Satellite Test in 2019, we have demonstrated capability. What would be the IAFs role in developing defensive and offensive capabilities for conflicts in space?

Space domain which includes Anti-Satellite weapons, jamming, spoofing and other effectors like Directed Energy Weapons, Electromagnetic Pulse, etc will play a major role in future conflict scenarios. To this end, the Defence Space Agency (DSA) has been formed to bring about the required synergy for operational control of all space resources in achieving our national military objectives. The DSA itself is an interim arrangement and we should see its evolution to Space Command in times to come. Safeguarding our own space assets from any adversary action (covert or overt) will be the key area of focus, towards which having a robust Space Situational Awareness (SSA) setup is an inescapable necessity. The latest reforms by the Government in the space sector will aid in ensuring that the interests of Armed Forces are met through greater participation from the private sector.

Air Defence (AD) is one of the primary roles of the Air Force. There is a proposal to have an Air Defence Command as an integrated operational command. With most aircraft having multirole capabilities, would it be feasible to dedicate some aircraft for the AD role? How do you visualize AD Command shaping up in the coming years?

Formation of an integrated Air Defence Command with operational control is being done to synergise all available resources. This will enhance our combat ability and reduce the sensor to shooter time. All our combat assets are multi or swing role. It needs to be understood that Offensive Air Power and AD operations are deeply intertwined and fighters as well as AWACS and AEW&C would on most occasions switch from Offensive to AD role within the same mission / airspace. We cannot have dedicated fighter assets devoted only to AD in command. We have a well



evolved Air Power Assets utilisation methodology which will be applied effectively towards all tasks.

The Air Force has played a critical role in Operation Snow Leopard in Ladakh last year, not only in the aspect of surveillance of the vast LAC but also in the crucial air maintenance and helicopter operations for the large number of troops deployed. Can you elucidate major highlights of the Air Warriors support to our troops in those difficult borders?

It is an ongoing operation and I would not like to discuss it. Suffice to know that every action to support the Army and deploy to cater for any emerging scenario was implemented swiftly.

The IAF has played an important supportive role in the fight against Covid-19 virus, evacuating Indian nationals from Wuhan and other places, as also transporting the vaccines from Pune to other cities. Can you amplify some of the major activities of IAF in this mission?

Towards Covid support, IAF transport and helicopter fleet have been available 24x7 since 25 March 2020. IAF had earmarked 30 Heavy and Medium airlift assets for the task in addition to 28 helicopters on standby role at various nodal bases. To ensure airlift of medical load and supplies across the country, we established the 'Hub & Spoke' model to interface heavy and medium lift airlift assets. We have undertaken evacuation of Indian citizens from across the globe including countries such as South Sudan, Kyrgyzstan and Iran. Till date we have clocked 3,38,850 km over 584 missions. We are cooperating with the civil authorities for ensuring last mile connectivity of Covid vaccine distribution whenever required.

Having been a test pilot, you would have often undertaken test flights in new aircraft, and some such sorties would have been with 'under-performing' engines or systems snags/failures. How do you manage to handle such unforeseen situations in air?

In aviation, we have to sometimes face certain unforeseen circumstances that require to be tackled correctly. During test pilot training, due focus is given towards handling and mitigation of such events. This prepares us to handle any unexpected occurrence during test flights.

In your childhood, you have studied in several schools, while your father was in the Air Force. Can you tell us about your school memories?

I have vivid memories of schooling in Kendriya Vidyalaya Chandigarh. I was lucky to have great teachers who guided us in every step. My classmates and seniors were great companions and we still retain bonds of friendship. We worked hard and delivered excellent results in school and I am happy to report that my classmates are doing exceptionally well.



Kiran Mark I Trainer.

Flying Instructor's School at Tambaram in 1954.

FLYING INSTRUCTORS' SCHOOL, TAMBARAM

Training pilots is not an easy task, and to train instructors to teach flying training is a more specialised affair.
Such training requires a high degree of professionalism; this photo feature recalls the growth and calibre of training at the school in Tambaram.



3 Chetaks flying in unison

Flying Instructors' School (FIS), Tambaram near Chennai is one of the premier training institutions of the Indian Air Force (IAF), performing the vital role of training flying instructors. At the time of Independence in 1947, India had only two institutes for flying training within the IAF, namely the Elementary Flying School at Jodhpur and the Advanced Flying Training School at Ambala. Realising the need for specialised focus on developing teachers to impart flying training, FIS was established at Ambala on 01 April 1948 under the command of Flight Lieutenant LRD Blunt ('Screamy'). FIS relocated to Tambaram in 1954.



HT 2 Basic Trainer



Simulator at the Flying School

The motto inscribed on the adopted crest of FIS is "Vidya Danen Vardhate" which translates to "Knowledge when imparted multiplies". This phrase reflects the ethos prevalent at FIS. The unit crest depicts a torch with an open fist, signifying knowledge passed on by an instructor and a clenched fist holding the torch upright, depicting an under trainee receiving the knowledge. In recognition of the valuable service rendered by FIS, Dr. Shankar Dayal Sharma, the Hon'ble President of India presented colours to the institution on 26 Oct 1995.

At Ambala, FIS had Harvard and Tiger Moth aircraft. The indigenously built HT-2 trainer aircraft replaced the Tiger Moth in 1954, later the Hindustan Aeronautics Limited built HJT-16 replaced the Harvard aircraft in 1971. The process of older aircraft being replaced by newer aircraft continued, with HPT-32 (Deepak) replacing the HT-2 in 1989. After the phasing out of HPT-32, Kiran Mark-I and Kiran Mark-II aircraft were inducted into FIS. The state of art Pilatus PC-7 has joined the inventory in FIS in 2015. Meanwhile, the role of FIS had expanded in 2001 to include helicopter training on Chetak helicopters. Presently, FIS conducts training on Kiran Mark-I and Pilatus PC-7 aircraft, and Chetak helicopters.

The Qualified Flying Instructors' (QFI) course is conducted bi-annually, for 26 weeks each with about 55 to 65 trainees per course. The trainee pilots are well trained operational pilots of IAF, Indian Army (IA), Indian Navy (IN), Indian Coast Guard and friendly foreign countries. The trainee pilots are from the three streams of flying i.e. fighter, transport aircraft and helicopters. Since pilots are specially chosen for the course on merit, it is considered a major professional milestone in the service career of pilots. Besides honing and streamlining basic flying skills, the course focuses on the skill of instructing trainee pilots in the air. After the conversion training and simulator capsule, a trainee flies the aircraft from the Pupil's seat, and then graduates to the Instructor's seat.

Trainee students are introduced to the basic aspects of Airborne Instructor Training (AIT), more commonly referred to as Patter – 'Speaking as you Fly'. The trainee is also exposed to Fault Analysis, before moving on to subsequent phases of training which include close formation flying, low level navigation, instrument flying, night flying and advanced manoeuvres. In the final phase, the student is taught how to go about teaching a particular exercise to a rookie cadet trainee. The teaching skills of the 'instructor-to-be' come to the fore in this phase. The students training is not limited to flying subjects only, but they are introduced to ground subjects in the field of avionics, aeronautics, aviation psychology, leadership and modern developments in aviation. Many lectures related to these subjects are taken by the trainees themselves, under the guidance of



Examination in progress at FIS



The President Presenting Colours to the School in 1995

the Directing Staff (DS). The DS evaluates the trainee officers' ability, knowledge and confidence to take a lecture. One of the instructors aptly stated- 'We teach to teach'.

After passing out from FIS, young flying instructors are rated as Category C instructors, and become the source of knowledge and guidance to the novices learning to 'soar in the skies' at other flying training establishments of IAF. In due course of time and after instructional experience, they are upgraded to Category B and are able to guide operational pilots in squadrons. On completing 200 hours of instructional flying experience, the Category B QFIs become eligible for the Category A upgradation test. The Aircrew Examining Board awards this category after a series of stringent tests, both in flying as well as in aviation related ground subjects. Additionally, officers who display 'above average' performance during the QFI course at FIS are awarded DS grading. To be a DS at FIS, one has to have a Category A rating or a DS grading.

Like other training establishments of the IAF, FIS also contributes during conflict situations and a number of instructors are attached to operational squadrons during war. In the 1971 war, Squadron Leader KK Bakshi, Flight Lieutenant DC Nayyar and Flight Lieutenant RC Gosain were moved from FIS and attached to operational squadrons, where they were awarded Vir Chakra for bravery of a high order in the face of the enemy. Squadron Leader Ajay Ahuja who was martyred in the Kargil operations was a DS at FIS in 1997-98.

FIS has completed 73 glorious years of service to the nation. It is the runway that has lifted the professional caliber and flying skills of pilots of IAF, IA, IN, Coastguard and friendly foreign countries to qualitatively higher standards. An instructor at FIS remarked "We produce the best flying instructors in the world". The tremendous responsibilities entrusted to QFIs demand a high level of competence, professionalism, motivation and the right attitude and temperament. FIS provides the environment to mould operational pilots into skilled instructors. FIS, a Centre of Excellence for training indeed nurtures professional leadership of the IAF. We salute this premier institution!!



Pilatus PC 7 ready to takeoff

The Editor



(Photo credit delhidefencereview.com/2018/08/02)

Battlefield Missile Defence Test by DRDO

AIR DEFENCE COMMAND

Challenges Ahead

An integrated functional Air Defence Command has been proposed, and is being pursued on a fast track.
The AD set-up in India and the pros and cons of this proposal have been analysed by Air Marshal Anil Chopra.

After Bipin Rawat took over as the first Chief of Defence Staff (CDS) in January 2020, the General worked with a sense of purpose and seems to have hit the ground running. He proposed the creation of an integrated military command that will look after the Air Defence (AD) operations of India. It was not mere letting 'the cat among the pigeons', but the idea is being seriously driven forward and his staff have prepared the proposal to create such a command. Executive orders for setting up the AD Command were targeted to be issued by end of 2020, and in the next two years, the formation work would be put in place, with the AD Command being fully operational in 3-5 years. A three-star officer from the Indian Air Force (IAF) will head the proposed AD Command, it was stated. It would integrate all the relevant assets of three branches of the Indian Armed Forces under a single command authority. All-long range missiles as well as AD assets will come under it. The CDS stated that the three services were being brought on board. The matter has been debated in security think-tanks too. Many veterans and defence analysts have articulated their views through widely published articles. Clearly, there are many issues that need understanding and fixing before venturing into this complex domain.

Global Military Command Structures

Currently the United States has seven unified geographical combatant commands covering the entire planet and globe, including the Space Command. All these commands cover areas mostly outside USA. USA has four functional multi-service combatant commands, Cyber, Special Operations, Strategic, and Transportation. The commands are composed of units from different services, and are established to provide effective command and control in peace and war. In addition, U.S. Army has many single service commands too. US Navy has nine independent commands and seven active fleets. US Air Force (USAF) has nine Commands, mostly functional in nature. USAF comprises of nearly 5,000 manned and many unmanned aircraft. Aerospace Defence Command (earlier established as Air Defence Command in 1946) was created for continental air defence of the United States in 1968. The Command was deactivated in 1980, primarily due to large number of aircraft having multiple roles, and limited specialised assets. Air Combat Command under USAF is the primary force provider of air combat forces to America's war-fighting unified commands. As China grew its military assets significantly in last few years, its People's Liberation Army (PLA) was divided into five Theatre Commands in February 2016, covering only the Chinese mainland.

PLA Air Force (PLAAF) has 29 operational air divisions, with three regiments per Division and 3 Squadrons per regiment. Each Division has 7 to 9 Squadrons. Effectively PLAAF has nearly 200 squadrons. Despite such a large air force, China does not have an AD Command. The Russian Air Force structure was completely changed in 2009 to a command-air based structure from the previous structure of army-air division system, to make them independent from the army-support doctrine. Russian Air Force and the Russian Aerospace Defence Forces were merged in August 2015. The Russian Air Force now has the AD and Anti-Ballistic Missile Defence Forces Command, Space Forces Command, the Military Transport Aviation Command, and the Long-Range Aviation Command.

AD Assets of Indian Army

The Corps of Army Air Defence (AAD) is tasked with air defence of Indian Army's integral assets and certain designated Vulnerable Areas / Vulnerable Points (VAs/VPs), at heights below 5,000 feet. The corps was formed with autonomous status in 1994, after the bifurcation of the Corps of AD Artillery from the Army's Artillery Regiment. It has around 85,000 soldiers and 6,000 officers, and its own AAD College. The main AD assets of Indian Army include the Akash Surface to Air Missiles (SAM), 9K33 Osa (SA-8), 9K35 Strela-10 (SA-13), 9K22 Tunguska, 9K38 Igla, ZSU-23-4M 'Schilka', FIM-92 Stinger, among others. Indian Army also has many radars linked to its AD systems, which are further integrated by the project 'Akash Teer' for situational awareness.

AD Assets Indian Navy (IN)

The IN has a significant air arm with nearly 200 aircraft, some of which, like the upgraded MiG 29K can take on AD tasks. IN has one operational aircraft carrier. The second aircraft carrier, indigenous Vikrant is in advance stage of readiness and may induct in the next two years. The naval variant of Light Combat Aircraft Mark1 has already done deck landing and take-off trials. The IN is looking for additional 57 carrier based fighters. Most of its 235 ships have powerful radars, and have SAMs and guns for AD tasks. The ships have significant Electromagnetic Counter Measures (ECM) and Electromagnetic Counter Counter Measures (ECCM) to defend from airborne threats. IN's indigenous Trigun System helps enhance battle-space transparency with better network-centric warfare tools riding on high-speed data communication systems. It integrates data from civil and military vessels, submarines and aircraft and shares with all its platforms. Currently AD of some naval installations and assets at sea is the responsibility of the IN.



Akash Missiles Displayed on Republic Day 2007 (Photo credit airnews_abad)

AD Assets IAF

As per the Union War Book, IAF is directly responsible for the air defence of India. To achieve this IAF has multi-role air-superiority aircraft like the Rafale and Su-30 MKI; the upgraded Mirage 2000, upgraded MiG29, MiG 21 Bison, and the LCA, are also multi-role aircraft with very significant AD capability. Mirage 2000 also has an important electronic warfare role. All these aircraft will also be used for surface attacks. IAF has a variety of SAMs like the Pechora S-125, Osa-AK, indigenous Akash, SPYDER LLQRM system, and the shoulder fired Igla-M missiles. They provide air defence against adversary aircraft, helicopters, cruise missiles and UAVs. Defence Research and Development Organisation (DRDO) has entered in a joint venture with Israeli Aerospace Industries (IAI) to develop the Barak-8 SAM. IAF has two Embraer ERJ-145



S-400 Air Defence System (Photo credit shutterstock_109)

based indigenous DRDO AEW&C (Airborne Early Warning and Control) 'Netra' aircraft. It also has 3 EL/W-2090 Phalcon AEW&C incorporated on a Beriev A-50 platform and two more are expected. India is also going ahead with 'Project India', an in-house AWACS (Airborne Warning and Control System) program to develop and deliver 6 Phalcon class AWACS, based on DRDO work on the smaller AEW&C aircraft. IAF currently has two Aerostats giving nearly 400 km range coverage. All these will support both the air defence and strike roles. The Air Force Network (AFNET) is a robust secure digital information grid that is helping the IAF become a truly network-centric air force. Integrated Air Command and Control System (IACCS), an automated system for AD operations, links command and control centres with offensive aircraft, sensor platforms and ground missile batteries. It rides on the AFNET. Integration with civil radars and other networks provide an integrated 'Air Situation Picture', for intelligence analysis, and mission control.

Indian Ballistic Missile Defence and Anti-Satellite Programmes

India faces ballistic missile threat from Pakistan and China. India's Ballistic Missile Defence (BMD) programme is a multi-layered system to protect India from ballistic missile attacks. Currently it consists of land and sea-based interceptor missiles, the Prithvi Air Defence (PAD) missile for high altitude interception, and the Advanced Air Defence (AAD) missile for lower altitude interception. It can cover incoming missile launched from 5,000 km away. The system includes an overlapping network of early warning and tracking radars, as well as command and control posts. The PAD was tested in November 2006, followed by the AAD in December 2007. India became the fifth country to have successfully developed an anti-ballistic missile system, after USA, Russia, Israel and China. The system has undergone several tests but is yet to be officially commissioned. The first phase of BMD programme is now complete and DRDO and IAF are waiting for government's go-ahead to install the missile shield for the national capital region. Also the Anti-Satellite missile test (Mission Shakti) was successfully conducted in 2019.

S 400 and NASAMS – Formidable Systems

India and Russia signed a $ 5.43 billion deal for the supply of five S-400 regiments on 5 October 2018, ignoring America's "Countering America's Adversaries Through Sanctions Act (CAATSA)". The S-400 is expected to be inducted into IAF by end 2021. There are reports of some delays. S-400 anti-aircraft weapon system has an operational range of 385 km. It is among the most advanced AD systems available.

USA has approved the sale of an Integrated Air Defence Weapon System (IADWS) to India at an estimated cost of $1.9 billion. National Advanced Surface to Air Missile System (NASAMS) is a distributed and networked medium to long range air-defence system with the first surface-based application for the AIM-120 AMRAAM (Advanced Medium Range Air-to-Air Missile). The missile itself is named SLAMRAAM (Surface Launched AMRAAM). On offer is the NASAMS 2, which is an upgraded version of the NASAMS air-defence system and it has been operational since 2007. The proposed sale comes amidst the massive military modernisation and muscle flexing by China. India has reportedly requested for five AN/MPQ-64Fl Sentinel radar systems; 118 AMRAAM AIM-120C-7/C-8 missiles; three AMRAAM Guidance Sections; four AMRAAM Control Sections; and 134 Stinger FIM-92L missiles.

The overall responsibility of thwarting an enemy air invasion shall continue with IAF, while bringing the ground based AD resources under better synergy.

Air Space Management in India

Air Space Control is meant to regulate the use of the 'finite' air space by various military and civil users. From military operations point of view, the objective is to maximize the effectiveness of combat operations without adding undue restrictions and with minimal adverse impact on the capabilities of any component. During conflict, the air activity in the Tactical Battle Area is extremely dense. Both friendly and enemy aerial platforms and weapons are transiting. Ground based air defence weapons are on hot standby, and some operate from remote locations close to the forward edge of the battle area (FEBA). Airspace management in most countries is with the air force, and so it is with IAF in India.

Existing Indian Functional and Geographical Commands

Indian Army has six geographical and one functional command. Similarly IAF has five geographical and two functional commands. IN has two geographical and one functional command. India already has an example of integrated tri-service geographical Andaman and Nicobar Command (ANC), albeit with limited assets. The tri-service Strategic Forces Command (SFC) exercises control over India's nuclear triad. The main aim of this model was efficient equipment management, maintenance and training. While SFC has a totally stand-alone charter, the success of ANC is still being questioned.

Proposed AD Command

Till now each service has its individual air defence set-up and maintain their own AD resources to counter specific threat perceived by each, sometimes even having overlapping areas. The proposed AD Command is meant to integrate the AD assets of the Army, Air Force and Navy and jointly provide AD cover to the country. The overall responsibility of thwarting an enemy air invasion shall continue with IAF, while bringing the ground-based AD resources under better synergy. Integrating AD assets are meant to also assist in better airspace management giving maximum freedom to various ground and aerial weapons, yet avoiding 'fratricide' during war like conditions.
The AD Command will be a functional command.

The case is that, in the era of hybrid war, integration of all kinetic and non-kinetic tools is considered as an operational necessity. The entire military power needs to work in a coordinated manner. The armed forces need to relook at their structures for better synergy and integration. Tri-services AD Command is the first off the block. The key elements of AD are the ability to detect and identify the threat and thereafter to engage and destroy. The threat could be any adversary military flying system from a manned/unmanned aircraft to incoming missile. All the three services have weapon systems to tackle these threats. IAF's combat aircraft equipped with air-to-air missiles can engage the threat at the farthest distances. Once within the surface-to-air guided weapons (SAGW) range, the fighters may disengage, and missiles take-on. The close-in weapon systems could be short range AD missiles and anti-aircraft artillery guns. The assignment is done by the sector AD Commander. Peculiarities of operations of each service create distinct air defence needs. Currently the three services procure their own AD assets, some of which may have commonality, or even have interoperability issues with each other. Therefore an integrated approach would be operationally relevant. Integration of equipment, systems, training, maintenance, and reducing duplication could save resources and enhance operational efficacy.

