VAYU

Aerospace & Defence Review

V/2024

Visit to IAF's Heritage Flight
IAF's Mil Mi–26 story
IAF in International Exercises
Army 2024 Moscow

Visit to IAF's No. 81 Sqn (Skylords)
AMCA: An Indian 5th Gen story
IAF's Exercise Tarang Shakti 2024
Farnborough/RIAT 2024 reports

LOCKHEED MARTIN

LOCKHEED MARTIN SALUTES THE INDIAN AIR FORCE

Lockheed Martin is committed to advancing India's indigenous defence manufacturing ecosystem through the strategic and exclusive F-21 and the proven and ready C-130J — delivering 21st Century Security® solutions to enhance India's sovereignty and air superiority.

VAYU
Aerospace & Defence Review
V/2024

Cover : Duo of Tigermoth and Harvard of IAF's Heritage Flight based at Hindon, India. Photo by Angad Singh (Twitter @zone5aviation)

Editorial Panel

EDITOR
Vikramjit Singh Chopra

EDITORIAL ADVISOR
Admiral Arun Prakash

FOUNDER EDITOR
Pushpindar Singh

EDITORIAL PANEL
Air Marshal Brijesh Jayal
Dr. Manoj Joshi
Lt. Gen. Kamal Davar
Air Marshal M. Matheswaran
Nitin Konde
Sayan Majumdar
Richard Gardner (UK)
Reuben Johnson (USA)
Bertrand de Boisset (France)
Dr Nick Evesenkin (Russia)
Tamir Eshel (Israel)

ADVERTISING & MARKETING MANAGER
Husnal Kaur

BUSINESS DEVELOPMENT MANAGER
Premjit Singh

Follow us on Twitter @ReviewVayu

We have completed 50 years of publication!

To celebrate our Golden Anniversary, we will be bringing out a Special Issue end of October 2024 to mark the event.

Regular features:

Opinion, Viewpoint, Aviation & Defence in India, World Aviation & Defence News, I learnt more than flying from them, Vayu 25 Years Back, Tale Spin.

Published By

Vayu Aerospace Pvt. Ltd.
E-52, Sujan Singh Park,
New Delhi 110 003 India
Tel: +91 11 24617234
Fax: +91 11 24628615
e-mail: vayuaerospace@lycos.com
e-mail: vayu@vayuaerospace.in

Printed by Advantage Offset, New Delhi

The opinions expressed in the articles published in the Vayu Aerospace & Defence Review do not necessarily reflect the views or policies of the Publishers.

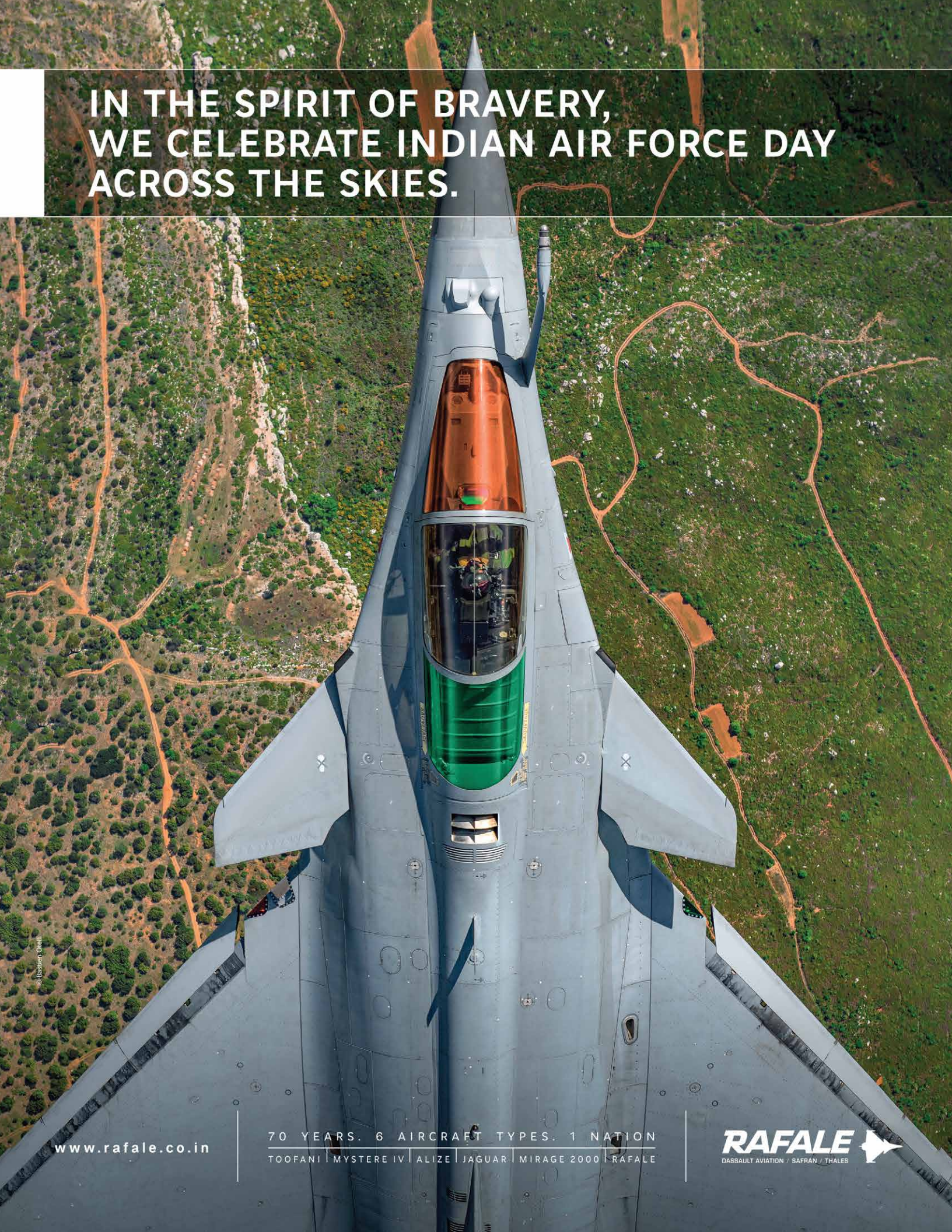
SUBSCRIPTION DETAILS

1 year/6 issues	Rs 700/– (incl postage)
2 years/12 issues	Rs 1200/– (incl postage)
3 years/18 issues	Rs 1800/– (incl postage)

BANK TRANSFER DETAILS

Account Name	:	Vayu Aerospace Private Limited
Account no.	:	52505132156
Type	:	Current Account
IFSC Code	:	SCBL0036027
Bank Name	:	Standard Chartered Bank
Branch	:	10, Sansad Marg, New Delhi 110001 (India)
PAN	:	AAFCV1240H
GSTIN	:	07AAFCV1240H1ZK

The above rates are valid for delivery within India only.
For international deliveries, please visit website.


IN THE SPIRIT OF BRAVERY,
WE CELEBRATE INDIAN AIR FORCE DAY
ACROSS THE SKIES.
© Rastier/Opell
www.rafale.co.in
70 YEARS. 6 AIRCRAFT TYPES. 1 NATION
TOOFANI | MYSTERE IV | ALIZE | JAGUAR | MIRAGE 2000 | RAFALE
RAFALE
DASSAULT AVIATION / SAFRAN / THALES

Admiral Arun Prakash says....

A holistic national security policy critical

The findings of the 1999 Kargil Review Committee Report start with these words; "…the Pakistani armed intrusion in Kargil sector came as a complete and total surprise to the government, army, and intelligence agencies…" In fact, "surprise" is a leitmotif that runs, unbroken, through independent India's national security discourse. The onus of responsibility for national security was placed squarely on the politician's shoulders, by Prussian strategist Carl von Clausewitz's dictum, that war was a "branch of political activity". Consequently, understanding the compulsions of national security and evolving strategies for achieving security objectives have become the sine qua non of the civilmilitary security establishments of major powers.

In India, Clausewitz's dictum has been implemented somewhat selectively. While adherence to the principle of "civilian control" has ensured that the soldier remains subordinate to the elected representatives, the latter has delegated the exercise of authority to the defence bureaucracy, and both have remained ambivalent about their responsibility vis–a–vis national security.

The creation of two new entities in 2020 after decades of procrastination by successive governments — a Department of Military Affairs (DMA) and a Chief of Defence Staff (CDS) — was deemed the most significant national security reform since Independence for two reasons. Not only did the CDS become the first ever military officer to be recognised as a government functionary in the "Allocation of Business Rules", but the onus of management of the armed forces, also shifted, from the Defence Secretary to the CDS. Paradoxically, the responsibility for the "defence of India, and every part, thereof," still remains with the civilian Defence Secretary.

The decision to go to war should come only after politicians and diplomats have exhausted all other avenues of dispute resolution. If war is, indeed, a political compulsion, it must be waged with the aim of eliminating the underlying casus belli to achieve enduring peace. This places three responsibilities on the country's political leadership: (a) to lay down clear aims for every military operation; (b) to specify the desired 'end–state' before conflict termination; and (c) to ensure that adequate resources are provided, well in time, for warfighting.

Unfortunately, in India, these stipulations have been disregarded time and again because the Indian politician has remained detached from issues related to national security. In 77 years of independence, no government has ever undertaken a defence review, or issued a defence white paper, or a national security doctrine/strategy. Total preoccupation with election related pursuits leaves our political order little time or mental space to devote to national security, except when it is seen as a "vote–catcher".

MBDA

EXCELLENCE AT YOUR SIDE REAL PARTNERSHIP.

MICA RF

METEOR

SCALP/STORM SHADOW

EXOCET AM39

MICA IR

MBDA's air-to-air and air-to-surface missile systems equip the must-have Rafale in service within the Indian Air Force and offered to the Indian Navy. In air warfare there is no medal for second best.

OPINION

The long term security policies of a state must be rooted in perceptions of its vital interests, and guided by a long term vision of its place in the regional or world order. Therefore, all major powers undertake periodic reviews of their evolving national security objectives, the options available, and the economic and military means available for achieving them. Such reviews automatically generate assessments of existing or potential adversary threats, as well as own military's material state, capabilities and readiness.

From here, it is a short step to estimation of capability, shortcomings and the funding support that the national exchequer must generate. Apart from providing fiscal guidance, this process also facilitates the evolution of a national security strategy. By not undertaking these exercises, the government deprives itself of a holistic national security picture with regard to: where we stand, where we want to go and how we intend to get there.

Technological advancement

Moreover, given the rapid pace of technological advancement, the absence of a long term roadmap creates seemingly intractable issues for the military. Our stalled transition to theatre commands is a proximate example. Recent conflicts have thrown up other posers for the military, such as the role of cyber and drone warfare, employment of armoured forces, vulnerability of warships at sea and continued relevance of manned aircraft in combat. Such force architecture conundrums can only be resolved in the context of a larger national level strategic vision.

Other nations have shown greater clarity and resolve. In the Indo–Pacific region alone, the past five years have seen 14 countries issuing national security strategies, policies or defence white papers. Apart from major powers like the US, China and Japan, this list includes Australia, Indonesia, Vietnam, South Korea, Malaysia, Singapore, Thailand and the Philippines. Of interest is China's example. Its political leadership has, since 1995, been issuing a defence white paper (DWP) every two years. The 11 DWPs issued so far — all public documents — discuss geo–political objectives, force structures and defence economics, against the backdrop of clearly stated national security aims, objectives and challenges.

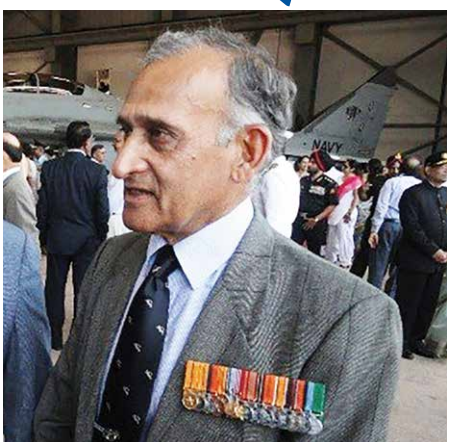
India's National Security Secretariat has produced many draft strategy documents, but none have seen the light of day. Regardless of this vacuum, the three armed forces have gone ahead, and issued doctrines or strategies, or both, with the stated objectives of providing, for example; "broad tenets for the prosecution of operations, across the entire spectrum of conflict"; or "strategic guidance for growth, development and deployment of the service". However, in the absence of formally enunciated national aims and security objectives, and given the silence of MoD and Parliament on such issues, one wonders about the degree of conformity between the military's doctrinal thought process, and the politician's Weltanschauung (world view).

The world's most populous nation, and fifth largest economy, India is a nuclear weapon state with a military that counts amongst the largest in the world, and a defence budget of US $ 75 billion. And yet, there is a view that India "punches below its weight" because Indian statecraft has been unable to leverage its significant national power to deter or dissuade neighbours from undertaking actions inimical to its interests.

As he commences his second innings in the MoD, our Raksha Mantri may note that his Chinese

counterpart, Admiral Dong Jun, was till January 2024, the serving PLA Navy chief. This, first–ever appointment of a career naval officer as head of China's armed forces, is a testament to the importance Xi Jinping has placed on bringing professional expertise to bear on the ongoing transformation of China's national security and military, in general, and its navy in particular.

The scale, complexity and diversity of security challenges that India faces today will continue to test the acumen of its statesmen, diplomats and soldiers. In this milieu, coherent security policies will serve to dispel perceptions of laxity or indifference towards national security and grand strategy. Using all its tools of statecraft, India needs to evolve a holistic national security strategy that will guarantee, firstly, a safe breathing spell for the country to build its economic, industrial and military sinews; and thereafter, the effective employment of its comprehensive power to stand up to external adversaries.



In the photo above is Admiral (Retd) Arun Prakash

Lt Gen Kamal Davar says...

...Many challenges lie ahead as new chief takes charge of Indian Army

Assuming command of the second largest and unquestionably the finest Army in the world would be the rarest of rare honour for any professional soldier. In a world at war with itself, and India too facing diverse security challenges to its progress and peace, this hallowed command brings with itself traditional and many unknown emerging problems, which may arise, to encounter and overcome. Thus, India's 30th Chief of the Army Staff (COAS), General Upendra Dwivedi, who took charge on 30 June 2024, will have, in all likelihood, an eventful and exacting tenure ahead. That he carries with it the best wishes of his countrymen and the support of the government and the other services is a foregone conclusion. His early days in command have already witnessed recurring terrorist acts in Jammu and Kashmir by Pakistani origin terrorists.

Though each COAS formalises his professional agenda according to his strategic perception and priorities, similar challenges persisting for years and decades are common problems for successive commanders. Among the many enduring confrontations, dealing with a continually assertive and overly ambitious China will remain India's most critical challenge.

The COAS, having been the Northern Army commander earlier, would thus have full and intimate knowledge of China's provocative proclivities towards us. His directions to all formation commanders confronting the Chinese in the western, central and eastern sectors along the Line of Actual Control (LAC), and Indian troops displaying their usual grit wherever the Chinese indulge in mischief, will go a long way in effectively sending the nation's and General Dwivedi's message across to the Chinese. The COAS may consider the planning and execution, if necessary, of mirroring actions by us to counter the Chinese mischief.

The Army Chief, by virtue of having been the vice chief in his last appointment, would be more than conversant with the nuances of the Integrated Theatre Commands, whose establishment has been dodging the armed forces despite the government having given the green signal. In concert with the Chief of Defence Staff (CDS) and the other two chiefs, General Dwivedi must push the creation of these commands even if it is done with deliberation and without haste. It's time our top hierarchy in the armed forces employ their collective wisdom to get on with this much needed transformation.

Another area of collective study and analyses are the lessons emerging from the Russia–Ukraine War and the Israel–Hamas conflict. The COAS, and especially his Army Training Command along with the two other services, must delve deep into the nuances of such wars albeit in the sub–continental context. These two ongoing conflicts have given a new and an unexpected orientation to the pursuit of conflicts in today's age, which appears radically different than the wars fought before these conflicts began. Similarly, the unorthodox but intensive employment of the once humble drones, now emerging as major force multipliers, must be studied in the India–China and India–Pakistan scenarios.

These two ongoing conflicts have given a new and an unexpected orientation to the pursuit of conflicts in today's age, which appears radically different than the wars fought before these conflicts began. Similarly, the unorthodox but intensive employment of the once humble drones, now emerging as major force multipliers, must be studied in the India–China and India–Pakistan scenarios.

The already promulgated "Agnipath" concept, giving birth to "Agniveers" has already, once again, become the subject of heated discussions, albeit more on political grounds. Along with the other services, the COAS must revisit the "Agniveer" concept and advise the government to tweak this scheme vastly or scrap it. But the services must not let the bureaucracy overrule the services' requirement of ensuring combat effectiveness being the first principle for Agniveers or any other form of military recruitment. If the government is looking for pruning the burgeoning pension bill of the three services, there are other more effective ways of doing so. In the defence ministry, for example, there are some offices which can be removed as their contribution to the overall security effectiveness of the nation is long over.

The COAS will have to look into the rightful issue of finding more money (capital expenditure) within the Army to muster enough resources for modernisation. Meanwhile, as the Army's operational commitments along the India–China and India–Pakistan borders continues to grow, it must be emphasised to the Centre that instead of raising additional units in the paramilitary forces, the same can be done in the Army for when the balloon goes up, the first responders to battle the enemy and the last bastion of the nation is the Indian Army.

Though it was felt that in the last two years terrorism had been largely reduced in J&K, since Narendra Modi government 3.0 was sworn in, Pakistan has upped the ante by resorting to terrorism acts in the region south of the Pir Panjal and recently in the hitherto untouched Kathua region. The Army Chief will have to now revisit our entire counter–terrorism strategy, reinforce our counter–terrorism grid and at the local levels, unit and formation commanders will have to become far more intelligence–savvy and tactically more alert and aggressive. It is certain that at this juncture, the COAS and the top security hierarchy of the nation will be contemplating even some strategic counter–measures to effectively thwart Pakistan from further mischief. Pakistan has to be firmly told that India has not yet exploited the many fault lines existing within Pakistan and they had better curb their terrorist tendencies before they are made to face India's wrath.

Modernisation of equipment and platforms, acquisition of tomorrow's technology, adaptation to newer forms of warfare and enhancing the Army's combat capabilities will also be of major concern for the new COAS.

Importantly, ensuring synergy and better inter–operability among the three services will equally be his KRA. His leadership of the most disciplined and professional fighting force in the world will be critical for the peace and stability of the region and the government must provide it the necessary wherewithal for it to excel in all domains of warfare.

The writer, a retired lieutenant–general, was the first head of India's Defence Intelligence Agency, is a long–time Pakistan watcher and has been involved in Track–2 diplomacy.

All photos: Indian Army

Lt Gen Kamal Davar says…

…..Deepening Russia–China ties will impact South Asian geopolitics; India needs to remain vigilant

Global geopolitics is indeed a dynamic phenomenon with regional and international disruptions impacting its contours with varied implications for the stakeholders involved. Russia and China, which for decades have sustained a complex relationship, are now seeking to deepen their ties which is likely to influence the existing global order, primarily the US, European Union and, of course, India.

Recently, US Secretary of State Antony Blinken and some other officials visited China ostensibly to repair ties between the two powerful nations. However, Russian President Vladimir Putin, amid the ongoing over two year old Russian–Ukraine War, paid a visit to China and met Chinese President Xi Jinping. This 43rd meeting between these two leaders pledged a "new era" of partnership between them. That its outcome would be primarily directed against the common foe of both these nations, the US, both militarily and in its economic impact, is reasonably clear. This meeting also marked the 75th anniversary of China–Russian diplomatic relations and reiterated "strategic cooperation" and a "comprehensive partnership" between the two nations.

Russia, after its February 2022 invasion of neighbouring Ukraine, faces increasing economic sanctions from the West and requires the assistance and cooperation of nations to keep itself economically resilient to bear the burgeoning costs of the war and keep its economy on rails. China, with its deep pockets, coupled with its varied endeavours confronting the US, thus fills the bill admirably.

Russia needs China

Amazingly, Russia appears now to tow the China line and displays no hesitation in playing the 'junior partner' to China as long as the latter assists Russia in weathering the economic impact of sanctions by the West. The latter is Russia's leading trade partner while Russia is only number six for China. Trade between these two nations has been on the increase with their bilateral trade touching a whopping 240 billion US dollars. While economic sanctions by the West have impacted both nations, Russia has been affected much more than China and thus Russia needs China more than ever before.

China is a major buyer of Russian oil and also a supplier of military components to Russia. Michael Kugelman, South Asia expert at the Wilson Center, has recently opined that "Russia will want to do everything it can to keep China close, especially as it is facing the very real threat of global isolation particularly from more consequential powers." He added, "If the war in Ukraine continues to rage on, Moscow will need economic support. But it doesn't have that many friends who can provide the kind of support it needs, China being one of the few."

However, notwithstanding the current bonhomie, the Chinese are wary of the Russian invasion of Ukraine as for the first time the US

has blacklisted nearly 50 Chinese companies for dealing with Russia. The US has also taken some steps to restrict China's global trade and technological presence thus driving China and Russia to get closer to confront the US and West's trade wars against them. In 2023 Russia overtook Saudi Arabia as China's main oil supplier.

Overall, China is content as long as Russia contributes to its economy and the war in Ukraine helps it to discredit US diplomacy. In varied ways, China is combating US hegemony as part of its long term strategy. In addition, Xi Jinping is also trying to mend fences with the EU and drive a wedge between the US and the EU, especially in matters of trade.

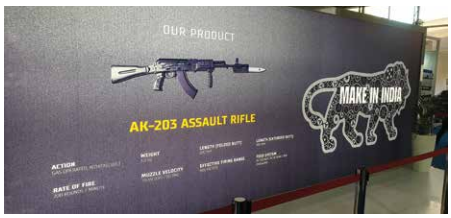
Though Russia and China appear to strengthen their ties, the Russians could not have forgotten the old border disputes between them and China. They would also recall China's debt–trap diplomacy and financial handling with many nations China is engaged with. Nevertheless, Russia is not the Soviet Union and. in the current times, Russia's financial commitments push them to warm up their relations, both mutually and globally, with an assertive China.

Traditional India–Russia ties

Apart from the US, another nation on China's radar to be constantly undermined is India. For the last 60 years or so, Russia has been India's major military supplier for her armed forces and even now continues to fulfil a major chunk of India's military needs. During the wars India has fought in the past, Russia faithfully discharged its business commitments, unlike the US and UK, which had imposed sanctions on India. India is naturally concerned that, owing to the growing economic linkages between China and Russia, the former does not influence Russia to stop supplying vital requirements for the Indian Armed Forces.

For the last 60 years or so, Russia has been the major and faithful supplier of defence equipment and military platforms for the Indian Armed Forces. According to the SIPRI figures, between 2013–2017 Russia accounted for nearly 62 percent of India's arms purchases but between 2018–2022 these sales dipped to 45 percent or so with France emerging as the second largest arms supplier for India. However, India and Russia have institutionalised their military cooperation for the period 2021–2031 by signing a pact which also includes cooperation in research and development and licensed production. Currently, technical cooperation is being witnessed apart from other weaponry in bilateral projects like T–90 tanks, Su–30MkI, MiG–29K, Kamov and above all the Brahmos guided missiles which are being improved in various characteristics.

Recently, India has also commenced production of AK–203 rifles. Russia is also making efforts to enter into India's forays in the selection of its Advanced Medium Combat Aircraft and the future production of fifth–generation fighters.