Challenges and Opportunities

There are many challenges for the AD Command that need to be understood and factored. The concept of AD Command has been tried for many years by USAF, which has huge resources, but was rejected. Both Russia and China with large air assets have not created an AD Command because of the multirole aircraft and inefficient use of resources. In Indian context, the AD Command will cover the entire air space over the Indian landmass and territorial waters. All airspace users, military and civil, will need to coordinate their activities with the AD Command, a responsibility currently with the IAF, which also has most of the AD assets. The air assets, most of which are



Indra Radar (photo credit radartutorial.eu)

multirole, will still be with the IAF. Imagine distributing small fleets of multirole aircraft (36 Rafale). Mirage 2000 has AD, Strike and EW roles. Upgraded MiG 29 has significant ground attack capability. SU-30 MKI will be used for offensive sweep missions, yet is available for AD role too. The aircraft are likely to remain with IAF, but will be used dynamically on as required basis. It will lead to their suboptimal utilisation and also confusion for prioritisation. Integrating all the radars, ground based weapons systems, including the secure independent networks of each service would be the next challenge. Systems like the radars and IACCS are required not only for AD but also for offensive sweeps and strike missions. India has just a few AWACS, they are required for both offensive and defensive missions. Similarly the few Fighter Reconnaissance Aircraft will be required for all types of missions. Will the AD assets of the highly mobile Strike Corps, and AD of the Army formations in the mountainous border be part of the integrated AD Command? How will AD Command integrate with the mobile elements? Could this be counterproductive? AD of naval fleet at sea is very peculiar. There are layers of AD cover provided by various ships. Carrier based air operations also have their own peculiarities. Will the AD of naval assets at sea be with AD Command or with IN? Will the operational efficiency be enhanced after creating the AD command? In case that is compromised, the entire exercise will be futile. Just integrating all the ground based radars and leaving them with IAF could be a first logical step. Upto the Air Defence Identification Zone (ADIZ) the AD responsibility is with the IAF. Out at sea, the Navy looks after its AD. Small hand-held UAVs of the Indian Army flying below a certain height already have freedom to operate. So is the case of inter ship movement of helicopters and low flying helicopters of Indian Army in the TBA.

There is another proposal to later create geographical combined commands. China's 'Western Theatre Command' with which India shares its entire border covers a geographical area larger than India. Creating smaller theatres against such a massive integrated Chinese theatre may need greater deliberation. IAF is already down to 29 combat squadrons. The number may go down to 25. India is looking at a two front war. Giving fixed air assets to any geographical command would impact the great flexibility air power provides. If India was to remain a single theatre as is the case currently, then all air assets could remain as it is with the IAF. If multiple theatre commands were to come up then the scarce assets would have to be allotted to different commands. Adequacy of resources is a very serious issue. The situation is unlikely to change in the next decade or so.

Way Forward – Hasten Slowly

There is a famous saying "if it isn't broke, don't fix it". The CDS obviously has the charter and desire to quickly achieve integration of the armed forces. AD Command appears to be a test case. Proposed changes would inevitably have long term operational and financial effects. We need to hurry slowly and wisely. Such reforms must be incrementally evolved over next 4-5 years and not have deadlines of six months. India still has limited resources unlike USA and China. Even then they have treaded slowly, and not had an AD Command. Let us first concentrate and build on the tri-service Defence Space Agency, Special Forces Division, and Defence Cyber Agency. The idea of AD Command needs to be deliberated professionally at all levels for effective resource utilisation and to ensure enhanced operational efficiency.



Air Marshal Anil Chopra,
PVSM, AVSM, VM, VSM (Retd) has been a fighter pilot, test pilot, and has commanded a Mirage 2000 Squadron, two premier fighter airbases, and the Flight Test Centre, Aircraft and Systems Testing Establishment (ASTE) of the IAF. He retired as the Air Officer Personnel. He has been a member of the Armed Forces Tribunal, and member of the Executive Council of Jawaharlal Nehru University (JNU). A prolific writer and author, he is currently Director General Centre for Air Power Studies (CAPS).



Malabar Exercise 2020. (photo credit www.ians.in)

THE EAGLE AND THE ALBATROSS

Joint Maritime Airpower

Rear Admiral Sudarshan Shrikhande highlights that there has been good cooperation between the Navy and the Air Force in the maritime domain. This needs to be further enhanced and synergy in application of joint maritime and airpower would be necessary to counter China.

Strange as it may seem, naval aviation became the leading edge of military aviation in the United Kingdom just before the First World War and the Royal Flying Corps was born out of the Royal Naval Air Service. This snippet is interesting but not important. What is interesting is that aviation at sea succeeded right from World War I because it leveraged shore based aviation (the "Eagle") with afloat aircraft (the Albatross"). Naval aviation mainly consisted of "float" planes launched via short rail-track catapults from battleships and larger cruisers. These were mainly used for scouting. At the end of their sortie they ditched in water and were hoisted up, or flew ashore or were for one-time use only. While these were great innovations for their time, accidents were many and valuable lives were lost. Shore-based naval aviation was also important in the First World War. Zeppelins or balloon airships of the Imperial German Navy in fact, bombed Britain across the Channel. They had limited effect, but pointed to the potential for developing long-range bombing. Consequently, longer range bombers and maritime patrol aircraft including "flying boats" appeared several years later.



MiG-29K. (photo credit www.defensenews.com).

A History of Cooperation and Turf Tussles

There are enough historical examples of campaigns and ways in which the Albatross and Eagle cooperated for operational and tactical successes. Equally, there are illustrations of inadequate cooperation and, worse, inter-services rivalry in World War II and beyond. In the book, Dreadnought to Daring: 100 Years of Comment, Controversy and Debate in The Naval Review, naval historian and strategist, Eric Grove makes this keen comment: "Ironically, the Grand Fleet got its best air support after the creation of the Royal Air Force (RAF) rather than before it. (However), the stage was set for a major inter-service controversy that would run until 1939, when the Admiralty obtained full control of the Fleet Air Arm (FAA) of the RAF which had been set up as an uneasy compromise in 1924."

In India, contrary to wider beliefs, the Indian Navy (IN) and Indian Air Force (IAF) have operated generally in close cooperation since the inception of the Fleet Air Arm. This involved early assistance in training and maintenance. I may add a personal note here. The IN's first Air Engineer was my father's elder brother who was seconded and absorbed from the RIAF. Cooperation in flying training has, of course, continued for decades. In operations, my early memories after commissioning were of seeing IAF Dakotas and Canberras coming out to sea with towed aerial targets (the Sleeve and Rushton). We also flew for a sortie over the sea in (ex-Air India and ex-IAF) Super Constellations used for visual maritime reconnaissance. These had been transferred, very rightly, from the IAF to the Navy in the mid-1970s because maritime patrol was thought to be tactically and operationally more effective under naval command and control. This was a lesson from the 1971 war.

The 1971 War

Speaking about the war, a few points need to be made. Much more effort could have been put into Navy and Air Force operational and tactical cooperative planning and execution on both fronts. Second, it was the IAFs veritable command of the air (a very high degree of Favourable Air Situation) over East Pakistan, established very quickly that enabled the IN to operate with relative impunity. The light carrier INS Vikrant did not need her fighters for Combat Air Patrol (CAP) and used them for shore strikes along with Alizes (primarily meant for Anti Submarine Warfare). Third, naval pilots were regularly seconded to IAF squadrons for operational and tactical skills and developing some aspects of "air-mindedness". Here's one more angle, much more than the trivia of war. In the 1971 war, a navy fighter pilot, Lt Arun Prakash, seconded to No 20 Squadron IAF, was cited by and received the Vir Chakra for gallantry. He rose to be the Chief of Naval Staff from 2005 to 2007; he had commanded National Defence Academy in the late 1990s and was the first CINC of the Joint Andaman and Nicobar Command in 2002.

Turf Wars?

Some differences are dictated by perceptions of budget squeezes by the other service, short-sightedness and personality differences at senior levels. At times, an individual service exaggerated the capabilities of a particular platform and weapons while playing down limitations and vulnerabilities which the other service then harped on. Ironically, the transfer of IAF Super- Constellations to the IN took place due to the camaraderie and good-sense of a few seniors and Service Chiefs of the early and mid 1970s (source: Vice Admiral Hiranandani's Official History of the IN). It was not without hiccups, but it did

happen. Inter-service cooperation can rarely be trouble free, smooth or in adequate measure. However; incremental steps, common- sense and an ability to put national interest before one's own Service-bias has enabled us to move forward. A notable dissonance still persists relating to aircraft carriers and the IAF has led a fairly intense anti-aircraft carrier campaign in the last few decades.

Taking Wings to the Future

We are now past the one-year mark since the appointment of a Chief of Defence Staff (CDS) and the Department of Military Affairs (DMA). What should the IAF and the IN do together to enhance maritime airpower within the Indian Ocean Region (IOR)? Sandeep Unnithan of India Today (Dec 7, 2020) quoted me suggesting that Indian seapower today will not have the luxury fighting the PLA Navy alone. It will also be fighting the combined elements of the PLA's military power, from airpower to long range ballistic and cruise missiles, a range of expeditionary capabilities, cyber warfare and space-based assets. Our responses… ought to be joint."

Five Dimensions into a Fist

The five dimensions of warfare are land, air, sea, cyber and space. They are dimensions because they have a geography, a physicality in which instruments are fielded and wielded. Even cyber-space has geography especially in terms of cables, stations, nodes, satellites, and of course several likely effects of cyber operations. The dimensions are relevant depending on their instrumentality and criticality in terms of time, space and force at strategic, operational and tactical levels of warfare. Overall though, they need to come together to achieve quicker and more complete desired end-states of military aims and finally, the political objectives set for achievement or for denying the enemy his appreciated set of objectives.



VT-DJX 'Rani of Madurai' BG 579 Super Constellation Aircraft. (photo credit ramrao.com/aircraft/connie).

In India's case, the advantages of mutual support and offensive and defensive fighting power that the IAF and IN can bring together are evident. It is not only the IAF's airpower that is shore-based; it is also a major component of the Navy's Intelligence Surveillance and Reconnaissance (ISR), maritime patrol, anti-submarine warfare and strike power. The fact is that the Navy's shore-based aviation's sensor and weapon reach and persistence is growing steadily. Within this, UAVs would play increasingly central and varied roles in the coming decade. Manned fighters might gradually recede due to relative increase in vulnerability to Unmanned Combat Aerial Vehicles (UCAVs) and very long range anti-aircraft missiles.

In essence, naval missions are about achieving enablers like sea control, its concomitant mission for sea denial and then power projection and strikes as required. This is very similar to IAF requirements of favourable air situation, counter force operations, Counter Air Operations, etc. Intense training, war-gaming and exercising are the ways in which IAF and IN assets can combine to significantly enhance our fighting punch. Much is happening along these lines already.

What are the Chinese doing about their five fingers?

The American term A2AD ie Anti-Access, Area- Denial is just complex jargon for the simpler idea of Sea Control (includes sea denial) backed by the other four dimensions, air, land, space and cyber. Any nation that needs to use the sea for trade, security, military operations and even fishing in time of conflict would need to have different degrees of sea control in time and space. Sea denial is sufficient by itself when one nation finds it adequate to deny the enemy use of certain sea areas in specific periods while itself not needing to use the same seas. In the Western Pacific littoral of China, especially up to the first island and even up to the second island chain, its multi-dimensional instruments enable China to have a high degree of potential sea control if conflict were to break out.

Much of the effective strength of the PLA Navy at sea lies in its surface ships, submarines, integral aviation and expeditionary capabilities operating with considerable density in the South and East China Seas. Other dimensions would also be critical while their inter-sé utility may be contextual, sequential or simultaneous.

Second, shore based airpower belonging to PLA Naval Aviation



Indian Aircraft Carriers INS Viraat and INS VIkramaditya together – a rare event. (photo credit creative commons wikimedia.org)

as well as the PLA Air Force is considerable. Both have considerable numbers, range, air to air refueling, AWACS, long range cruise missiles and other Precision Guided Missiles and possibly even air-launched anti-ship ballistic missiles (ASBM).

Third, the PLA is developing a variety of cruise missiles from a few hundred to about 1500 kms range. They are transportable, can be concealed along the coast or fire from deep inland. In the maritime geography of the two island chains, the PLAs Medium Range Ballistic Missiles can hit both ground targets and surface ships depending on the type of missile. The Type 21D and 26B (ASBM), are estimated to be targetable up to 1800 and 4000 km. That these are called "carrier killers" is a dramatic expression but they could target any large sized-ship.

Fourth, the cyber dimension could be standalone initially and a great lever when used offensively in any dimension including against an enemy's seapower. It could be a constant, unseen, but not unfelt presence in peace as well, as in conflict. Fifth, the space dimension will play a greater role in ISR, targeting, weapon guidance and much, much more in the mid and long term.

Counter-balancing

The IN has clearer advantages in the Indian Ocean Region in the near term. This margin may be diminishing due to Chinese multi-dimensional sea presence in increasingly greater areas of the Indian Ocean. China is as much a maritime neighbor and adversary as it is a continental one. Its access to bases, and above all its relationship with Pakistan creates options for itself and for Pakistan while increasing challenges for India.

Broadly India's counter-balancing "play book" would principally be building joint, multi-dimensional seapower across the Indo-Pacific. We need not be apologetic about imitation. Go joint, pool in resources, use island territories for offence and defence. In fact, the peninsular orientation of India and the islands in the Bay of Bengal are as much an asset for maritime as for aerial geography. The more joint air and seapower become, the more difficult and disjointed might an adversary's responses be.

Add to this shore-based missile power of increasing range, precision, numbers and survivability. The ability to deliver ordnance on target along increasing arcs and ranges gives seapower muscle that originates on land but impacts on sea. Add both air and sea expeditionary capability and we account for three older dimensions of warfare anyway!

Finally, expanding jointness could include friends. It may not quite be Soviet friends as was in 1971, but it could be the Quad, some ASEAN countries, IOR island nations that rally to us due to our democracy, values of rule of law, respect for rules based orders and the willingness to use force for the larger good as we did in 1971, in Maldives, in Sri Lanka and in some other instances decades past in the IOR. That counts for something and a totalitarian China simply does not and cannot provide anything similar.

Therefore, let the Eagle and the Albatross fly and fight together as never before.

(Note: Part of this article is derived from a talk given during the Annual Air Chief Marshal Subroto Mukherjee Seminar of the CAPS, New Delhi on 17 Dec 2020.)



Rear Admiral Sudarshan Y Shrikhande, AVSM, (Retd) was commissioned in July 1980. During his illustrious service, he commanded IN ships Nishank, Kora and Khukri and served at sea for several years. He is a post- graduate (with distinction) of the Soviet Naval War College (1988), DSSC Wellington (Scudder Medal), Naval War College and of the US NWC with highest distinction (2003) winning the Levy, Bateman and Forrestal Prizes. He is a strategic analyst of repute and post retirement is involved in teaching strategy formulation, operational art, force structuring, RMA, China, the Indo-Pacific, the Peloponnesian War, leadership and ethics in several military as well as civilian institutions. He is associated with the National Maritime, Vivekananda International and Observer Research Foundations as well as FINS. He has participated in Track 1.5 dialogue with China and the US and in a US State Department Indo-Pacific Dialogue and Simulations Conference in Sydney as well as at other national and international conferences. He is also studying for a Ph.D in sea-based nuclear deterrence.



Ready to Strike – an armed Mirage 2000 (photo credit en.wikipedia.org/wiki/Dassault_Mirage_2000).

THE MUNTHO DHALO AIRSTRIKE

A Telling Blow

Precision bombing of small bunkers and tented camps on the rugged Himalayan Mountains during the Kargil conflict required phenomenal visual acuity combined with technical imagery interpretation. The Air Warriors achieved this synergy; they worked with tremendous enthusiasm and *josh* to break the enemy morale. Read on!

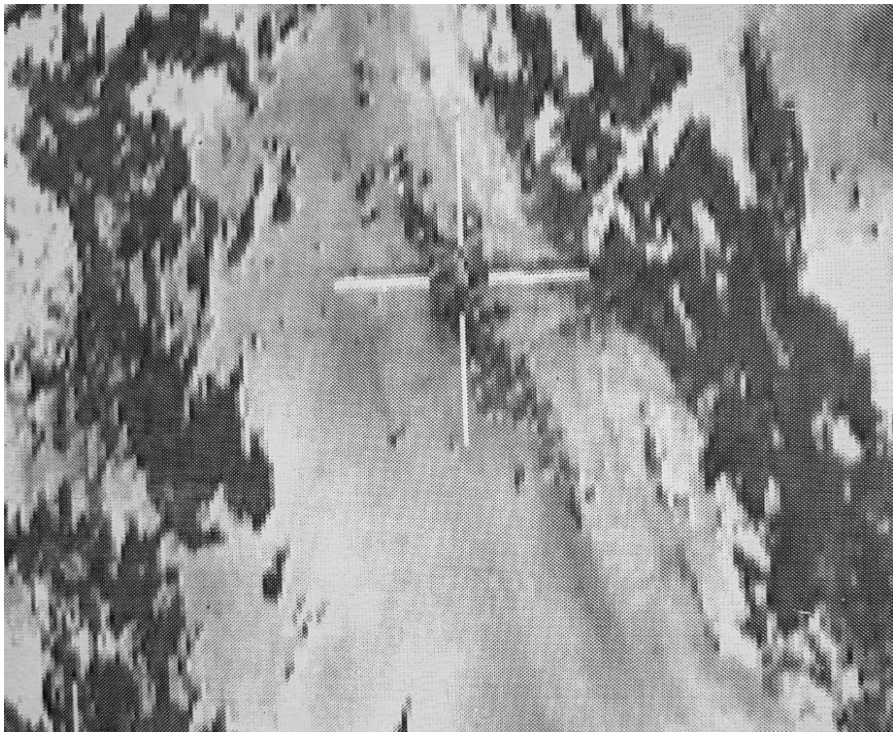
It was time for the periodic command air exercise and 7 Squadron, "The Battle Axes" were tasked to operate a detachment of Mirage 2000 aircraft at Bareilly in May 99. The Mirage-2000 was the most versatile multi-role fighter aircraft in the inventory of the Indian Air Force (IAF) at that time. With its suite of armament and avionics, it was equally adept at aerial combat as well as precision bombing of targets on the ground. It also had an impressive Electronic Warfare suite, all of which made it a formidable combat platform. A point of interest is that the Balakot strike on 26th February 2019 was also carried out on the Mirage-2000 aircraft.

During the short, hectic and interesting exercise, the Air Officer Commanding – in - Chief (AOC-in-C), Central Air Command dropped in and gave valuable tips on attacks on targets in mountainous terrain. Little did we realise how prophetic these tips were. He also mentioned that 'intruders had occupied some Indian posts in the Kargil Area'. We initially took it as one of those small scale skirmishes that took place from time to time in the Kashmir valley. But as Flight Commander, I was privy to the fact that some MiG-23, MiG-27 and MiG-29 squadrons of Western Air Command (WAC) were already deployed to the valley.

Back at Gwalior, I was busy writing the Exercise report one afternoon, when I heard a vehicle screech to a halt in front of my office. It was the Air Officer Commanding (AOC), Air Force Station Gwalior. "Get the Commanding Officer to your office", he called out, as he strode into the Flight Commander's office, the hub of all operational activity of a squadron. As per information available, he told us that "a handful of Pakistani intruders have taken over the Kargil heights". The task for the Battle Axes "may be a 2 to 4 aircraft detachment from our operational location in Punjab, to do 'something' to them". In the next 10 days, with more detailed and accurate information coming from the Army, these 'few intruders' increased to '40-50'; then to '100-150' and then to 'thousands' and the situation became quite clear. It was not a 'skirmish' in the valley but a full-fledged plan by the Pakistan Army; they had moved well inside the Line of Control (LC) into our territory, and occupied our border posts stretching out 60-80 kilometres on either side of Kargil. The task for the Indian Armed Forces was to evict them from our territory.

The squadron went through long days and sleepless nights pondering over the peculiar task ahead of us. The Mirage 2000 was designed and tasked to destroy high value targets with pin point accuracy with Laser Guided Bombs (LGBs), or specialist weapons such as BAP 100s for runway penetration and BL-755 Beluga cluster munitions for armoured vehicles. But infiltrators? How do you take out individuals on the ground from a jet flying high above at high speeds? The designers of the Mirage-2000 would have been equally stymied, for ways to target these unconventional targets. We tried out all possible weapon configurations available in our technical manuals. The aircraft also went through several changes in weapon configuration, trying to keep pace with the reported number of infiltrators, which kept increasing dramatically over those 10-12 days.