Nevertheless, India is chary of Chinese influence to disrupt its purchase of the already contracted S–400 air defence systems and later the S–500 from Russia. India will be looking forward to cooperating with Russia in the development and acquisition of hi–tech weapons including nuclear powered submarines, cyber warfare, AI and space warfare etc.

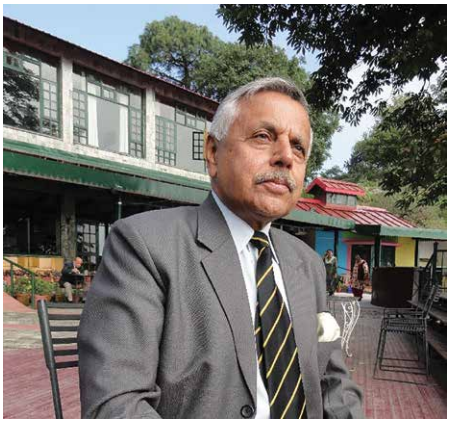
Apart from military cooperation, both nations, reportedly, are engaged in cooperation in metallurgy, mechanical engineering products and pharmaceuticals. In addition, Russia is now catering to around 35 percent of India's oil needs from a meagre 3 percent earlier.

Though the Russians will not be too happy with India now trying to diversify its arms purchases, recently Russian Foreign Minister Sergey Lavrov stated that they respected India's decision to look for arms purchases from sources beyond Russia. Moscow continues to support New Delhi's quest for permanent membership of the UN Security Council. India too has refrained from condemning the Russian invasion of Ukraine, an example of quid pro quo in international relations.

China's South Asian forays

China, however, continues with its efforts to restrict India in the South Asian region. It is making all out efforts to employ its famed debt trap policy to lure India's neighbours away from India. Pakistan is virtually China's colony and in recent years China has redoubled its infamous endeavours to rope in Bangladesh in its area of influence. Thus in the immediate future, Indian diplomacy will have to utilise all its genius to ensure South Asia does not succumb to China's machinations.

India must remain ever vigilant in ensuring that the growing China–Russia bonhomie does not adversely impact it. For that India will have to maintain its traditional cordial relations with Russia. This aspect will have to be substantially factored into the newly elected Indian government's foreign policies.



The writer, a retired lieutenant–general, was the first head of India's Defence Intelligence Agency, is a longtime Pakistan watcher and has been involved in Track–2 diplomacy.

DRDO tests Phase–II BMDS

Defence Research & Development Organisation (DRDO) successfully flight–tested Phase–II Ballistic Missile Defence System on 24 July 2024. The target missile was launched from LC–IV Dhamra at 1620 hrs mimicking adversary ballistic missile, which was detected by weapon system radars deployed on land and sea and activated the AD interceptor system. The test has demonstrated Nation's indigenous capability to defend against the ballistic missiles of 5000 km class.

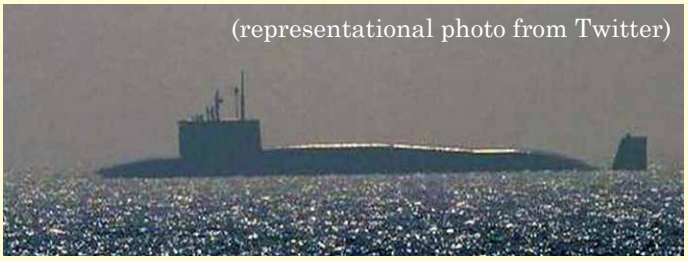
DRDO tests LRGB 'Gaurav'

Defence Research and Development Organisation (DRDO) carried out a successful maiden flight test of Long Range Glide Bomb (LRGB), Gaurav from a Su–30MKI platform of the Indian Air Force (IAF). Gaurav is an air launched 1,000 kg class glide bomb capable of hitting targets at long distance. After being launched, the glide bomb steer towards the target using highly accurate hybrid navigation scheme with a combination of INS and GPS data.

2nd nuclear powered INS Arighaat commissioned

The second Arihant Class submarine 'INS Arighaat' was commissioned into the Indian Navy on 29 August 2024 at Visakhapatnam in the presence of Raksha Mantri Rajnath Singh. In his address, the Raksha Mantri exuded confidence that 'Arighaat' would further strengthen India's nuclear triad, enhance nuclear deterrence, help in establishing strategic balance and peace in the region, and play a decisive role in the security of the country. The minister commended the Indian Navy, DRDO and the Industry for their hard work and synergy in achieving this capability. He termed this self–reliance as the foundation of self–power. He appreciated the fact that the country's industrial sector, especially MSMEs, had received a huge boost through this project, and more employment opportunities had been created.

The construction of INS Arighaat involved the use of advanced design and manufacturing technology, detailed research and development, utilisation of special materials, complex engineering and highly skilled workmanship. It has the distinction of having the indigenous systems and equipment which were conceptualised, designed, manufactured and integrated by the Indian scientists, industry and naval personnel.



(representational photo from Twitter)

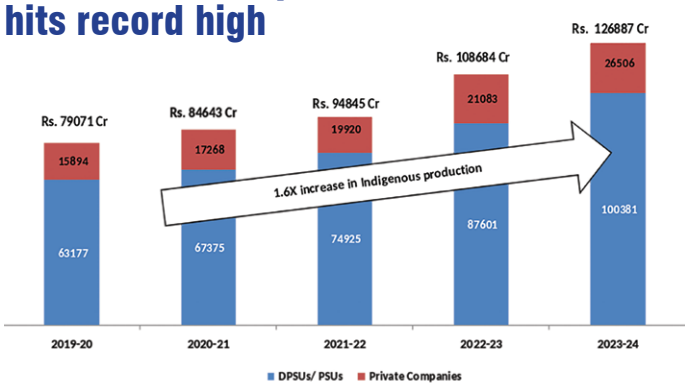
Indian Army orders additional 73,000 SIG716 rifles

"SIG SAUER, Inc, is honoured to announce a second procurement contract with the Government of India, Ministry of Defence to supply an additional 73,000 SIG716 rifles. When completed, 145,400 SIG716 rifles will be in service with the Indian Army", stated the company. The SIG716 is an enhanced AR platform chambered in 7.62 NATO featuring a 16 inch barrel, M–LOK handguard and a 6–position telescoping stock. SIG SAUER designs and builds the SIG716 rifles for the Indian Army and for all of its customers in the United States.

ISRO's SSLV–D3 successful

The third developmental flight of SSLV is successful! The SSLV–D3 placed EOS–08 precisely into the orbit on 16 August 2024. This flight completes the SSLV Development Project and enables operational missions by Indian industry and NSIL.

Annual defence production hits record high



Ministry of Defence has achieved the highest–ever growth in indigenous defence production in value terms during Financial Year (FY) 2023–24. As per the data received from all defence public sector undertakings (DPSUs), other PSUs manufacturing defence items and private companies, the value of defence production in the country has gone up to a record high figure of Rs 1,26,887 crore, reflecting a growth of 16.7% over the defence production of the previous financial year.

MoD's 5th Positive Indigenisation List

In a major boost to Aatmanirbharta in defence and minimise imports by Defence Public Sector Undertakings (DPSUs), Department of Defence Production (DDP), Ministry of Defence notified the fifth Positive Indigenisation List (PIL) consisting of 346 items on 16 July 2024. These include strategically important line replacement units, systems, sub–systems, assemblies, sub–assemblies, spares and components and raw materials, with import substitution value worth Rs 1,048 crore.

DAC clears acquisitions for IA and ICG

A meeting of the Defence Acquisition Council (DAC), under the chairmanship of Raksha Mantri Rajnath Singh, took place on 29 July 2024, in which various capital acquisition proposals were considered. Acceptance of Necessity (AoN) was accorded to the procurement of Advanced Land Navigation System (ALNS) for Armoured Fighting Vehicles (AFVs) of the Indian Army. In order to enhance the capabilities of the Indian Coast Guard, the DAC accorded AoN for procurement of 22 interceptor boats with latest systems capable of quick interception and shallow water operation in territorial waters.

RRM visits HAL

Raksha Rajya Mantri Mr Sanjay Seth visited HAL facilities on 15 July 2024 and said the Company had a huge role to play in achieving 'Make–in–India' dream in defence. He addressed HAL's top management. HAL made presentations covering its product profile (the present and the future), current ROH, aircraft upgrade and modifications, avionics developments, exports, engine production, manned and unmanned aerial vehicles, indigenisation measures, civil MRO initiatives and support given to various ISRO platforms.

RRM visits BEL

The Minister of State for Defence also visited Bengaluru Complex of Bharat Electronics Limited (BEL) on 16 July 2024. The RRM visited Precision Manufacturing Facility at Advanced Defence Systems Navy (ADSN) Strategic Business Unit (SBU), Military Radars SBU and the EMI/EMC Lab. The Minister was given a demo of the Coastal Surveillance System and the Perimeter Security System.

BEL in tripartite MoU for ammunition

Bharat Electronics Ltd (BEL) signed a tripartite MoU with joint stock company Rosoboronexport, Russia, and MSK Business Solutions Pvt Ltd for co–operation in the licensed production and supply of indigenised ammunition: 30 mm ammunition (HEI and HET), 40 mm ammunition (VOG–25) and 30 mm grenade ammunition (VOG–30 D). The MoU aims at leveraging the complementary strengths and capabilities of BEL and Rosoboronexport.

BEL registers growth of 46%

Bharat Electronics Limited (BEL) achieved a turnover of Rs.4,105 Cr, registering a growth of 19.10% during the 1st Quarter of FY 2024–25, as against the turnover of Rs. 3,446 Cr recorded in the corresponding period of the previous year. The order book position of the company as on 1 July 2024 stood at Rs. 76,705 Cr.

MoU for facilities in Tamil Nadu corridor

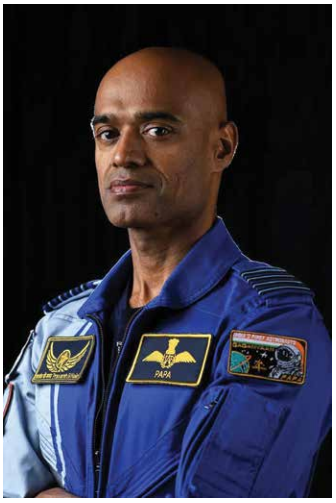
Ministry of Defence (MoD) has signed an MoU to establish three testing facilities in Chennai under the Tamil Nadu Defence Industrial Corridor – one each in Unmanned Aerial System (UAS), Electronic Warfare (EW) and Electro Optics (EO) domains. The MoU, under the Defence Testing Infrastructure Scheme (DTIS), was exchanged between senior officials of MoD and Tamil Nadu Industrial Development Corporation Limited in the presence of Defence Secretary Giridhar Aramane at New Delhi.

DRDO sanctions 7 new projects

Defence Research & Development Organisation (DRDO) has awarded seven new projects to industries under the Technology Development Fund scheme for various requirements of the Armed Forces and aerospace and defence sectors. These project sanctions are a testimony to the continuing endeavour of DRDO in nurturing industries, especially MSMEs and start–ups, in defence and aerospace domains. The seven projects include indigenous scenario and sensor simulation toolkit; underwater launched unmanned aerial vehicle; long range remotely operated vehicles for detection and neutralisation; development of ice detection sensor for aircraft; development of radar signal processor with active antenna array simulator; development of Indian regional navigation satellite system based timing acquisition and dissemination system etc.

IAF selection for Indo–US Axiom–4 mission

"After touching the sky with glory, it's time for the IAF to touch space with glory. Group Captain Shubhanshu Shukla and Group Captain Prasanth Balakrishnan Nair have been selected for the upcoming Indo–US Axiom–4 mission to the ISS. The prime astronaut, Group Captain Shukla, is an experienced Test Pilot with 2000 hrs of flying," stated the Indian Air Force.



IN for anti–submarine warfare sonobuoys

India has requested the US to buy AN/SSQ–53G High Altitude Anti–Submarine Warfare (HAASW) sonobuoys and AN/SSQ–62F HAASW sonobuoys for an estimated cost of $52.8 million. "The proposed sale will improve India's capability to meet current and future threats by enhancing its capacity to conduct anti–submarine warfare operations from its MH–60R helicopters".

GRSE in MoU with Merlinhawk

GRSE and Merlinhawk are to collaborate in the development of composite doors and hatches for use on naval ships, counter UAV solution using electro–optical fire control system (EOFCS), electro–optical infra–red search and track (EOIRST) system, composite masts for Indian Navy ships and hydrogen fuel cells based power generation for maritime applications.

BEML structures for ISRO's Mk–3

BEML Ltd has achieved another milestone by successfully delivering light alloy structures for the Launch Vehicle Mk–3 (LVM3) programme to Dr. Unnikrishnan Nair S, Director of VSSC, ISRO, at BEML's Aerospace hangar in Bangalore.

BEML's Aerospace division has consistently demonstrated its expertise in manufacturing and delivering high quality light alloy structures for ISRO's various space programmes.

New ICG Maritime Rescue Coordination Centre

Raksha Mantri Rajnath Singh inaugurated a newly constructed Indian Coast Guard (ICG) Maritime Rescue Coordination Centre (MRCC) building in Chennai on 18 August 2024. He also inaugurated two additional key facilities: the regional Marine Pollution Response Centre (RMPRC) in Chennai and the Coast Guard Air Enclave (CGAE) in Puducherry.

IAF and IA in para–drop of BHISHM

Indian Air Force (IAF) and Indian Army have jointly carried out a first of its kind precise para–drop operation of the Aarogya Maitri Health Cube at a high altitude area close to 15,000 feet. These critical trauma care cubes have been indigenously developed under Project BHISHM (Bharat Health Initiative for Sahyog Hita and Maitri). The IAF utilised its tactical transport aircraft C–130J Super Hercules to airlift and precisely para–drop the cube.

Meprolight agreement with RRP S4E

Meprolight Ltd has announced the opening of a new assembly line in India. The official launch event took place on 10 July 2024, in Mumbai, India, marking the cooperation agreement with India's RRP S4E Innovation Pvt Ltd. The assembly line will produce the Mepro MOR, a reflex sight for day, low–light, and night operations with integrated laser pointers; the Mepro M5, a red dot sight with multiple brightness levels and NVG compatibility; and the Mepro M21, a self–illuminated reflex sight utilising fiber optic and tritium technology, ensuring continuous operation without batteries; all, MIL–STD and battle proven products.

Boeing and AIESL for IN P–8I component MRO

Boeing and AI Engineering Services Limited (AIESL) have partnered to provide in–country overhaul services of critical components for the Indian Navy's fleet of 12 Boeing P–8I aircraft. As part of the partnership, the first landing gear overhaul of a P–8I aircraft was recently completed at INS Rajali.

This is a first in India and reflects the growth in India's indigenous capabilities for undertaking complex Maintenance, Repair and Overhaul (MRO) services.

L&T for part construction of two Fleet Support Ships

Larsen & Toubro has won an order for part construction of Two Fleet Support Ships (FSS) from Hindustan Shipyard Limited (HSL), with Indian Navy being the end user of the vessels. Indian Navy had signed a contract with HSL for design and construction of five FSS for the Indian Navy in August 2023. FSS are specialised naval vessels, which provide logistics and material support to the naval task force at sea. With more than 220 meters in length and 45,000 ton displacement, FSS would be amongst the largest vessels in the Indian naval fleet.

INS Triput launch ceremony

Goa Shipyard Ltd (GSL) launched the first indigenous P1135.6 Frigate on 23 July 2024. The vessel is first of the 2 frigates of P 1135.6 Class being constructed at GSL. It is the first time that these vessels are being constructed indigenously. The construction of these ships is based on Indian Navy's specific requirements to meet the entire spectrum of naval warfare in all three dimensions. The 124m long and 15.5m wide ship is propelled by four gas turbines which are designed to achieve a maximum speed of 28 knots at a displacement of 3200 tons.

Pollution Control Vessel of ICG 'Samudra Pratap' launched

Raksha Rajya Mantri Sanjay Seth urged industry partners to work for the country to become not only fully Self–sufficient (Aatmanirbhar) in defence production but also a net exporter. He was speaking on occasion of launching of the first indigenously built Pollution Control Vessel (Samudra Pratap) in Goa on 29 August 2024. The Ship has been built by Goa Shipyard Limited (GSL) for the Indian Coast Guard (ICG). The vessel will help to check the oil spillage in the country's sea coast. GSL signed a contract for constructing two Pollution Control Vessels for Indian Coast Guard at a cost of Rs 583 Crores. It is for the first time that these vessels are being designed and constructed indigenously.

Deutsche Aircraft collaborates with SASMOS HET

Deutsche Aircraft has announced a strategic partnership with SASMOS HET Technologies Ltd,

marking a significant milestone in their efforts to advance aerospace engineering worldwide. In this ground breaking collaboration, SASMOS HET Technologies will provide specialised design and development of electrical wiring interconnection system (EWIS), enhancing the 40 seater regional turboprop from Deutsche Aircraft, the D328eco.

ICG in maiden landing at Agatti Airport

In a significant milestone, the Indian Coast Guard (ICG) conducted its maiden night landing of the ICG Dornier aircraft at Agatti Airport in the Lakshadweep Islands on 2 August 2024. Located approximately 460 kilometers west of Kochi in the Arabian Sea, Agatti features the only airstrip in the Union Territory of Lakshadweep.

Magellan Aerospace partners with Aequs

Magellan Aerospace announced the signing of a Memorandum of Understanding with Aequs Private Limited to explore the development of a business plan for a jointly owned engine MRO business in the Aequs Special Economic Zone, at Belagavi in Karnataka, India. Under the terms of this MoU, Magellan and Aequs will work together to evaluate the market for business, commercial and military aircraft engine MRO services, to develop a comprehensive business plan that expands our existing partnership into the MRO sector through this new project.

Optiemus Unmanned Systems diversifies

Optiemus Unmanned Systems (OUS), a subsidiary of Optiemus Infracom has launched its range of drones in agricultural and mapping category, which will be powered by components designed and manufactured in India.

In the photo is Mr. Ashok Kumar Gupta, Chairman, Optiemus Infracom Limited

TechEagle and ideaForge in alliance

TechEagle, India's drone delivery startup known for its E–VTOL cargo drones (BVLOS), has entered into a strategic alliance with ideaForge Technology Limited, a global UAV technology leader. This collaboration aims to leverage the strengths of both entities to revolutionise UAV technology and drive innovation in the drone industry. Notably, ideaForge has also participated in TechEagle's recent Bridge Financing Round as a strategic investor.

Thales and Garuda Aerospace sign MoU

Thales and Garuda Aerospace have signed a Memorandum of Understanding to promote the development of the drone ecosystem in India. This collaboration aims to foster innovation and to advance the development of technological solutions that can enable safe and secure drone operations and help the growth of drone based applications in India. Under the agreement, Thales will provide expertise in the field of Unmanned Traffic Management (UTM) solutions, UAV detection, and system integration, whilst Garuda will bring its skills in the manufacture and use of UAVs, as well as its expertise in the Indian market.

Successful launch of Agni–4 IRBM

A successful launch of an Intermediate Range Ballistic Missile, Agni–4, was carried out from the Integrated Test Range in Chandipur, Odisha on 6 September 2024. The launch validated all operational and technical parameters. It was conducted under the aegis of the Strategic Forces Command.

HAL in Rs 26,000 crore for 240 AL–31FP engines

Ministry of Defence (MoD) signed a contract with Hindustan Aeronautics Limited for 240 AL–31FP aero engines for Su–30MKI aircraft at a cost of over Rs 26,000 crore. These aero–engines will be manufactured by the Koraput Division of HAL and are expected to fulfil the need of the Indian Air Force to sustain the operational capability of the Su–30 fleet. HAL will supply 30 engines per annum as per the contractual delivery schedule. The supply of all 240 engines would be completed over the period of next eight years.

DAC approves 10 capital acquisition proposals

The Defence Acquisition Council (DAC) has accorded Acceptance of Necessity (AoN) for 10 capital acquisition proposals amounting to Rs 1,44,716 crore. Of the total cost of AoNs, 99% is from indigenous sources under Buy (Indian) and Buy (Indian–Indigenously Designed Developed and Manufactured) categories. For modernisation of the tank fleet of the Indian Army, the proposal for procurement of Future Ready Combat Vehicles (FRCVs) has been cleared. AoN was also accorded for procurement of Air Defence Fire Control Radars. Three AoNs were accorded to enhance the capabilities of the Indian Coast Guard (ICG) namely procurement of Dornier–228 aircraft, Next Generation Fast Patrol Vessels and Next Generation Offshore Patrol Vessels.

First Joint Commanders' Conference commences

The maiden Joint Commanders' Conference (JCC) commenced at Lucknow on 4 September 2024, under the theme 'Sashakt and Surakshit Bharat: Transforming Armed Forces'. The conference focussed on shaping the future of India's military to adapt to the changing operational milieu. Chief of Defence Staff General Anil Chauhan alongwith Chief of the Army Staff General Upendra Dwivedi, Chief of the Naval Staff Admiral Dinesh Kumar Tripathi, and Chief of Air Staff Air Chief Marshal Vivek Ram Choudhari led the convocation which brought together the apex level hierarchy from the Ministry of Defence and the Armed Forces.

CDS releases Joint Doctrine for Amphibious Operations

Chief of Defence Staff General Anil Chauhan released the Joint Doctrine for Amphibious Operations during the Chiefs of Staff Committee (COSC) meeting held on 9 September 2024 at New Delhi. The Doctrine is a keystone publication which will provide guidance to the Commanders for "conduct of Amphibious Operations in today's complex military environment".

DRDO and 30mm HEPF shells

Defence Research and Development Organisation (DRDO) has handed over the production document of 30mm High Explosive Preformed Fragmentation (HEPF) Shell to Director General of Naval Armament Inspection (DGNAI) during a ceremony organised at Armament Research and Development Establishment (ARDE), Pashan in

Pune. This 30mm HEPF shell, developed by ARDE, the Pune based laboratory of DRDO, will further enhance the combat capability of the Indian Navy against drones.

4th and 5th ASW SWC launched

Malpe and Mulki, fourth and fifth ships of the 8 Anti–Submarine Warfare Shallow Water Craft project, being built by Cochin Shipyard Ltd, for the Indian Navy, were launched on 9 September 2024 at CSL, Kochi. The Mahe class of ships will be equipped with indigenously developed underwater sensors and are envisaged to undertake anti–submarine operations in coastal waters as well as low intensity maritime operations and mine laying operations. The ASW SWC ships can achieve a maximum speed of 25 knots with endurance of up to 1800 nautical miles.

Launch of LSAM 21 (Yard 131)

The launch of 'Ammunition Cum Torpedo Cum Missile Barge, LSAM 21 (Yard 131)', 7th Barge of 11 x ACTCM Barge Project, built by MSME Shipyard, Suryadipta Projects Pvt Ltd, Thane for Indian Navy, was undertaken on 5 September 2024 at Suryadipta Project Pvt Ltd.

IN and SAN in agreement

The Indian Navy and the South African Navy have signed an Implementing Agreement that ensures the safety of the South African Navy's submarine crew in times of distress or accident. Under this agreement, the Indian Navy will provide assistance by deploying its Deep Submergence Rescue Vehicle (DSRV) when required, further strengthening the collaborative ties between the two navies.

Exercise Tarang Shakti–24 Phase–II

The night skies over Jodhpur came alive with the roar of mighty flying machines including the LCA Tejas during Exercise Tarang Shakti–24 Phase–II. "The night missions are testament to the precision, skill and unwavering dedication that define our strength and interoperability" stated the IAF.

The IAF put on a display of power and precision at the Open Day event on 8 September 2024, as part of Tarang Shakti Phase–II at Air Force Station Jodhpur. Aircraft from IAF and Participating Friendly Foreign Countries (FFCs) were showcased in the static display. The all–women Air Warrior Drill Team put up a great performance, while the Prachand (LCH), Tejas, Su–30MKI and the Surya Kiran Aerobatic Team displayed their maneuvers.

Zen Technologies introduces AI–powered robots

Zen Technologies in collaboration with its subsidiary AI Turing Technologies based in Pune, launched four new products. These IP–owned innovations Hawkeye, Barbarik–URCWS (Ultralight Remote Control Weapon Station), Prahasta, and Sthir Stab 640 cater to a wide range of defence requirements, empowering forces with "unmatched tactical superiority and enhanced operational efficiency".

Inertial Labs and ideaForge partnership

ideaForge Technology Limited has partnered with Inertial Labs to integrate their RESEPI LiDAR solution into ideaForge's UAVs. This collaboration enhances UAV based LiDAR mapping, providing industries with accurate and reliable solutions. The demand for LiDAR based drones is growing for precise 3D mapping across various sectors like surveying, mining, and SAR.

Air India's B–777 TCS for Lufthansa Technik

Lufthansa Technik has taken over the Total Component Support (TCS) for Air India's entire Boeing 777 fleet. The multi–year agreement encompasses services for a total of 27 aircraft. With this first contract, both companies are laying the foundations for long term cooperation.

New Delhi at No. 10!

Airports Council International (ACI) World has published the latest ACI World Airport Traffic Dataset, confirming the top 20 busiest airports in the world in 2023. The dataset's key findings confirm total global passenger traffic for 2023 was close to 8.7 billion, driven by a continued resurgence in international traffic. ACI World collects airport traffic every year through its global network of airport operator members, investors and aviation stakeholders.

PASSENGERS*

2023	2022	2019	AIRPORT	2023	% CHANGE VS 2022	% CHANGE VS 2019
1	1	1	ATLANTA, USA (ATL)	104 653 451	11.7	-5.3
2	5	4	DUBAI, UAE (DXB)	86 954 365	31.7	0.7
3	2	10	DALLAS/FORT WORTH, USA (DFW)	81 755 538	11.4	8.9
4	8	7	LONDON, UK (LHR)	79 183 364	28.5	-2.1
5	16	5	TOKYO, JAPAN (HND)	78 719 302	55.1	-7.9
6	3	16	DENVER, USA (DEN)	77 837 917	12.3	12.8
7	7	28	ISTANBUL, TURKEY (IST)	76 027 321	18.3	45.7
8	6	3	LOS ANGELES, USA (LAX)	75 050 875	13.8	-14.8
9	4	6	CHICAGO, USA (ORD)	73 894 226	8.1	-12.7
10	9	17	NEW DELHI, INDIA (DEL)	72 214 841	21.4	5.4
11	10	9	PARIS, FRANCE (CDG)	67 421 316	17.3	-11.5
12	58	11	GUANGZHOU, CHINA (CAN)	63 169 169	142.0	-13.9
13	11	20	NEW YORK, USA (JFK)	62 464 331	13.0	-0.1
14	13	12	AMSTERDAM, NETHERLANDS (AMS)	61 899 586	18.0	-13.7
15	15	22	MADRID, SPAIN (MAD)	60 181 604	18.9	-2.5
16	18	15	FRANKFURT, GERMANY (FRA)	59 255 389	21.3	-15.9
17	36	18	SINGAPORE, SINGAPORE (SIN)	58 946 000	83.1	-13.7
18	17	31	ORLANDO, USA (MCO)	57 735 726	15.1	14.1
19	12	30	LAS VEGAS, USA (LAS)	57 665 456	9.4	11.6
20	99	14	INCHEON, KOREA (ICN)	56 235 412	213.8	-21.0

*TOTAL PASSENGERS ENPLANED AND DEPLANED, PASSENGERS IN TRANSIT COUNTED ONCE.

L3Harris in contract with Air India

L3Harris Technologies announced an agreement with Air India to become lead supplier of the SRVIVR25 Voice and Data Recorders for the airline's B737–8 fleet. One hundred aircraft will be equipped with L3Harris' cutting edge technology with the possibility of an additional forty planes, cementing a robust future collaboration.

Honeywell agreement with Air India for APUs

Honeywell has signed a long–term agreement with Air India Limited for Auxiliary Power Unit (APU) aftermarket support covering both Air India's existing and new fleets.

APPOINTMENTS

Dr D K Sunil is new CMD of HAL

Dr D K Sunil, Director (Engineering, Research and Development) took over as Chairman and Managing Director (Additional Charge) of HAL from Mr C B Ananthakrishnan on 1 September 2024.

During his tenure in Mission Combat Systems R&D Centre in Bengaluru, he led teams focused on ground breaking projects such as Active ESA Radar, Automatic Flight Control System for Light Combat Helicopter (LCH) and Mission Computers for helicopter and fighter platforms. His extensive design expertise spans from the equipment level to system level projects for both aircraft and helicopters, covering the entire spectrum of design activities at HAL's design centers.

Air Marshal Tejinder Singh is new Deputy Chief of the Air Staff

Air Marshal Tejinder Singh took over as Deputy Chief of the Air Staff (DCAS) of the Indian Air Force, at Air Headquarters (Vayu Bhawan) on 1 September 2024. An alumnus of the National Defence Academy, Air Marshal Tejinder was commissioned in the fighter stream of the IAF on 13 June 1987. He is a Category 'A' Qualified Flying Instructor with over 4500 hours of flying, an alumnus of Defence Service Staff College and National Defence College. In recognition of his meritorious services he was awarded the Vayu Sena Medal in 2007 and Ati Vishist Seva Medal in 2022, by the President of India.

Air Marshal Ashutosh Dixit takes over as AOC-in-C, CAC

Air Marshal Ashutosh Dixit assumed the appointment of Air Officer Commanding-in-Chief of Central Air Command on 1 September 2024. Air Marshal Ashutosh Dixit was commissioned into the fighter stream of IAF on 6 December 1986. The Air Officer is an Experimental Test Pilot and a Qualified Flying Instructor with more than 3300 hours of flying experience on a variety of aircraft in the IAF inventory. He is an alumnus of the prestigious National Defence Academy, Defence Services Staff College (Bangladesh) and National Defence College. He has actively participated in numerous operations and exercises such as Op–Safed Sagar and Op–Rakshak.

Vice Admiral Vineet McCarty is Controller Personnel Services

Vice Admiral Vineet McCarty assumed charge as the Controller Personnel Services (CPS) on 3 September 2024. The Flag Officer was commissioned into the Indian Navy on 1 July 1989 and is a graduate of Defence Services Staff College, Wellington and National Defence College, New Delhi.

Historic flight by Vice Chiefs of Army, Navy and IAF

In a landmark event for India's defence forces, the Vice Chiefs of Indian Army, Navy and Air Force made history on 9 September 2024 by flying in the indigenously manufactured Light Combat Aircraft (LCA) Tejas. Vice Chief of Air Staff (VCAS) Air Marshal AP Singh flew the lead fighter and Vice Chief of the Army Staff, Lt Gen NS Raja Subramani as well as Vice Chief of the Naval Staff, Vice Admiral Krishna Swaminathan flew in the Tejas twin seater. Their joint participation in the exercise demonstrated the growing focus on cross–domain cooperation, with land, sea and air forces working together to face modern challenges. This unprecedented joint flight, marking the first time when the three services Vice Chiefs have flown in one occasion is a powerful testament to India's advancing integrated defence capabilities, commitment to self–reliance and showcases not only their leadership but also the seamless integration of India's armed forces.

The flight took place over the skies of Jodhpur wherein Indian Air force had organised the exercise Tarang Shakti 2024, India's first multi–national exercise aimed at enhancing interoperability and operational coordination amongst participating Friendly Foreign Countries (FFCs). With an array of participants, the IAF led exercise aimed to foster closer ties that strengthen cooperation with a myriad of capacities. Inclusion of Tejas in this mission underscored the critical role indigenous platforms are playing in modernising India's defence infrastructure.

The flight of the Tejas, a symbol of India's indigenous defence manufacturing prowess, represents a significant moment for the nation's 'Make in India' initiative. Designed by Aeronautical Design Agency (ADA), developed and produced by Hindustan Aeronautics Limited (HAL), the Tejas is a state of the art multirole fighter, designed to meet the needs of India's armed forces while reducing reliance on foreign imports.

This opportunity was also utilised by three Vice Chiefs for interacting with the participating forces both from India and FFCs.

Text and images: IAF

Lockheed Martin's 10th Annual Suppliers Conference with Indian industry

Following Lockheed Martin's teaming agreement with Tata Advanced Systems Limited to establish a C–130J MRO facility in India and expansion of C–130J manufacturing and assembly in India for the Indian Air Force's Medium Transport Aircraft acquisition, Lockheed Martin held its 10th edition of India Suppliers Conference in Bengaluru on 25 September 2024.

The two day conference saw representatives from almost 50 Indian companies across all sizes, large, MSMEs and start–ups, participating in the conference. Throughout the event Indian companies showcased capabilities to Lockheed Martin and international partners like GE Aerospace, Honeywell, Pratt & Whitney, Martin Baker and Northrop Grumman, among others. More than 120 delegates attended the event and more than 70 business to business meetings were organised to explore partnership opportunities.

The conference was inaugurated by Mr. Priyank Mallikarjun Kharge, Minister for Information Technology and Biotechnology, Government of Karnataka, who spoke about how Karnataka has always championed "local for global" thereby driving self–reliance through manufacturing. Highlighting the state's repository of talent and resources and the fact that 40% of India's startups in aerospace reside there, the minister outlined Karnataka's ambition to lead the world in aerospace and defence. Also, gracing the inauguration ceremony was Christopher W. Hodges, Consul General of the United States of America in Chennai who outlined his thoughts on how a partnership driven approach would be the way forward for deeper India–US strategic ties.

"We are committed to strengthening the Indian defence industrial ecosystem through partnerships that not only build innovative solutions but also help Indian partners access global markets. Aligned with the Government of India's vision of "Make in India, Make for the World," our focus is on identifying industrial partners that can meet the needs of not just the Indian armed forces but also Lockheed Martin's global supply chain," stated Michael Fernandez, India country head, Lockheed Martin.

Rossell India Limited was recognised as an Outstanding Supplier by the Lockheed Martin Rotary and Mission Systems (RMS) Global Supply Chain Organisation for on–time support and customer–first focus to support countless engineering changes due to design modifications critical to the success of the MH–60R programme.

The Lockheed Martin Rotary and Mission Systems (RMS) Global Supply Chain Organisation recognised another Indian manufacturer, Veer–O–Metals, for demonstrating outstanding customer focused approach through their exceptional responsiveness and eagerly working to understand requirements significantly contributing to the success of the MH–60R programme.

Post the conference, Lockheed Martin Supply chain teams visited almost 20 suppliers across India to assess their capabilities and establish alliances.

Dassault Aviation to create company for military MRO in India

Dassault Aviation has decided to create a company dedicated exclusively to maintenance, repair and overall (MRO) of its military activities.

This company, Dassault Aviation MRO India (DAMROI), incorporated in India and based in Noida (Uttar Pradesh), is a subsidiary of Dassault Aviation. It is committed to meeting the needs of the Indian Air Force by offering tailor made products and services to support its Mirage 2000 fleet and, more broadly, the fighter aircraft supplied by Dassault Aviation in India, in order to guarantee the best possible responsiveness and efficiency in fulfilling its requirements.

Created under the "Atmanirbhar Bharat" policy to contribute to India's self–reliance and promote indigenous value added services, DAMROI will benefit from Dassault Aviation's technological expertise and offer new opportunities for cooperation and collaboration with the aim of becoming a key player in participating to a full–fledged aero defence ecosystem in India.

Alongside a significant industrial input to positioning India as an international aerospace supplier under the "Make in India" policy and a full commitment to the "Skill India" initiative through the implementation of training and education programmes, this new step shows Dassault Aviation's determination to make its presence in India a success and to contribute to India's strategic vision for its future.

Photos of IAF Mirage 2000s and Rafales: VAYU

Sukhoi Su–30MKI upgrade project all set to go ahead

IAF Su–30MKI's are to get a big upgrade (Photo: Phil Camp).

India has now put finishing touches on the mega indigenous plan to make its existing Russian origin Sukhoi–30MKI fighter jets much more lethal with advanced radars, avionics, longer range weapons and multi–sensor fusion to ensure they are capable of air combat for another 30 years.

The defence ministry has more or less finalised the 'draft note' for the approval of the PM–led cabinet committee on security (CCS) for the upgrade of the first lot of 84 Sukhoi jets at an overall cost of around Rs. 63,000 crore, which includes the design and development phase, sources told TOI.

The upgraded 'Super' Sukhois will be close to fifth generation fighters in terms of capabilities except for stealth.

"They will also have manned–unmanned teaming capability (to operate in concert with advanced autonomous drones using AI and data links) to boost mission effectiveness. IAF aims to fly these Sukhois till 2055," a source said.

The Sukhoi upgrade is critical since IAF is currently grappling with just 30 fighter squadrons (16–18 jets in each) when its "authorised" strength is 42 to deter both China and Pakistan.

All the 84 twin engine Sukhoi's will be upgraded by Hindustan Aeronautics (HAL) in around 15 years. After the CCS sanction, it will take seven years for development work and flight testing, which will then be followed by the progressive upgrade and induction of jets in batches.

IAF currently has 259 Sukhoi's, the bulk of them licensed produced by HAL for over $12 billion from Russia, which constitute the backbone of its combat fleet. Another 12 new Sukhoi's along with associated equipment are now being ordered for around Rs. 11,500 crore to replace the ones that crashed over the years.

"In another 15 years, India will have its own 5th Gen fighter AMCA (advanced medium combat aircraft) with futuristic technologies. Those technologies would be incorporated in the next tranche of Sukhois to be upgraded after the first 84 jets," another source stated.

5th gen AMCA is in the works.

The present upgrade project will include equipping Sukhois with indigenous 'Virupaksha' advanced electronically scanned array (AESA) radars, which will increase the detection range by "1.5 to 1.7 times" over existing Russian radars. This, in turn, will allow Sukhoi's with longer range weapons like Astra–3 air to air missiles, with a beyond visual range of 350 km. While IAF is currently inducting Astra–1 missiles (100 km), DRDO is developing Astra–2 (160 km) and Astra–3 (with solid fuel ducted ramjet propulsion) variants.

Apart from the fly–by–wire system, all other electronics in the upgraded Sukhois will be indigenous. This will include all three mission computers with better algorithms. Overall, of the 51 systems to be upgraded, 30 are by HAL, 13 by DRDO and eight by the private sector.

At present, 40 Sukhoi fighters have also been modified to carry the air to ground precision strike BrahMos supersonic cruise missiles.

The BrahMos range has already been extended from 290 to 450 km, and will go up further with an 800 km variant, as reported by TOI earlier.

Article by: Rajat Pandit/The Times of India
Photos: Phil Camp/KSC/Vayu Aerospace Review

HAL selects SAFHAL engines for IMRH and DBMRH

On 30 August 2024, Hindustan Aeronautics Limited (HAL) and SAFHAL Helicopter Engines Pvt Ltd (SAFHAL) signed an airframer contract, to commence joint design, development, manufacture, supply and support of a new generation high power engine named 'Aravalli' for the 13 ton medium lift class, Indian Multi–Role Helicopter (IMRH) and the Deck–Based Multi–Role Helicopter (DBMRH), being designed and developed by HAL.

The name 'Aravalli' derived from the mighty mountain range of India, symbolises the aspirations of the country in achieving Aatmanirbharta in critical engine technologies. The contract was signed by Mr. S Anbuvelan, CEO (Helicopter Complex), HAL and Mr. Olivier SAVIN, Director, SAFHAL Helicopter Engines and EVP, Sales & Marketing, Safran Helicopter Engines and Mr. S K Mehta, Director, SAFHAL Helicopter Engines and Executive Director (Finance), HAL.

Mr. C B Ananthakrishnan, Chairman and Managing Director (Addl. Charge), HAL stated, "This partnership with SAFHAL marks a pivotal moment in our journey towards achieving technological self–reliance in India's aerospace and defence sector. The collaboration will not only ensure the operational capabilities of the IMRH and DBMRH platforms but also contribute to the broader goal of indigenous development of critical defence technologies."

Mr. Cedric GOUBET, CEO of Safran Helicopter Engines stated, "We are extremely proud to collaborate with HAL on this strategic project, capitalising on 25 years of successful partnership between Safran and HAL. With this project, we are enriching the collaboration with HAL as well as the strategic relationship between India and France. Our combined expertise and resources will ensure the success of the IMRH and DBMRH programmes, while contributing to the growth of India's aerospace and defence sector. Together we remain fully dedicated to our customers in India. We look forward to designing, producing and supporting those new efficient helicopter engines".

SAFHAL, a joint venture between Safran Helicopter Engines SAS and HAL, is dedicated to the design, development, production, sales and support of new generation helicopter engines in India, marks a significant milestone in India's aerospace and defence sector, aiming to enhance the nation's Aatmanirbharta in helicopter engine technology.

Under this strategic contract, SAFHAL will work with its parent companies on cutting edge engine technologies, ensuring superior performance, reliability and operational efficiency. This collaboration involves state–of–the–art design, advanced manufacturing processes and rigorous testing protocols to meet the highest global standards.

IMRH is a new 13 ton multi–role helicopter designed by HAL to meet the requirements of the Indian Armed Forces. A naval version, the 12.5 ton DBMRH is also being developed for the Indian Navy. The engines will be designed to operate in diverse and challenging environments in which these helicopters get deployed. Future extension to the civil market for offshore operations, utility, VVIP transport etc., is also planned followed by MRO activities.

Safran Helicopter Engines has been HAL's partner of choice for powering its helicopters, starting with the Artouste engines used in Cheetah and Chetak, followed by Shakti engine and its variants powering the ALH, LCH and LUH. The present collaboration elevates this time tested relationship to the next level through the joint design and development of modern state–of–the–art helicopter engines intended for application in medium lift helicopters.

Lockheed Martin and TASL in C–130J Agreement

(LM photo)

Lockheed Martin and Tata Advanced Systems Limited have entered into a teaming agreement to expand upon the companies' business relationship through the C–130J Super Hercules tactical airlifter. This announcement marks a significant step in enhancing India's defence and aerospace capabilities while also deepening India–US strategic ties.

This agreement provides a framework for collaboration on future potential business opportunities to include establishing a Maintenance, Repair and Overhaul (MRO) facility in India to support the Indian Air Force's (IAF) existing fleet of 12 C–130Js as well as other global Super Hercules fleets plus expanding C–130J manufacturing and assembly in India to produce aircraft for the IAF's Medium Transport Aircraft (MTA) programme, subject to US and Indian government approvals.

Lockheed Martin will continue to build C–130Js for the US government and other global operators at the existing Super Hercules production facility in Marietta, Georgia, USA. Lockheed Martin will establish additional production and assembly capacity in India if awarded the MTA contract.

"Collaborating with Lockheed Martin on the C–130J platform proposition for IAF's MTA project is a milestone for Tata Advanced Systems," stated Sukaran Singh, chief executive officer and managing director of Tata Advanced Systems. "The current announcement is also significant as it marks the entry of Tata Advanced Systems into the defence MRO space in India for large aircraft platforms. This also helps towards a deeper relationship between the two companies, adding to the aerostructure work by Tata Advanced Systems for Lockheed Martin platforms."

(Photo VAYU)

"The C–130J is known as the world's workhorse, not just for its large global presence, but also for its international supply chain partners including the single source provider of empennages — Tata Lockheed Martin Aerostructures Limited in Hyderabad," stated Rod McLean, vice president and general manager of the Air Mobility and Maritime Missions line of business at Lockheed Martin. "This teaming agreement between Lockheed Martin and Tata Advanced Systems further demonstrates Lockheed Martin's commitment to a self–reliant India and the degree of confidence that exists in our relationships with our partners in India and the Indian industry at large."

The IAF is actively seeking to acquire up to 80 medium transport aircraft and issued a request for information (RFI) last year. Lockheed Martin responded to the RFI as the C–130J–30 Super Hercules is ideally suited to meet the requirements.

Lockheed Martin and Tata Advanced Systems Limited have a long standing partnership through the Tata Lockheed Martin Aerostructures Ltd, (TLMAL) joint venture. Established in 2010, TLMAL exemplifies the government of India's "Make in India" objectives and has the distinction of being the single global source of C–130J empennage assemblies included on all new Super Hercules aircraft produced in the United States. To date, TLMAL has manufactured more than 220 C–130J empennages.

Airbus and TASL formalise contract for H125 helicopter FAL in India

Tata Advanced Systems Limited (TASL), India's leading private sector player for aerospace and defence solutions, and Airbus Helicopters have formalised the contract to establish the H125 Final Assembly Line (FAL) in India. The FAL will be the first instance of the private sector setting up a helicopter assembly facility in India, which will produce Airbus's "best–selling H125 helicopter from its civil range" for India and the neighbouring countries.

The contract was signed at the Farnborough International Airshow 2024. The setting up of the FAL was announced on 26 January 2024 by Airbus CEO Guillaume Faury and Tata Sons Chairman N. Chandrasekaran.

"We are pleased to partner with Airbus to establish the final assembly line for H125 helicopters in India. This collaboration built on TASL's expertise in airborne platforms, and the strength of our ongoing partnership with the Airbus Group, aligns with the 'Make in India' initiative and addresses India's growing helicopter market potential. The project will enhance helicopter manufacturing capabilities in India, and support growth of civil aviation in India," stated Sukaran Singh, Chief Executive Officer and Managing Director, Tata Advanced Systems Limited.

"India is a country with great potential for helicopters and we believe that there is no better way to unlock this promising market than with a 'Made in India' H125 helicopter. We are confident that a locally assembled helicopter will open new civil and parapublic markets such as the Helicopter Emergency Medical Services and other public services, making helicopters a critical component of nation building. We are delighted that we are embarking on this pioneering journey with our trusted partner the Tata Group, with whom Airbus already has a multi–faceted partnership," stated Bruno Even, CEO of Airbus Helicopters.

The FAL will undertake the integration of the major component assemblies, avionics and mission systems, installation of electrical harnesses, hydraulic circuits, flight controls, dynamic components, fuel system and the engine. It will also do testing and qualification of the helicopters.

Helicopters assembled at this FAL will be delivered to customers in India and its neighbouring countries. The deliveries of the first 'Made in India' H125s are expected to commence in 2026. Tata Advanced Systems and Airbus Helicopters are well advanced in their joint selection of the location of the FAL, which will be communicated soon.

"The H125 is the world's best selling single engine helicopter that outclasses other helicopters in its category. This high performing versatile helicopter is a member of Airbus' Ecureuil family, which has accumulated more than 40 million flight hours worldwide. It can operate in high and hot and extreme environments and can be easily reconfigured for various missions, including aerial work, firefighting, law enforcement, rescue, air ambulance, passenger transport, and many others. The H125 is the only helicopter to have landed on Mount Everest, demonstrating its agility in operating in high altitude, extreme environments" stated Airbus Helicopters.