On 26 May 1999, the IAF was placed on high alert. We learnt that we lost two fighter aircraft in the valley – a MiG 27 due to engine malfunction and a MiG-21 due to an enemy Surface to Air Missile (SAM). The pilots, Squadron Leader Nachiketa and Squadron Leader Ajay Ahuja had been taken captive by the enemy. To us, this signalled that the war had begun! On 27 May, we took 10 aircraft to our operational location in Punjab. We were now in WAC Area of Operations, which was the primary Command to fight this war. There was a sense of sombreness at the base; one of the two fighters was from a locally based squadron. In addition to the two fighters, a Canberra on a Fighter Reconnaissance (FR) mission had taken a hit, but recovered safely on one engine. In subsequent days, a Mi-17 was lost to enemy SAMs. The threat of shoulder fired SAMs therefore was present and real. This was no training exercise; this was war, the scope of which was NOT very well defined, or should I say, not easy to define. It promised to be a very unconventional war!



Aiming Cross of No.1 Mirage on the Muntho Dhalo Logistics Camp.

The loss of aircraft in the initial days, though a setback, also gave Air Warriors a resolve to hit back and hit hard at the enemy which, by now, was clear were mostly Pakistan army regulars, not mujahid infiltrators. The Indian Army had been mobilized but was not making much headway, because the enemy was sitting on dominating heights – gallingly, our very own peaks! The army had to win back those heights in order to evict the intruders from Indian territory; the IAF was required to assist the Army in achieving the National goal.

We started our build-up at our operational location. Mirage specific armament and equipment started arriving, to be stored in appropriately reinforced structures. Aircrew training and fine-tuning of aircraft was undertaken on a war footing. Mirage-qualified pilots, who were posted to Flying Training Establishments (FTEs) as Instructors, arrived to augment the squadron and had to be retrained. A reconnaissance (recce) of the operations area was organised, for the aircrew to get a better idea of the lay of the land.

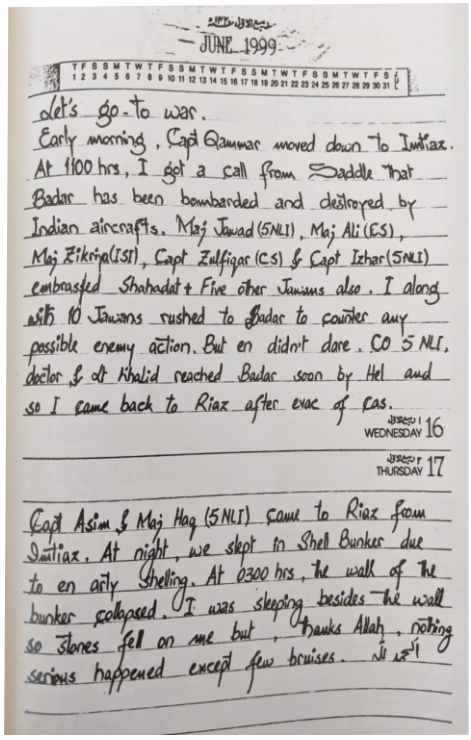
There was a dilemma in the minds of the Mission Planners of WAC. "Mirage does not use any conventional



Mirage 2000 in mountains.



Mirage 2000 dropping bombs in Kargil. (photo credit defenceupdate.in)



JUNE 1999

Let's go to war.

Early morning, Capt Qamar moved down to Imtiaz. At 1100 hrs, I got a call from Saddle that Badar has been bombarded and destroyed by Indian aircrafts. Maj Jawad (5NLI), Maj Ali (ES), Maj Zikria (ISI), Capt Zulfiqar (CS) & Capt Izhar (5NLI) embraced Shahadat + Five other Jawans also. I along with 10 Jawans rushed to Badar to counter any possible enemy action. But en didn't dare. CO 5 NLI, doctor & Lt Khalid reached Badar soon by Hel and so I came back to Riaz after evac of cas.

WEDNESDAY 16

THURSDAY 17

Capt Asim & Maj Haq (5NLI) came to Riaz from Imtiaz. At night, we slept in Shell Bunker due to en arty Shelling. At 0300 hrs, the wall of the bunker collapsed. I was sleeping besides the wall so stones fell on me but, thanks Allah, nothing serious happened except few bruises.

From the Diary of Lt MU Sumbal, 8 NLI.

weapons; what weapons would they use?"; "Could LGBs be used against intruders?" The answer seemed to rest in the 250 Kg conventional bomb which had been successfully showcased by the Mirage-2000 during the Fire Power Demonstration (FPD) conducted at Jaisalmer in March 1999. We gave several briefings to AOC-in-C, WAC and his operational staff, on the performance and accuracy of the 250 Kg bomb. The diktat from WAC was clear – "first prove these weapons by dropping them from altitudes in excess of 25,000 feet". Once cleared for operations, Mirage-2000 will not descend below 30,000 feet over Operations Area, to remain above the envelope of the SAMs, which were reportedly deployed on the mountain peaks, at 15,000 to 18,000 feet elevation. I was off to Jodhpur with my Deputy Flight Commander, to prove the 250kg bombs over Pokhran range from an altitude of 30,000 ft. The results were excellent – two Direct Hits (Bulls Eye) and the other two also very close to the target!

We were cleared for missions in the Operations Area and were now operating mainly in the Mushkoh valley, Tiger Hill, Tololing and Muntho Dhalo area. The Litening targeting pod acquired recently from Israel, was a valuable addition, since it was capable of bringing back useful imagery from the target area; moreover, the imagery could be viewed on a normal television set. But because of the snow and camouflaging techniques of the enemy, the targets were not clearly visible. Also, the enemy was dug in on the reverse side of the ridges which our forces could not see. The photos did suggest gun positions and the odd helipad but we just could not spot them with our eyes. That meant, we did not have a target to point our aiming index, and hence no targeting! We could not launch a single LGB in our Search and Strike missions, because we could pick up no targets to strike.

Our squadron resorted to 'level bombing' with 250 kg bombs on the 06th, 07th and 12th June but to not much effect, because accurate target coordinates are essential for such a mode of bombing, and the coordinates given by the Army were on approximation. The MiG fleet, meanwhile, was carrying out level mode bombing from similar altitudes, and to similar effect.

On 15th June, I was tasked to carry out recce of the Muntho Dhalo area (in the Batalik Sector east of Kargil airfield by about 20 kms). I took off in a twin-seater with a youngster and did the recce with the Litening LDP. A routine stalemate of a mission, I expected. We saw nothing from the air. I landed, handed over the 8 mm cassette to the bunch of youngsters, telling them to see if they could find something, and went on to the cafeteria for my supposedly 'Eggs to Order' breakfast. No joy again, I thought to myself. Stalemate in the air and stalemate (eggs) in the cafeteria! Just as I seated myself, one of the youngsters came running to me. "Sir, we found something!". Forget the ruddy eggs! I sprinted to the operations room and sat down in front of the 29 inch TV, praying that the doctor's assessment of my eye sight a perfect 6/6 was justified.

Over the next one hour, we played and replayed the 8 mm cassette. Yes, there was something! But just a mere 3 second 'blink and miss' fleeting glance of a 'camp like' area with some tents and track marks leading to nowhere. Hold it guys! The camp could be anywhere in that scan area of 10 km and since it was a blind pick by the LDP and NOT visually with our eyes, it was impossible to pinpoint on the map. Therefore we were still groping in the dark! Was it an Indian camp or an enemy camp? Anyway it was some achievement, and we showed the film to the AOC of the base who in turn informed HQ WAC. We could sense the instant excitement at Command, when the Air-I, WAC (an Air Commodore in charge of Operations) said, "Mo, come to HQ WAC immediately with the film; a Dornier is airborne and enroute to you". So there I was, being received at Palam airfield by the Air-I himself. Enroute to the WAC Operations room, he told me that the AOC-in-C wanted to see the film straightaway. I was still setting up the connectors and cords of the Handycam and the TV, when the

AOC-in-C arrived. He saw the film and saw it again, very intently. At the end of it, he said, "That is a good target". Excited, he further ordered us "take it within one hour of first light tomorrow". He wanted the camp to be 'annihilated'.

I had to convince the AOC-in-C that the target picked up was not physically seen by me and by my co-pilot and that we needed one more recce sortie around the Muntho Dhalo area in the early morning hours to pick it up with our naked eyes. We would also have to work out an attack plan keeping in view our own army deployment around that target area to avoid fratricide. We were time-sharing the Operations Area with other squadrons. Allowed a 30 minutes block in the morning of 16th June, we selected a time slot of 0730 to 0800 hours, which would ensure no ridge shadowing due to low sun angle. But it was imperative that we cleared off by 0800 hours as the MiG-27 fighters would be operating in the same area from 0800 hours onwards.

Two Mirage-2000 twin-seaters were soon airborne for the recce, which was the Phase I of the operation. We searched the Operations Area incessantly but in vain. I remembered WAC's diktat to "clear off by 0800 hours". It was already 0758 hours. Only 2 minutes left and we hadn't found the target yet. Just then, my co-pilot spotted 'something' and announced on R/T. Following his call, was one of the most vigorous scans by four pairs of eyes; in the next couple of minutes, all of us had picked up the target visually! We took the liberty of hanging on for another five minutes to work out the attack pattern for a four aircraft strike; the four aircraft which were armed and ready and waiting for us on the ground. We returned at high Mach numbers (.95 Mach), to get back to base at the earliest. A quick cup of tea, and we were taxying out for Phase II of the operation.

We were soon airborne and flying at 35,000 feet like any other mission we had flown till then. Only this time, it was a mission with a difference. This was no Search and Strike; this was a pure STRIKE mission to annihilate the enemy camp. We had a fifth aircraft with us, configured with the LDP to carry out Battle Damage Assessment (BDA), a critical component of air operations to confirm the effectiveness of the strike. We routed via 'Nun Kun' peaks, carried out an update of the Inertial Navigation Unit over Kargil airfield, and then settled down on the bombing run, about 070 degrees to Muntho Dhalo. There was no hiding for the enemy this time! We were like hungry hawks hunting for a prey. A confident call from me, "One Contact, Rolling In" followed by number two, three and four. Within a space of 60 seconds, we had pumped in 24 bombs on the target. The Battle Damage Assessment by the fifth aircraft, which filmed the target 'Before' and 'After' summed it all up. The camp was blown to smithereens. We had finally drawn blood.

Within half an hour of our landing, the AOC-in-C WAC was in our crew room. He was happy, proud and excited. "Good show Battle Axes! You are Heroes. Give me the film and the name of formation members. This event is worth mentioning in the Parliament and national news headlines". The stalemate had ended. The IAF had begun hitting them where it hurt.

The diary entry of 16 June 1999 of Lt Muhammad Ullah Khan Sumbal of 8 Northern Light Infantry of Pakistan, recovered from Point 4812 in Batalik Sector, makes interesting reading. He writes, "At 1100 hours, I got a call from 'Saddle' that 'Badar' (code name for Manto Dhalo) has been bombarded and destroyed by Indian Aircrafts. Major Jawad (5NLI), Major Ali (CS), Major Zikriya (ISI), Captain Zulfiqar (CS) & Captain Izhar (5 NLI) embraced shahadat and five other jawans also".

Muntho Dhalo was a major logistics node North of Leh, which stocked food, ammunition, medicines and other supplies for further distribution to the forward posts. Destruction of this supply node had a significant impact on the enemy, and their ability to conduct sustained operations in the sector. The successful attack on Muntho Dhalo had indeed rendered a telling blow to the enemy.

> "There was no hiding for the enemy this time! We were like hungry hawks hunting for a prey. A confident call from me, "One Contact, Rolling In" followed by number two, three and four".



Air Vice Marshal Mohan Rao,
VM, VSM (Retd) of 63th NDA Course was commissioned in the fighter stream in December 1983. He has flown 3400 hours in his career comprising MiG-21, Mirage 2000, Su 30 and trainer aircraft. He has over 1000 hours flying experience on Mirage 2000. He was awarded the Vayusena Medal for gallantry in 1999 during the Kargil War while functioning as the flight commander in 7 Squadron. He commanded two vital flying bases in SWAC and EAC and held key appointments in SWAC and WAC. The air officer has also served as Defence Attache in Italy.



A C119 Fairchild Packet of the IAF (photo credit wikimedia.org Creative commons Attribution 3.0 Unported).

MID-FLIGHT HEROISM

A nose wheel landing gear malfunction, the Flight Engineer undertakes an extremely risky in-flight rectification. The Indian Air Warriors have rarely shied away from taking risks. An exciting description. Worth reading!

Late that November evening in 1982, Air Commodore KK Badhwar, the Air Officer Commanding (AOC), Air Force Station Kheria (Agra), was the most tensed commander of the Indian Air Force (IAF). A "May Day" call from a C-119 Fairchild Packet aircraft of 12 Squadron Air Force, airborne for a routine training flight, had sent the AOC rushing to the Air Traffic Control (ATC) tower. "There's an emergency… Packet aircraft, call sign IK-461… problem with the nose landing gear… orbiting overhead… will approach for landing in about an hour," he had been informed briefly by the ATC.

The ATC tower was abuzz; preparing to deal with the worst. The crash crew had been alerted; crash tenders and the ambulances were ready, awaiting further orders. Routine take-offs and landings of aircraft had been stopped altogether; all aircraft had been advised to clear the airspace and the runway; everyone concerned had been notified. Once in the control tower, the AOC spoke on radio telephony (RT) to Squadron Leader CK Jolly, the Captain of the aircraft, to gauge the gravity of the situation.

A little while earlier, Call Sign IK-461 had approached Agra airfield for landing. On lowering the landing gear, the Captain had observed

that the nose landing gear warning light had remained 'red', while the other two turned 'green', indicating that the nose landing gear had remained in the 'up' position. Emergency measures to lower the nose wheel as per the Standard Operating Procedure (SOP) had been in vain—either the warning light indication in the cockpit was faulty, or, more likely, the landing gear was actually malfunctioning. In the latter case, it was a serious situation, with potentially grave consequences for the aircraft and the seven member crew. A few more checks confirmed their worst fears - it was a positive warning; the nose landing gear was indeed malfunctioning.

C-119 Fairchild Packet was a one-of-its-kind flying machine. In appearance, she was quite un-aircraft-like; its cargo-hauling ability and unusual twin-boom design earned it the nickname "Flying Boxcar". The aircraft saw extensive action during the Korean War as a troop and equipment transport aircraft for American forces. The IAF operated a fleet of almost 80 Packet aircraft. Some aircraft of the IAF were fitted with a turbojet on top, for additional power under "hot and high" flight conditions, which came in very handy when operating from high altitude airfields like Leh. The aircraft participated in the Sino-Indian War of 1962 as a troop transporter and for cargo. Having served so well for long years, the ageing machine demanded careful maintenance to remain airworthy.

In the ATC, the AOC listened intently to the RT conversation between the Controller and the Captain. Even in the extremely charged environment, he was composed, quietly observant, and non-interfering. An experienced Canberra Bomber pilot and war hero (a Vir Chakra awardee of the 1971 Indo-Pak War), Air Commodore Badhwar had seen many stressful situations! He knew the boys under his command well. They were a professional lot, who didn't need hand-holding or nudging. Leadership!



A Flying Boxcar over the plains of India. (photo credit reddit.com)

Up there, in the aircraft..

The Captain had consulted the other crew members and the professionals who had gathered in the ATC tower. There appeared no option available, other than landing the aircraft with the nose landing gear locked up. It meant a very high probability of extensive damage to the aircraft, the engines and possibility of a fire. There was a possibility of the aircraft cartwheeling due to one of the wings hitting the ground and ending up in a mangled mass of metal. Threat to the lives of the crew on board IK -461, was almost certain, only the degree could vary. The only way to mitigate the damage was to land with almost empty fuel tanks, to minimise the chances of fire and the intensity of the blaze. The Captain took an informed decision to land the crippled aircraft. And, it was a unanimous decision.

Well, A-L-M-O-S-T!

Amongst the crew was a young Flight Engineer whose mind was flying out and ahead of the Boxcar. Flight Lieutenant Sumer Chand Gaur, "SC" to his friends, was an engineer instructor on the Packet; SC knew the aircraft systems like the back of his hand. He was somehow not convinced about the decision to attempt landing the aircraft in that condition. He didn't accept what others saw as a fait accompli.

SC Gaur reasoned with the Captain that the nose undercarriage was not lowering due to an internal obstruction. He opined that it was possible to remove the jack from its attachments in the nose undercarriage bay and free the landing gear to come down fully. A Qualified Flying Instructor himself, the Captain understood the technicality very well, but wavered on the decision to attempt in-flight rectification. The solution was fraught with great risk and as Captain, he was not ready to expose his Flight Engineer to that danger. The Captain's dilemma was whether he should put Gaur's life to risk in the hope that seven lives might be saved or, disallow Gaur to attempt rectification and endanger all seven lives in the attempt at landing.

After reviewing his very limited options, he gave in to the enthusiasm of



Packet aircraft – a workhorse of the past.

his Flight Engineer. He told him to discuss the plan with the experts in the ATC tower to get their opinion. The AOC and the others listened closely to Gaur on the radio set and grasped the technical viability of the solution suggested by him. But most of them thought he was volunteering for an extremely audacious action—almost impossible to execute—to solve the problem. It entailed almost hanging outside (below) the flying aircraft and working on the landing gear. Barnstorming!? A mistake while attempting it could send him hurtling 5,000 feet down, to mother earth.

All eyes were on the AOC.

Air Commodore Badhwar knew Flight Lieutenant SC Gaur as an energetic and enthusiastic young officer; a thorough professional and a go-getter at that. He took little time to decide and was unflinching when he gave a nod to his gutsy plan of action. That indeed marked the beginning of an ordeal which, to those involved in it, appeared to last an eternity.

Moments into the exercise, the protagonists realised that the problem was far more complex than visualised. For one, the gap created by removing the panels from the floor of the aircraft was very small for well-built Gaur to pass through. Secondly, the small, poorly lit wheel bay was crammed, with hardly any elbow room to undertake a complex technical task mid-air. Non-availability of proper tools on board necessitated resorting to the ubiquitous Indian Jugaad! Without wasting any time, Gaur got down to execute Mission Impossible. While one of the trainee Flight Engineers held his feet, he got himself lowered, head first, into the nose wheel bay.

Incidentally, it was November the 25th - a day after Gaur's 36th birthday. The winter cold had already set in at Agra, and a merciless December was less than a week away. At 7:45 p.m. outside the aircraft it was dark and freezing.

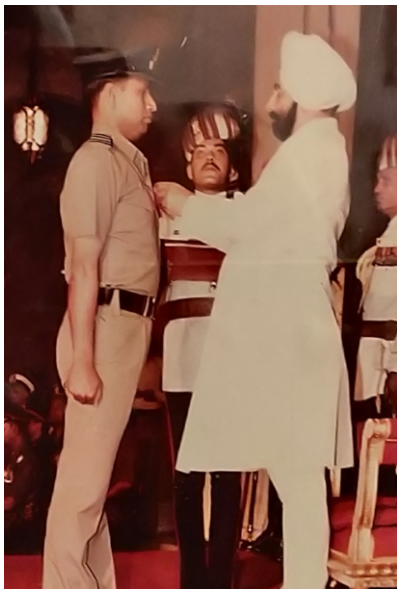
In the wheel bay..

At a hundred miles an hour, the cold pierced Gaur's face and numbed his nose, cheeks and ears. Within seconds, his eyes and nose started watering. Six to eight minutes was a very long time to work in that air blast. Gaur surveyed the landing gear and quickly withdrew into the cargo compartment for a breather. He had to thaw his frozen hands, clean up his face, which, thanks to the wind chill, was smeared with saliva and mucous.