MBDA celebrates Indian Air Force Day 2024

ASRAAM

MBDA is proud to celebrate Indian Air Force Day 2024 as a steadfast partner of the IAF in defence of India's skies.

India and MBDA share a long history of partnership in equipping the Indian Air Force going back to the early days of air to air missiles. Throughout its history the Indian Air Force has relied upon MBDA's missile systems to provide the latest air combat performance across a number of different aircraft types.

MBDA today has two focuses providing the highest performing missile technologies to the Indian Armed Forces, and secondly supporting Atmanirbhar Bharat as part of MBDA's longstanding partnership strategy with India.

With a strong reputation as a reliable partner that has supported the Indian Air Force for over 50 years, European missile firm MBDA understands the importance of operational capability and sovereignty to the IAF. For these reasons, the company has strongly committed to Make in India to deliver both industrial sovereignty and the best of military equipment to India. Over this time, many tens of thousands of MBDA designed missiles have been built in India and we continue to deepen and deliver on new programmes.

Today MBDA is working closely across the Indian defence ecosystem to deliver these two strategic pillars – deliver on Atmanirbhar Bharat while providing world best technologies to equip the serving personnel of the Indian Air Force.

MICA

Indian firms now supply key components for key new missiles that are enhancing the combat power of the IAF. For example, by Indian industry today to extensive manufacturing of 15 major subassemblies of MICA missile covering various complex technologies such as mechanical, electrical, electromechanical and pyrotechnic items. MBDA continues to deepen its relationship with Indian industry, as seen by the formation of a joint venture with long standing partner Larsen & Toubro to deliver a series of important missile programmes under the Make in India category.

IAF Jaguar with ASRAAM (Photo: VAYU)

The IAF is also getting a major boost with the addition of the ASRAAM as its Next Generation Close Combat Missile. MBDA and its longstanding Indian partner BDL are establishing a new facility in Hyderabad to assemble and test this potent air combat missile. With its large rocket motor and clean aerodynamic design, ASRAAM has unrivalled speed and resultant aerodynamic manoeuvrability and range. ASRAAM gives it a high kinematic capability that delivers superior end game performance for within visual range air combat.

Article by Ludovic Dumont, General Delegate, MBDA India Private Limited

INS Tabar at Alexandria, Egypt

As part of her ongoing deployment to Africa and Europe, Indian Navy's frontline frigate, INS Tabar, arrived at the historic port city of Alexandria, Egypt for a goodwill visit from 27 to 30 June 2024. INS Tabar, is a stealth frigate built for the Indian Navy in Russia and is commanded by Captain MR Harish and has a complement of 280 personnel. The ship is part of the Western Fleet under the Western Naval Command.

INS Sunayna at Port Victoria, Seychelles

INS Sunayna entered Port Victoria, Seychelles on 26 June 2024 as part of her long range deployment in the South West Indian Ocean Region. The ship's visit coincided with the celebration of 48th National Day of Seychelles on 29 June 2024. An Indian Navy marching contingent along with a naval band participated in the military parade organised as part of the Seychelles National Day celebrations. The deployment of an Indian Naval ship marks sustained participation of an Indian military contingent since 1976 reaffirming bonhomie between the two nations.

INS Shivalik at Pearl Harbour for RIMPAC–24

Indian multirole stealth frigate INS Shivalik, mission deployed in South China Sea and North Pacific Ocean, reached Pearl Harbour in Hawaii to take part in the Rim of the Pacific (RIMPAC) exercise, which is world's largest naval exercise. INS Shivalik sailed into Pearl Harbour on completion of JIMEX 24, a bilateral exercise between India and Japan.

The harbour phase of the exercise from 27 June to 7 July 2024 saw participation in multiple symposiums, exercise planning discussions, sports competitions and reciprocal deck visits. The sea phase of RIMPAC–24, divided into three sub–phases witnessed ships undertaking basic and advanced level integration exercises during the first two sub–phases. The event concluded with a theatre level large force tactical exercise.

INS Ranvir at Chattogram, Bangladesh

Indian Naval Ship Ranvir, of the Eastern Fleet under the aegis of the Eastern Naval Command arrived at Chattogram, Bangladesh on 29 July 2024 as part of an Operational Deployment. The ship was accorded a warm welcome by the Bangladesh Navy. During the visit, personnel from the Indian and Bangladesh navies engaged in wide range of professional interactions including Subject Matter Expert Exchange (SMEE), cross–deck visits, community outreach and friendly sports fixtures aimed at further strengthening existing mutual cooperation and maritime linkages between both navies and nations. On completion of harbour phase, INS Ranvir participated in a Maritime Partnership Exercise (MPX)/PASSEX with ships of the Bangladesh Navy.

India–Thailand military Exercise Maitree

An Indian Army contingent departed for the 13th edition of India–Thailand joint military Exercise Maitree. The exercise was conducted from 1–15 July 2024 at Fort Vachiraprakan in Tak Province of Thailand. Last edition of the same exercise was conducted at Umroi, Meghalaya in September 2019. The Indian Army contingent comprising 76 personnel were represented mainly by a battalion of the Ladakh Scouts along with personnel from other arms and services. The Royal Thailand Army contingent also comprised 76 personnel mainly from 1st Battalion, 14 Infantry Regiment of 4 Division.

INS Sunayna at National Day of Seychelles

INS Sunayna, mission deployed in South West Indian Ocean Region participated in the 48th National Day celebrations of Seychelles on 29 June 2024. As part of the event, a 24 men Indian Navy marching contingent along with a naval band participated in the National Day Parade held at Port Louis.

India–Mongolia Exercise Nomadic Elephant

The 16th edition of India–Mongolia Joint Military Exercise Nomadic Elephant commenced at Foreign Training Node, Umroi (Meghalaya). The Exercise was conducted from 3–16 July 2024. Indian contingent comprising of 45 personnel was represented by a battalion of Sikkim Scouts along with personnel from other arms and services. The Mongolian contingent was represented by personnel from 150 Quick Reaction Force Battalion of the Mangolian Army.

IN P–8I at RIMPAC 2024

Touchdown in the Pacific on 7 July 2024! "Aloha to the Indian Navy P–8I and its crew joining RIMPAC 2024 to sharpen skills and build partnerships for a secure Indo–Pacific", stated the organisers.

INS Tabar at Casablanca, Morocco

Indian Navy's frontline frigate, INS Tabar arrived at Casablanca, Morocco on 8 July 2024 for a three day visit. India and Morocco share warm bilateral relations that span diverse fields, including regular interactions between the two navies. INS Tabar, is a stealth frigate built for the Indian Navy in Russia and is commanded by Captain MR Harish and has a complement of 280 personnel.

Kazakhstan Army delegation visits SFTS

A six member army delegation from Kazakhstan Special Forces visited Special Forces Training School, SFTS, Bakloh on 13 July 2024. The delegation witnessed training activities, infrastructure and skill demonstrations to foster jointness and interoperability.

COAS visits assorted IA corps

General Upendra Dwivedi COAS along with Army Commander eastern Command visited the Indian Army's Spear Corps, Gajraj Corps and Trishakti Corps and reviewed the security situation along the Northern borders

and in North Eastern States. COAS complimented all ranks for "their professionalism and high state of readiness despite challenging terrain and weather conditions". COAS exhorted them to remain steadfast to meet all current and emerging security challenges.

INS Tabar in Hamburg, Germany

Indian Navy's frontline frigate, INS Tabar arrived at Hamburg, Germany on 17 July 2024 for a three day visit. Activities during the visit included professional interactions between the Indian Navy and German Navy, visit of ship's crews to the German Naval Academy and ship open to visitors.

INS Tabar, is a stealth frigate built for the Indian Navy in Russia and is commanded by Captain MR Harish. The ship is equipped with a versatile range of weapons and sensors and is among the earliest stealth frigates of the Indian Navy. The ship is part of the Indian Navy's Western Fleet which is based at Mumbai under the Western Naval Command.

Indian Army in Mongolia for Khaan Quest

An Indian Army contingent participated in the multinational military exercise Khaan Quest that took place from 27 July to 9 August 2024 at Ulaanbaatar, Mongolia. The exercise first started as a bilateral event between USA and Mongolian Armed Forces in the year 2003. Subsequently, from the year 2006 onwards the exercise graduated to a Multinational Peacekeeping Exercise with current year being the 21st iteration.

The Indian Army contingent comprised 40 personnel and represented mainly by troops from a battalion of the Madras Regiment along with personnel from other arms and services. One woman officer and two women soldiers also formed part of the contingent. The exercise enabled the participating countries to share their best practices in Tactics, Techniques and Procedures for conduct of joint operations.

INS Tabar in MPX with Russian naval ship Soobrazitelny

Indian Navy's frontline frigate, INS Tabar arrived at St. Petersburg, Russia on 25 July 2024 for a four day visit to participate in 328th Russian Navy Day Parade celebrations. India and Russia share warm bilateral relations and maritime co–operation that span diverse fields. The visit by INS Tabar aimed to strengthen this longstanding friendship and also explore newer avenues of bolstering the relationship between the two countries. INS Tabar, on departure from St. Petersburg, Russia successfully conducted Maritime Partnership Exercise (MPX) with the Russian Navy Ship Soobrazitelny on 30 July 2024.

Indian Army exercises

In July 2024, The Pine Warriors carried out infantry armour integrated training and validated interoperability and operational readiness to conduct rapid operations on the western front. Additionally, snipers of the Charging Ram Division practiced swift operational deployment under battle conditions and accomplishment of mission with a display of precision shooting, stealth and stamina.

INS Shalki at Colombo

Indian Navy's submarine INS Shalki was in Colombo, Sri Lanka on a two day visit and accorded a ceremonial reception by the Sri Lanka Navy on 2 August 2024. During the visit, the Commanding Officer called on the Commander of the Western Naval Area Rear Admiral WDCU Kumarasinghe, followed by visit and briefing of Sri Lanka Navy personnel onboard. INS Shalki is a Shishumar class diesel–electric submarine, commissioned into the Indian Navy on 7 February 1992. This is the first ever submarine to be built in India.

INS Tabar in UK and Sweden

Indian Navy's frontline frigate, INS Tabar arrived at London harbour on 7 August 2024 for a four day visit. Indian Navy and the Royal Navy share historical ties, which have continued to thrive in recent decades.

Ships from each side have been visiting each other's countries regularly and have also participated in various naval exercises together. A week later the warship arrived in Sweden for a 2 day visit.

INS Tabar exercises with Spanish ship Atalaya

Indian Navy's frontline frigate, INS Tabar arrived on a two day visit at Malaga, Spain on 25 August 2024 and conducted a Maritime Partnership Exercise (MPX) with Spanish Navy Ship Atalaya in the Mediterranean Sea. India and Spain have been engaging in multiple fields towards enhancing the existing bilateral relations, including maritime domain.

India–Sri Lanka Exercise Mitra Shakti

The 10th edition of India–Sri Lanka Joint Military Exercise Mitra Shakti took place at Army Training School, Maduru Oya, Sri Lanka. The Exercise was conducted from 12–25 August 2024. Indian contingent comprising of 106 personnel was represented by a Battalion of Rajputana Rifles along with personnel from other arms and services. The Sri Lankan contingent was represented by personnel from Gajaba Regiment of Sri Lankan Army.

Visit to the Heritage Flight, AFS Hindon
From 'Vintage Aircraft Flight' to 'Heritage Flight'

Dakota DC–3 (Photo: Angad Singh)

Air Force Station Hindon (under the Western Air Command) in Ghaziabad on the outskirts of New Delhi is home to the Indian Air Force's Heritage Flight. It is the biggest and largest airbase in Asia. Hindon Airport, also spelled Hindan Airport, is a commercial domestic airport and an Indian Air Force base in Ghaziabad, Uttar Pradesh, India, operated by the Airports Authority of India at Hindan Air Force Station of the Indian Air Force. It is the second commercial airport serving the National Capital Region after Indira Gandhi International Airport in Delhi (though civil flights have temporarily been suspended). The annual Air Force Day parade was held here for over two decades before moving out to other parts of India. This military airbase is home to a number of squadrons that include Heritage Flight plus C–17s, C–130s, Mi–17s etc.

Heritage Flight (initially Vintage Aircraft Flight) was established in 1988 at Air Force Station Palam to showcase the IAF's rich history. The name 'Vintage Aircraft Flight' to the 'Heritage Flight' changed in 2020. The Heritage Flight is carries out ceremonial flypasts on occasions such as Republic Day, Air Force Day parades and airshows. As of now, the Heritage Flight operates the Tiger Moth, Harvard and Dakota; two more vintage aircraft are slated to join soon!

Current aircraft at Heritage Flight, AFS Hindon

Dakota DC–3 (VP–905, Parashurama): "The Dakota is the reason why Poonch is still with us". The first aircraft to take–off and land at Srinagar was Dakota VP–905 piloted by Wg Cdr KL Bhatia, CO of 12 Sqn AF and it carried the first batch of troops of 1 Sikh Regiment under the command of Lt Col Dewan Ranjit Rai. This signalled the start of the 1947–48 Indo–Pak war and the rest, as they say, is history.

The Dakota played a stellar role in the 1962 Sino–India War where it was used extensively for transportation of troops and logistics. During the 1971 Indo–Pak war the

Dakota contributed significantly to the liberation of Bangladesh. Its role during the Tangail paradrop on 11 December 1971 played a crucial role which led to Pakistan Military's surrender five days later.

On 13 February 2018, Mr Rajeev Chandrashekhar (MP Rajya Sabha) gifted this Dakota, with the historic tail No VP–905, to the Indian Air Force on behalf of his father, Air Commodore MK Chandrashekhar (Retd). This aircraft was restored to flying condition in UK from 2011 to 2018 and was ferried from UK to Air Force Station Hindan in April 2018, over a period of Nine Days. It was formally inducted into the Heritage Flight on 4 May 2018.

Dakota DC–3 (Photo: Phil Camp)

Tigermoth (HU–512): Tigermoth aircraft, registration No HU–512, was manufactured by Morris Motors in Oxfordshire, UK in June 1942. It was allotted RAF Registration No DE–893 and flew with the RAF. In March 1943 it was allotted to South African Air Force with Registration No SAAF–2492. In July 1946 the aircraft was allotted to the Indian Air Force and allocated Registration No HU–512 and was operated by the Indian Air Force Academy, Jodhpur.

In April 1963 it was transferred to the Government of India and allotted Registration No VT–DPK and was operated by the Jaipur Flying Club.

Tigermoth (Photo: Phil Camp)

Dakota DC–3 (Photo: Mayyank Kaul)

The aircraft was again transferred back to the Indian Air Force in 1982 and allocated to the Vintage Aircraft Flight. The aircraft flew with the Vintage Aircraft Flight till 1989. From 1989 until transportation to UK in July 2011, the aircraft resided in a hangar at Air Force Station Palam. After restoration to fly–worthy condition in UK, Tigermoth HU–512 was formally inducted into the Heritage Flight in September 2012.

Tigermoth (Photo: Angad Singh)

T6 Harvard (HT–291): Harvard aircraft, Registration No HT–291, was manufactured in the USA in June 1943 and was allocated to the RAF in early 1944 with Registration No FS–787 and was held in storage at Liverpool. In September 1947 it was transferred to the Indian Air Force and allotted Registration No HT–291 after which it trained many generations of pilots.

It was allotted to the Vintage Aircraft Flight in 1982 where it flew till 1989 after which it was decommissioned. From 1989 until transportation to UK in 2011, the aircraft resided in a hangar at Air Force Station Palam. After restoration to fly–worthy condition in UK, Harvard HT–291 was formally inducted into the Heritage Flight in July 2015.

Article by The Team Vayu and IAF officials

Harvard (Photo: Mayyank Kaul)

Harvard (Photo: PSC)

Vayu's interview with IAF Heritage Flight

***VAYU**: From where did the need and idea of having a fleet that operates vintage aircraft that IAF operated in the past come from?*

Ans: The Heritage Flight (initially known as Vintage Aircraft Flight), was established in April 1988 at Air Force Station Palam to offer a glimpse into the legacy of the erstwhile aircraft operated by the Indian Air Force and showcase its rich heritage and proud history. The nomenclature was changed from Vintage Aircraft Flight (VAF) to the Heritage Flight (HF) in the year 2020.

***VAYU**: What is the significance of operating a fleet of this type for the IAF?*

Ans: The aim of Heritage Flight is similar to the Suryakiran and Sarang Aerobatic Teams, ie, to showcase IAF and to inspire future generations by being a symbol of pride of the Indian Air Force. The Heritage Flight is mandated to carry out ceremonial fly past during occasions of national importance like the Republic Day and Air Force Day. It also undertakes aerial displays during international air shows like the Aero India and other such occasions.

***VAYU**: What types of aircraft does the Heritage Fleet operate?*

Ans: The Heritage Flight currently operates three types of aircraft – the Tiger Moth, which was refurbished and inducted in the year 2012; the Harvard, which was inducted in 2015, and the Dakota which was inducted in the year 2018.

***VAYU**: Are there any plans to expand the fleet?*

Ans: Two additional aircraft, ie, the Spitfire and the HT–2 are planned to be inducted into the Heritage Flight in near future.

***VAYU**: Are there any plans to open the fleet for static display for the general public?*

Ans: As and when there is an apt occasion, the Heritage Flight undertakes aerial/static displays. On clearance from Air HQs, same is open for general public.

***VAYU**: What will the future Heritage Fleet look like?*

Ans: The flight bears the proud distinction of operating vintage aircraft well before World War II era and the only tail wheel aircraft, presently being flown in IAF.

With the planned inductions, the future of Heritage Flight looks promising in executing its primary task of inspiring the youth of this country towards joining defence forces in general and Indian Air Force in particular.

Interview and photos by Abhinav Negi of Team VAYU. (Twitter: @ThatArticleGuy)

Base visit by Mayyank Kaul and Abhinav Negi

VAYU on–the–spot report

Squadron 81: The Skylords of the Indian Air Force

The C–17 Globemaster III with its proud team at Hindon! (Photo: Mayyank Kaul)

On the 81st anniversary of the Indian Air Force (IAF), a new chapter was written in the annals of Indian military aviation. On 1 September 2013, No. 81 Squadron, known as "The Skylords," was officially constituted. This squadron, based at Hindon Air Force Station, has since become synonymous with strategic airlift capabilities, thanks to its fleet of Boeing C–17 Globemaster III aircraft.

Giving impetus to the long standing strategic airlift of the Indian Air Force, the then Defence Minister AK Antony on 2 September 2013, formally inducted the Boeing C–17 Globemaster III into the IAF at a special ceremony held at Hindon airbase of the IAF. The induction ceremony was attended by a host of dignitaries including the then Minister of State for Defence Jitendra Singh, the now retired Chief of the Air Staff Air Chief Marshal NAK Browne, now retired Vice Chief of the Air Staff Air Marshal Arup Raha, then Air Officer Commanding–in–Chief Western Air Command Air Marshal SS Soman, the now former US Ambassador to India Ms Nancy Powell and other senior officials of the IAF, USAF and Air warriors of the newly formed C–17 squadron "Skylords".

Recalling the journey embarked by the IAF to fulfill the futuristic needs of air operations, the then Air Chief Marshal NAK Browne stated, "The induction of ten C–17 aircraft promises to be a game changer on how we conduct air transport operations. The C–17 fleet will provide tremendous flexibility in terms of operational response

options in any future campaign. The long range, heavy lift capability will allow the commanders to induct troops, squadrons, re–locate forces as well as shift forces between theatres rapidly. The Skylords join a very unique group of officers and me of our transport squadrons who bring with them a legacy of honour, dedication and sacrifice with a mandate to uphold the highest professional standards of IAF".

The government accorded approval to buy 10 C–17 Globemaster IIIs along with associated equipment for the IAF in June 2011. The first of the 10 aircraft touched down in India on 18 June 2013 and the delivery of all 10 was completed by November 2014. One further aircraft was added to the fleet later on bringing the total to 11 eventually.

The C–17 Globemaster III: A Marvel of Engineering

The C–17 Globemaster III, manufactured by Boeing, is the backbone of No. 81 Squadron's operations. This aircraft is a testament to modern engineering and aviation prowess. Measuring 174 feet long (53 meters) with a wingspan of 169 feet, 10 inches (51.75 meters), the C–17 is a behemoth of the skies.

Powered by four Pratt & Whitney F117–PW–100 turbofan engines, each rated at 40,440 pounds of thrust, the C–17 is designed for performance and reliability.

These engines include thrust reversers that direct the flow of air upward and forward, preventing the ingestion of dust and debris. This feature also provides enough thrust to reverse the aircraft while taxiing backwards, a capability that is particularly useful in austere airfields.

The C–17's design allows it to operate into and out of short runways and airfields while carrying large payloads. It can airdrop 102 paratroopers with their accompanying equipment, making it an invaluable asset for rapid deployment and strategic operations.

With an unrefuelled range of approximately 2,400 nautical miles and a cruise speed of approximately 450 knots (0.74 Mach), the C–17 is a versatile and powerful aircraft.

The four images above: On 31 July 2012, Vayu Aerospace Review was amongst a few select media teams invited to Boeing facilities to witness progress being made on the IAF's first C–17. A significant step had taken place a month before our arrival when a 'Major Join' ceremony had taken place at Boeing's Long Beach assembly plant. This was an important event in the assembly of the C–17; the event saw integration of the forward, centre and aft fuselages along with the wing assembly. (Photos: Vayu)

Formation and Early Years

The formation of No. 81 Squadron was a significant milestone for the IAF. The induction ceremony, held at Hindon Air Force Station, was attended by high ranking officials, including the defence minister and the Chief of the Air Staff. The induction of the C–17 Globemaster III was described as a "defining moment" for the IAF, marking

a giant stride towards acquiring multi–spectrum strategic capabilities. The Skylords were tasked with a broad range of missions, from humanitarian assistance and disaster relief to strategic airlift operations. Their motto, "Capable, Powerful, Omnipresent", reflects their commitment to excellence and readiness to serve wherever needed.

Notable Missions and Achievements

Since its inception, No. 81 Squadron has been at the forefront of numerous critical missions, showcasing its versatility and reliability.

Covid–19 Relief Operations: During the devastating second wave of the Covid–19 pandemic, the Skylords played a crucial role in airlifting oxygen tanks, containers and concentrators across India. Their efforts ensured that life saving supplies reached hospitals and patients in dire need. The squadron also ferried medical relief to international destinations, including Singapore, Bangkok, Dubai and various European countries.

Ladakh Standoff: In response to the escalating tensions along the India–China border in Ladakh during 2020–21, No. 81 Squadron swiftly deployed troops and equipment. Their strategic airlift capabilities bolstered national security and demonstrated India's resolve.

Evacuations from Conflict Zones: The Skylords have been instrumental in evacuating Indian citizens and foreign nationals from volatile regions. Notable missions include:

Yemen Crisis (2015): Amidst the chaos, they conducted rescue missions, ensuring the safe return of Indian citizens.

Nepal Earthquake (2015): Their relief sorties provided critical aid to Nepal during a devastating natural disaster.

South Sudan (2016): In a war torn region, they facilitated the safe evacuation of Indian citizens.

Afghanistan (2021): Following the Taliban takeover of Kabul, the Skylords airlifted Indian nationals, Afghan MPs, Sikhs, Hindus and embassy staff.

International Peacekeeping: No. 81 Squadron has also extended its reach beyond India's borders. They deployed to Tajikistan in 2013 and supported Indian peacekeepers in Rwanda. Their humanitarian and military operations have earned them recognition and respect on the global stage.

The Emblem of The Skylords

The emblem of No. 81 Squadron is a symbol of pride and identity. It features a winged globe at its centre, representing the squadron's global reach and capability to operate across borders. Surrounding the globe are laurel leaves, symbolising victory, honour and achievement. The Indian tricolour forms an outer ring, signifying the squadron's allegiance to the nation. The emblem also includes stylised clouds and mountain peaks, representing the skies they navigate and the challenging terrains they conquer.

Ceremony at Hindon on 2 September 2013 (Photos: IAF)

Conclusion

No. 81 Squadron, The Skylords, epitomises the spirit of the Indian Air Force. Their unwavering commitment to service, excellence and readiness to respond to any challenge makes them a formidable force. Whether it's the roar of their engines echoing across the Himalayas or the quiet determination in their eyes, the Skylords inspire confidence and pride. As they continue to soar higher and serve with distinction, they remain a testament to the capabilities and resilience of the Indian Air Force.

Article by Mayyank Kaul of Team VAYU

Photos by Mayyank Kaul except where mentioned.

(Instagram: thrustvectorneo & Twitter: @ MayyankK3246)

Base visit by Mayyank Kaul and Abhinav Negi

VAYU on–the–spot report

VAYU interview with IAF's No. 81 Sqn (Skylords)

***VAYU**: When did the IAF feel the requirement to procure a heavy transport aircraft (in the 80 tonne category)?*

Ans: IAF is the fourth largest Air Force in the world and has an ever growing requirement for heavy lift capability. The need for procuring heavy transport aircraft in the 80 tonne category was realised in the early 2000's due to expanding inventory sizes, with need to airlift heavy cargo across the country and globe, if required. With India's growing stature and being a potent force to reckon, in its sphere of influence, C17 becomes an ideal platform to carry out both strategic and tactical tasks. With India's aspiration of Amritkaal by 2047, along with national strategy of projecting and protecting Indian footprint around the globe, IAF has acquired capability to deliver in most expeditious and efficient manner.

***VAYU**: The C–17 Globemaster is an aircraft well known for its heavy lifting capabilities, how satisfied are the forces especially the IAF with it?*

Ans: IAF is extremely satisfied with the performance of the aircraft and the strategic capability enhancement which is enabled by the induction of C–17 in the IAF.

***VAYU**: IAF has used the C–17 in many operations, be it Op Rahat or Op Ganga. What makes the IAF so confident when operating the Globemaster for critical Ops like the ones mentioned above?*

Ans: C–17 is ideally suited to carry out Humanitarian Assistance Disaster Relief operations across the globe due to its strategic reach and heavy airlift capability. High

reliability of the aircraft and its support equipment makes it first choice of IAF and the nation to undertake any critical mission.

***VAYU**: What are some of the features that makes the C–17 so special and first priority for the IAF to carry and kind of heavy lifting while we have another aircraft in the same category?*

Ans: C–17 is one of the best heavy lift aircraft available with any air force across the globe. Its long range reach coupled with heavy lift capability makes it an ideal platform. This aircraft is capable of landing at austere airfields with heavy loads, and at high altitude airfields with ease.

***VAYU**: The C–17 Globemasters are seen very frequently transporting cargo that can be delivered by other aircraft in service, this seems to take a toll on the already small fleet of eleven aircraft in service which can severely fatigue the airframe before its lifespan and cause serious issues later on. What is the IAF doing to counter this and resolve the issue?*

Ans: C–17 Globemaster is being used as per the planned utilisation and there is no fatigue on the airframe or aircraft.

***VAYU**: The C–17 has proved its reliability in every Op it was part of so are there any plans to further increase the numbers of C–17?*

Ans: C–17 is a versatile heavy lift military platform and IAF is employing it in various Op roles over a wide spectrum of operations and present requirement is being adequately met by these platforms.

***VAYU**: As Boeing Aerospace has shut down the production line for the C–17, if the IAF anytime in future decides to increase the number of the type, how will the IAF actually go about procuring more C–17s?*

Ans: In case IAF requires more such heavy lift platforms with similar capability, there are standard laid down procedures for procurement and standard protocols will be followed. The requirement will be projected by the IAF to GoI.

***VAYU**: What will the future of IAF's heavy lifting squadrons especially No. 81 Sqn look like?*

Ans: The 81 Sqn 'Skylords' will continue to undertake tasks and missions assigned to it by the IAF with utmost professionalism and zeal. Sqn in its short existence of 10 years has undertaken number of operations and will continue to do so in future. Skylords have emerged as diplomats in flying suits for the nation furthering the reach of our country by conquering the world with their strategic reach.

Interview/photos by Mayyank Kaul of Team VAYU (Twitter: @MayyankK3246)
Base visit by Mayyank Kaul and Abhinav Negi

IAF's Mil Mi–26: The giant rotorcraft

Designed by Marat Tishchenko, the Russian Mil Mi–26/Izdiliye 90 (NATO Code: Halo) heavy lift transport helicopter entered operational service with Soviet Air Force in 1983. A conventional semi–monocoque structure of pod and boom type, vital areas are protected by with titanium armour plating. Lift is provided by eight blade titanium main rotor with a span of 32 metres. The helicopter has a fixed undercarriage and non–retractable tricycle type landing gear with carbon disc brakes with differential braking for steering.

The giant helicopter is powered by two Loratev D–136 free turbine turboshafts each rated at 11,600 shaft horse power with auto synchronisation and boosters for emergencies. The helicopter has a maximum speed of 306 km/h, can cruise at 240 km/h and a decent service ceiling of 8,000 meters.

The helicopter with an elaborate advanced avionics suite is operated by two pilots seated side–by–side along with one engineer in the cockpit. A load master is usually carried in the cabin. Up to 85 fully equipped troops can be embarked in the fully pressurised cabin that approaches the size of a basic Lockheed Martin C–130 Hercules. Maximum take–off weight is 56,000 kg.

The Mil Mi–26 was procured to meet the Heavy Lift requirements of the Indian Air Force (IAF). A requirement of six helicopters was projected and the first two helicopters were procured in May 1986. No. 126 Helicopter Flight, based out of Chandigarh, was raised the same month to operate the type.

The Flight has a Unit Establishment of 18 Officers, 142 airmen and 28 NCs (E) and four helicopters. The other two helicopters were procured and inducted in February 1989. Due to low utilisation, the plan to procure two more helicopters was dropped. For the total fleet of four helicopters, twelve engines were procured.

Serviceability of the helicopter suffered in the 1990s, at one point of time in 1995–96, as many as three of the four helicopters remaining on ground. Serviceability gradually fell in the mid–1990s from a high of 61% down to 40%. The

A rare photo of a formation of 3 Mi–26s flying in the year 2010 at Air Force Station Chandigarh. The photo was provided by Gp Capt Vishnu Sharma who was part of the formation flying in the third helicopter.

helicopters also remained underutilised. Against a projected utilisation rate of 50 hours per month per helicopter, the average utilisation hovered around 11 to 22 hours per month.

The first two helicopters procured in 1986 were due for an overhaul in 1990. The two helicopters were ferried to Russia for overhaul in June 1991 and were returned in August 1993. The fourth helicopter came up for overhaul in October 1996 and was given an extension of a year after maintenance by the Base Repair Depot. However the helicopter suffered some damage after one of the undercarriage struts failed in August 1997. The damaged helicopter was subsequently overhauled by the manufacturer in January 2003.

During the Kargil Operations, two Mil Mi–26s logged about 25 hours airlifting heavy equipment and guns to the Kargil area. In July 2005, a helicopter of the unit landing at Rampur in Himachal Pradesh was damaged after the rotor got entangled in high tension electrical cables. The aircraft was being used in lifting heavy road building equipment in the area. One Mil Mi–26 was written off after it crashed at Jammu airport on 14 December 2010. It was involved in the heavy lift of tunnelling equipment for the Northern Railways. The crew escaped with injuries. This was the first and till date the only major airframe loss for the Mi–26 in nearly 25 years of service.

The Mil Mi–26s have been utilised in the sky–crane role over the years. In February 1989, Mil Mi–26 helicopter undertook the only of its kind underslung operation taking Pontoon bridge form Ludhiana to Sirhind canal. In early 1999, a crashed MiG–21 was airlifted by the Unit to Chandigarh. On 21 November 2001, the Mil Mi–8 which crashed in the Rann of Kutch was lifted by the Mil Mi–26 to Bhuj. In 2002, a MiG–21 Bison which crashed in the fields near Ambala was airlifted by the Unit to Ambala Air Force Station (AFS). In July 2002 the Mil Mi–26 recovered the first civilian aircraft (Beechcraft), which had met with an accident at Kangra airfield. Another first was achieved as the unit flew the longest ever under slung flight of 3:15 hours. On 22 February 2006, a Mil Mi–26 flown by the CO, Wg Cdr Sushil Ghera, airlifted a Mil Mi–17 that force landed in a river bed a few days earlier to Chandigarh AFS. In September 2007 a Mil Mi–17 1V was airlifted from Bandipore to Awantipura. In 2010, the Mil Mi–26 was actively used to lift heavy equipment for the Katra–Quazigand Railway project providing rail connectivity to the Srinagar valley.

Notably in early 2002, a civilian Mil Mi–26 was leased to recover two United States Army MH–47E Chinook helicopters from a mountain in Afghanistan. The Chinooks, operated by the 160th Special Operations Aviation Regiment, had been employed in Operation Anaconda, an effort to drive al Qaeda and Taliban fighters out of the Shahi–Kot Valley and surrounding mountains.

They found themselves stranded on the slopes above Sirkhankel at altitudes of 2,600 metres and 3,100 metres. While the second craft was too badly damaged to recover, the first was determined to be repairable and estimated to weigh 12 tonnes with fuel, rotors, and non–essential equipment removed. That weight exceeded the maximum payload of 9.1 tonnes at an altitude of 2,600 metres of the United States military's Sikorsky CH–53E.

The Mil Mi–26 was located through Skylink Aviation in Toronto, which had connections with a Russian company called Sportsflite that operated three civilian Mil Mi–26 versions called "Heavycopters". One of the aircraft, aiding in construction and fire fighting work in neighbouring Tajikistan, was leased for $300,000.

It lifted the Chinook, flew it to Kabul, then later to Bagram Air Base, Afghanistan to ship to Fort Campbell, Kentucky, United States for repairs. Six months later, a second US Army CH–47 that had made a hard landing 160 kilometres north of Bagram at an altitude of 1,200 metres was recovered by another Sportsflite operated Mil Mi–26 Heavycopter.


भारतीय वायु सेना
ZANSKAR


126 HF

Currently, the IAF has three Mi–26 helicopters but all of them are grounded. According to The Print which reported in January 2024, "after being grounded for several years, the Indian Air Force (IAF) fleet of Mi–26 heavy lift helicopters are finally getting overhauled following a contract signed with the Russian Helicopters. Work is set to begin soon, and India will become the first country to have a simultaneous inventory of both Mi–26s and the American Chinooks.

While initially, the overhaul of three Mi–26s was to be done in Russia, they will now be done locally with help from the Russian defence firm". Sources in the defence and security establishment told The Print that the entire repair and overhaul process would require 30 months from the date of commencement of the overhaul. The planned overhaul will extend the life of these helicopters by more than a decade.

Let's see if this happens since the upgrade and overhaul plans have been talked about for over 15 years now. However, we eagerly look forward to seeing the Mi–26s over Chandigarh skies soon!

By Sayan Majumdar

All photos by Simon Watson/Vayu Aerospace Review except where mentioned.

AMCA: An Indian Fifth Generation Story; an update

Medium Combat Aircraft from 2009

The Advanced Medium Combat Aircraft, or AMCA, is an indigenous attempt to develop a fifth generation fighter aircraft, the most ambitious indigenous project to reshape the Indian Air Force (IAF). It was in 2008 when, for the first time, a plan to develop a twin engine "Medium Combat Aircraft" was publicly announced. That was a different era. Mirage 2000 and Jaguar were to be phased out by 2015. Two squadrons of Tejas Mk.1 were to be followed by only four squadrons of Tejas Mk.2. India was gearing up for the MMRCA (Medium Multi–role Combat Aircraft) to equip six squadrons. And talks with Russia just started regarding the FGFA.

The IAF approached ADA (Aeronautical Development Agency) for the development of a 20 ton platform with stealth features. Initially, an amount of Rs 90 crore was released for the preparation of the feasibility studies. The entire project cost at that time was estimated at $2 billion with the commencement of the first flight by 2017! The programme was to see two technology demonstrators followed by seven prototypes. It was expected to be powered by a new variant of the indigenous "Kaveri" engine developed by the GTRE (Gas Turbine Research Establishment). Even there was a plan of potential cooperation with Snecma. The project soon would be renamed as the "Next Generation Fighter Aircraft" and ultimately AMCA.

A five member team was set up in 2009, led by Ashish Kumar Ghosh. They were provided the operational requirements of the IAF by VCAS N.A.K. Browne. The first drift of a feasible configuration was completed by 2013. The first known model was named 3B–01, which

was to be followed by eight more design configurations. The baseline configuration was improved with each successive model, culminating in improvements in stealth, aerodynamics, payload capacity, layout, controls and many others. Each model went through extensive studies and wind tunnel tests. When the 3B–09 came, there were significant changes in design, wings, air intakes, tails, weapon bays and vertical stabilisers. The 3B–09 would be further improved in the coming time to reach the final design much later.

ADA received draft Preliminary Services Qualitative Requirements (PSQRs) in September 2014. However, the next few years weren't much reportedly public, and MMRCA and FGFA stole the limelight. Ironically, none would be fruitful. While initially many were skeptical of India's capability to afford two different fifth generation fighter jet programmes simultaneously, after one point, AMCA became India's only resort to having fifth generation capability. An additional grant of Rs. 447 crore was sanctioned in 2018. A "Project Monitoring Team" was also formed to look after combat readiness and solve potential maintenance issues at the design level itself. During a press interaction in 2020, then CAS ACM RKS Bhadauria iterated the commitment of the IAF towards AMCA with the potential procurement of seven squadrons in multiple phases.

The first two squadrons would be powered by the imported GE F414 (F414–GE–INS6) with a maximum output of 98 kN, while the rest will be powered by the indigenous engine with a higher output (at least 110 kN).

Not just a high output, but the new engine must have super cruise capability, which will allow it to have the supersonic flight without using the afterburner, which is crucial to sustain for a long time in the combat environment. ADA–GTRE is currently in discussion with multiple foreign OEMs (Rolls–Royce, General Electric and Safran) for the joint development. India aims for not just 100% transfer of technology but active participation in design and development and holds on to crucial knowledge of critical technologies like metallurgy as well.

In 2020, HAL took a ground breaking novel decision to include a private company, culminating in a three way partnership with HAL and ADA. Thus, AMCA onwards would progress as a public–private programme. The aim was to create a SPV (special purpose vehicle) as fast as possible with the participation of the private venture, which would be on equal financial and work terms with the public sector. The PDR (preliminary design review) was completed in 2022, followed by the completion of the CDR (comprehensive design review) in 2023. A nod was given for the formation of the SPV for the "manufacturing and production" of the aircraft. The year 2022 also witnessed the metal cutting of titanium bulkheads.

In early 2024, the CCS (Cabinet Committee on Security headed by the PM) approved and allocated Rs 15,000 crore for the development and manufacture of five prototypes. According to the original plan, ADA, DRDO and HAL, along with a selected private company, would build these prototypes. In mid–2024, a high–level meeting was conducted between DRDO and the IAF to discuss the further roadmap.

According to the latest reports, now there are some changes in approach. Now onwards, it will be a collaborative competition. In easy words, DRDO (ADA) will select two development–cum–production partners (DCPP) involving one public sector and one private sector entity. Thus, there will be two production lines, facilitating a quicker commencement of the project. Thus, it also reduces the risk of derailment if one production line hits the hiatus. However, India has yet to solve the engine issue. Amidst the Russia–Ukraine war, the continuous sanctions and counter sanctions have put the global supply chain at risk. Almost every major aircraft and engine OEM (original equipment manufacturer) is facing slow production rates.

As of July 2024, the contract between India and the US for the GE F–414 engine is yet to be signed. Besides, India has yet to select an OEM for the joint development of the indigenous engine necessary to power later series of AMCA. Though India is facing several challenges, work on AMCA is going on in full swing. In fact, with time, there are improvements to it. According to the latest news, the AMCA now has a maximum take–off weight (MTOW) of 27 tons with enhanced payload capability in the internal weapon bay. The first flight is now expected only by 2028 and anticipated to enter production by 2035.

Article by Sankalan Chattopadhyay
(Twitter/X @vinoddx9)

Indian Air Force in Australia for Exercise Pitch Black 2024

An Indian Air Force (IAF) contingent landed at the Royal Australian Air Force (RAAF) Base Darwin, Australia for participation in Exercise Pitch Black 2024 which took place from 2 July to 2 August 24; this is a biennial, multinational exercise hosted by the RAAF. The name 'Pitch Black' was derived from the emphasis on night time flying over large unpopulated areas. This edition was the largest in the 43 year long history of Ex Pitch Black,

which included participation by 20 countries with over 140 aircraft and 4400 military personnel of various air forces. The exercise focussed on Large Force Employment warfare aimed at strengthening international cooperation and facilitated experience enhancement with the IAF Su–30MKI operating alongside the F–35, F–22, F–18, F–15, Gripen and Typhoon fighter aircraft.

The IAF contingent comprised over 150 highly skilled air warriors including pilots, engineers, technicians, controllers and other subject matter experts, who operated the formidable Su–30MKI multirole fighters, with the C–17 Globemaster and the Il–78 air–to–air refuelling aircraft in combat enabling roles. The exercise provided the IAF with an opportunity towards force integration with participating nations and mutual exchange of best practices.

The exercise provided an excellent opportunity for strengthening the ability of the participating nations to deploy over large distances, support integrated operations in the Indo–Pacific region and building strong aviation associations in a highly challenging environment. The IAF has previously participated in the 2018 and 2022 editions of this exercise.

Text: IAF

Photos: IAF, RAAF and LACW Maddison Scott

Pitch Black 24

Logistics and maintenance as backbone of a seamless military exercise

More than 13,000 kilometers separate Europe and northern Australia. Over the course of three weeks, 20 nations took part in the Pitch Black exercise – a highly demanding scenario in which aircraft flew every day with the aim of strengthening international relationships, improving regional security and increasing resilience to transnational threats.

Over the course of several months, a great deal of work has been done in the shadows, from a logistical, maintenance and, of course, human point of view.

Going Down Under

With air forces from all over the world taking part in Pitch Black, getting equipment and personnel Down Under was a huge logistical task in itself. The French, Spanish, German and Malaysian air forces all relied on the A400M, mainly to transport spare parts for their fighter jets, as well as personnel. As Felix, an A400M pilot with the German Air Force puts it: "We mainly took care of the logistics in the background. For example, a Eurofighter does not have a cargo hold to transport spare parts, so we brought them in advance or when they were needed."

Likewise, the A330 MRTT was used in this context. France, Singapore, the United Kingdom and the Germany led Multinational MRTT Unit all counted on the aircraft for logistical support in addition to its primary tanker role.

Eurofighter 100 hour inspection

On the ground it was up to people like Brigadier Fonseca to ensure that the aircraft were up and running. She is a Eurofighter mechanic with the Spanish Air and Space Force and responsible for carrying out inspections on the fighter jet – from the most superficial, once the aircraft reaches 25 hours, to the most detailed, up to 2,000 hours.

"We came mainly to do a 100 hour inspection, which was pretty laborious," she explains. "We had to lift the plane on jacks and put it in the hangar. It took several people." The service included the inspection of visual and functional elements that could prevent the aircraft from flying. One of the main difficulties faced by the mechanics was the distance from Europe, with its limitations in terms

of personnel and equipment, as well as an unfamiliar climate.

“The work was a bit different because of the long flight times we had, the temperatures and the winds,” stated Dennis, an A400M technician from the German Air Force. “There was also a lot of sand in the air.”

Crossed maintenance: reduction of the logistical footprint

Faced with these complexities, Germany and Spain had signed agreements to support each other in case certain equipment was needed or an aircraft broke down.

“This greatly reduced the footprint, both in terms of material and personnel,” explained Major Fernando, a Eurofighter pilot with the Spanish Air and Space Force. “For example, German mechanics were authorised to repair an issue on a Spanish Eurofighter with a Spanish mechanic present who checked that the action taken was in accordance with national standards.”

This came to bear before Pitch Black started: In Alaska, a Spanish Eurofighter developed an engine problem and was unable to fly. After the necessary approvals and compatibility checks, it was replaced by a German one and continued its journey to Australia via Japan.

Germany and Spain collaborating, is nothing new. The two countries also joined forces when it came to maintenance during air policing in the Baltics, protecting NATO's eastern flank.

Franco–Australian A330 MRTT cooperation

Meanwhile, a French A330 MRTT was struck by lightning on a flight to Australia. A thorough analysis revealed that a vital tool for checking the frequency of the in–flight refuelling boom was missing. Arriving at Amberley Air Base in Western Australia, the French mechanics were joined by their Australian counterparts and together they solved the problem. "Everything was ready for us when we arrived in Australia," stated Lieutenant Florence, head of technical support for the French A330 MRTT detachment. "We were immediately able to retrieve our equipment without quarantine and were given a storage area with the other air forces participating in the exercise."

All this exemplifies the great level of collaboration, combined with excellent logistics and a high level of preparedness that allowed European air forces to anticipate problems and resolve them efficiently when they arose. It played a huge role in making Pitch Black a success, enabling the European participants to strengthen alliances between each other and with the countries of the Pacific.

All photos: Royal Australian Air Force/IAF/Airbus Defence

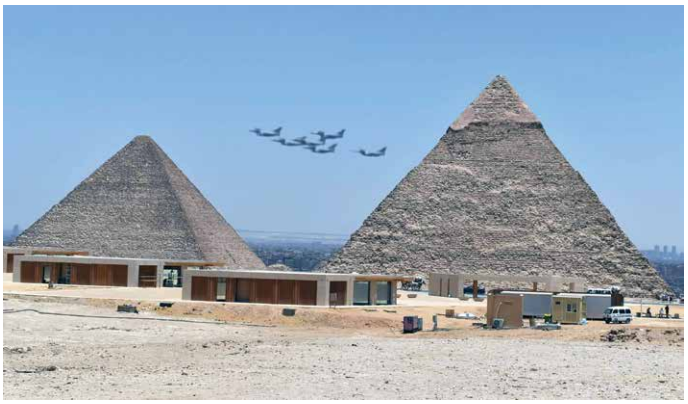
Text: Airbus Defence and Space

Indian Air Force at Red Flag 2024, USA

An IAF contingent arrived on 30 May 2024 at the Eielson AF Base of the USAF at Alaska, USA, to participate in the next edition of the multi–national exercise Red Flag 24. Ably supported by its Il–78 air to air refuellers and the C–17 transport aircraft, the IAF Rafale fighters took a transatlantic flight with staging halts at Greece and Portugal. Aimed to integrate aircrew in a multinational environment, Ex Red Flag is a two week advanced aerial combat training exercise.

IAF Rafale fighter jets then finally returned to India on 26 June 2024, after successful participation at Ex Red Flag in the USA. While on the return, a refuelling halt was planned at Lajes, Portugal, where Mr Manish Chauhan, the Indian Ambassador to Portugal, interacted with the IAF team and exchanged mementos. Subsequently, the contingent split into two teams and conducted a joint exercise with the Egyptian AF and Hellenic AF in Egypt and Greece respectively. While at Egypt, the Indian Rafales soared high and flew over the Great Pyramids in formation with the Egyptian Rafales. Indian Ambassador to Egypt Mr Ajit Gupte met the team and extended his best wishes.