The best in people comes to the fore when they are in crisis situations. It is as true about the grit and resilience of men in distress, as about their sense of humour. At a time when they were unsure of seeing another sunrise, Squadron Leader Narwal, the Navigator did not miss the opportunity to lighten the mood with wise cracks and jokes, even as Gaur prepared to enter the nose wheel bay a second time. Gaur crouched precariously in the bay, clinging on to a strong point with one hand, and working on the landing gear with the other. The blast of cold air was relentless. He resurfaced into the cargo compartment, to regain his breath and thaw. The process repeated several times. Over the next forty minutes or so, Gaur had been into the nose wheel bay five times. All this while the cockpit crew, and the AOC in the ATC tower listened, with bated breath, to the running commentary that was being broadcast by the Flight Signaller, Junior Warrant Officer Subbu who was keenly observing and relaying



Group Captain SC Gaur, SC, VSM



The officer being conferred the Shaurya Chakra by the President of India.

every piece of action. With great effort, Gaur was able to unlock the nut holding the landing gear actuator—the bolt however, remained stuck. It was imperative to dislodge it to set the landing gear free. His attempts to remove it were fruitless. He needed a hammer to complete the task. Meanwhile, breathing was becoming a strain; he felt exhausted. One of the crew brought a cylinder of breathing oxygen with a mask to revitalise him. Rejuvenated by a tonic of humour and a lungful of oxygen, he got down to pushing the bolt out of its casing. For want of a hammer, he struggled with a large spanner.

Viva! The adamant bolt finally slipped out. Without wasting another second, Gaur removed the actuator, freeing the landing gear to move into the fully down position. The nose wheel undercarriage warning light turned 'Green.' There was instant jubilation in the cockpit! In the last action, Gaur inserted the Ground Lock Pin into the undercarriage to prevent its accidental retraction; to make it doubly fail proof, he tied it with a lashing chain and jack. Gaur emerged from the nose wheel bay for the sixth and the last time, numb, utterly exhausted, but feeling triumphant. Down below in the control tower, there was a cautious sense of celebration. Everyone in the ATC had their fingers crossed as they waited for the aircraft to land. Squadron Leader Jolly made a perfect landing and switched off the engines. As he gingerly lowered the nose wheel on the runway, the nose wheel held firm, to the collective relief of all. Using minimum braking, he carefully brought the aircraft to a halt at the end of the long runway.

The AOC sped to the aircraft in his car, a convoy of vehicles following closely—crash tenders, fire tenders, ambulances and cranes. With arms wide open and a smile that conveyed everything, he congratulated the aircrew. After a warm hug, he offered his overcoat to Gaur who was still shivering. He learnt the details of the episode from Jolly and Gaur as he drove with them to the Flight Commander's office, where steaming cups of beverages awaited them. The spontaneous revelry that followed at the Commanding Officer's residence was loud and long, going on till the wee hours the next morning. After all, they had seven birthdays to celebrate that evening!!!

Flight Lieutenant SC Gaur was unquestionably the hero of the day! His sound professional knowledge, his self-confidence, the professional respect he commanded amongst his subordinates, peers and superiors, all contributed to making this mid-air feat possible. He dared to think differently and he willingly put himself in harm's way to execute his audacious plan, to meet with spectacular success! This was raw courage and pure heroism.

In recognition of his professionalism and exceptional valour under extremely perilous circumstances, Flight Lieutenant Sumer Chand Gaur was awarded the Shaurya Chakra by the Hon'ble President of India, Shri Giani Zail Singh.

Now a veteran, Group Captain SC Gaur, SC, VSM resides in Ghaziabad. When the ever-so-youthful and daring officer is not playing golf, he spends time motivating youth. The legacy must live; the baton must be passed on.



Group Captain Ashok K Chordia *(Retd) has been a Parachute Jump Instructor at the Paratroopers Training School, Agra and the Commandant at the Garud Regimental Centre, Chandinagar. He was a member of the Indian Contingent that landed at Hulule Airport to rescue President MA Gayuum (the Maldives, November 1988). He has authored a book titled, 'Operation Cactus: Anatomy of One of India's Most Daring Military Operations' (Knowledge World, New Delhi, 2017). He was the Episode Consultant for a Discovery Channel documentary on Operation Cactus based on his book. He posts articles on a variety of subjects on his blog 'Road Much Travelled' (https://www.akchordia.com).*





At MOFTU, Tezpur (photo credit Group Captain MJ Augustine Vinod).

GUARDIAN ANGELS IN THE SKIES

Most pilots have had a close shave while flying, and averted an aircrash narrowly. At times, it was a providence that they survived, perhaps a benign guardian angel helped. One such anecdote.....

Legends abound about angels and demons that inhabit some places, and so it is in the field of aviation too. Many old timers who have logged thousands of flying hours talk of a pilot's guardian angel keeping him or her alive when by all logic he / she should have perished. When I became an aviator in the mid-1980s, I heard such tales from my instructors and seniors. Soon I began to believe in these guardian angels that watch over foolhardy men and women who choose to spend several hours in the skies even though they have no feathers. During my years of active flying, I experienced several instances wherein logically there was no reason for me to have survived, a possible explanation for my living past each of these incidents may have been a benign guardian angel who pulled me through such incidents.

My Guardian Angel Introduces Itself

Year 1985, as a freshly commissioned Pilot Officer, complete with magnifying glass in pocket to allow the curious to actually see the thin rank tape on my shoulders I reached Tezpur where I was tasked to undergo MiG Operational Flying Training (MOFT) being conducted on the old MiG-21FL, or Type-77 (T-77). Progressing smoothly through the MOFT syllabus it was time to start the Air-to-Ground Phase of training. The Dulangh Mukh (DM) Air-to-Ground weapon training range (DM Range) was assigned for use of our MOFT aircraft.

After the mandatory physical ground reconnaissance of the range by our course of fresh pilots, it was time for the first range sortie or Dual Check (DC) in the front seat of the two-seater trainer, the MiG-21U or

I realised that the flying had not been as accurate as required and that catering for the inevitable drifting off the desired track caused by the prevailing winds had not been adequate.

Type-66(T-66) with an experienced instructor in the rear seat to carry out an aerial reconnaissance of DM Range and to be taught the correct range circuit pattern. Flying roughly East from Tezpur, at a prominent fork to the left (North) in the Brahmaputra River where a tributary joined it, the route to the range required us to turn left and then look along the western bank of the tributary river for a 'U' shaped clearing along the left bank of the tributary as the range was in this 'U' shaped clearing. Soon after take-off however extensive clouding was encountered and we were flying in clear air above thick broken sheets of clouds. My instructor informed me that we would now practice Dead Reckoning Navigation (DRNav) by flying accurately and timing out the travel on fixed courses. Noting our airborne time on the aircraft clock, we flew on the correct course at a fixed true speed and sure enough at the estimated time we found ourselves over the prominent Northwards fork in the Brahmaputra River. Now we proceeded to turn left to the map marked course from the bend to DM Range. As we flew roughly Northwards towards the range the clouding thickened and we were soon flying within clouds. My instructor took over the controls and in due course the time on the clock indicated that we had possibly arrived at the range, but we were still flying within clouds with ground not visible.



MOFTU Crest

The instructor now retained controls and elected to carry out a slow spiral descent to the right at a speed of about between 600 to 700 kilometres per hour (kmph) as we estimated our position to be over the 'U' shaped clear ground on the Western bank of the river in which the range lay. I was told to keep a sharp look out and to call out on the intercom when I visually acquired the range. Sitting at ease in the front seat with the instructor flying I continued peering into the thick white condensation outside.

My idle boredom of sitting while someone else flew was soon dispelled along with my breath and I shouted, "CLIFF LEFT!!" as I saw a veritable wall of Grey-Brown rock emerge from clouds just a few meters to the left, so close that blades of grass growing between the rocks were easily discernible. The instructor opened up full power and pulled the nose of the aircraft up into a steep climbing right turn till we broke clouds and uneventfully flew back to base and landed.

In the debriefing I realised that the flying had not been as accurate as required and that catering for the inevitable drifting off the desired track caused by the prevailing winds had not been adequate. The debrief ended with an earthy explanation of what the 'Dead' in DR Nav can very easily actually mean.

In this sortie, there is no logical reason why the T-66 flying at about 780kmph true air speed and experiencing variable winds was not just another five to ten meters to the left and impacted on the cliff instead of narrowly missing it except for a higher power working hard to keep us alive.After this incident as the narrowness with which I had missed becoming another Flight Safety statistic sunk in, I raised a glass in salute to my own Guardian Angel who had somehow kept watch over me. In the many years of flying since then I have always felt my Guardian Angel's benign breath on my neck. Hard science and the Principles of Flight apart there is certainly more than 'Modern Science' that keeps aviators safe in the skies.



Group Captain Vivek Kapur
(Retd) served in the IAF for 33 years and has extensive experience on MiG series of aircraft. His flying career ended in January 2004 due to a small medical issue involving a brain stroke. Since then he served on an operational post in Command HQ, as an instructor in College of Air Warfare, and as a Research Fellow in the think tanks Centre for Air Power Studies (CAPS) and Institute For Defence Studies and Analyses (IDSA). He earned a MBA from Delhi University's Faculty of Management Studies in 2009 and a PhD from JNU in 2016. After retirement in June 2018 he has settled down in Secunderabad.



Rockwell B-1 Heavy Bomber of the US Air Force doing a fly-by accompanied by LCA Tejas

RUNWAY TO A BILLION OPPORTUNITIES

Aero India Show 2021

Aero India Show 2021 was a major event in the defence and aerospace sector. Air Marshal Harpal Singh gives us a rundown.

"Defence Manufacturing is becoming vibrant in India. With holistic efforts, we are creating a strong ecosystem to ensure self- sufficiency in Defence Production" - Prime Minister Shri Narendra Modi

The thirteenth edition of the Aero India Exhibition and Air Show was held at Air Force Station, Yelahanka, Bengaluru from 03 - 05 February 2021. This year's event was also the Silver Jubilee of the Aero India Show, which started in the year 1996, and has steadily risen to become the largest and the most important air show of Asia. Due to the global pandemic, Aero India was a Business focused event.

This exhibition was important for giving impetus to indigenous manufacturing, and would have great significance in giving the required impetus to the 'Atma Nirbhar Abhiyan' and 'Make in India' initiatives. There were several unique features of Aero India 2021:-

- It was the first exhibition post the onset of the COVID pandemic.
- It was the first 'hybrid' exhibition, in which exhibitors were present physically as well as digitally, in the virtual medium.
- One of the major attractions of such an event is throwing open the exhibition to general public. This year, due to the pandemic, the event was limited to three days, leaving out the days traditionally kept for general public.
- There was limited participation in flying displays by foreign display teams and aircraft manufacturers. Consequently, there was a strong presence of flying displays by Indian Armed Forces and manufacturers, including a flypast of indigenously manufactured aircraft.

Aero India-2021 was inaugurated by the Hon'ble Raksha Mantri, Shri Rajnath Singh on 03 February 2021. In his inaugural address, the RM shared his vision and indicated that the decision to hold the Aero India Show was not easy due to the twin challenges of COVID-19 and the security challenge thrust on India on the Northern borders. He highlighted that India's calibrated response and the bravery of the soldiers on the border led to stabilization of the situation and the nation showed its resolve to defend its sovereignty and integrity. He hailed Aero India 2021 as an epochal event and said that this year would witness new initiatives of new India which have begun to change the prevailing status.

The inauguration was marked by the flypast of a Rockwell B-1 Lancer bomber aircraft of the U.S. Air Force, which had flown from Ellsworth Air Force Base in South Dakota, USA. A Light Combat Aircraft (LCA), the Tejas, joined up with the B-1B

on the outskirts of Bengaluru and flew in formation for the fly by. There were also air shows with the Surya Kiran and Sarang aerobatic teams performing aerobatics jointly. The Dassault Rafale also appeared for the first time in the colours of the Indian Air Force (IAF).

"Aatma Nirbhar" or self- reliance was the major theme of the exhibition. India is one of the largest importers of arms globally. With plans to spend billions in defence acquisitions over the next several years, and a civil aviation industry projected to reach the third largest in the world, India is perhaps the world's most competitive aerospace and defence market. Through the exhibition, the government wanted to showcase India as an attractive destination for investment in the defence manufacturing sector besides highlighting a series of initiatives it has taken to promote the domestic industry.

The Raksha Mantri (RM) reiterated India's intention to bring down defence imports by at least $ 2 billion by 2022 to encourage manufacturing of defence related items in the country. The Defence Ministry visualises that the boost to domestic manufacturing of defence equipment would not only fulfil the demands of the Armed Forces of the country, but would also make India a net exporter of defence equipment and platforms to friendly foreign countries. RM reiterated that 'self-reliance' does not mean isolation from the world or acting as a closed economy but we plan to promote globalisation by making India a more competitive player on the global field.

The defence ministry has set a goal of increasing the country's defence turnover from 11 billion USD to 25 billion USD (Rs 1.75 lakh crore) in defence manufacturing in the next five years that includes an export target of 5 billion USD (Rs 35,000 crore) worth of military hardware. Mentioning this target in his address, the RM highlighted the important role of the aerospace sector in reaching this target. He informed that defence exports grew from Rs 2000 crores to Rs 9000 crores from 2015-2020 with a vast majority spearheaded by the private sector.



Indoor Display at the Aero India Show.

Exhibitions

A total of 602 exhibitors from 14 countries put up their stalls at the Aero India, of which 524 were Indian Exhibitors and 78 were foreign exhibitors. A unique aspect of Aero India 2021 was the concept of Virtual Exhibitors. 338 exhibitors conducted business virtually.

The US Participation. Several leading aerospace companies have offered to set up manufacturing bases in India provided they get big-ticket contracts. US aerospace giant Lockheed Martin has said that it would not sell the newly rolled out F-21 fighter jet to any other country if India places an order for the 114 planes. Another aviation major, Boeing, too has announced that it is ready to set up manufacturing facilities for its F/A-18 Super Hornet aircraft if it bags the IAF contract. Many leading U.S. defence companies participated in Aero India 2021.

Russia and India : The Partnership at Aero India 2021. The defence facet of the relationship between India and Russia is evolving from the traditional 'buyer-seller' one to that of joint production and development, with emphasis on technology sharing. This is the first time that the Russian Government has allowed manufacturing of their Original Equipment Manufacturers (OEMs) spare parts in a foreign country, indicating the strength of India-Russia cooperation. 30 Memorandum of Understanding (MoU) have already been signed between Indian companies and Russian OEMs for manufacturing of spares in India. India-Russia Military Industrial Conference (MIC), a platform for interaction between Russian OEMs and Indian defence companies to identify possible areas of cooperation, held the 6th MIC on 03 February 2021 during Aero India-2021 at Bengaluru This initiative is envisaged to result in reduction in import of spare parts of Russian Origin Equipment being used by the Indian Armed Forces.



The Suryakiran jets and the Sarang helicopters in an integrated aerobatics aerial ballet

France – The Strongest Foreign Representation. The French Embassy in India stated, "France was the strongest foreign representation at Aero India, reaffirming the French industry's keen interest in this event, despite the adverse global public health situation. This also reflects the enduring commitment of French companies to contributing to developing India's aerospace and defence industry. Indeed, French companies invest, design and Make in India to produce aircraft and high-tech parts. Over 60 French defence and aerospace companies are present in India through industrial facilities and / or India representation offices. Their activities contribute to the strategic partnership that unites our two countries". Undoubtedly, a number of French companies were present at the Aero India Show either at the France Pavilion or were exhibiting directly. France's participation in Aero India 2021 came two weeks after France and India conducted joint air force exercises in Jodhpur, involving Rafale fighters of the French and Indian Air Force.

India Helisphere - Blades of Glory

India is one of the seven countries in the world with capability to produce and support helicopters throughout their life cycle. Aiming to depict the journey and the potential of our indigenous 'blades of glory' along with a glimpse of the roaring future of rotary wing systems in the country, India Pavilion @ Aero India 2021 was themed on 'Rotary Wing Platforms: Helicopters'.

The India Pavilion show cased over a hundred and fifty products / technologies. It depicted the journey of helicopters in India, and showcased India's design and manufacturing supply chain associated in various facets of the rotary wing eco-system. It also featured the existing infrastructure in Qualification and Certification capabilities along with the support infrastructure, Training, Testing and MRO (Defence and Civil) for the Rotary Wing platforms.

The RM unveiled the Light Utility Helicopter (LUH) - Military Variant, at the India Pavilion. LUH, a 3-ton class new generation single engine helicopter, is indigenously designed and developed by Hindustan Aeronautics Limited (HAL) for deployment in diverse operating conditions to replace the ageing fleet of Cheetah / Chetak helicopters. He also unveiled the Advanced Light Helicopter (ALH) – Civil version.

Indian Exhibitors at the Show

The Indian exhibitors included Public Sector Undertakings (PSUs) as well as private manufacturers, across the range of categories, viz., Micro, Small and Medium Enterprises (MSME) as well as Large Enterprises. A range of indigenous products were the central focus of the aero show. This included the Akash Air Defence system that has recently been approved by a cabinet committee for exports, besides the BrahMos missile system. A number of Indian private firms and start-ups showcased products ranging from small arms to drones and bullet proof jackets. The government has already created a country-wise profile to understand what each nation needs and how Indian products can be pushed.

HAL expectedly had a strong presence at the Aero India 2021, centred on the theme 'Conceive; Indigenise; Collaborate' showcasing its products across the spectrum of fighter aircraft, transport aircraft, helicopters and training aircraft. HAL focused on the rotary wing platform that is also available for exports, and the armed versions of the ALH and the LUH. The static display showcased Do 228, Hindustan Turbo Trainer (HTT)-40, LUH and ALH Mark III.

A major highlight of Aero India 2021 was the signing of the contract for 83 LCA for the IAF worth Rs. 48,000 Crore, which includes 73 LCA Mk 1 A (modernised version of the aircraft) and 10 trainer aircraft. The Chairman HAL stated that the unit cost of the LCA fighter was Rs. 309 crore and that of the trainer was Rs. 280 crore. HAL also received a Request for Proposal (RFP) from the IAF for their Basic Trainers' requirement at the Aero India 2021. The RFP is for 70 aircraft with a clause for 38 additional aircraft. The production will take place at HAL's two manufacturing units at Bengaluru and Nashik. The trainer is reported to have more than 60 percent indigenous content.

Defence Research and Development Organisation (DRDO):

DRDO displayed more than 300 indigenously developed systems and sub-systems, "bringing alive the spirit of self-reliance and national pride at the Aero India 2021". The participation was marked by flying displays of LCA Navy, LCA Tejas and Airborne Early Warning & Control (AEW&C) aircraft. More than 30 laboratories of DRDO from all technology clusters showcased over 17 products in the India pavilion at the exhibition. The outdoor exhibition

displayed ADFCR Radar, ADTCR Radar, Anti Drone System, QRSAM, Rustom-1, Mobile Launcher Vehicle and indigenously developed robots. During a ceremony on 03 February 2021, Shri Rajnath Singh released the DRDO Export Compendium, the new procedure for Design, Development and Production of Military Aircraft and Airborne Stores (DDPMAS), a document for Air Worthiness Certification, Aeronautical Research & Development Board (AR&DB), and some other related documents.

Innovation in Defence

Start-ups play a significant part in innovations and help in developing defence related items and equipment. At Aero India 2021, start-ups had the opportunity to present their innovations through Innovations for Defence Excellence (iDEX), (www.idex.gov.in). Managed by the Defence Innovation Organisation (DIO), iDEX was launched in April 2018 to make the country self-reliant and self-sufficient in matters of defence, through mastering of the fundamentals of Identify, Incubate, Innovate, Integrate, and Indigenise. The core objective of iDEX is to create an ecosystem, essentially to foster innovation, entrepreneurship and technology development, specifically in the Defence and Aerospace sector.

More than 1200+ start-ups and innovators responded to the four rounds of Defence India Start-up Challenge (DISC), out of which 60+ start-ups / individuals have been selected to receive innovation grants in close to 30 technological areas under DISC 1, 2, 3 and 4 Open Challenge through the prototype funding guidelines called "Support for Prototype and Research Kick-start" (SPARK), which entail provisioning of grants upto Rs 1.5 crore to the start-ups on the basis of milestones through multiple tranches.

iDEX has also launched the iDEX4Fauji initiative to facilitate rapid development of new, indigenized and innovative technologies by veterans and serving personnel. iDEX4Fauji stands out as a unique and strategic initiative and shall pan out to be one of the well-executed initiatives providing opportunities to the members of the Indian Armed Forces benefiting from their knowledge and the first-hand experience and intention towards improving existing platforms and equipment in Defence.



RM at the Bandhan Ceremony.

Start-Up Manthan 2021

Start-up Manthan is a Pan India hunt with a goal to boost market visibility for the most promising and early stage start-ups. Start-up Manthan is a one-of-a-kind series of Start-up events spread across major Indian states. The aim is to help bridge the gap that currently exists between the ecosystems in tier I and tier II cities by making the essential resources available to emergent Start-ups in these cities. Speaking at the 'Start-up Manthan 2021', the RM said that Start-up India is based on three major pillars - 'Simplification and Handholding', 'Funding and Incentives' and 'Industry-Academia Partnerships'.

Bandhan Ceremony

At the Bandhan ceremony held on 05 February 2021, Shri Rajnath Singh said Bandhan exemplifies the spirit of public-private partnership in defence and aerospace sectors. He said 128 MoUs, 19 Transfer of Technologies, 4 Handing Overs, 18 Product Launches, and 32 major announcements were made at Aero India this year. 45 MSMEs participating in Aero India 21 bagged orders worth Rs 203 crore. He stated that the foundation of India's vision rests on three pillars – 'Research and Development', 'Public and Private Defence Production', and 'Defence Exports'. Referring to the field of research and development, he said there was an attempt to broaden the research base of the nation by supporting and encouraging the private sector.
The formal handing over of the ALH Mark-III to the Indian Navy and Indian Coast Guard (ICG), commencement of

Performance Based Logistics of the Coast Guard fleet, and Initial Operational Clearance of Army version of LUH, were part of the Bandhan Ceremony.

Karnataka Showcases Itself

During the show, the Karnataka government Department of Industrial Training and Employment (DITE), in collaboration with Tata Technologies showcased their initiative of transformation of 150 Government Industrial Training Institutes (ITIs) into Technological Hubs. The civil and technological upgradation of the ITIs is to be utilised as skill development centres for youth and as technological hubs by MSMEs and large industries. The ITI transformation programme has been undertaken by the Karnataka government to create a highly skilled workforce and attract investments. The technological upgradation of the ITIs is expected to help in introducing 10 additional advanced trades and multiple focused, short-term courses. The Karnataka government and Tata Technologies planned to scope potential MoUs, partnerships and placement agreements during the show with potential investors.

Defence Ministers' Conclave

The Indian Ocean Region (IOR) Defence Ministers' Conclave began with a keynote address by the Raksha Mantri on 4th February on the sidelines of Aero India 2021 in Bengaluru. Of the 28 countries constituting IOR, 26 countries participated in the event either physically or in virtual mode, represented by Defence Ministers, Ambassadors, High Commissioners and senior officials. The RM stressed that SAGAR – 'Security and Growth for All in the Region' is the theme of Indian Ocean Policy, and added that in line with this, the IOR conclave should focus on security, commerce, connectivity, fight against terrorism and inter cultural exchanges. He added that IOR countries have



Defence Ministers' Conclave.

demonstrated mutual respect for a rules-based order and commitment to abide by international law. India's approach and vision to tackle global challenges was highlighted by the five 'S' vision of the Prime Minister, Samman (Respect), Samvaad (Dialogue), Sahyog (Cooperation), Shanti (Peace) and Samriddhi (Prosperity).

Chiefs of Air Staff Conclave

A Chiefs of Air Staff Conclave was held during Aero India 2021, which was attended by Chiefs of Air Staff of more than 24 countries physically, while another 16 Chiefs attended the Conclave virtually. The theme of the 2-day event was "Leveraging Aerospace Power for Security and Stability". In the opening address, Air Chief Marshal RKS Bhadauria pointed out that amid the COVID-19 pandemic, rising mistrust and geopolitical tensions have reinforced the need for mature and balanced cooperation at the international level. In this backdrop, there is a need to strengthen mutual understanding and existing security frameworks based on the principles of cooperation, collaboration and coexistence. He said that the IAF has built bridges of friendship through numerous bilateral and multilateral exercises with a large number of nations who share common values and interest in maintaining peace and stability. He said conclaves such as the current one, provided an opportunity to discuss current and emerging security challenges and enhance cooperation among the air forces.

Referring to the changing nature of warfare, the Chief of Air Staff said the IAF was closely observing these developments and was working on capabilities in the Unmanned and Optionally Manned platforms, Manned-Unmanned teaming and Anti -Drone technology. He highlighted the growing criticality of space-based technologies for modern warfare and the importance of software capabilities in the digital great game. He added that low cost and easy availability of technology to state or non-state actors have made them more lethal and capable of generating disproportionate effects.

Indian Navy: Building Collective Maritime Competence Towards Security And Growth For All In The Region (SAGAR)

A seminar on the theme 'Building Collective Maritime Competence Towards Security And Growth For All In The Region' (SAGAR) was held during the Aero India 2021. Admiral Karambir Singh, Chief of Naval Staff gave the opening address and emphasised, "Towards maintaining a safe and secure maritime environment in the IOR, the Navies / Maritime Agencies in the region are partnering to develop a comprehensive Maritime Domain Awareness in the IOR." In recent years, India has taken a number of initiatives to strengthen relations in the IOR in a mutually supportive and cooperative



The President and the First Lady at the Valedictory Function.

manner, identifying shared concerns from partner countries and necessitating synchronised and coordinated response, to accomplish a common goal. During the seminar, two panel discussions were held on "Identifying Common Maritime Security Challenges" and "Building Collective Maritime Competence to Overcome Security Challenges". Besides these conclaves, a number of seminars were held during Aero India 2021 over three days by various organisations on relevant themes.

Flying Displays

The most thrilling part of any air show is the display flying by aerobatics teams, air forces and aircraft manufacturers. Due to the COVID situation, there was very limited participation from foreign aircraft manufacturers and air forces. The exception was the fly by carried out by the B-1B Lancer heavy bomber. Nicknamed 'the Bone', the supersonic heavy bomber is capable of carrying out missions worldwide from its bases in the United States, as well as from forward deployed locations. It carries the largest conventional payload of both guided and unguided weapons in the U.S. Air Force and is considered the backbone of America's long-range bomber force. Airborne from Ellsworth Air Force base in South Dakota, the aircraft flew for 26 hours to participate in the inaugural event of Aero India 2021 by performing a 'fly-by' along with a Made in India LCA Tejas, which joined up with the B-1B on the outskirts of Bengaluru..

Hindustan Aeronautics Limited came up with 'Aatmanirbhar Formation Flight' consisting of its products such as LCA trainer (LIFT Trainer), HTT-40, IJT, Advanced Hawk Mk 132 and Civil Do-228 which flew in a special formation showcasing the spectrum of trainers and signifying self-sufficiency in the trainer segment. There was a scintillating display of 'Dhanush' formation by the LCH and 'Netra' formation showcasing the DRDO's flying display of AEW&C.
For the first time ever, the two aerobatic display teams of IAF performed an integrated display at Aero India 2021. The Surya Kirans flying the Transonic Hawk aircraft and the Sarang Team flying the indigenous ALH Dhruv performed a mesmerising aerial ballet. It is a rare sight to see two aerobatic teams performing in the air simultaneously, truly indicative of the professionalism of the IAF.

Valedictory Function

Curtains came down on the mega three-day international event Aero India 2021 on 5 February. The valedictory function was graced by Hon'ble President of India Shri Ram Nath Kovind and the First Lady Smt. Savita Kovind. In his address President Ram Nath Kovind said, India is not just a market, but a land of immense opportunities for the whole world, including in the defence sector. He added that the government has taken a number of policy initiatives aimed at placing India among the top nations in the defence sector with twin objectives of self-reliance and export promotion and that the government is focused on improving the 'Ease of Doing Business' to encourage manufacturers to set up units in India. The President said that Aero India 2021 is a living proof of India's ever-growing strength in the defence and aerospace sectors at the global level. The event has exhibited the global confidence in India's capabilities. He praised the "courage and bravery" of the IAF pilots who display exemplary professionalism in protecting India's skies and strengthening the country's defence.

"Aero India 2021 has been an unprecedented success", he concluded and stated that despite the COVID-19 challenges, Aero India was successful in attracting 16,000 visitors physically and close to 5 lakh people virtually.

Note: Material for the article has been sourced from The Show Daily, The Print, The Indian Express, The Economic Times, IANS, PTI, https://aeroindia.gov.in and other publications



Air Marshal Harpal Singh,
PVSM, AVSM, VM (Retd) was commissioned as a fighter pilot in June 1980. He has about 2500 hours of flying experience mainly on MiG 21, MiG 23, MiG 27 and MiG 29 aircraft. He has commanded a MiG 29 Squadron and has also been a Chief Operations Officer at an Air Force Station. He has commanded two Air Force Stations in the West and East respectively. Besides his DSSC Course, he has also attended the Senior Officers Course at National Institute of Defence Studies, Japan. He has been the Deputy Commandant College of Air Warfare (CAW) and has held important appointments in the strategic arena. He was Director General (Inspection and Safety) of the IAF till his superannuation in May 2019.



Water Colour by Amit Dhane

REMEMBERING A HERO
Col B SANTOSH BABU, MVC (Posthumous)

The description and visuals of the ferocious fight in mid June 2020 between the Indian and Chinese Armies reverberated across India. We bring to you lesser known traits of Colonel Santosh Babu, the leader of the gallant Biharis in Galwan.

Gallantry at Galwan

On 16 June 2020, the world woke up to learn that clashes had broken out between the Indian Army (IA) and Peoples Liberation Army (PLA) at Galwan, Ladakh. A Colonel and 19 soldiers from the IA were killed and an unspecified number of troops from PLA had also been killed.

The action became clear over the next few days. On 15 June 2020, Colonel Bikumalla Santosh Babu, Commanding Officer (CO) of 16 BIHAR led a Quick Reaction Force of 16 BIHAR and some other troops tasked to evict the PLA from General Area Y Nala and move further to Patrolling Point (PP) 14. The column successfully evicted the enemy from Y Nala and reached PP 14 where a skirmish broke out between the IA and PLA troops.

The first wave of fighting in Galwan Valley erupted around 6.00 p.m. on 15th June after Colonel Babu led a squad of 30 soldiers to a location near PP-14 to verify if the PLA had removed some structures erected in the area as agreed to on 6th June by top Indian and Chinese military commanders in a disengagement plan to reduce rising border tensions. The squad, however, found that a few tents and an observation post were still intact and the Chinese soldiers had not retreated from PP-14. The Indian soldiers confronted the Chinese troops, who refused to remove their installations and vacate the area, triggering a violent clash that involved more than 400 rival soldiers at its peak.

Col B Santosh Babu and his troops fought gallantly in hand to hand combat causing heavy casualties to the PLA. In the ensuing fight, 20 Gallants of Galwan achieved martyrdom, which included troops from 16 BIHAR, 12 BIHAR, 3 PUNJAB, 3 Medium Regiment, 81 Field Regiment and 81 Mountain Brigade Signal Company. Intelligence estimates put the number of PLA casualties as over 40.

Col Santosh Babu made the supreme sacrifice in the true spirit of a soldier and a commander leading from the front. 60 to 70

Indian soldiers fought more than 250 to 300 Chinese PLA troops in a ferocious fight at an altitude of 17,000 feet. The Chinese were carrying dirty bats/sticks, while the Indian soldiers were not even carrying walking sticks.

Seeing their CO hit by PLA soldiers, the Indian soldiers were enraged and pounced on the Chinese. The Chinese started requesting with folded hands to stop the fight when they saw their soldiers being lifted and flung into the Galwan River by the Indians. The ferocity of Indian soldiers unnerved the Chinese soldiers.

Col Santosh Babu – An Exemplary Leader

Santosh Babu was born on 13 February 1983 in Suryapet in present day Telangana. Schooled at Sainik School Korukonda, he joined the illustrious cradle of leadership, namely National Defence Academy (NDA), Pune and passed out as a Squadron Cadet Captain in 2003. On commissioning from IMA, Dehradun he was commissioned into 16 BIHAR on 10 December 2004.

Col Santosh Babu was a highly regarded professional who excelled on all important courses including Staff College Course. He saw active operational service on the Line of Control in J&K, where he commanded an extremely difficult post in the Tangdhar Sector. He was awarded the Chief of Army Staff Commendation Card for his role in a counter-infiltration operation wherein three infiltrating terrorists were killed in December 2007.

He was also involved in hinterland operations with 63 Rashtriya Rifles in the Rajauri area of J&K from December 2011 to January 2014. Thereafter, he served in the UN Mission to DR Congo (MONUSCO) from March 2014 to June 2015. His professional expertise got honed further when he was an Instructor Class 'B' and Divisional Officer at NDA, Khadakwasla. He took command of his unit, 16 BIHAR in the bitterly cold, windswept Indus valley in Ladakh on 02 December 2019.



Colonel and Mrs Santosh Babu with their children.

Babu – A Humane Person

It was love at first sight and Col Babu married Mrs Santoshi on 8th October 2009, after meeting her just once. They have two children, a daughter Abhijna (9 years) studying in Class IV and son Anirudh Teja (04 years) studying in LKG. He was a very caring husband and a doting father. Despite being a workaholic, Col Babu would always find time for his family and friends.

Santosh Babu was a sports enthusiast, Santosh had a pleasant demeanour and had excellent interpersonal relations with superiors and subordinates. Popular amongst the Saikorians and his course mates from the 105th NDA Course, he remained in touch with friends even when posted to difficult areas with weak network connectivity. He made it a point to reconnect as soon as he got an opportunity. He always tried to help his colleagues and juniors in their career development.

and took part in sports activities like 5 km, 10 km, 20 km marathons and long distance running, cycling, badminton, squash and such games. He loved exploring new things, be it places, food, entertainment, challenging sports events, or adventure tours. He loved nature and photography, music and played the keyboard too. He was undoubtedly an 'outdoor adventurer' and a dynamic personality.

Valour Recognised

Colonel Santosh Babu was awarded the Maha Vir Chakra (MVC), the second highest war time gallantry award on the eve of Republic Day 2021. Naib Subedar Nuduram Soren, Havildar K Palani, Naik Deepak Singh, Sepoy Gurtej Singh (all posthumous) and Havildar Tejinder Singh were conferred with Vir Chakra (VrC). 16 BIHAR became the highest gallantry award winner unit in a single operation in recent memory with 01 MVC, 02 VrC, 16 Sena Medals (Gallantry) and 01 Mention in Despatches.









Colonel Santosh Babu's citation read as *"undaunted by the violent and aggressive action by overwhelming strength of enemy soldiers, the officer in true spirit of service before self, continued to resist the enemy's attempt to pushback Indian troops. Despite being grievously injured, Colonel Babu led from the front with absolute command and control despite hostile conditions to deter the vicious enemy attack at his position"*

In Tribute

The Intensive Care Unit in the 1,000-bedded Sardar Patel Covid 19 Hospital at Delhi Cantonment has been named in honour of Colonel Babu. A memorial has also been built near his place of martyrdom, at KM 120 along the Durbuk- Shyok- Daulat Beg Oldie Road in the Galwan Valley by 16 BIHAR in memory of Colonel Babu and the Gallants of Galwan. His school friends, the Saikorians paid homage to their school hero at the National War Memorial, New Delhi and at their School. Santosh Babu lived up to the motto of his school "Ever Loyal" in an unflinching manner worthy of emulation by generations of school alumni.

The martyrdom of valiant Indian soldiers at Galwan and their telling blow to Chinese plans reverberated through the length and breadth of the nation. Numerous programmes were held across the country in honour of Babu and the Galwan Martyrs on Independence Day - 15 August 2020.

In a rare gesture, Mr K Chandrasekhar Rao, the Chief Minister (CM) of Telangana travelled to Colonel Babu's residence to console his family and Mrs Santoshi was appointed a Deputy Collector in Telangana. The CM also gave grants to all the Galwan Martyrs, although they were not from his state.

Col Santosh Babu and his men have left a legacy for the Indian Army by shattering the myth of the invincibility of PLA soldiers. The Indian Army and nation have displayed steely resolve in stopping the Chinese in their 'surreptitious expansionism'. After prolonged negotiations at the military, diplomatic and political levels, the disengagement of the two forces has commenced in Eastern Ladakh.

The martyrdom of valiant Indian soldiers at Galwan and their telling blow to Chinese plans reverberated through the length and breadth of the nation.



Brig Sanjay Chawla (Retd) *joined NDA, Khadakwasla in December 1976 after completion of schooling from Military School, Belgaum. He was commissioned in 6 Garhwal Rifles and was later posted to 16 Bihar, a newly raised unit which he went on to command. He commanded an Infantry Brigade in South Western Command. He has served in IMTRAT, Bhutan, as an Intelligence Staff Officer in an Infantry Brigade, and has also held staff appointments at HQ Northern Command and in Delhi. His last assignment was as Deputy GOC, Bhopal Sub Area. Post retirement he is Director in a company and is devoted to social activities.*



Kharphocho Fort at Skardu (photo credit wikipedia.org).

THE LONE SURVIVOR OF SKARDU

Lt Col Sher Jung Thapa, MVC

In 1947-48, many of the remote towns of the erstwhile J & K State were besieged by the Pakistani Army and Irregulars. It took many months and several battles and skirmishes for the Indian Army to expand outwards from Srinagar and Jammu to recover some of the lost lands. Some towns fell after a long resistance, here the author narrates the survival of a hero.

In June 1947, Major William Alexander Brown, British Indian Army was placed as the acting Commandant of the Gilgit Scouts, and his services were made over to Maharaja Hari Singh and the J&K Government. As the deliberations over the state of J & K and its accession remained undecided in September – October 1947, Major Brown felt and openly stated that the state should merge with Pakistan, being a Muslim-majority state. Major Brown disagreed with the State's accession to India. In Gilgit, he engineered a swift insurrection, resulting in the Governor, Brigadier Ghansara Singh along with all non-Muslim soldiers being put to the sword. The subsidiary states in the Gilgit area wanted to proclaim independence. To stem such designs, Major Brown hoisted the Pakistan flag at Gilgit on 03 November 1947. Gilgit and Baltistan, one of the four Provinces (Sic. districts) of the J & K State was declared ipso facto a part of Pakistan.

At that time, out of eight J & K State Forces Infantry Battalions, 6 J&K Battalion was deployed to cover both Gilgit and Ladakh Provinces; The State Forces unit under Lieutenant Colonel Abdul Majid Khan had its Battalion HQ and one Company (Sikhs) at Bunji, another Company at Gilgit (Muslims), the third Company (Sikhs & Muslims) at Leh and the fourth Company (Dogras) at Kargil. Passage of orders to and fro was through runners which in that inhospitable terrain took 3 to 5 days. So Colonel Khan and the troops at Bunji were taken by complete surprise when Captain Matheson (2nd-in-command of Gilgit Scouts) descended upon them and in one fell swoop eliminated the garrison to the last man. As news of the fall of Bunji and Gilgit reached authorities at Srinagar, they acted swiftly to defend Ladakh Province; Major Sher Jung Thapa, who was commanding the Leh Company was promoted to Lieutenant Colonel and ordered to proceed forthwith to Skardu with his Company (along with the sole radio set) and prevent enemy ingress towards Leh while simultaneously 5 J&K State Forces Battalion was moved to Kargil, in driblets.

Sher Jung Thapa left Leh on 23 November 1947 with 79 troops, covering 138 km to Skardu by 03 December 1947. He displayed remarkable tactical acumen in siting defences around Skardu Fort and enlisting the services of 300 locals. By mid February, 1948 with the arrival of reinforcements from Kargil his combat strength was augmented to 285 (armed with bolt action rifles with limited ammunition). This was of



(photo credit justdial.com/Dharamshala/).

Brig Sher Jung Thapa, MVC Park at Dharamshala, HP"



(photo credit wikipedia.org)

Skardu Fort in 1948. *Inset Lt Col Sher Jung Thapa, MVC*

little comfort as Major Brown confronted him with 800 motivated irregulars, supported with a few machine guns and two 3.7 inch Mountain Artillery guns. The siege of Skardu commenced in earnest on 11 February and ended after six long horrendous months of steady, daily battle casualties and ultimately near total starvation.

Every effort was made to degrade and disperse the besiegers including aerial strafing by Tempest fighters of the RIAF and on five occasions the Tempests even attempted to drop survival food rations but this proved futile in that terrain. By the penultimate day, Thapa and his men had been on two Chapattis of barley and one cup of tea per head, per day for a month; and no soldier had more than ten bullets! Major General KS Thimmaya, DSO (GOC, Srinagar Division), concurred with Thapa's assertion of the stage of hopelessness and the Skardu garrison comprising four officers, 35 soldiers and about 50 civilians surrendered on 13 August 1948. Within an hour, all but one were shot dead in cold blood; the lone survivor owed it to an unknown benefactor, none other than General Sir Douglas Gracey, KCIE, CBE, MC, Commander-in-Chief Pakistan Army who had issued express orders to extend to Sher Jung Thapa "all courtesies of war and his person is not to be harmed." And thereby hangs a tale of tender camaraderie!