The Greek sky saw the IAF Rafales flying with the F–16s of the Hellenic Air Force. Aimed at enhancing international military cooperation and interoperability, this "transatlantic leap by IAF's Rafales has opened the gates to many such enriching exercises in future".



IAF in Indonesia

On 10 July 2024, an IAF contingent made a transit halt at Indonesia while heading towards southern hemisphere for Ex Pitch Black 24. Su–30MKI fighters landed at Halim and were welcomed by Mr. Sandeep Chakravorty, Indian Ambassador to Indonesia. These long range missions were supported by IAF Il–78 inflight refueller aircraft.

IAF returns after Exercise Udara Shakti

After successful participation in Exercise Udara Shakti 2024 at Malaysia, the Indian Air Force (IAF) contingent returned to India, on 10 August 2024. The joint air exercise was conducted in collaboration with the Royal Malaysian Air Force (RMAF) from 5 to 9 August 2024 at Kuantan, Malaysia. The IAF participated with Su–30MKI fighter jets.

During the exercise, IAF's Su–30MKI fighter jets engaged in air combat missions alongside the RMAF's Su–30MKM fighters, enabling the crew of both air forces to familiarise with each other's operational protocols, thereby enhancing interoperability, commonality and overall effectiveness in Su–30 aircraft operations. Aimed at bolstering operational efficiency, technical experts of both Air Forces engaged in exchange of their maintenance practices.

Exercise Tarang Shakti 2024

1st Phase: 6–14 Aug (Sulur)
2nd Phase: 29 Aug to 14 Sep (Jodhpur)

IAF LCA Tejas at Sulur during Tarang Shakti 2024 (Photo: Mayyank Kaul)

Exercise Tarang Shakti, Indian Air Force's first ever multinational air exercise, at the Sulur Air Force Station in Coimbatore, Tamil Nadu, represented a new era of international military cooperation and showcased India's growing role in global defence dynamics.

This exercise represented a significant step forward for the Indian Air Force and its international partners. By bringing together air forces from around the world, the exercise fostered a spirit of cooperation and mutual respect, essential for addressing the complex security challenges of the 21st century.

The exercise attracted participation from nine nations, including Australia, France, Germany, Greece, Spain, United Arab Emirates, United Kingdom, United States and Singapore. Additionally, 18 other countries were observers for the exercise, underscoring its global significance. The skies over Sulur were graced by a diverse array of aircraft.

Photo: RAF

The German Air Force, for instance, deployed Eurofighter Typhoons, marking their largest deployment of air assets in 2024. The French contingent included Rafale fighters, an Airbus A330 multirole tanker transport (MRTT) aircraft and an Airbus A400M transport aircraft.

The UK's Royal Air Force sent six Eurofighter Typhoons, two A330 Voyager air–to–air refuellers and an Airbus A400M military transport aircraft. The IAF also showcased its formidable fleet, including Su–30MKI, Rafale, Tejas (LCA), Mirage and MiG–29K (Indian Navy) fighters, along with refueller Il–78 and military transport aircraft C–130J.

The exercise aimed to enhance interoperability among the participating air forces, allowing them to share best practices and improve coordination in complex operational scenarios. The exercise provided a platform for the participating nations to showcase their aerial tactics and operational proficiency, fostering mutual understanding and cooperation.

Air Chief Marshal Vivek Ram Chaudhari, the Chief of the Air Staff, emphasised that the exercise tested coordination among various air formations, pilot skills and the support staff management under various testing conditions, which were crucial for successful multinational operations.

One key highlight of the event was that Lieutenant General Ingo Gerhartz of the German Air Force, who flew a Eurofighter Typhoon for five hours to reach Sulur Air Force Station. Four Tejas fighter jets flew in formation to commemorate his arrival.

Photo: FASF

Photo: FASF

Not limited to military drills, Exercise Tarang Shakti is a strategic initiative focused on strengthening defence ties and enhancing regional security. The engagement of several nations from Europe, the Middle East and Asia reflects India's commitment to a collaborative approach to global security challenges. Through the organisation of this extensive exercise, India is establishing itself as a pivotal force in the global defence landscape, demonstrating its ability to lead and manage intricate multinational operations.

The second phase of the exercise took place in Jodhpur, Rajasthan, from 29 August to 14 September 2024. The achievements of Exercise Tarang Shakti are expected to open doors for more multinational exercises in the future, further solidifying India's position in global defence collaboration.

The IAF's proficiency in organising and engaging in such exercises highlights its expanding capabilities and its

dedication to upholding peace and security both regionally and globally.

Lindy Cameron, British High Commissioner to India, stated, "I congratulate the Indian Air Force on organising its first multilateral air exercise, Tarang Shakti, and am delighted that the Royal Air Force is one of the key participants. Our cooperation in security and defence extends across the seas, land, and air. It is crucial that our armed forces work together to preserve stability and enhance prosperity in the Indo–Pacific."

Group Captain Neil Jones, Air Adviser, British High Commission, stated, "Exercise Tarang Shakti adds to a significant milestone in the ongoing relationship between the air forces of our two countries. Training in a multilateral environment provides a unique exposure to new challenges as well as integration of our tactics and skills across all specialisations. For the Royal Air Force, it also demonstrates our ability to deploy and sustain air

operations over great distances and maintain an effective presence in the Indo–Pacific, whilst working with partner nations; it is a pleasure for us to be here."

The six Typhoons from XI (Fighter) Squadron, from RAF Coningsby arrived in India after participating in Exercise Pitch Black in Australia, where they operated alongside the IAF. In March 2023, the IAF debuted at RAF's multilateral Exercise Cobra Warrior, organised at Waddington Air Base in the UK.

The participation of the French contingent formed part of its two month long mission across the Indo–Pacific region, titled "PEGASE 24", which started from France at the end of June and concluded on 15 August. The mission's goals were to demonstrate France's ability to protect its sovereignty as a resident nation of the Indo–Pacific with several territories in the region, promote the rule of law and multilateralism in this zone, and enhance interoperability with key partners like India. By the end of its mission, the PEGASE 24 had made stopovers in 13 partner nations and taken part in three major exercises throughout this period, including Tarang Shakti.

Photo: FASF

On this occasion, the Ambassador of France to India, H.E. Mr Thierry Mathou, stated, "As India's trusted strategic partner, France is proud to participate in India's first ever multilateral air exercise and contribute to making it a success. Our contingent joins India as part of an extended deployment in the Indo–Pacific, which reflects

France's commitment as a resident power of the region. I also wish to highlight the European dimension of Tarang Shakti with EU Member States Germany and Spain participating, too.

France is a strong supporter of Europe's role as an active stakeholder of security and stability in the Indo–Pacific."

To mark the conclusion of Tarang Shakti and France's PEGASE 24 deployment, France's Chief of Air Staff, General Stéphane Mille, paid an official visit to India from 12–14 August. He attended the closing ceremony of the exercise at AFS Sulur, met his counterpart and key officials in Delhi, and spoke at the National Defence College.

The French and the Indian Armed Forces maintain an intense schedule of exercises that go back decades and illustrate the trust underpinning the France–India strategic partnership. These include the Varuna Navy exercises (dating back to 1983), Garuda Air exercises and Shakti Army exercises. France and India have also taken part in each other's multilateral exercises, such as the France–led La Perouse naval drill in 2022 and Orion mega–exercise in 2023.

Visit, article and photos (except where mentioned): Mayyank Kaul (Twitter/Instagram ThrustVectorNeo
Additional text courtesy UK High Commission in India and Embassy of France in India

VAYU on–the–spot report

Army 2024 at Patriot Centre, Moscow

On the sunny morning of 11 August 2024, we (select Indian media) touched down at Sheremetyevo Airport, Moscow, ready to begin our coverage of the International Military Technical Forum "Army 2024". The first day was reserved for rest, preparing us for the thrilling days ahead at the Patriot Expo at Moscow Oblast.

Day 1: August 12th

Our first day began with an impressive display of Russian ground vehicles, including main battle tanks, infantry fighting vehicles, and armoured personnel carriers. The massive fleet of nuclear missile carrying Transporter Erector Launchers (TELs) stood out as we navigated the vast campus of Patriot Expo. After a brief photography session, we attended the Rosoboronexport Conference, where the Lancet–E Complex, an export oriented family of ZALA Lancet 3 loitering munitions and UAVs, was unveiled.

Next, we visited the United Shipbuilding Corporation (USC) pavillion, where we were briefed on new surface vessels and submarine concepts. Lunch at the USC pavilion was thoughtfully arranged, catering to both vegetarians and non–vegetarians in the media team.

Post lunch, we explored the Tactical Missiles Corporation pavillion, getting a firsthand look at their latest missiles, including air–to–air, air–to–surface and anti–ship platforms. The pavilion also showcased submarine launched torpedoes and hypersonic missiles. At the Kalashnikov pavillion, we were introduced to a range of firearms and gear, from legacy systems to future innovations. Our day concluded at the Rostec pavilion, where Uralvagonzavod representatives shared insights into the Russian tank fleet, highlighting enhancements made since the war began.

Day 2: August 13th

The second day began with a refreshing rain and a smooth entry into the venue. We started by exploring the Chinese and Iranian pavillions, which showcased export oriented flagship products. The Indo–Russian joint venture firm BrahMos also had a distinctive stand.

We soon headed to the High Precision Systems shooting range, where, after a brief informative session, we had the exhilarating opportunity to test various firearms, including anti–materiel rifles, designated marksman rifles, carbines, pistols, and grenade launchers. The hands–on experience spiked our adrenaline, making it one of the highlights of the day.

After a delightful Russian lunch, we returned to the High Precision Systems pavillion for a briefing on their displayed products, including anti–air and anti–tank systems, UAVs, fire control stations, and armoured vehicles like the Sprut and BMP–3. We then visited the Almaz–Antey pavillion, where we viewed state–of–the–art air defence systems like the Antey 4000, S–400 and Viking 1.

Our day concluded with an hour long meeting with Rubin's Deputy CEO, Mr. Andrei Baranov, at the USC pavilion. This informative session provided us with valuable insights into Rubin's vision and strategies, which we will feature later in this series of reports from Army 24.

Day 3: August 14th

The final day started with a bit of a delay due to heavy traffic caused by increased security, but we only missed a few minutes of the Rosoboronexport conference. The company presented its successes, strategies and various products including firearms, communication systems, individual protection systems, armoured vehicles, electronic warfare equipment and export ready missiles like the Iskander–E.

At the Kronshtadt pavilion, we were introduced to the new supersonic Unmanned Combat Vehicle GROM–U and the Orion E MALE UCAV, both available for export and partnerships. Then, a short breakfast break was followed by a visit to the Russian Helicopters display, featuring export variants of the Mi–28 and Ka–52 attack helicopters.

One of the most exciting moments was witnessing a spectacular demonstration of robotic dogs performing in sync, mesmerising the audience. Our next stop was the United Aircraft Corporation pavillion, where we saw the launch of the Sukhoi C76 heavy cargo UAV. After lunch, we toured the Yak–130, now integrated with new technologies to meet advanced combat training needs.

Our final visit of the day involved viewing war trophies, where captured vehicles from the Russia–Ukraine conflict, including those donated by NATO countries, were displayed. Detailed explanations of how they were captured added depth to our understanding. This wrapped up not just our day but also our coverage of Army 2024 where we witnessed the grand display of Russian firepower, key innovations in defence and optimism for continued strategic cooperation with allied countries, including India.

We extend our heartfelt gratitude to our wonderful coordinator, Alice Gritskova from Rubin Design Bureau, and also our hosts and coordinators from United Aircraft Corporation (UAC) and Rosoboronexport for their continuous support throughout the media tour, enabling us to gather comprehensive insights on dedicated subjects. Thank you again and much appreciated!

Visit, report and all photos: Rishav Gupta (Twitter: @ connect_rishav)

Security personnel with C–UAS equipment at the expo site

Longtime friends of the Vayu magazine: Maxim Syssoev (UAC) and Alice Gritskova (Rubin Design Bureau)

The Brahmos Pavillion at Army 24

Indian–Russian IRIGC–M&MTC holds its 3rd meeting

The Working Sub Group on Planning of Military Cooperation of the India–Russia Intergovernmental Commission on Military and Military Technical Cooperation (IRIGC–M&MTC) held its 3rd meeting recently on 23–24 July 2024 at New Delhi. The discussions focused on strengthening the ongoing defence engagements between the two sides, pondering over new initiatives under the ambit of the existing bilateral defence cooperation mechanism.

The Working Sub Group Meeting is a forum established to carry forward defence cooperation between the countries through regular talks at the operational level between Headquarters, Integrated Defence Staff (HQIDS) and the Main Directorate of International Military Cooperation of the Ministry of Defence, Russian Federation.

VAYU on–the–spot report

International Military Technical Forum "Army"

The year, in August 2024, saw the Russian Ministry of Defence backing up the 10th edition International Military Technical Forum "Army", a grand annual trade show in the country since 2015. The event saw the participation of several companies based in Russia and abroad, exhibiting their product line and offering it to potential customers. The forum aims to showcase the firepower of Russian armed forces, the engineering excellence of the nation in arms manufacturing and military science, the vision for a strengthened future and provide a common ground for representatives from many countries to interact with each other.

Taking place in the third year of Russia's ongoing conflict with Ukraine, Army 2024 carried a heightened sense of urgency and significance. The forum served as a crucial showcase for the advancements in military technology that have been developed and tested in the heat of battle. Therefore, the event also provided a platform to demonstrate the effectiveness of its defence industry in supporting the armed forces.

Outdoor Display

The Army 2024 featured an impressive array of platforms, primarily focused on military applications, with a select few dedicated to law enforcement, such as advanced police vehicles.

The Russian nuclear arsenal, including the Topol M and Topol Intercontinental Ballistic Missiles (ICBMs) mounted on imposing MAZ Transporter Erector Launchers (TELs), stood out prominently from a distance. The tank lineup, spearheaded by the formidable T–14 "Armata" and accompanied by variants of the T–90, T–80 and T–72 main battle tanks, was equally striking. Most of the tanks had their sensors and other equipment discreetly concealed by camouflage, enhancing their tactical appeal.

Complementing these were a wide array of armoured vehicles, such as mine protected vehicles, armoured personnel carriers, infantry fighting vehicles, and more, strategically displayed throughout the campus.

There were also inflated dummies of various systems in service with the Russian armed forces, like Pantsir and S–400 Air Defence Systems, T–90, Kamaz utility truck and more. These systems have been effectively deployed in the current war, to fool the hostile strike missions by loitering munition or other electro–optical guided munitions, as focusing on wasting them on a false target.

The show also had a brief but exciting demonstration of robot dogs, who performed in sync and with exhilarating background music, appeasing the crowd.

In the indoor pavilion, multiple exhibitors, from Russia and abroad displayed their product line–ups and flagships. Countries like China and Iran displayed a wide range of products which gained popularity in recent times. Indian company BrahMos also had its stand, where it displayed the cruise missiles with its land launched, air launched and ship launched variants.

Russian conglomerates and their newly launched platforms

Once again, this year, the state owned Russian companies and conglomerates, like the Rosoboronexport, United Shipbuilding Corporation and United Aircraft Corporation presented new products, including the platforms open for export. They also had their special pavillions placed at a distance from the main display halls. The dedicated pavillions gave a special recognition and wide space to display an in–depth presentation of the respective portfolios. It included Kalashnikov, Tactical Missiles Corporation, Rostec, United Shipbuilding Corporation, United Aircraft Corporation and Almaz–Altey Air and Space Defence Corporation.

Rosoboronexport

JSC Rosoboronexport is Russia's official state agency that handles all exports and imports of defence and dual–use goods, technologies and services, produced by home manufacturers. It unveiled the Lancet E Complex on the first day of the show. The Complex consists of the family of Loitering Munitions: Izdeliye (Item) 51E, Izdeliye (Item) 52E and UAV Z–16E, all of which are export oriented variants of the Lancet family. Rosoboronexport has been pitching the system as a "game–changer" platform for the customers, as it is backed by its successful deployment in the ongoing Russia–Ukraine conflict where it performed in all weather conditions.

Apart from Lancet E, Rosoboronexport showcased a range of heavy systems, like infantry fighting vehicles like Boomerang, ballistic missile systems like Iskander, surface to air defence systems like Viking and armoured vehicles like the ones from KAMAZ Typhoon. Electronic warfare equipment, communication systems as well as small arms, anti–tank/armour solutions, mortars and more, all of which are open for export, complemented the display as well.

United Aircraft Corporation

United Aircraft Corporation (UAC), the conglomerate overseeing the various aircraft designing and development firms, also launched new manned and unmanned platforms. Firstly, the Sukhoi S–76 cargo carrier drone. With autonomous vertical take–off and landing capability, the system can operate from various wide variety of terrains and geographical conditions as it will require less space than conventional take–off/landing aircraft, which would require an aerodrome or runway for launch. It is capable of delivering cargo weighing up to 300kg and within a range of 500 kilometres. The platform is in the early stages of trials and testing, with progress being made consistently.

Next up was the Yak–130M aircraft introduced by Yakovlev

as a modernised variant of Yak 130 combat trainer aircraft. The aircraft integrates new multi–mode President–S130 multi–mode radar, a new set of armament for air–to–air and air–to–ground roles, President–S130 electronic warfare pods, advanced and secured KSS–130 navigation and communication systems, as well as other sensors like KSS–130 to enhance the precision and survivability of the aircraft, as well as offering more exposure for both training and combat purposes.

United Shipbuilding Corporation

United Shipbuilding Corporation (USC) supervises Russia's shipbuilding industry, being the umbrella organisation of firms focusing on maritime engineering and the production of naval vessels. USC presented a plethora of concepts and platforms which are produced in Russia as well as offered for foreign clients, for both civil and defence purposes. The flagship product showcased was the Amur 950 with vertical cruise missile launchers, the newly launched member in the Amur class (export–oriented Lada Class family) of submarines by Rubin Design Bureau, which is a 120 year old professional submarine designing firm and also the first to be established in Russia. The submarine has a comparatively smaller size than its predecessors, which gives it a low tonnage displacement and can be operated by a crew of 19. However, it can launch a salvo of cruise missiles.

Moving ahead, there were also multiple ship designs; which are being developed as well as deployed by Russia, like the Project 228003 Corvette, Project 11356 Frigate, Project 636 Kilo–class submarine with Club–S and more. Concepts like mammoth capacity aircraft carriers and landing helicopter decks were also presented. USC is also looking forward to contributing to civil agencies by delivering vessels for various purposes, like fishing vessels, cargo freighters, salvage ships and more. It expects to deliver 36 vessels to civil customers in 2024.

War Trophies

Due to their incredible placement by the organisers, War Trophies greeted the visitors during their entry into the main campus of the Patriot Expo. There were more than 10 types of vehicles, from utility vehicles like HMMWV/Humvee to M1A1 Main Battle Tank, on display which are showcased as war trophies, as the Russian Armed Forces captured them in the Russian–Ukraine war. All the vehicles have been pasted with the flag of their respective country of origin to identify what country have donated what to Ukraine. Few of them were also in a state where they could be operated after a few tweaks. Russian officials have "thoroughly studied" the vehicles, allowing them to analyse the advantages and disadvantages of their equipment. This also led them to introduce upgrades on their platforms to increase their survivability if they would face the same platforms again in the battlefield.

Conclusion

This year's forum was not just about displaying military might, but also about reflecting on the lessons learned from the battlefield, underscoring the resilience and innovation of Russia's defence capabilities amidst an enduring and complex conflict. The event emphasised the importance of adaptability and technological advancement in modern warfare, showcasing how Russia's defence industry has responded to the evolving demands of the battlefield. By presenting both operational platforms and emerging technologies, Army 2024 reaffirmed Russia's commitment to maintaining a robust defence posture, while also signaling its readiness to engage with global partners and potential clients. As the conflict with Ukraine continues to shape the strategic landscape, the forum highlighted Russia's determination to secure its interests and fortify its position on the global stage.

Visit, report and all photos: Rishav Gupta (Twitter: @connect_rishav)

Visit by Admiral Aleksandr Alekseyevich Moiseyev, Commander–in–Chief Russian Federation Navy

Admiral Aleksandr Alekseyevich Moiseyev, Commander–in–Chief, Russian Federation Navy was on an official visit to India from 19 to 22 August 2024. The visit was a testimony to the longstanding relationship between the navies of Russia and India. The visit aimed to strengthen bilateral naval relations between India and Russia, as also to explore new avenues for naval cooperation.

Admiral Aleksandr Alekseyevich Moiseyev called on Adm Dinesh K Tripathi, the Chief of the Naval Staff, Indian Navy on 19 August 2024 at New Delhi and held discussions on collaborative mechanisms and measures to further strengthen Navy to Navy cooperation. He was received with a ceremonial Guard of Honour at the South Block Lawns.

Indian Navy cooperates with Russian Federation Navy on many fronts, which include operational interactions, training, hydrographic cooperation and exchange of Subject Matter Experts in various fields through the IRIGC M&MTC mechanism between the two countries. Indian Navy has also been interacting with Russian Federation Navy in various multilateral fora viz. IONS (Indian Ocean Naval Symposium), MILAN, IORA (Indian Ocean Rim Association), WPNS (Western Pacific Naval Symposium) and ADMM–Plus (ASEAN Defence Ministers' Meeting–Plus).

The C–in–C, Russian Federation Navy also met the Chief of Defence Staff, the Defence Secretary, the Vice Chief of the Air Staff, and the National Maritime Security Coordinator of India, as part of his official engagements in New Delhi.

In addition to New Delhi, the C–in–C, Russian Federation Navy, also visited Mumbai, where he held bilateral discussions with the Flag Officer Commanding–in–Chief, Western Naval Command, as well as indigenous warships & submarines; Naval Dockyard; and Mazagon Dock Shipbuilders Limited.

Visit of Russian naval ships to Kochi

Russian Naval Ships 'Varyag' and 'Marshal Shaposhnikov' were on a goodwill visit to Kochi from 6–9 August 2024.

The ships were accorded a warm welcome by the Indian Navy in the background of fanfare by the naval band. Captain Anatoly Velichko, Flag Officer onboard Russian Ship along with Commanding Officers of both warships called on Rear Admiral Upal Kundu, Chief of Staff, Southern Naval Command and discussed matters of maritime interest.

VAYU on–the–spot report

Rubin Design Bureau at Army 2024

Nestled along the banks of the iconic Neva River in the historic city of St. Petersburg, the Rubin Design Bureau stands as a pillar of Russian maritime engineering excellence. It has been at the forefront of designing state–of–the–art submarines for more than 120 years now. Since its establishment in 1900, the company proudly flaunts its portfolio of serving the Russian and several allies around the world.

On the right, Mr. Andrei Baranov, Deputy CEO for Foreign Economic Activities, Rubin during a press conference at Army 2024

This year at the grand International Military Technical Forum "Army 2024", Rubin unveiled a great range of products in both civilian and military applications to cater to the needs in maritime domain.