Way back in 1924, Captain Gracey, Adjutant of 1st Gorkha Rifles Regimental Centre, Dharamsala leading their hockey team clashed in the finals with the College team led by Sher Jung Thapa. On learning that Sher Jung came from a family of distinguished soldiers (grandfather Subedar Major and father Subedar Major & Honorary Captain), Gracey encouraged Thapa to also seek a future in the Army. So he did, earning a commission in the J & K State Forces on 01 September 1932. 24 years after their clash on the hockey field, General Gracey remembered the young team captain hailing from an illustrious Army Gorkha family. His own ties with the Gorkhas couldn't let him leave Sher Jung to be slaughtered at the hands of the Pakistani irregulars.

In Independent India's first Defence Services Investiture Ceremony in 1950, Lieutenant Colonel Sher Jung Thapa was awarded the Mahavir Chakra. Did General Gracey call up his protégé, we don't know. Interestingly, in July 1948 Major Brown was made a Member of the Most Excellent Order of the British Empire by the British Government (MBE). Years later, in 1993 Brown was posthumously awarded the Sitara-i-Imtiaz by the Government of Pakistan.

The fortunate Sher Jung rose to Brigadier rank before superannuation in 1961, thereafter he settled down in his ancestral home at Dharamsala and lived with utter humility to the ripe old age of 91, breathing his last on 15 February, 1999.



Lt Gen Baljit Singh, *AVSM, VSM (Retd) was commissioned into the Regiment of Artillery in 1956. He superannuated from service in 1992 after a distinguished career spanning 36 years. He was invited to the Board of Trustees of World Wildlife India in 1990 and served two terms therein.*



Assembly at Paangkriang Friendship School, Ijeirong

Fostering Peace Through Education

What does a retired Colonel do after spending three-and-a-half decades in uniform? Join the corporate sector? Start a new business? Play golf? Colonel Christopher Rego decided to build a 'second life' in North East India, making a difference to youngsters there. Excerpts from a conversation.

It was Swami Vivekananda who said, "Take up one idea. Make that one idea your life - think of it, dream of it, live on that idea. Let the brain, muscles, every part of your body, be full of that idea, and just leave every other idea alone. This is the way to success." These are words that Colonel Christopher Rego held dear and eventually chose to live by. In the relentless pursuit of fulfilling his idea, Sunbird Trust was born, with the vision to create 'peace through education'.

What he has self-admittedly dubbed his 'second life' is spent with people in the remote, insurgency-affected villages in India's North East. "At Sunbird Trust, we facilitate the education of

thousands of children," explains Col Rego. "Along with a band of young professionals from across the country, the aim is to help build schools and hostels, train village teachers and bring livelihood sustainability to local communities."

Seeking Exploration

Born into a family with strong military ties, Col Rego is a fourth generation officer. His late father, an Air Commodore, served during the 1962 Sino-Indian war. The late Admiral Ronnie Pereira, a former Chief of Naval Staff, was from his extended family, while his wife Myrna Pais is the daughter of an Army Colonel. "I believe that this cosmopolitan, adventurous, well-travelled and relatively frugal background has a lot to do with the choices I continue to make," he says.

Commissioned into the Bombay Sappers, Col Rego enjoyed professionally delving into multifarious roles, with a focus on the specialised Russian PMP equipment of his unit. He excelled as a basketballer and enthralled his colleagues with his musical skills as a pianist and guitarist. "I was travel-holic seeking exploration," he recalls, "I hitchhiked on service aircrafts to all parts of the country! When devastating earthquakes hit the Latur District in Maharashtra in 1992 and Bhuj in 2001, I took leave and spent several days in disaster zones as a volunteer striving to learn about disaster relief in real time."

But it was a chance voluntary posting in the North East in 2003, which changed the course of his future. "I was drawn by the myriad cultures, natural beauty and the mysticism of the remotest areas. The three-and-a-half-year stay with the Assam Rifles at Mizoram was a watershed moment in my awareness of the realities impacting people in conflict-affected areas. Here, I sought solutions to the divisive issues of decades that had fuelled the insurgency. Despite the Mizo Peace Accord of 1986, I perceived an emotional chasm between the people of the state and the rest of the country."



Col Christopher Rego with his wife Myrna

The Seeds of an Idea

Along with his wife Myrna, he decided to immerse himself into the community to understand their reality and perceptions. "Befriending local families, we took a deep dive into the indigenous culture, history and even gastronomy of the area. Travelling extensively on duty, we noted that the lack of education and empowerment was a prime cause of radicalisation of youth."

Deciding to 'be the difference', Col Rego and his wife Myrna started sponsoring the education of lesser privileged children in Mizoram from their own resources. They gathered that the process of 'outsiders' sponsoring children could not only help educate the children, but also help build bridges of friendship across cultures. "The sponsorships did wonders for kids who may never have seen proper schooling otherwise. Soon my friends and classmates joined me in this venture and the sponsorship numbers increased with every passing year, even after I was posted out of the North East."

This stint at Mizoram and his experience with engaging with local communities fired his imagination. Decades of civil disturbance and insurgency had taken a heavy toll on human life and severely impacted development and livelihoods. The frustrated youth of the new generation were plunging headlong into militancy, perpetuating the cycle of violence. He

A chance voluntary posting in the North East in 2003, changed the course of his future

> The lack of education and empowerment was a prime cause of radicalisation of youth

researched deeply, to understand the source of their angst.

"In 2012, due for my last posting before retirement, I spurned a hometown posting in favour of returning to the North East, and was delegated to the Border Roads Organisation at Imphal," he explains. "Between 2012 and 2016, there was considerable civil disturbance and violence including deadly ambushes in Manipur. As soft targets, BRO personnel were sometimes assaulted, extorted and even kidnapped. I was the unofficial chief negotiator, and intervened in and resolved several life-threatening situations. All these incidents served as opportunities for me to study the ongoing situation even more closely."

Realising a Dream

Then in 2012, a group of Naga villagers from a tiny Ijeirong Village, then in the Tamenglong District of Manipur, visited him at the BRO camp in Imphal. "They had heard of my work in Mizoram and the child sponsorship initiative," he says. "Having built the only viable school that served a large number of villages, there was the dire need for a hostel, especially given that all the children from neighbouring villages were 'self-help' children. Unbelievably, children as young as six stayed on 'rent' with local villagers, cooking and living entirely on their own as they could not afford hostel fees. The village was in the heart of militant territory and I did not have any protection. But it was a leap of faith that both sides took that was to be the start of a journey from which I never looked back!"

Startled by seeing the poverty of the kids at the rudimentary school at Ijeirong, their joi de vivre and dogged determination of their families to get them an education, Col Rego decided that the hostel had to be built at this idyllic locale, whatever it took. He assembled a coalition of stake holders: the local community contributed wood from their forest, stone from their fields and substantial free labour and the Assam Rifles contributed the GI sheets required for the building and helped with the logistics of transporting the construction materials. His classmates pitched in with funds for the balance work.

Six months later, on February 14, 2014, the first Sunbird Friendship Hostel was inaugurated. "At the time it hosted just 40 children, but the numbers grew to 150 the next year and 250 in the third year. This was thanks to the excellent facilities that had been developed for the boarders including solar electrification, heavily subsidised boarding facilities and much improved school infrastructure."

The Ijeirong Hostel became the first of many institutions that came to bear the 'Friendship' label, when, after the founding of Sunbird Trust, it came to be called Sunbird Friendship Hostel. A host of partner institutions retained the first name in the local language while appending 'Friendship' as the second. The word 'Friendship' became a Sunbird Trust by-word that signified inclusion and acceptance of diversity and plurality, denoting that the institution served all without discrimination or preference on grounds of culture, tribe, religion or background.

Growth & Accolades

Inspired by Col Rego's vision, friends at Bangalore registered Sunbird Trust as a charitable organisation on December 11, 2014. "Found across the North East and other parts of India, the sunbird is a neutral logo signifying positive energy and freedom from violence. On retirement from the Army in January 2016, I immediately took over as CEO



Sunbird Friendship Hostel At Ijeirong Village

of the organisation. By then, over 500 children were being sponsored by my classmates, friends and family members." Col Rego had fine-tuned his strategy of building peace in the conflict zone through the medium of education. His innovative concept earned him the prestigious international Ashoka Fellowship (Awarded by Ashoka Innovators for the Public based in Arlington, New York) from South Asia. The Fellowship across 82 countries is deemed as the international gold standard for early stage social entrepreneurs and counts among its members, several luminaries including Nobel Peace Prize winners Kailash Satyarthi and Bangladeshi Mohammed Yunus, besides eminent personalities like Kiran Bedi and heart surgeon Dr Devi Shetty.

"With the stamp of international credibility, we rapidly began scaling work and ideas," says Col Rego. "We transformed a tiny village school at Singhat, South Manipur that came to be called the Lyzon Friendship School. Once again, the Assam Rifles contributed old structures that could be used as classrooms while the BRO helped level the grounds for the new school. Friends and donors pitched in and by 2020, the school had been raised to the eighth standard with 350 students. It boasted computer and science laboratories, a hostel for 100 students, a library and several other amenities uncommon in local schools."



A Classroom At The Sunbird Trust



Gen MM Naravane, COAS Unveiling the Foundation Stone'

People for People

Brimming with ideas, but needing the boots on the ground, Sunbird Trust got its first employee in the shape of Aswathy Jayakumar. A BITS Pilani graduate and Teach for India (TFI) Fellow, she was informed that Sunbird Trust did not have funds and did not pay any salaries. However, she volunteered to work merely with the assurance of shelter and food. She was soon deputed to Ijeirong and quickly won hearts.

"By 2020, Team Sunbird had expanded to 20 young professionals, most in their 20s. They brought with them rich experience and knowledge from across domains as varied as engineering, business management, dentistry and hotel management!" says Col Rego. "I am proudest of the youngest, a Naga tribal girl who was sponsored since her ninth standard - she joined the organisation after her Bachelors in Social Work, becoming the first alumna team member. As COO at the head of this dynamic and committed group was Dr Sonal Sethia, an IIT post graduate with a doctorate from Glasgow University. She changed the direction of her life after interning with Sunbird Trust at a home for HIV affected children supported by the organisation."

In 2018, seeing that youngsters were giving up their studies due to lack of financial support, Col Rego arranged for 35 children from tiny villages, mainly in Manipur, to come to Bangalore and Kolar and pursue their further studies in engineering, law, science and humanities. His wife Myrna was a huge support, mentoring each child individually and even taking their tuitions. "In June 2020, 14 of these students completed their graduation. Amazingly, eight of them volunteered to join the Sunbird Team before their next step," he says. "Smart and confident youngsters today, they

Col Rego's innovative concept has earned him the prestigious Ashoka Fellowship.



The Sunbird Team

have aspirations for a variety of careers including the Army, the Civil Services and the development sector."

Dreams Powering Success

Ask him about the founding values of the trust and he says, "Firstly, 'diversity'. An organisation working towards peace and friendship has to be secular and inclusive with a humanistic agenda. Our tagline in all project areas is 'Broaden your vision and deepen your roots', encouraging everyone to accept plurality while observing their own culture. Secondly, in the rough environs of the remote locations and the impaired security environment in the conflict zone, there is 'commitment', without which no team member can survive. Then there is 'creativity' – the nuances in each and every project area vary with the community and the tribe." As for the major ingredients of the Sunbird Trust's strategy, Col Rego realises that to achieve the objective of peace there is the need to open clogged channels of communication amongst all the stakeholders - the various communities, the security forces, citizens from the rest of the country. Each sponsored and empowered child also acts as an arrow for injecting broadmindedness and inclusion into their own communities. Further, every school and hostel is a hub for engaging with villages in a wide radius – sometimes even over 50 kms!

"I have set my sights on helping raise 50 institutions and sponsoring 25,000 children by the year 2025," says Col Rego, when asked about future plans. "Happily, Sunbird Trust looks well on the way to achieving that target, having helped raise 15 institutions - 7 schools and 8 hostels - small and large, in Manipur, Nagaland and Assam. I hope to turn this initiative into a movement, whereby generous and committed donors from across the country invest in fostering peace in the North East. I envisage hundreds of young professionals volunteering to serve in remote schools across the region, being powerful instruments of empowerment and integration."

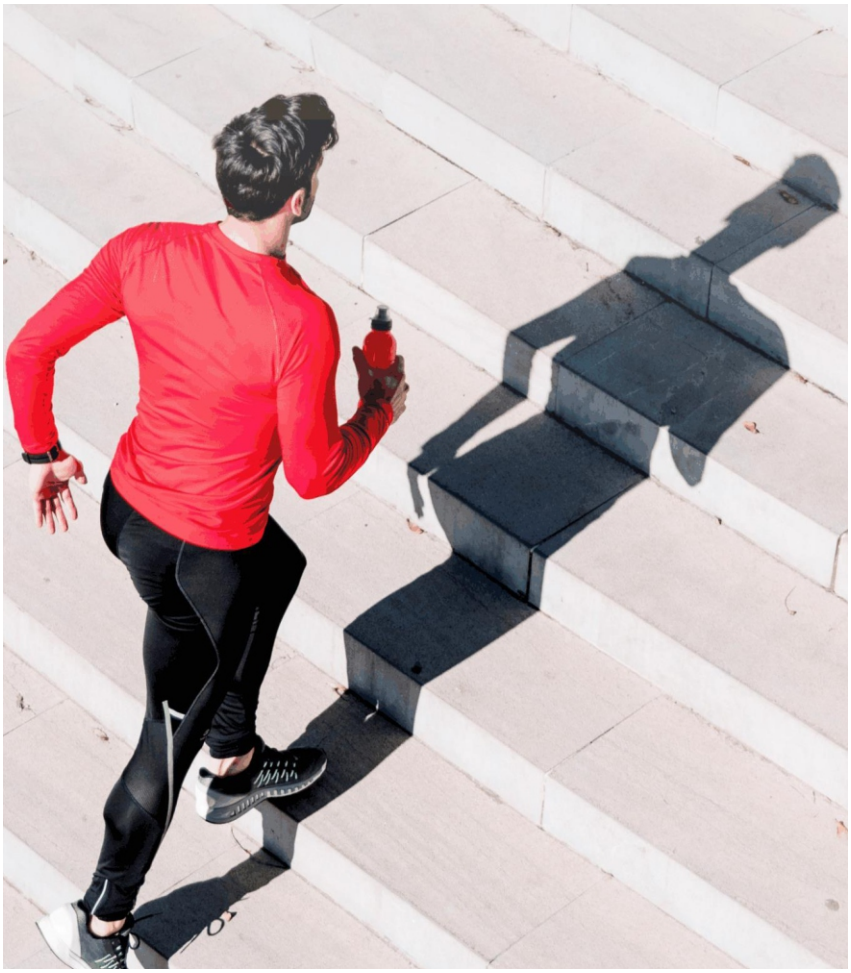
Today, Sunbird Trust counts among its alumni a super-specialist doctor, social workers, two lawyers, engineers, MBAs and youngsters working in the USA, Australia and the UAE. While they count this as one of their big successes, Col Rego also celebrates the mindset change from fear and suspicion to trust, peaceful cohabitation and optimism that permeate the environment around Sunbird project areas. "The new generation, purging the baggage of the past, is suitably empowered and self-sufficient, contributing to nation building."



Sunbird Graduation Sponsored Students : Bangalore



Neeti Jaychander *has over 17 years of experience as a writer, journalist and editor. For over a decade, she was the Senior Regional Editor (Southern India) at FEMINA, the country's oldest and largest-selling lifestyle magazine. She has been the Editor of ET Madras Plus, the erstwhile lifestyle supplement of The Economic Times, and has authored books for Children. She is a writer with Zenger News (the world's first digitally native wire service) as also teaches a journalism course at the National Institute of Fashion Technology, Bangalore.*



SYSTEMISATION IN MUTUAL FUNDS

Continuing with our series on personal financial management and guidance, our expert introduces the gains of investing regularly and systematically in mutual fund schemes.

"You ask what is the use of classification, arrangement, systemisation? I answer you: order and simplification are the first steps toward the mastery of a subject – the actual enemy is the unknown."

- Thomas Mann – Nobel Laureate in Literature

A Mutual Fund (MF) is a pool of money created by an asset management company (AMC) where the inflow is from both retail and institutional investors who share a common investment objective. The AMC further invests this pooled money in equities, bonds, money market instruments and/or other securities. It then distributes the income/gains generated from its investments amongst the investors after deducting applicable expenses and levies. Professional fund managers manage the mutual fund schemes and decide on when and where to invest for maximum returns within the parameters of the laid down investment objectives. The Mutual Fund industry in India started in 1963 with the formation of Unit Trust of India (UTI) in 1963 by an Act of Parliament and functioned under the regulatory and administrative control of the Reserve Bank of India (RBI). In May 2014, the Securities and Exchange Board of India (SEBI) introduced progressive measures to achieve greater penetration in Tier I and II cities, and for greater alignment of the interest of various stakeholders. Currently, there are 44 fund houses registered in India with the Association of Mutual Funds in India (AMFI) and together they offer more than 2,500 mutual fund schemes. The assets under management (AUM) of the Indian MF Industry has grown from ₹6.65 trillion as on November 30, 2010 to ₹30.01 trillion as on November 30, 2020, which is about 4 ½ fold increase in a span of 10 years. Globally, investors use MF

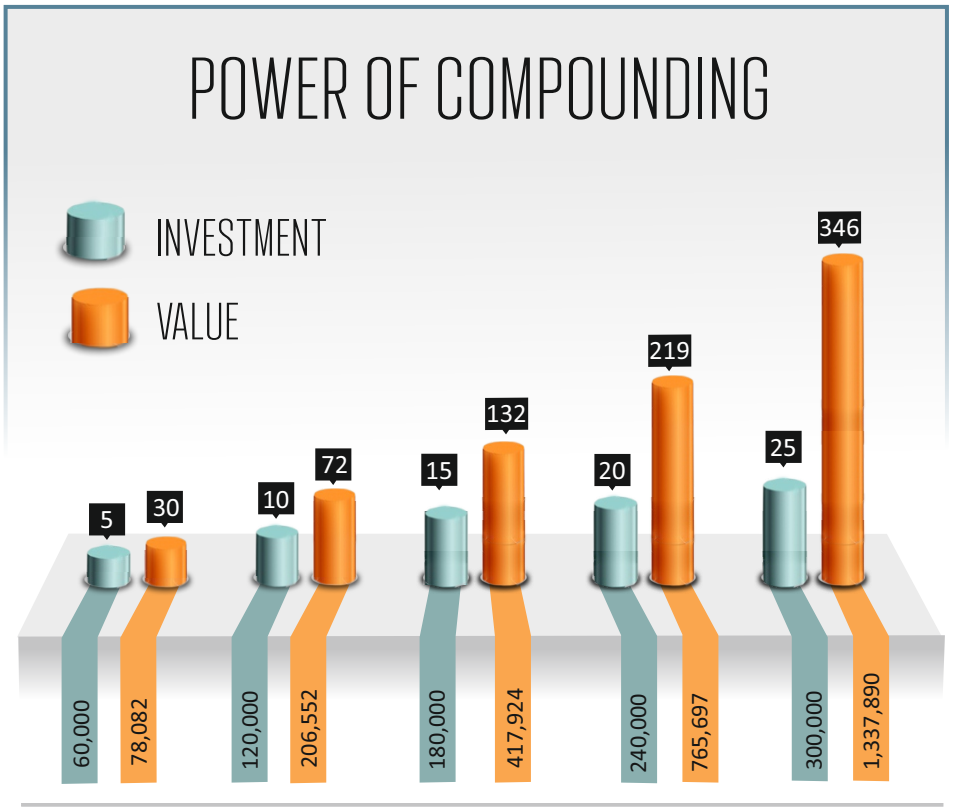
investments for a variety of investment options that they offer with something for every profile and preference.

Financial discipline is an important investor trait to achieve financial goals and avoid impulsive financial decision making. MF investments are ideally suited to inculcate financial discipline since they offer options to invest, transfer or withdraw money systematically. This feature is particularly handy for salaried employees who can invest every month based on their financial state. Almost all schemes of MF offer an investor the choice to invest directly from his bank through a systematic investment plan (SIP). In case an investor has lump sum but is wary of investing it in one go, then he can spread his investments over a period with systematic transfer plan (STP). In this, the investor will park his lump sum money in a liquid scheme of the same AMC in which he wants to invest and then transfer a certain predefined amount systematically into the concerned scheme. MF also offer an option of systematic withdrawal plan (SWP) to investors who want a fixed amount to meet their expenses.