Firstly, the Amur 950 submarine with Vertical Launchers. This is equipped with a Vertical Launch System, is a small attack submarine capable of launching cruise missiles (including BrahMos) in salvos to neutralise enemy defences and strategic positions. With low noise and advanced sonar for enhanced reconnaissance and covert operations, it is ideal for missions up to 1,000 miles offshore. The submarine boasts a 30 day endurance, a top submerged speed of 20 knots and operates with a crew of 19 people only. With a displacement of around 1,000 tons, the Amur 950 serves as an excellent base platform for manoeuvrability submarines, thanks to Rubin's advanced design solutions. While the submarine is powered by a diesel–electric powerplant, it also offers an option to integrate Air Independent Propulsion (AIP), in case the customer prefers it.

The Argus–D leads Russia's range of Autonomous Underwater Vehicles (AUVs) as the first with a detachable payload. It offers a payload space of up to 2 meters long, 0.55 meters wide, and 0.5 meters high, allowing the attachment of various scientific instruments, such as seismic sensors or environmental monitors. The AUV can deploy these instruments on the ocean floor to collect data on acoustic signatures or biological activity.

Operating independently of a manned ship, the Argus–D has a 20 hour endurance at 3 knots, with a top speed of 6 knots and a diving depth of up to 3 kilometres. The 8.9 meter long, 5.5 ton vehicle is equipped with an obstacle avoidance system and can be transported in a standard 40 foot container. Its open architecture allows for interoperability with other systems and easy customisation to meet customer needs, with accessible sub–systems for fast maintenance.

The WHALE 3000 is a work–class Remotely Operated Vehicle (ROV) designed for complex underwater tasks. It can retrieve equipment from the surface and install it at target locations. Equipped with two manipulators and interchangeable grippers, WHALE can perform various operations, such as assembling components, laying cables, and maintaining oil and gas systems. It operates with high automation, maintaining depth and tracking autonomously.

With the ability to cut, weld, clean and install vacuum anchors, WHALE is essential for underwater construction, pipeline maintenance and rescue missions. Its high definition cameras and powerful LED lights ensure precise work even in total darkness. WHALE operates at depths of up to 3 kilometres and can assist in scientific research by collecting samples from the ocean floor. Measuring about 3 meters long, 1.8 meters wide, and over 2 meters tall, WHALE is lightweight at 5 tons, thanks to its composite materials, and can be transported in a standard 20 foot container. Designed using 3D modelling, its production process is streamlined and efficient.

And last but not least, to replenish the above AUVs, the Octavis can be deployed. The Octavis station is designed to support AUV operations by providing a docking point where AUVs can recharge, undergo maintenance checks

USC stand

WHALE 3000

and await new missions. It serves as an information hub, storing and transmitting data to shore based control centres or other AUVs, and can upload new mission programmes to the AUVs.

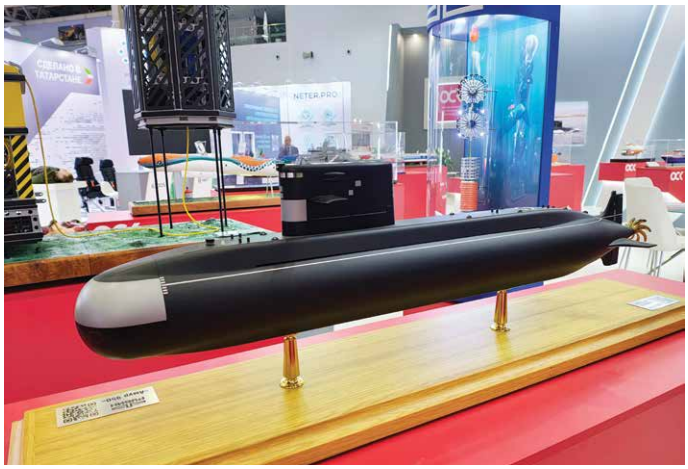
Octavis enhances operational efficiency by eliminating the need for constant mother vessel presence, reducing mission costs, and mitigating the risks of AUV deployment in harsh weather. It also enables continuous environmental monitoring and wider underwater coverage for tasks like seabed mining and oceanographic research.

The station can be anchored at depths between 500 and 1,000 meters and is capable of supporting one to three AUVs, depending on mission requirements. Octavis is powered by an onboard Li–Ion battery, with additional power options from external modules or energy sources like offshore platforms or ocean energy converters. Rubin Design Bureau is collaborating with scientific institutes to further develop this innovative technology.

Cooperation with India

Rubin is also looking forward to continuing its strategic cooperation with important allied countries like India, which has been an important client for the company for a very long time. As confirmed in our interview with Deputy CEO for Foreign Economic Activities (Rubin), Andrei Baranov during Army 2024, there are preliminary discussions with Indian officials taking place to collaborate

on the development of AUV solutions, for both civilian and military applications. The partnership, if moved ahead, will see the Indian Navy as well as civil research firms, acquire locally made AUVs to carry out desired tasks.



Amur 950 submarine

Mr Andrei also shared how small submarines, similar to Amir have been successful in recent operations, where the strategy to launch the salvo of cruise missiles from the submarines in the Black Sea, towards enemy positions has been proven effective. It helped the ground forces to advance into hostile territory with lower resistance as the cruise missiles were able to suppress the enemy defences and positions. He also expressed the viewpoint on how small attack submarines are fast and hard to detect as compared to bigger submarines with comparatively higher signatures as well as the cost to produce.

Rubin's latest vision centres on revolutionising its product line with cutting edge Autonomous Underwater Vehicle (AUV) solutions. By offering an all inclusive package that integrates both operational and support systems, Rubin delivers a complete, robust solution for customers seeking to elevate their maritime and underwater research capabilities. Moreover, the introduction of new submarine and launch systems will not only enhance the operational prowess of customer navies but also empower them to establish a formidable deterrence in the maritime domain.

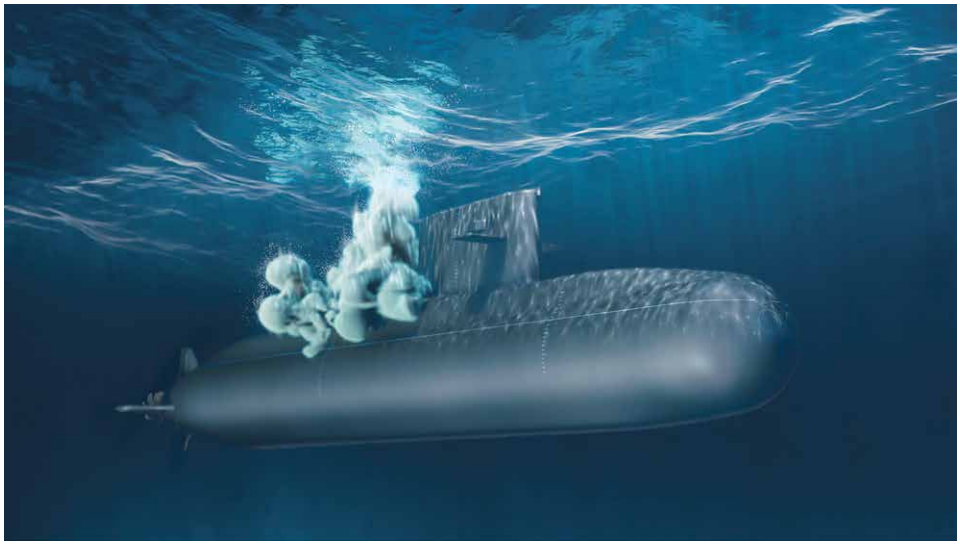
Visit, article and photos: Rishav Gupta (Twitter: connect_rishav)

Argus D AUV

VAYU on–the–spot report

Interview with Mr. Igor V. Vilnit, CEO of Rubin Design Bureau

Rubin CEO Igor Vilnit



Amur 950 ocean submarine with vertical launchers

***VAYU**: How have the relations nurtured between Rubin Design Bureau and India over time?*

CEO: Rubin is proud to be part and parcel of Indian submarine fleet development. Next year it will be 60 years since the agreement was signed for construction for India of four large diesel–electric submarines of Kalvari–class developed by Rubin. Pretty much, we were receiving training together because it was the first submarine for India and as for Rubin Design Bureau and Admiralty Shipyard in Leningrad (today St. Petersburg), where the submarines were built, it was the first submarine constructed as required by a foreign customer.

When Rubin had designed the Kilo class – one of the most successful classes among non–nuclear submarines in the 20th century – India retained for Russia the position of priority partner. A large series of these submarines was delivered to the Indian Navy. What's interesting, India is the first foreign customer who received boats with the Club–S missile system. An advanced level of automation in the final of the series – INS Sindhushastra – made it then the most state–of–the–art submarine in the world among diesel–electric boats.

In recent years, Rubin has been rendering assistance in service life extension of Project 877EKM including installation of Indian made equipment. Thats why, we are fully aware of the situation in the fast growing shipbuilding industry of India.

A new interesting trend has now appeared in our cooperation. Rosoboronexport (Russian State Intermediary) and Rubin discuss opportunities for AUV joint design with the Indian side. We had multiple contacts on this point, Indian representatives visited Rubin, and we described our expertise. Availability of AUVs is of great interest for awareness of the situation in the ocean as well as exploration/mining of mineral resources. The Indian Ocean is very deep, its average depth is about 3700 metres, maximum depth is over 7700 metres, therefore to conduct multifaceted activities in this ocean, deep–water AUVs and AUVs with high endurance are required, and this is the domain where Rubin works.

We designed and manufactured a number of deep–water AUVs. In 2020, our deep–water autonomous unmanned vehicle Vityaz–D was the first in the world to perform a mission in the Mariana Trench. Descending by 10028 metres, Vityaz–D passed three kilometres above the trench bottom. The mission lasted for three hours, and Vityaz–D acted on its own all this time. Project Vityaz–D allowed us to make a major step in the development of AI control systems and in introduction of new structural materials. At the Army–2024 show, we are demonstrating AUV from the Argus family. Its depth rating is 1 km, 3 km and 6 km depending on customer's tasks. The first in Russia AUV with detachable payload – Argus–D – is also being shown here at Army 2024.

***VAYU**: How is the Rubin Design Bureau supporting Indian Navy in maintenance activities and infrastructure development in the maritime domain?*

Indian Navy's INS Sindhuvijay Kilo–class submarine

CEO: Today's world situation imposes certain restrictions but I can mention only that we fulfil our contractual obligations. We know well that timely repair and upgrade contributes to a long service of any ship. Normally, time till the first medium refit of the boat is ten years. In the next ten years, a medium refit takes place with the service life being extended up to ten years depending on the state of the hull and main systems. Our unrivalled expertise of repairs with extension of service life proves that the submarine can service in the Navy up to 40 years and even longer.

***VAYU**: Are there negotiations still underway with India to Project 75I? Is there any alternative planned to be pitched to India after withdrawing the earlier offer?*

CEO: Any negotiations with a foreign customer are conducted by the Russian Federal Service for Military and Technical Cooperation and Rosoboronexport, whose leaders time and again stated that India is a preferred partner for our country. As for Rubin, we are open to cooperate with Indian industry and Navy in the context of policy "Make in India" and "Self–reliant India".

***VAYU**: Has Rubin Design Bureau collaborated or in talks with Indian firms for joint development of Air Independent Propulsion (AIP) systems or similar maritime technology for future Indian submarines and naval vessels?*

CEO: Representatives of Indian Navy command, DRDO management and other Indian experts were acquainted with our AIP technology. We are also familiar with Indian technology and inform on our readiness to help in Indian AIP plant integration into the submarine design and render assistance in its development. It's up to Indian Navy to decide. Indian mass media are discussing now whether a Li–ion battery is able to become an alternative to AIP plant, therefore let me note that Rubin has in the works new non–nuclear submarines with different power plant versions including Li–ion batteries.

***VAYU**: Are there Rubin products deployed in the Black Sea? If yes, can you share some highlights on their combat performance?*

CEO: Russian non–nuclear submarines are the only ones in the world, from which salvo firing in combat conditions was performed. Admiral Nikolai Yevmenov, Commander–in–Chief of the Russian Navy in 2019–2024, many times touched on the high combat performance of Project 636 submarines. The Russian Ministry of Defence informed on successful fulfilment of assigned tasks in the Black and Mediterranean Seas.

***VAYU**: With the current orderbook and timeline of submarine deliveries, for how long Rubin will be fulfilling naval requirements of the Russian Navy?*

CEO: Rubin has been fulfilling orders of the Russian Navy

Project 636 submarines

for 123 years now, and we believe that Rubin will be doing such works for at least the same period of time. The point is that any design agency works continuously because creating submarines differs from creating other types of weapon systems. Construction of serial ships starts before the trials of the lead unit are completed. When the submarine series is being built it is necessary to take into account the appearance of new equipment especially electronics.

It means that we together with the customer and suppliers make each next ship more modern than the previous one, at the same time observing a pace of construction. In addition, proposals regarding optimisation for follow–on boats come out from the trial results of the lead unit. All the above mentioned is going on under designer's support. And what is more, the designing process of next generation begins before the previous generation ships have joined the Navy. Rubin specialists support the construction of both non–nuclear and nuclear submarines of the fourth generation simultaneously and have already started working on the fifth generation submarines.

BOSS from Rubin DB

***VAYU**: What is the status of the Border and Offshore Submersible Sentry (BOSS) vessel, which was unveiled in 2021? Are there any talks with foreign nations as well?*

CEO: In 2022, we proposed the second version of BOSS with better functionality, more powerful propulsion plant and maximum amount of weapon. Now, we are working towards a detailed featuring of BOSS to foreign customers. In recent years, the trend to increase the number of patrol vessels having various stealth technologies is obvious. The second trend is to enhance functionality due to a modular design of project. A related trend is the emergence of larger ships operated as patrol vessels with the potential to be upgraded to "light frigates" if required.

Combination of these trends in a new way – due to making the patrol vessel submersible – is a main idea of the BOSS. Submerged condition provides for an absolute radar stealthiness and makes it possible to create an asymmetric threat even for larger combat ships.

We are looking forward to cooperation with Indian partners in this area. Indian shipyards build patrol vessels both for the Indian Navy and for export. Thus, we can be partners in development of BOSS–type vessels for the Indian Navy or the Coast Guard as well as for markets of third countries.

It is possible to install systems of other developers in the vessel (both Indian ones and of third countries) taking into account design constraints on weight, volume, power consumption, etc. First priority task for Rubin when working on this project was development of a multi–mission platform. Principal dimensions, layout, type and power of propulsion plant were put together in such a way to make BOSS a carryall truck, whose body can be filled with various payloads.

The payload determines its intended use to a considerable extent: If BOSS takes onboard RHIBs and boarding teams, the customer will receive a patrol vessel (OPV); if several UAVs are embarked, it will be a vessel for inspection of vast areas, for example, search of those in distress and finally if several UUVs are loaded in the vessel, mine hunting or bottom mapping activities can be conducted.

During conflict escalation, BOSS even in basic configuration can be used for covert intelligence and SOF delivery. Availability of additional units (torpedo tubes, sonar system, etc.) will enable its more extensive use under these conditions. This multi–mission capability is useful in peacetime but it will be particularly demanded in tension time when each and every ship counts.

VAYU on–the–spot report

Rosoboronexport at Army 2024

Rosoboronexport JSC (part of Rostec State Corporation) took an active part at the 10th anniversary of International Military–Technical Forum Army 2024, which was held from 12–14 August 2024 at the Patriot Exhibition and Convention Centre, Moscow.

The company's exhibits were based on the latest weapons and weapon systems developed by leading Russian defence manufacturers that are in demand among foreign partners.

Rostec

ROSOBORONEXPORT
Russian Defence Export

"At Army 2024, Rosoboronexport presented Russian products for the most relevant segments of the global arms market today. At the forum we used a cluster approach for exhibiting state–of–the–art weapons and military equipment that have proven effective in real combat conditions," stated Alexander Mikheev, Director General of Rosoboronexport. "We showcased unmanned solutions for all domains of warfare, UAV countermeasure systems, precision guided weapons, artillery systems, armoured vehicles and air defence assets at our venues and in Russian leading manufacturers' exhibits and stands. We are expecting high interest from the customers in the systems designed to protect facilities, equipment and personnel from a variety of threats, including unmanned ones that have been modified in light of combat experience".

At Army 2024, Rosoboronexport presented 700+ military, dual use and civilian products to foreign partners. Many of them were exhibited for the first time. Among them were the Lancet–E loitering munition system with two different guided munition carriers, SPTP2S25M (Sprut) upgraded light amphibious tank, MGTT–LB robotic multipurpose tracked transporter/tractor, Plastun universal transport platform, Spartak and Tigr–M SpN

wheeled armoured vehicles equipped with unmanned aerial vehicles, as well as a number of the latest UAV countermeasures.

The company's static display area was divided into long range weapon, fire control automation equipment, armoured combat vehicles, armoured vehicles and special vehicle segments. Explosive reactive armour (ERA) and active protection systems, slat armour systems, flexible anti–HEAT screens, radar absorbent camouflage kits were showcased along with the hardware.

In the air defence equipment and UAV countermeasures segment, the Prival, SKPV, RB–504P–E, SkyHunter–4PM/FPV, Argument–3, Fumigator, Serp–VS6, Radiomonitoring, Paltus–1M and Paltus–FPV drone detection and jamming systems were presented. A layered air defence and counter–UAV system was on display at the forum. It is based on the use of advanced radars, automated control systems and air defence systems of various ranges, including the Viking and Tor–M2E SAM systems.

Rosoboronexport's presentation pavilion housed 200+ Russian products presented within thematic segments for ease of navigation. In the guided weapon zone, the 155mm Krasnopol–M2 and 120mm Kitolov–2M guided artillery projectiles, 120mm Gran guided mortar bomb, Kornet–EM, Konkurs–M, Metis–M1 ATGM systems and missiles for them were on display. In the guided munition platform zone, the Kub–E and the latest Lancet–E drones were showcased. Grenade launchers and rounds for them were exhibited in the close combat weapon zone, while radios and the Planshet–A (Tablet–A) mobile automated artillery fire control system could be found in the artillery fire control aids zone.

A variety of Kalashnikov assault rifle models, including the AK–19 and AK–308, the Kord assault rifle, machine guns, sniper rifles, pistols and submachine guns were demonstrated in the standard and special small arms zone. Special small arms were represented by the 5.45mm ADS amphibious assault rifle, 9mm SR.1M semi–automatic pistol, 9mm PP–2000 submachine gun, and precision sniper rifles.

Visitors to the presentation pavillion were offered various small arms tuning kits, tactical optics, individual equipment for the special units personnel, non–lethal weapons, RCIED and toxic chemical detectors.

In the air materiel segment, Rosoboronexport presented the Su–35 multi–purpose super–manoeuverable fighter, Il–76MD–90A(E) military transport aircraft, Ka–52E scout/attack helicopter and precision guided weapons. "Rosoboronexport is ready to show its partners a wide range of aviation equipment at the venue of the United Aircraft Corporation, which is part of Rostec State Corporation" stated company officials.

During the forum, the company held public presentations of the most in–demand products in its pavilion such as Lancet–E loitering munition system, Russian army guided weapons on the battlefield, security equipment and the latest Russian counter–UAV systems.

Visit, report and all photos: Rishav Gupta (Twitter: @connect_rishav)

Rosoboronexport unveils Lancet–E system at Army 2024

The Lancet–E system is an export version of the well–known Lancet loitering munition system that has proven to be effective on the battlefield. It consists of the Z–16–E reconnaissance drone and two kamikaze drones (loitering munitions), Item 51–E and Item 52–E, with different characteristics, in particular, in terms of range and maximum takeoff weight.

"The presentation of the Lancet–E at Army 2024 marked the beginning of Rosoboronexport's global marketing campaign for this advanced weapon system. The system demonstrated the highest effectiveness on the battlefield and capability to engage a wide range of targets,

from any type of armoured vehicles and fortifications to surface targets. As a result, today the Lancet–E has great export potential, which we estimate at 1,000+ systems. I'm sure that once the needs of the Russian Armed Forces are met, the available production capacities will enable us to successfully deliver the system abroad. In addition, we actively offer partners cooperation in the format of license and joint production on the customer's premises within the framework of technology partnerships", stated Alexander Mikheev, Director General of Rosoboronexport.

In addition to the Lancet–E, the company is successfully marketing the Kub–E loitering munition developed and manufactured by Rostec's Kalashnikov Group. The Orlan–10E, Orlan–30 and Orion–E reconnaissance and reconnaissance/strike unmanned aerial systems are in strong demand among foreign partners.

VAYU on–the–spot report

The National Army Museum, London (Part 2)

The National Army Museum in Chelsea, London, proudly preserves the British Army's legacy through an immersive journey spanning centuries of military history. Established in 1960 and renovated in 2017, this institution offers a huge collection of artifacts, interactive exhibits, and poignant narratives and tales from battlefield. The big galleries encapsulate the evolution of warfare, its societal impact and the human experience, which enlightens the visitors about the multifaceted nature of a conflict. Through its interactive displays and educational initiatives, the museum aims to bridge the gap between past sacrifices and present day understanding, serving as an important medium to primarily display the British Army's valour, and transformation throughout history.

In 2017, the museum was expanded and redesigned with a multimillion pound redevelopment. Its new state of the art galleries and immersive displays reflect the narratives of soldiers, battles and the societal impacts of war. The museum's mission is not only to preserve historical artifacts but also to educate and inspire visitors, shedding light on the army's pivotal role in shaping British history. One can plan their visit from Tuesday to Sunday between 10 am to 5 pm, and without any concern of the entry fees as it is completely free to explore the museum.

The exhibits within the museum are diverse and comprehensive, covering a wide array of themes. From ancient battles to modern conflicts, visitors can explore the evolution of military tactics, weaponry and the profound societal changes brought by war.

The displays vividly portray the experiences of soldiers from different eras, offering glimpses into their daily lives, challenges and triumphs on the battlefield. Apart from the tales of soldiers from the British Empire, the colonial forces, like that of India, were also honoured with tributes, like photos, clippings, artifacts and more. One of the museum's standout features is its interactive nature. Engaging activities, simulations, and multimedia installations allow visitors to step into the shoes of soldiers, experiencing the physical and emotional aspects of military life. It includes multiple audiovisual elements, live drills/simulations, and even access to replicas of certain equipment. This hands–on approach fosters a deeper understanding of the sacrifices and complexities inherent in armed conflict.

Moreover, the National Army Museum isn't solely focused on battles and strategy. It delves into the human stories behind the uniforms, highlighting the diverse roles individuals played within the army. Women's contributions, the experiences of soldiers from various cultural backgrounds, and the impact of war on civilians are all part of the rich tapestry woven within its walls. Vehicle displays can be yet another breathtaking experience for visitors as they are able to explore the vintage range of utility and combat automobiles, including jeeps, trucks, tanks, APCs and more. Also, make sure not to miss the ex–British Army Westland Lynx helicopter hanging from the ceiling!

The museum also serves as a centre for research and learning as it allows hosting lectures, workshops, and educational programmes aimed at influencing young enthusiasts as well as seasoned learners. Its extensive archives offer a wealth of resources for those eager to dive deeper into military history and understand it from depth.

In essence, the National Army Museum at Chelsea stands as a living tribute to the courage, resilience and evolution of the British Army. It honours the past while providing invaluable insights into the complexities of armed conflict, making it an essential destination for those seeking to explore the intertwined threads of history, society and warfare. The museum is committed to preserve the past while fostering an understanding of its relevance today, which ensures that its impact transcends beyond historical documentation.