SIP – this is by far the most widely used and accepted method of MF investment. In this the investor can invest a fixed amount in a mutual fund scheme periodically, at specified monthly or weekly intervals. The minimum instalment is as little as ₹ 500 with maximum limit as per investor's convenience. The most significant advantage of this methodology of investment is that it achieves rupee cost averaging. Since 'buying low and selling high' is the established investment practice, this technique removes the attempt to time the market to make purchases at the best prices. Let me illustrate. If one invests ₹ 10,000 per month in a mutual fund for 12 months (refer table above), the average NAV cost per unit by rupee cost averaging comes lower to ₹ 99.25 (₹ 1191/12). This implies that he buys each unit at a price of ₹ 99.25. The other major advantage achieved by the investor is of the power of compounding. The chart below depicts an investor who invests ₹ 1,000 per month for 25 years at 10% return. Thus, after 5 years his investment of ₹ 60,000 grows to ₹ 78,082, which is a growth of 30%. However, if he continues his investment over 25 years, then he invests ₹ 3 lakh that grows to ₹ 13.37 lakh – a stupendous 346% growth.

BENEFITS OF SYSTEMATIC INVESTING

MONTH	NAV	No. of Units Allotted (Amount / NAV)
January	100	100.00
February	95	105.26
March	105	95.24
April	103	97.09
May	92	108.70
June	90	111.11
July	101	99.01
August	108	92.59
September	100	100.00
October	105	95.24
November	98	102.04
December	94	106.38
Sum	1191	1212.66
Average NAV	99.25	



In case of SIP, the investor has the following investment options to meet his financial goal:

- **Traditional SIP –** This is the standard investment methodology wherein an investor invests a fixed amount in a mutual fund scheme, at a laid down frequency for a specified period or number of instalments.

- **Top Up SIP** – This is a good option for salaried people to adopt whose annual increment/bonus/dearness allowance is guaranteed. As their career progresses, they earn more and can thus increase the amount of SIP instalment at regular intervals. Suppose, you invest ₹ 5,000 every month, then you can give instructions to the AMC to increase the existing instalment by ₹ 1,000 every year. This means, that your instalment in 2nd year will be ₹ 6,000, in 3rd year it will be ₹ 7,000……and so on. This option is advantageous to invest in schemes that are performing well and giving better returns than their peers.

- **Perpetual SIP** – Unlike the traditional SIP, where the number of instalments or time period is specified for investment, in perpetual SIP the end date of the SIP is not defined at the time of signing up for the SIP. In the SIP mandate, if you leave the end date column blank, then the AMC considers it as a perpetual SIP and continues your instalments unless you give specific information to stop them.

- **Flexi SIP** – This allows an investor to vary the amount of their investments every month. He sets up and starts his SIP with a minimum default amount. Thereafter, seven days prior to the due date of the instalment, he can change the SIP amount for that month. In case of no change by him, the default SIP amount set by him gets invested. This way, he can invest more in falling markets and less in rising markets.

- **Trigger SIP** – This is basically recommended for seasoned investors who understand the market volatility since triggers encourage speculation. The trigger can be set based on NAV, index, capital, or time.

- **Smart SIP** – Introduced of late by some AMCs, this invests your monthly SIP amount in equity MFs when the markets are valued fairly and doubles your monthly SIP amount when they are undervalued. When the markets are expensive, it skips fresh investments in equity schemes and when they are very expensive it books profit and switches a part of your existing equity units into a liquid scheme. It also parks that month's instalment in a liquid scheme to later invest it in the market when it is valued fairly. The system uses an algorithm to evaluate price-to-earnings (P/E) ratio and decide the SIP contribution amount. An investor must select this option only when his investment horizon is more than 5 years.

AMFI figures given below display the rising investor confidence in SIP and their investments through this mode of investment:

Total SIP Contribution ₹ Crore during FV				
FY 2020-21 (till Dec 20)	FY 2019-20	FY 2018-19	FY 2017-18	FY 2016-17
71,347	1,00,084	92,693	67,190	43,921

Systematic Transfer Plan (STP)

….. is a good investment option when you have a lump sum amount but want to stagger your investment. STP is widely used by investors to achieve rupee cost averaging, manage risks, and rebalance portfolios.

STP – This is a good investment option when you have a lump sum amount but want to stagger your investment. STP is widely used by investors to achieve rupee cost averaging, manage risks, and rebalance portfolios. In this, you can transfer funds from one scheme to another of the same AMC. Therefore, if an investor invests his lump sum amount in a liquid or debt scheme, he can regularly transfer money into an equity scheme of the same AMC. When he books profit in the equity scheme, he can then transfer the money back into the liquid scheme. The difference between SIP and STP is that in SIP the instalment amount is deducted directly from the bank for which the investor has given the mandate, whereas, in STP it is deducted from the scheme in which the investor had previously invested the lumpsum amount. While SIP works only one-way from bank to scheme, STP works both ways between two schemes of the same AMC. The investors require minimum six instalments to start a STP. They should keep in mind exit loads and tax deductions before setting up a STP. The frequency of transfer can be daily, weekly, fortnightly, monthly or in some cases even quarterly.

In case of STP, the investor has the following investment options:

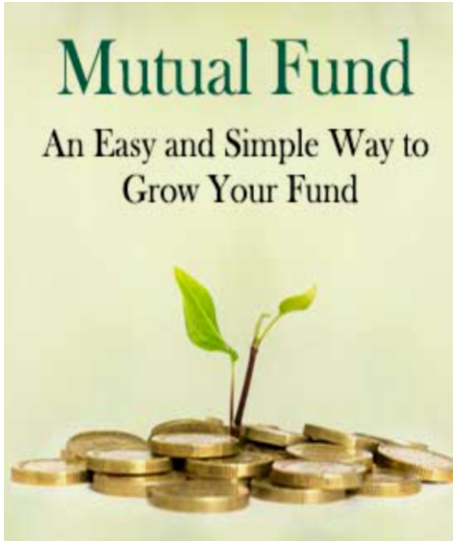
- **Fixed STP** – In this a fixed amount is transferred from one scheme to another.
- **Flexible STP** – Here the investor chooses to transfer a varied amount from the source scheme to the target scheme based on the market conditions. This implies, when the NAV of the target scheme goes down then more money is transferred from the source scheme to it. This helps the investor to invest more in falling markets.
- **Capital Appreciation STP** – This is an ideal tool for profit booking. In this, only the appreciated capital is transferred from the source to the target scheme, while the capital remains intact.

SWP – Typically retirees use this plan to systematically withdraw money from their corpus invested in the mutual funds at intervals of monthly, quarterly, semi-annually, or annually. This helps them customize their cash flow to meet their expenses and lead a comfortable lifestyle. The investor specifies a fixed amount that is withdrawn from his MF scheme and credited to his default bank account registered with the fund house on the given date. To explain this, I have selected an equity-oriented scheme from a mutual fund house with its actual NAV. If a retiree invests part of his retirement corpus, say ₹ 10 lakh in ICICI Prudential Blue-chip Fund (Growth) scheme to beat the inflationary pressure and starts withdrawing ₹ 10,000 every month to boost his monthly income, then from 01 Jan 2010 to 01 Jan 2021 he would have withdrawn ₹ 13.2 lakh. However, the invested corpus after all these withdrawals still stood intact at ₹ 9.89 lakh on 14 Jan 21, which was the date of calculation.

ICICI Prudential Blue-chip Fund (Growth)					
Period	**SWP Start Date**	**Total Amount Invested**	**Total Amount Withdrawn**	**Scheme Market Value**	**Scheme SWP Returns**
01-Jan-2010 To 01-Jan-2021	01-Jan-10	10 lakh	13.2 lakh	9.89 lakh	12.62%
Note: Calculations made at https://www.icicipruamc.com/mutual-fund-calculators/swp-calculator					

In case the retiree wants to play safe and invests the corpus in a conservative money market fund, then by investing and withdrawing identical amount as above over the same duration, his corpus on 14 Jan 21 will still be ₹ 2.37 lakh.

ICICI Prudential Money Market Fund (Growth)					
Period	**SWP Start Date**	**Total Amount Invested**	**Total Amount Withdrawn**	**Scheme Market Value**	**Scheme SWP Returns**
01-Jan-2010 To 01-Jan-2021	01-Jan-10	10 lakh	13.2 lakh	2.37 lakh	7.77%
Note: Calculations made at https://www.icicipruamc.com/mutual-fund-calculators/swp-calculator					



Summary

I have thus introduced the facets of Mutual Funds along with a brief insight into different forms of SIPs, STPs and SWP. SIPs have become the most widely selected investment option by most salaried employees, and this backgrounder would enable you to understand them better.



Colonel Raj Rakesh *is a 1980 batch ex-NDA officer who commanded an armoured regiment and converted it to state-of-the-art T-90 tanks. He served as a Brigade Major of an independent armoured brigade and as Colonel General Staff of an infantry division. Post retirement, he is a consultant with an investment advisor at Jaipur and edits their monthly investment magazine. The officer has also contributed to DIAV annual magazine 'SAMMAAN' and number of web portals.*



Selection Centre East at Prayagraj, (Allahabad). (photo credit youtube.com).

NUANCES OF OFFICER SELECTION

A large number of boys and girls seeking a commission in the Armed Forces report to Services Selection Centres every year, and go through the SSB tests. Here is a peep into what these tests are about.

After having spent six years and having assessed over 3000 candidates coming for officer selection from all parts and strata of society, it would be unfair on my part if I don't pen down the veritable procedures and their importance for the esteemed readers of this magazine. The selection system for officer selection in the Army is not only the finest but also unique, flawless and fair not only for the candidates but also to the organization. It is a selection system which has undoubtedly withstood the test of time and quality.

Though each one of us has successfully gone through this system in our times, however very little is known about the latent procedures. The whole process at Services Selection Board (SSB) is scientifically designed and implemented to cull out the best among the candidates who yearn to don the uniform of an officer and lead men. While we all have fond memories of our own attempts at SSB, I was pleasantly surprised to see that the process of assessment is also equally interesting and challenging. Each answer, each action, each gesture of a candidate has an important meaning to convey when fitted into the broad canvas of personality. The roots of the present selection system stem from the British and German armies (Military Psychology, Reuven Gal &

David Mangalsdorf, 1991) but a number of refinements have been done to suit our environment.

There are three important players in the whole process of selection: the candidate, the assessor and the selection system (which lays down the suitable level of qualities required to be an officer). The assessors are nothing but means to put the parameters of the selection system into the rolling process irrespective of their own likes / dislikes and biases. The selection system provides the guidelines and the requirements are defined in terms of personality profile of a suitable individual who could be trained in the academies to be a future leader.

The Candidate

The Candidate undoubtedly is at the centre of all activities at the selection boards. Each candidate feels that he is vying with others to get selected, hence his behavior here is immensely influenced by this mindset. Due to this perception each candidate adopts the following types of behavior:-

- **Show His Best.** Each candidate makes an endeavor to put his best foot forward in consonance with his abilities.
- **Socially Desirable Responses.** The responses given by the candidate apart from being his best are also the socially desirable ones. For example, he may be asked whether he would cheat in an examination to get good marks. Even if he had cheated when he had got an opportunity to do so, in this situation his answer will be a vehement 'no'. This is a socially desirable response.
- **Urge to do Well.** Every candidate who comes to the Selection Centre has an innate urge to do well. This urge undoubtedly brings out the best in an individual but at times, while the urge is strong the capacity/acumen is lacking. This results in negative tendencies like using unfair means, trying to show down others, complaining etc.



Navy GTO tests in progress. (photo credit en.wikipedia.org)



Group Tests in Progress. (photo credit defencetaiyari.com).

Misconceptions about the Selection Procedures

Many candidates come to the selection centres with preconceived ideas imbibed from various sources like books, guides, rejected / selected candidates etc. One such idea was speaking loudly to show boldness and speaking continuously to prove participation. The truth is words which lack substance in the matter are of no use, no matter how boldly articulated.

Effect of Coaching

Today, coaching is available for each and every type of test / interviews and books and websites on this subject are replete with information. Verily coaching is not essential for SSB. However, if a person takes coaching with a view to know about the system and then tackles the tests intelligently, he benefits. If he tries to use it in a 'ditto' manner without applying his own mind, what he produces is a very dismal picture.

The Assessors

Assessors are the backbone of the selection system. They are the architects of the foundation of the Human Leadership Resource of the Armed Forces. Assessors are predominantly Army / Navy and Airforce officers with adequate experience and above average profile, as also some psychologists from Defence Institute of Psychological Research (DIPR). There are three types of assessors; the Interviewing Officer (IO), the Group Testing Officer (GTO) and the Psychologist. Each assessor is assessing a candidate independently through his technique of personality assessment. At the end of his assessment, notes are exchanged and an objective decision is reached on the abilities / disabilities of a candidate to undergo training at the academies.



Candidates at a Selection Centre. (photo credit defencedirecteducation.com).

The Interviewing Officer (IO).

An officer of the rank of Major General / Brigadier / Colonel or equivalent from the Navy / Air Force is especially trained to conduct interviews of prospective candidates. The IO through the technique of personality interview builds a rapport with the candidate and fathoms the depths of his personality by understanding his background, academic performance, relations, awareness of surroundings and tackling of simple situations etc. Based on the verbal responses, method of tackling the questions and behavioral manifestations, the IO is able to join the threads together and crystallize a conclusive personality profile of the candidate. The interviewing technique is based on the credence that the deeds of the past and the actions of the present can be verily extrapolated to predict the future tendencies / actions. An experienced IO with his astute handling of the questions and answers is able to penetrate the façade presented by a candidate around himself and peep at the actual level of traits. The candidates trying to hide, circumvent and avoid information are also clearly identified because by doing this they leave abysmal gaps in the overall personality graph.

The Psychologist

Psychological tests in officer selection were first used by the German Army after World War I (Reuven Gal & David Mangalsdorf, 1991). This initiative was part of an attempt to surrogate quality for quantity. This practice became prevalent in most of the western countries after World War II. In layman's terms, the psychologist is assessing a prospective candidate at the subconscious level by using a projective technique. By administering various tests like Thematic Apperception Tests (TAT), Word Association Tests (WAT), Situation Reaction Tests (SRT) and self-description under a time stress (i.e. completed under a stipulated time frame), the Psychologist is able to analyse the factual responses given by the candidate. With a detailed assessment of the imagination, inner feelings, attitudes, inter - personal associations, moral and leadership qualities and reactions to stressful situations which a candidate shows in his responses, the Psychologist is able to gaze into the subconscious level of the candidate's potentialities. The interpretation of the responses is subjective (i.e. there is no right or wrong answer but each answer has a particular meaning in forming an overall personality profile of the candidate).

The Group Testing Officer (GTO)

The GTO administers a series of group tasks. The group tasks may be leaderless, individual or nominated leader tasks and consist of a number of situational tasks with each task having several ways of being tackled. Each candidate is free to choose his own role in the group, choose his priorities and engage himself in collective group activity. The GTO by his dexterous but minimal interference is able to observe the traits being displayed by each individual when he / she is working in a group and carries out an assessment of the candidates on the basis of his contribution to the group efforts. It is an observational technique in which the GTO first does a detailed briefing and then he stimulates the group into action and thereafter adopts a passive role as an observer. The basis of group testing is the premise that a human being is a social animal and his social functions are best observed in the social field i.e. a group in which the individual interacts with other members continuously in achievement of a given goal. While closely observing the behavioral roles in a group activity, the GTO is able to evaluate the quantum of an individual's social, leadership, intellectual and dynamic qualities.

The Selection System

The present day selection system has its roots in the erstwhile War Office Selection Board (WOSB) UK, but has been refined after a number of morphological changes. The present system is based on a three dimensional evaluation of a candidate by the psychologist, IO and the GTO where each one has the same quantum of marks and the same powers for selecting / rejecting a candidate. Though personality assessment intrinsically is surfeit with subjectivity, the various

modifications and changes in the selection techniques have made it sufficiently objective and reduced the ambiguity to the minimum. The procedures are scientifically sound and based on reliable psychological principles which have been validated both empirically and practically. The overall selection process is conducted in two stages - Stage 1 and Stage 2.

Stage I: Testing. This was introduced in 1998 with the aim of adding a filter to separate out those who have little chance of selection at the SSB. Essentially it can be termed as a broad sieve. On the first day, the candidates are put through two types of tests: intelligence tests and a story writing-cum-group discussion. Based on the results of the intelligence test and the discussion several candidates who have little chance of selection are weeded out and the balance go through the full SSB testing of five days.

Stage II Testing. During the stage II testing, three assessors i.e. the IO, the GTO and the psychologist carry out independent testing through their respective techniques and crystallize their assessment. Each assessor rates a candidate in 15 officer-like qualities (OLQs) and based on his level in each OLQ the assessor awards marks. The details of OLQs which are evaluated at the SSBs are: -

- **Factor I –** Effective Intelligence, Reasoning Ability, Organizing Ability, Expression.
- **Factor II-** Social Adaptability, Cooperation, Sense of Responsibility.
- **Factor III-** Initiative, Self Confidence, Ability to take Decisions, Ability to Influence others, Liveliness.
- **Factor IV-** Determination, Courage, Stamina

On the day of the final conference, all assessors sit together and carry out a meaningful discussion to decide whether a candidate should be recommended or not. When there is unanimity in decision about recommending / not recommending a candidate there is little discussion for obvious reasons, but where there is variation in assessment, a discussion takes place before reaching a decision. During the discussion, each assessor may bring out any aberrations in personality noted by his technique and the other assessors check whether the same has been corroborated by the other techniques or not. After the problem areas have been brought to light, it is important to see the quantum of the skewness and whether the training at the academies will be able to smoothen the same or not. Decision in such cases is taken after detailed deliberations and reference to certain norms and guidelines provided by the DIPR / Recruiting Directorate. The bottom-line is that an undeserving individual should not enter the organization.

Follow Up Cases

In case a chasm in some aspects of personality is seen by an assessor and the same is not corroborated by others as the individual has performed well in their techniques, the individual is cleared by the board but a 'follow up note' is attached for the training academies to keep a track of that particular aspect. A team of assessors visits the training academies regularly and interacts with the directing staff at the academies to check the progress of such cases. The studies of follow up cases are taken seriously and gainful lessons are drawn for the assessors / the selection process.

Testing Schedule

The five day testing schedule is a grueling yet an adventurous experience for the candidates. On the first day, a candidate is put through Intelligence Tests, Picture Perception and Group Discussion. On the second day there are Psychological Tests, Thematic Appreciation Test (TAT), Word Association Test (WAT), Situation Reaction Test (SRT) and self description (SD). The third day is packed with GTO tasks such as Group Discussion, Group Planning, Progressive Group Task, Group Obstacle Race, Half Group Task and Lecturette. The fourth day continues with Individual Obstacles, Command Task and Final Group Task. On the fifth day a Conference is held and results of the interview are announced. The personality interview by the IO is held either on the 2nd / 3rd / 4th day during afternoons.

To conclude...

Personnel selection is the foundation of the human resource development of any organization. But when you are selecting leaders who are to lead trained men in adverse conditions including in life-threatening situations, any organization has to be ruthless in setting and ensuring standards. As an old adage says "an army of lambs led by a tiger is better than an army of tigers led by a lamb". I would like to conclude by saying that if we have to entrust the lives of our trained soldiers in the hands of officers, then it is imperative that the selection process continues to be stringent, complete and fair and the training in the academies tough and hardening.



Colonel Mohinder Pal Singh, *PhD is an alumnus of St Xavier's College, Mumbai and was commissioned into the MAHAR REGIMENT in December 1989. He has been an assessor for over six years in Selection Centres. He is presently the Director of a Training start-up AMAS Training mentoring SSB aspirants passionately.*

WHATSAPP GROUPS LIMERICK



Dear Course Mates, my lame attempt at limericks

WA groups at times make me wonder
Am I really enjoying it, or, am I making a blunder?
Sublime at times; at times, hail and thunder
Unifying no doubt, but also pulling us asunder
Is it even a worthy endeavour?

WA brings out our traits, black, white and grey
The cool cucumber, as also the firebrand, who jumps in every fray
Rip Van Winkle, who springs from deep slumber
And hits the ground running, to forward his target number
Quick gun Murugun who, without his stride breaking
Fast Forwards all that he gets (without reading), in a twinkling
The nocturnal chap who loves his tune and his tot
The Ad Nauseum repeater, reposting old wine in old bot
The Mass Mailer, ceaseless in his endeavour
To post all that he can, persistent as a beaver
Mr Testosterone, high on life, adrenaline surging
Disdainful of the laggard, who is loath to stirring
The unapologetic pondy man strives to titillate
Sends naughty forwards, keeps it up for his mates
The philosophers delivering sermons on the mount
The Know-It –All pundit, the political fount

Sharing joys and sorrows, achievements of coursemates,
Accomplishments of progeny, their fortunes and fates
Bountiful wishes of CMs on special dates
Poignant requiems of fallen mates
Make it absolutely worthwhile; wouldn't miss it at any rate!

But there are those days when it's open season
Everyone is out, shooting with his choice of weapon
The bewildering deluge of rapid exchanges
The thrusts, the parries, the feints and the lunges
Makes one seriously doubt one's reason

That brilliant message that you so want to send
Has already been received from many a friend
So cease and desist,
And fight and resist,
Kill the urge and bring it to an end!

We know social media is messing our mind
Yet we press on relentless, inconsiderate and unkind
So dear friend of youth, dear thoughtless chum
Spare the onslaught of forwards, we are getting it in the bum

Here is a hope and a wish for the incoming New Year
May all of us be healthy, happy and in Good Cheer!
Let's not treat the group as a dumping ground
Be gentle with one another, to ensure we are still around!!



Air Marshal Harpal Singh, *PVSM, AVSM, VM (Retd) joined the 56th NDA Course and was commissioned as a fighter pilot in June 1980. He has about 2500 hours of flying experience mainly on MiG 21, MiG 23, MiG 27 and MiG 29 aircraft. He has commanded a MiG 29 Squadron and has also been a Chief Operations Officer at an Air Force Station. He has commanded two Air Force Stations in the West and East respectively. Besides his DSSC Course, he has also attended the Senior Officers Course at National Institute of Defence Studies, Japan. He has been the Deputy Commandant College of Air Warfare (CAW) and has held important appointments in the strategic arena. He was Director General (Inspection and Safety) of the IAF till his superannuation in May 2019.*







BONDING IN BARAKHANAS

The 'barakhana', literally translated as "big food", is a quintessential function in the Indian Army. It may be a 'drop of the hat' celebration to rejoice over an event, like a victory in a competition, or the end of a grueling training exercise, or the Raising Day / Battle Honour Day of a unit, in which case it would be an elaborately planned function. The barakhana is organized on large playfields, with the Subedar Major / Risaldar Major overseeing the arrangements. The invite is also extended by the Subedar Major or by the seniormost JCO host. Barakhanas are also organized at sub-unit levels, namely at company / squadron / battery level.

The barakhana enables bonding between officers and men, as the officers join the troops in their dance and revelry. In Gorkha units, the officers dance the 'Jhamre' with the men, with 'Ho Ki Hoina' shouts interspersed between each song. The Nepali numbers have a rhythm of their own, with the 'Madal' (a drum) beats setting the tune. In Jat units, the 'Ragini' evokes memories of their homes amongst the men. Bollywood presence has naturally entered the present day barakhanas, with jazz / pop bands belting out popular Hindi dance music. Punjabi foot tapping music is also a big hit, and Daler Mehndi numbers bring forth vigorous "fauji dancers", with everyone doing the Bhangra. Great fun indeed!!

Barakhanas are not just "fauji parties", they have a disciplined regimen. The troops and families are seated in company / squadron / battery enclosures before the officers arrive. The officers / JCOs and their families have a separate enclosure. The Commanding Officer or the seniormost officer present raises a toast to the unit or formation and the drinks then begin. The officers and ladies then go around the enclosures and join the men in their merriment.

In earlier times, rum was the standard drink served to all ranks in a barakhana. Off late, a variety of drinks are served like beer, vodka, whisky, thus catering for diverse tastes. Interestingly, the number of teetotalers has also increased in most units. The bill of fare however remains common to all ranks, and is normally a standard Indian menu.

The barakhana enables the officers and men to relax together, inhibitions are lowered too, and friendly chats take place. The leaders are able to sense the morale of the troops and sub-units too, as it is easy to read the barometer of enthusiasm and josh. Subdued responses would be a 'red flag' which the commanders will have to pay heed to. So, barakhanas are not just "big food", but they are bonhomie and bonding meals, morale boosting functions.



Lt Gen J S Sandhu, *PVSM, UYSM, AVSM, VSM (Retd) was commissioned into 6/5 GR (FF) in June 1980. He has vast operational experience having commanded his unit and formations in Jammu & Kashmir including the Srinagar Corps. He has also been an instructor in institutions of the defence services and retired as Military Secretary in Army Headquarters in 2019. He was a leader of great repute within the army. He is now the Editor of this magazine.*

WEIGHT & WATCH

Dr Renuka David's pointers tell you how to win the battle of the bulge, without compromising on overall health or taste

I've put on weight after the fun and feasting of the festive season just gone by, what steps can I take to ensure healthy weight loss?

Hello! Isn't this a common woe many of us face? I have some simple pointers that have worked well for me over the past couple of years.

1. Keep your fridge or larder free of unnecessary temptations like sweets with refined sugar, especially the leftovers of the festivities gone by.
2. Replace processed food that comes in a packet with healthy snacking options on hand, such as yoghurt, cashews, fox nuts (makhanas) fruits, dried fruits like walnuts, pistachios and dried apricots.
3. Whenever possible, eat healthy home-cooked meals.
4. If you are confused about the balance of food groups, here is a basic guideline for intake during the day – 50 percent fruits and vegetables (encompassing a gamut of rainbow colours), 25 percent lean protein (fish, poultry, eggs, dairy and lentils), 20 percent fibre-rich carbs (whole grains and starchy vegetables) and 5 percent good fats (ghee, olive oil and even fruits like avocadoes).
5. Ensure healthy lifestyle practices. Do not stress over the weight gain. It is all about doing one day at a time. Your quota of 7-8 hours of sleep is essential. Do not indulge in excessive exercise risking your overall health. 'All in moderation' is a healthy mantra to follow.

What local superfoods can I include in my diet for good health?

Contrary to popular belief, you needn't break the bank seeking out exotic and expensive superfoods. Everything you need is locally available in abundance and accessible. Here's what you should include in your diet:

1. **Pomegranate seeds:** These are an impressive nutrient source with benefits ranging from fibre to vitamins C and K, potassium and folate along with plant compounds. In fact, a glass of pomegranate juice contains three times as many antioxidants as a cup of green tea! It also reduces inflammation within the body, keeping diseases ranging from cancer to heart ailments at bay.
2. **Drumsticks:** The western world maybe waking upto moringa powder now, but drumsticks have been around for centuries in India. They help regulate blood sugar levels, reducing the possibility of diabetes. They also purify the blood and boost immunity thanks to the A, B and C vitamins and minerals present. The calcium and iron content lead to strong bones and teeth.
3. **Seasonal tropical fruits:** While these need to be consumed in moderation since they are rich in natural sugars, they also come with a cartload of benefits. The mango or king of fruits owes its orange-yellow hue to carotene, an antioxidant, and also has a low glycemic index. Bananas are one of the richest sources of good carbs and potassium, aiding both digestion and heart health, while papaya contains an enzyme called papain, which is a fabulous remedy for all digestive ills ranging from constipation to ulcers.
4. **Seeds:** All seeds are great for health, but chia and flaxseeds especially boast a wealth of benefits, with very few calories. They keep you filled up for longer, since they're a source of insoluble fibre while also ensuring stable blood sugar levels. Both flaxseeds and chia seeds also have high levels of omega 3 fatty acids, and lower bad cholesterol levels. They also contain high quality plant protein.
5. **Coconut water:** With summer here, what better way to stay hydrated than with Mother Nature's own concoction? Coconut water has electrolytes that are naturally found within our bodies. So if you're unwell or simply dehydrated, it helps replenish lost nutrients. It is also isotonic to human blood plasma, so it can rejuvenate patients who need a little boost on that front. Coconut water can prevent acid reflux, balancing out the body's pH levels, and also has thiamine, essential for eye health.
6. **Local probiotics:** Move over kombucha! Tried and tested home-set curds, buttermilk or lassi, and kanji (a fermented rice drink) offer fabulous probiotic benefits, balancing out the friendly bacteria in your gut, keeping your entire digestive system in shipshape.
7. **Spices:** The wisdom of using local spices in everyday cooking is for good reason! Turmeric contains curcumin, which boasts medicinal properties ranging from preventing cancer to enhancing brain function. Cloves boost



(photo credit Taryn Elliott for pexels)

The COVID 19 Vaccination: An Overview

With the vaccination drive underway in India, here's all the data you need to make an informed choice for yourself.

What should you consider before taking the COVID-19 vaccination?

India currently offers two vaccines – COVISHIELD (manufactured by the Serum Institute and developed by Oxford-Astrazeneca) and COVAXIN, India's first indigenous two-dose vaccine. Phase 3 trials are still going on for the latter. Before you decide to take the vaccine, check with your GP, or any specialists you might be consulting, if you are at risk of the side effects, or if your immunity is compromised. You might need to stop regular medication for a couple of days, give up smoking and alcohol, and improve your sleeping habits before you opt for the shot. Pregnant women, lactating mothers and children are advised against being vaccinated. Ensure you don't have any allergies that could be triggered by the vaccine.

What can I expect after I get vaccinated?

In most cases, on the arm where the shot is given, pain, redness and swelling could be experienced. Fever, chills, tiredness, general joint pain and headache are the common side effects. These symptoms normally last less than a week. On the side of caution, consult your doctor if the symptoms persist for over a week on whether and how this needs to be mitigated. Since the vaccines work on a two-dose principle, don't forget to go back for the second dose at the right time which is generally four to six weeks after the first dose.



Keep your covid-19 vaccination card among your other important identification documents. While the vaccine offers increased immunity from the virus, it does not guarantee 100 percent prevention, so continue taking utmost prevention against the SARS CoV2 virus which is responsible for COVID19, following all the protocols such as hand washing, wearing masks and practicing physical distancing.

liver and eye health, while cardamom has antibacterial properties and improves respiratory function. Cumin aids in weight loss and helps lower cholesterol.

8. **Honey:** Pure, raw honey is another food found in nature, which can be bottled and preserved without a shelf life! Its plant compounds called polyphenols prevent heart disease. It has antiviral, antifungal benefits, can heal wounds, cure a sore throat and cool down the digestive organs.
9. **Garlic:** Add a couple of pods of garlic a day to your diet for overall health benefits. Even Hippocrates, the ancient Greek physician, advocated this! Allicin, a compound found in freshly-crushed or cut garlic combats sicknesses ranging from the common cold to blood pressure. It is a complete detox ingredient, improves bone health and can neutralise free radicals in the body.

Is my weighing scale an indicator of progress?

Weight isn't always linked to size! While it is a general indicator of whether you're within safe limits for your height and age, knocking off inches doesn't necessarily mean it's going to reflect on the weighing scale. This is primarily because with diet and exercise, you convert fat to muscle. The weighing scale, of course, doesn't know this! Also, understanding your body is important. Weight fluctuates through the day depending on mealtimes, bathroom usage, water retention and so on. So instead of only using the weighing scale as an indicator, start noticing other things – like how your clothes fit. Also, maintain a positive body image. If you're a healthy weight, and are eating and exercising right, don't obsess about those last 500 grams or 5 cm. Occupying lesser space in the world isn't necessarily linked to good health!



Dr Renuka David,
MBBS, PGD (MCH), USA-PhD (HC) is the Managing Director of Radiant Medical Services and an alumnus of the Coimbatore Medical College. She has been a frontier doctor, working extensively with women and young adults in urban, rural and tribal India. She has also been a contract doctor with the Indian Army for three years. Dr Renuka dons many avatars as an entrepreneur, doctor, professional speaker, television show host, TEDx speaker and wellness expert.
She is the Founder-Curator of the immensely successful Radiant Wellness Conclave.
For medical queries, please email: ask@drrenukadavid.com

REFLECTIONS ON PILOTS TRAINING

Air Marshal Harish Masand, VrC, VM (Retd)
A gallantry award winner from the 1971 war and a prolific writer, he has been an instructor in several establishments.



Most modern Air Forces have to invest heavily into training the pilots and support staff, as contemporary aircraft have many technological advances in avionics fitted into the airframes. The quality of the pilots and support systems decides the battle winning ability of the Force. Realising this importance, I would like to share some thoughts related to training pilots of the IAF based on my personal experience of 40 years.

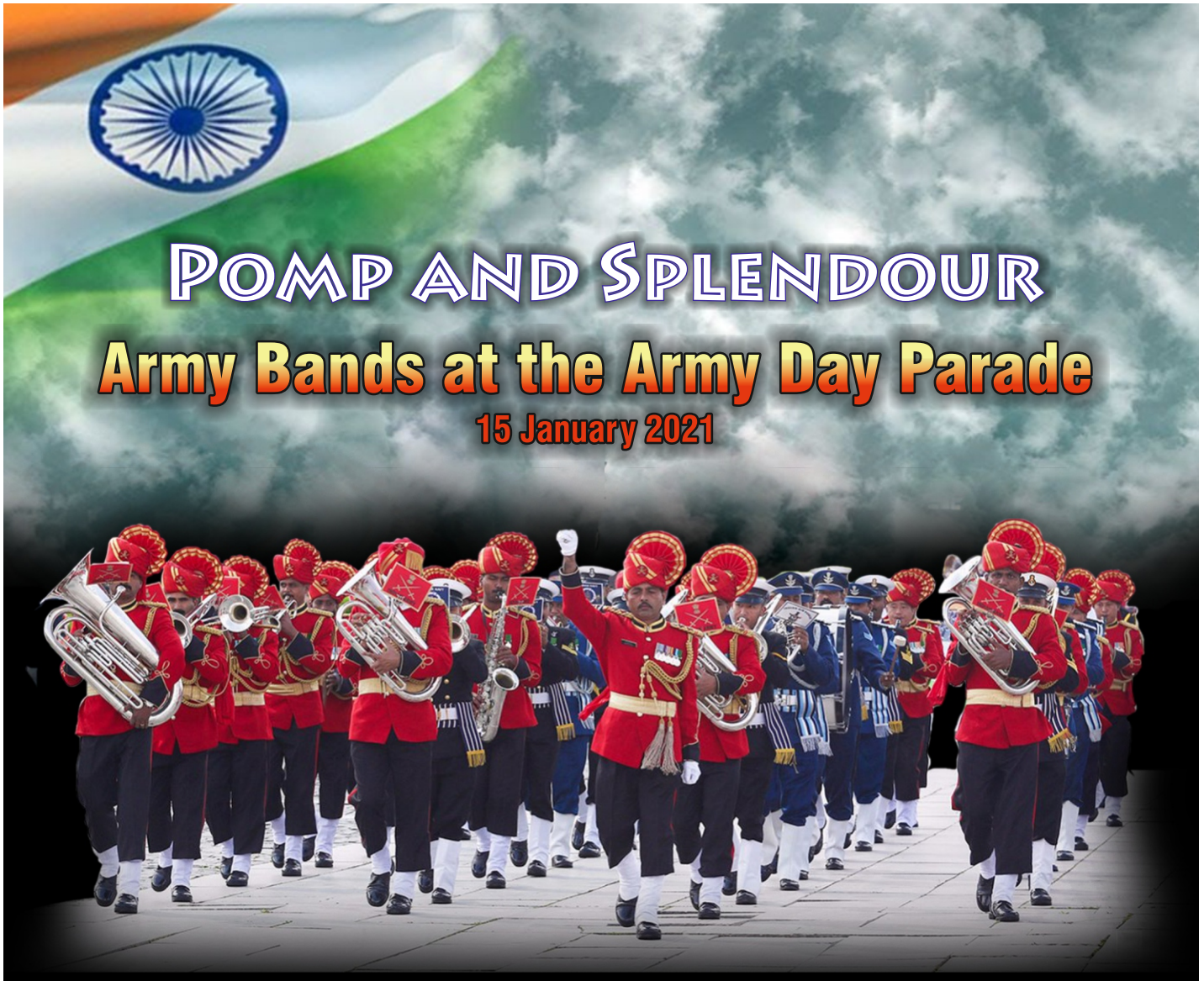
To recap, I wish to highlight that our pilots' course, the 98th GD(P), was the last of the emergency courses in the IAF in the wake of the Sino-Indian conflict of 1962 and the rapid expansion which took place thereafter. We started with close to 300 cadets in 1965-66 but only 183 finally passed out as pilots or navigators on December 31, 1967. Thereafter in 1968, as a fighter pilot, I personally did barely 20 hours of flying on Vampires in Poona and 15 hours on Hunters in OTU, Jamnagar instead of the usual 50 hours syllabus. An inadequate total of 35 hours of fighter flying in a whole year. In 1968-69, we had around 52 pilots each in both the Hunter squadrons in Hasimara against an establishment of 20.

By December 1971 when the war started, I had barely 240 hours on Hunters, averaging about 65 hours per year for four years of service. However, looking at the positive side, our training was hard, the leaders demanding and the slightest mistake or non-performance saw pilots grounded and on their way to Air Traffic Controller and Fighter Controller courses. So, while the number of hours was meagre, we had to cope well and every sortie mattered in adding to the skill levels. In this time in Hasimara, I formulated a 'Theory of Paths', which helped me tremendously in tactical and combat flying. As a leader thereafter, and an instructor after 1974, I explained this theory to all my pupils, and even some senior transport pilots converting to fighters, and demonstrated how to use it effectively in various phases of flying. I also preached the importance of flying smoothly without constant movement of controls so that one could fly accurately by feel with minimal reference to instruments. My mantra was that, as a fighter pilot, one had to try and spend minimal attention inside the cockpit, not really quantifiable but say less than 5%, while spending the remaining 95% on all other aspects of single-seat fighter flying including navigation, communications, maintaining station, spotting and control of the formation in combat.

Such techniques helped me train my own pupils, juniors and subordinates to very high standards while identifying weak links. My slogan was, 'I'd rather have empty cockpits on the tarmac than have no cockpits or pilots'. Such training and evaluation methods ensured that we flew in the toughest of conditions with confidence without any losses whatsoever. Without being immodest, this also prompted one of my pupils to point out just before my retirement that all the pilots who served under me were still alive. To be honest, the only aircraft or person I lost, many years after he moved to another squadron, was Flight Lieutenant Koty Rao whose engine in a MiG-21 flamed out on short finals and his ejection sequence did not work. Personally also, I had a charmed life without any accidents with 'God is my Co-Pilot' always inscribed on every helmet I flew with.

In our time, we did not have any meaningful and realistic simulators and everything had to be thought of on the ground, perhaps visualized before you drifted off to sleep, and practiced on the aircraft. With advances in technology, very realistic simulation is now possible for almost all facets of fighter flying, including through Virtual Reality. At the same time, the costs of modern aircraft have grown exponentially and a loss has a significant impact on force-levels. The costs of a human life and the training imparted are incalculable. It, therefore, behoves the Air Force to increase its focus on simulators and use precious fighter aircraft only for certain training and combat missions.

As a matter of fact, Beyond Visual Range (BVR) combat actually lends itself to simulation, particularly in large-force engagements that require a large number of pilots and controllers to network and operate in unison as a coordinated team. Perhaps, Virtual Reality can make such simulation even more realistic and the training far more cost-effective. Concurrently, such simulation minimizes the risk of collisions and accidents inherent in large-force engagements. Saving of precious resources for actual combat is surely the ultimate objective of all combat forces and the IAF cannot afford to lose or waste precious resources, particularly now with its strength way down from the authorized 42 combat squadrons.



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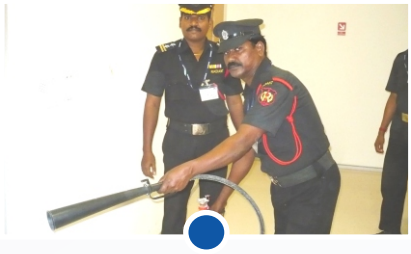

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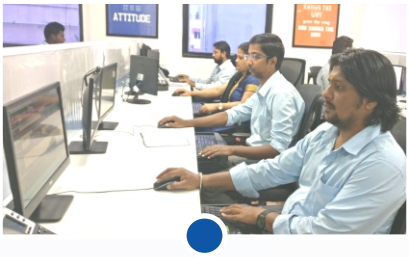

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