Article by: Rishav Gupta
All photos: The Vayu Team

1st CH–47F Block II for US Army

In support of ongoing US Army modernisation efforts, Boeing delivered the first CH–47F Block II Chinook. The aircraft is one of up to 465 in the Army's fleet that will be modernised to the new Block II configuration. With an improved drivetrain, a reinforced airframe and enhanced fuel system, the CH–47F Block II provides for an additional 4,000 pounds of max gross weight and extends the mission radius for nearly all payloads.

USASOAC for 2 more MH–47G Block IIs

The US Army Special Operations Aviation Command (USASOAC) has awarded Boeing a $115 million contract to produce two more MH–47G Block II Chinook aircraft and begin advanced procurement on future helicopters. Including the new order, the Army has contracted for a total of 46 MH–47G Block II aircraft.

Netherlands/Austria to acquire 9 C–390 Millennium

The Dutch Ministry of Defence signed a contract for acquisition of nine Embraer C–390 Millennium aircraft during a ceremony at the Farnborough Airshow. As part of the project 'Replacement of Tactical Airlift Capacity', the contract is a joint purchase, in cooperation with Austria; five aircraft for the Royal Netherlands Air Force and four aircraft for the Austrian Air Force.

Leonardo's M–346 enhancement programme

At Farnborough International Air Show, Leonardo announced the launch of a comprehensive capability enhancement package for the M–346 integrated training system including the aircraft's core avionics, navigation/identification, mission equipment and ground training capabilities. The move reflects the training needs to align pilot's skills to the evolution dictated by modern multi–domain battlefields, combat air technology and information management.

Taiwan to receive AV's Switchblade 300s

The US Department of State announced approval of a possible foreign military sale of AeroVironment (AV)

Switchblade 300 loitering munition systems to Taiwan for an estimated $60 million. The proposed sale will bolster Taiwan's defensive capabilities and supports US national security and economic interests in the Indo–Pacific region.

Leonardo DRS delivers 1,000th IR sensor

Leonardo DRS says it has provided the 1,000th advanced sensor package which is at the core of BAE Systems' 2–Colour Advanced Warning System (2CAWS), a next generation missile warning and hostile fire detection system. The system is designed to protect US Army pilots and crews from new and emerging missile threats.

Saudi Arabia for more A330 MRTTs

Saudi Arabia has ordered four additional Airbus A330 Multi Role Tanker Transport (MRTT) aircraft for the Royal Saudi Arabia Air Force (RSAF). The first of these aircraft will enter into conversion at the beginning of 2026; they will enter into service and join the RSAF in 2027 to carry out air–to–air refuelling and transport missions.

NGC uncrewed X–Plane for DARPA

Northrop Grumman has announced the design and construction of the Series Hybrid Electric Propulsion AiRcraft Demonstration (SHEPARD) vehicle. The uncrewed air system developed for DARPA recently received its official X–plane designation of XRQ–73. Built in collaboration with Scaled Composites, a Northrop Grumman subsidiary, the XRQ–73 SHEPARD is a DARPA "X–prime" programme leveraging hybrid electric architecture and component technologies to quickly mature a new mission–focused aircraft design with propulsion architecture and power class for the Department of Defence.

Raytheon Patriots for Germany

Raytheon was awarded a $1.2 billion contract to supply Germany with additional Patriot air and missile defence systems. These systems will augment Germany's existing air defence infrastructure with additional Patriot major end items. The scope of the contract includes the most current Patriot Configuration 3+ radars, launchers, command and control stations, associated spares, and support.

Hanwha to supply Romania with K9 and K10s

Hanwha Aerospace signed a contract with Romania over the supply of 54 K9 Self–Propelled Howitzers (SPH) and 36 K10 Ammunition Resupply Vehicles (ARV). Signed by Hanwha Aerospace and the Romanian Ministry of National Defence, the contract also includes ammunition and support vehicles both on tracks and wheels. The contract is valued about $1 billion.

Hanwha celebrates 10,000 military engines

Hanwha Aerospace rolled out its 10,000th military engine on 15 April 2024, achieving a major milestone for its indigenous development and manufacturing of aero engines. A ceremony was held at the Changwon Plant I to commemorate the rollout of the 10,000th aircraft engine, the F404 powering the TA–50 trainer jet flown by the ROK Air Force. The milestone was achieved 45 years after the company had produced a J79 Turbojet engine for the F–4 Phantom II in 1978.

Drukair adds Airbus A320neo and A321XLR's

Drukair, Royal Bhutan Airlines, the national flag carrier of the Kingdom of Bhutan, a fully owned subsidiary of the state holding company Druk Holding and Investments Limited (DHI) has signed a Memorandum of Understanding (MoU) with Airbus for 3 A320neo and 2 A321XLR aircraft to expand its international network.

VoltAero expands with 15 aircraft order

Global Sky has signed a Memorandum of Understanding (MoU) with VoltAero for the pre–order of 15 Cassio aircraft, becoming a candidate launch customer in Southeast Asia for VoltAero's family of electric–hybrid airplanes.

Eve Air Mobility unveils eVTOL prototype

Eve Air Mobility announced a significant advancement in the assembly of its first full scale eVTOL prototype. During the 45th Farnborough Airshow, the company unveiled the aircraft being built in the Embraer test facility of Gaviao Peixoto, Sao Paulo State.

Vertical Aerospace unveils VX4 prototype

Vertical Aerospace, a global aerospace and technology company that is pioneering zero emissions aviation, unveiled its next generation full scale VX4 prototype, the only electric take–off and landing vehicle (eVTOL) designed, built and assembled in the UK.

Nammo: Largest artillery ammunition order in the company's history

The industrial working group of Diehl Defence and Nammo (ARGE DiNa 155mm) received a large volume order from the German Armed Forces for the production and delivery of 155mm artillery projectiles. Diehl Defence CEO Helmut Rauch together with Nammo Executive Vice President Vegard Sande signed the framework agreement with Annette Lehnigk–Emden, President of the Federal Office of Bundeswehr Equipment, Information Technology and In–Service Support (BAAINBw) in Coblenz.

The signing of the contract represents a substantial expansion of the framework agreement already signed last year and is a clear sign to ensure the security of supply of 155mm artillery ammunition for the German Armed Forces and their allies. At the same time, this framework agreement is a further sign of confidence to Diehl Defence and underlines the intention to procure large calibre ammunition over the long term. Such a long term approach enables the industry to build up the necessary production capacities in Germany.

Saudia Group signs with Lilium for 100 eVTOL Jets

Saudia Group and Lilium signed a binding sales agreement for 50 Lilium Jets, with options for the purchase of 50 more. The signature ceremony was held at Lilium's HQ in Gauting near Munich.

IAI's REX MK.II

FTS, a joint venture between IAI and FFG, successfully participated in the European Land Robot Trial (ELROB)

and was awarded first place for the best scientific solution with its REX MK.II multi–mission unmanned land vehicle system in off road autonomous driving in challenging environment and scenarios. The demonstration took place in Trier, Germany, and interest was shown by military personnel from various NATO countries.

Belgium for 196 SDBs

Belgium has requested the US to buy up to one hundred ninety–six (196) Guided Bomb Unit (GBU)–53/B Small Diameter Bombs–Increment II (SDB–II) All–Up–Rounds (AURs).

IAI unveils Wind Demon

Israel Aerospace Industries has unveiled the Wind Demon, a new generation of air to surface cruise missile, combining new capabilities based on years of experience in missiles and loitering munition development. IAI's newly developed Wind Demon missile offers a 'pragmatic response to the changing nature of warfare where affordable mass can deliver lethality'.

Greece for upto 40 F–35 Lightning IIs

Greece has finalised its intention to procure 20 Lockheed Martin F–35 Lightning II aircraft by signing a Letter of Offer and Acceptance (LOA) through a US government Foreign Military Sale. The LOA also includes an option for 20 additional aircraft.

Poland for 96 Boeing AH–64E Apache's

Poland has signed a Foreign Military Sales (FMS) Letter of Offer and Acceptance (LOA) for 96 Boeing AH–64E Apache combat helicopters, as part of the Polish KRUK Attack Helicopter programme. Boeing has been building the AH–64 Apache for more than 40 years in Mesa, Arizona and the AH–64E is the most modern configuration of the Apache and combines a battle tested design with "transformational technologies to deliver an unmatched mix of performance and versatility".

There are currently more than 1,290 Apaches operating worldwide, with sustainment and training support provided by Boeing Global Services.

Poland selected the AH–64E Apache for the Polish Armed Forces' new attack helicopter fleet in September 2022 and becomes the 19th nation to acquire the Apache; the largest operator outside of the US.

Updates from MBDA

MBDA and UK MoD renew complex weapons partnership

MBDA and the UK Ministry of Defence have renewed their strategic partnership on complex weapons for a further decade, with a renewed Portfolio Management Agreement (PMA). Known as PMA2 and worth at least £6.5 billion, the agreement will deliver complex weapons to the UK Armed Forces faster, at lower cost and with greater agility. PMA2 will also support British jobs, skills and industrial investment.

Eric Beranger, CEO of MBDA, stated, "PMA2 underlines the excellent work done by our colleagues to innovatively support the UK, acting as both a key sovereign national champion and as a conduit for international co–operation across our group and worldwide."

The new agreement confirms MBDA as the MoD's preferred supplier of complex weapons. Its framework will drive a further £2 billion in benefits and efficiencies while enhancing current capabilities. The new agreement also is anticipated to deliver new systems such as the Future Cruise and Anti–Ship Weapon (FC/ASW), Land Precision Strike and continue the evolution of Meteor.

Today more than 5,500 people work at MBDA UK sites in the North West, East and the South West of England. Nearly doubling the workforce since 2010. MBDA's work also supports thousands of further jobs in the eco–system of its UK's supply chain. The value of the PMA model has enabled MBDA to invest over £550 million in the UK, including a new manufacturing site in Bolton. PMA2 will see a further £500 million of MBDA investment in British manufacturing and technologies.

German procurement of MBDA's Brimstone

MBDA has received a contract from Germany to manufacture and supply Brimstone 3 precision strike missiles for the Bundeswehr's Eurofighter combat aircraft. A final assembly line and a service centre for Brimstone will be set up at MBDA's Schrobenhausen site for this purpose.

Brimstone 3 is a tactical precision strike missile characterised by very high levels of accuracy, effectiveness and reliability. Brimstone 3 enables the forces to hit stationary and fast moving targets with pinpoint accuracy in all weathers. Brimstone is also being integrated onto unmanned aerial vehicles such as the Eurodrone and MQ–9B and is a suitable armament option for land vehicles, helicopters and heavy remote carriers.

Orchestrike/AI for SPEAR cruise missiles

MBDA has made rapid advances to its Orchestrike collaborative weapons artificial intelligence (AI) over the past 12 months and can announce the SPEAR family of weapons will be the first cruise missiles to feature AI enhanced collaboration, while keeping a human operator in the loop.

Orchestrike will enhance the performance of SPEAR missiles via AI driven coordination, collaboration and cooperation between the missiles and the pilot controlling them from the launch aircraft. Orchestrike will enable SPEAR missiles to react to threats and work together with the pilot to solve tactical challenges, increasing both missile and platform survivability and overall mission performance. The missiles will only ever operate within the boundaries of operator input, ensuring legal and ethical utilisation at all times.

Since it was unveiled at Paris Air Show 2023, MBDA has rapidly developed Orchestrike from concept towards capability in twelve months. In particular, work has focused on refining the AI algorithms, advancing missile to missile datalinks, and on integrating both elements together and into SPEAR to enhance the already world–leading capabilities of the cruise missile weapon system.

SPEAR is a family of network enabled cruise missiles developed by MBDA to meet the need of air forces to defeat and supress enemy air defences by striking moving targets in all weathers, at stand–off ranges.

MBDA new MANPADS VSHORAD

MBDA showcased for the first time ever at Farnborough International Airshow, its new MANPADS (Man Portable Air Defence System) VSHORAD (Very Short Range Air Defence) solution, under development for the Italian Army and ready to be marketed to export customers.

The new VSHORAD missile is a supersonic, fire and forget, all day interceptor, equipped by a seeker with image processing capabilities. It can target fighters, helicopters, small drones. Its design will allow a smooth integration either on current (VTLM2 by IDV with Leonardo turret, as displayed on MBDA stand) and on future vehicles, equipped by automated turrets.

Being man portable, this VSHORAD solution will be suitable for paratroops and amphibious forces, while giving tactical advantage when mounted on military vehicles. This VSHORAD system will also be integrated in Sky Warden, MBDA's modular, scalable and evolvable flagship system to counter unmanned aerial systems (C–UAS).

The system is in development following an Italian Army operational requirement expressed last year for a very short range man portable air defence missile. The system characteristics and performances are fully compliant with NATO standards.

The new Sky Warden

MBDA has unveiled a new effector concept for its Sky Warden counter–uncrewed aerial systems (C–UAS) modular solution.

The new effector concept is a ground launched anti–air munition targeting threats that include Class 1 and smaller Class 2 small uncrewed aircraft systems (sUAS) and loitering munitions. Collaborating with Fortem Technologies and utilising their DroneHunter technology, the concept enables the rapid incorporation of a warhead on a drone to defeat threats at lower cost.

Next gen rotorcraft capability concept

NATO has awarded a contract to Airbus Helicopters, MBDA and Collins to lead a concept study in the frame of the Next Generation Rotorcraft Capability (NGRC) project under which the participants combine efforts to work on design, development and delivery of a medium multi–role helicopter.

Worldwide C–130J Super Hercules fleet soars past 3 million FH

Lockheed Martin, at the Farnborough International Airshow, has announced that the worldwide C–130J Super Hercules fleet recently surpassed 3 million flight hours. With 545+ Super Hercules delivered worldwide, this achievement reflects the C–130J's unmatched global reach, multi–mission versatility and proven tactical performance capabilities.

Operators and crews from 21 nations contributed to this achievement, logging hours through 18 different mission requirements including combat, transport, aerial refueling, Special Operations, medevac, humanitarian relief, search and rescue, weather reconnaissance, firefighting and commercial freight delivery.

"From the highest landing strip in the world to the snow packed runways of Antarctica and all the many mission locations in between, these 3 million hours represent the proven power and wide reaching presence of the C–130J's global fleet," stated Rod McLean, vice president and general manager of Lockheed Martin's Air Mobility & Maritime Missions line of business. "In celebrating this achievement, we also honour the many crew members, maintainers and airlift partners who truly keep the global Super Hercules fleet ready for any and every mission requirement."

3 million hours by the numbers

- These hours were logged beginning with the C–130J's first flight on 5 April 1996, through the beginning of July 2024.
- Countries with C–130Js contributing to these flight hours include (in order of delivery) the United Kingdom, United States (the USAF, Marine Corps and Coast Guard; Pallas Aviation), Australia, Italy, Denmark, Norway, Canada, India, Qatar, Iraq, Oman, Tunisia, Israel, Kuwait, South Korea, Kingdom of Saudi Arabia, France, Bahrain, Bangladesh, Indonesia and Germany.
- Also contributing to these flight hours is the Lockheed Martin Flight Operations team, whose crews are the first to fly every C–130J produced, and the US Air Force Defence Contract Management Agency crews that support C–130J test flights at Lockheed Martin's Aeronautics site in Marietta, Georgia, home of Super Hercules production line.
- Super Hercules variants used to log these hours include: C–130J and C–130J–30 (tactical airlifter), KC–130J (tanker), WC–130J (weather reconnaissance), EC–130J (information operations), MC–130J (Special Operations), HC–130J (search and rescue, US Air Force and US Coast Guard variants), AC–130J (gunship) and LM–100J (commercial freighter).
- Hours flown include test, training and operational missions on all seven continents.

Always evolving, continually innovating and ready for what's next, the Super Hercules leads the charge by setting standards and shaping the future of tactical airlift missions, offering a multitude of advantages found in no other medium–sized tactical airlifter in production or operation today.

These discriminators include proven operational readiness with the greatest ease of transition, increased reliability, superior tactical airlift and combat airdrop capabilities, certification by more than 20 airworthiness authorities, and engine–out performance with extended range. The C–130J also delivers unmatched interoperability with NATO and global air forces, robust industrial partnerships and verified low life–cycle costs with significant fuel savings resulting in a reduced carbon footprint compared to other medium–sized jet airlifters.

Courtesy: Lockheed Martin

Photos: C–130J of the IAF at Aero India 2023 by Vayu Aerospace Review

Great 1st half 2024 at Dassault Aviation

End July 2024, Éric Trappier, Chairman and Chief Executive Officer of Dassault Aviation along with the Board of Directors, met and approved the 2024 half year financial statement.

At the end of the Board meeting, Éric Trappier stated, "The global context in this first half–year remains marked by the war in Ukraine and the state of war in the Middle East. In France, the President of the Republic, as head of the armed forces, wrote to defence manufacturers urging them to step up their efforts in the context of a war economy. In response to this call, I instructed Dassault Aviation employees to prioritise Rafale production, for both France and for Export".

"The first half of 2024 saw entry into force of the third batch (18 Rafale) of the Indonesia contract in January. As a result, the Group's backlog broke a new record, reaching EUR 41.2 billion on 30 June 2024 (306 aircraft–159 Rafale Export, 64 Rafale France and 83 Falcon); the first Falcon 6X customer deliveries, after its entry into service in November 2023; the delivery of 6 Rafale to France and 12 Falcon as the Group continues to suffer from supply chain problems and adjusted net sales amounted to EUR 2,538 million for the half–year, leading to adjusted net operating income of EUR 170 million and Group adjusted net income of EUR 442 million, i.e. a net margin of 17.4%".

"With 495 aircraft ordered since its launch, including 18 for Indonesia this half–year, the Rafale has confirmed its success. Users of our fighter aircraft appreciate its operational qualities as well as its continuous evolution in line with new standards currently under development and those to be introduced in the future. We are preparing for the future of the Rafale with the F5 standard accompanied by a combat drone, and remain committed to developing the F4 standard. The Group has reaffirmed its crucial role as an architect of complex systems. In the military sector, during the first half of the year, we recorded order intake for the third batch (18 Rafale) of the Indonesia contract and delivered 6 Rafale to France, supported the French and export fleets and continued work to develop the F4 standard".

"In the civilian sector, during the first half of the year, we recorded 11 Falcon orders, compared with 12 in the 1st half of 2023, and delivered 12 Falcon, compared with 9 in the 1st half of 2023; delivered the first Falcon 6X to customers and continued the world tour and continued the development and manufacture of the first Falcon 10X. First deliveries are scheduled for 2027".

"Corporate Social Responsibility remains a major commitment of the Group, particularly for the decarbonisation of its products and processes. The SAF (Sustainable Aviation Fuel) plan that we have put in place is ramping up by the intensification of the use of alternative fuels. In 2024, the Group maintained an attractive remuneration policy. The recruitment target is approximately 2,000 new employees (of which more than half has been achieved as of 30 June) with a focus on their integration and training. Like other major players in the aerospace industry, the Group is suffering from a difficult supply chain. There are many shortages in our production lines due to supplier inefficiencies in some cases, especially in the aerostructure sector. These difficulties have given rise to risks affecting Falcon and Rafale deliveries, and also impact customer support. The Group is taking internal and external measures to mitigate these effects and to anticipate sub–contractor inefficiencies. Moreover, given the links forged with Indian companies as part of the "Make in India" initiative and the major business opportunities we have there in the future, India has emerged as an opportunity to expand our supply chain. In a difficult context due to the supply chain, our 2024 objectives remain unchanged–increased revenue compared to 2023, EUR 6 Bn range (of which 35 Falcon and 20 Rafale)."

Serbia acquires 12 Rafale fighters

In the presence of the President of the French Republic, Emmanuel Macron, and the President of the Republic of Serbia, Aleksandar Vucic, the Chairman and CEO of Dassault Aviation, Éric Trappier, on 29 August 2024 signed in Belgrade with the Minister of Defence of the Republic of Serbia, Bratislav Gasic, a contract for the purchase of 12 Rafale to equip the Air Force and Air Defence of the Serbian Armed Forces.

"On behalf of Dassault Aviation and its partners, I would like to thank the Serbian authorities for the confidence they have placed in us by choosing the Rafale, and assure them of our total commitment to making its integration into the Serbian Armed Forces a success. Serbia's decision to equip itself for the first time with a Dassault aircraft confirms the Rafale's operational superiority and its proven excellence in serving the sovereign interests of a nation", stated Éric Trappier.

Chièvres Air Fest 2024

At Chièvres air base (ICAO code: EBCV) in Belgium, the Chièvres Air Fest was held on 28 June 2024. During the 1980s several air shows were held and after a gap, the Chièvres Air Fest was reinstated a few years ago. In the 2024 edition, the civilian population in the area got the opportunity to have a view of the airbase. Food and beverage trucks took care of the catering for the visitors, while a band played pop songs during the day. For the visitors, a dynamic and a static show was organised; at the static show the large transport aircraft were opened for visitors.

Chièvres AB

The Chièvres airfield was created in 1914 by the German forces and after the First World War finished, the Belgian armed forces took over the airbase. During the Second World War, the German Air Force flew missions from the airfield and after the war, the Belgium Air Force took the base over again. After some years of Belgian fighter jets flying on this base, it became a SHAPE airbase in 1967 to transport SHAPE officials. The US Air Force controls the infrastructure and flying activities of the airbase and the US Army controls the daily operations of the airbase. The current commander is US Army Colonel Lindsay "Riley" Matthews.

SHAPE

Supreme Headquarters Allied Powers Europe (SHAPE) is the top level command centre of NATO in Europe. Until 1967 the SHAPE headquarters was located in France, but it was moved to the village of Casteau, close to Mons in Belgium that year. It is led by the Supreme Allied Commander Europe General Christopher G. Cavoli of the US Army.

Aircraft

These are the aircraft present at Chievres:

Aircraft	Country	Dynamic/Static	Remark
KC–390	Portugal	Static	Open for public
A400M	Belgium	Static	Open for public
AH–64	USA	Static	
F–16	Poland	Static	
F–16 (2x)	Greece	Static	
C–27	Romania	Static	Open for public
C–130J	USA	Static	Open for public D–Day markings
H–145	Hungary	Static	
IAR 330 (2x)	Romania	Static	
L–159	Czech Republic	Static	
F–16	Belgium	Static	
NH90	Germany	Dynamic	
JAS–39 Gripen	Czech Republic	Dynamic	
A109 (2x)	Belgium	Dynamic	Medevac demo
SF260 (4x)	Belgium	Dynamic	Red Devils
W–3A SOKOL	Czech Republic	Dynamic	SAR demo

Interview with Colonel Lindsay "Riley" Matthews

Q: Can you tell about the history of Chièvres air base?

A: The airbase was started after World War, when German airplanes landed in some crop fields here. And it's been an active air base ever since. Then during World War II it changed a lot of hands between the Italians, the Germans, the British and after World War II it became the home of the Belgian Red Devils, the Seventh air wing. During the Battle of the Bulge a lot of support was provided from this airfield and that actually solidified the relationship between the Mons area and the people of the Bastogne area; because the Mons area took a lot of refugees during the Battle of the Bulge. The United States took it over when NATO moved from France to Belgium in 1967.

Q: Can you tell me about the history and the present Air Fest?

A: There was an air show for many many years but unfortunately in the 1980s and 1990s there were very terrible accidents and safety issues, so the air shows ended. A couple of years ago the commander decided that we needed to bring back the air shows because that is 100% the identity of Chièvres Air Base. So I am absolutely thrilled to carry on the tradition of air fests here in the Chièvres air base area. And honestly you can look around and you can see how beautiful it is to bring the community on the base, to bring 11 different nations here together. We have 11 different nations here and it's demonstrating the most powerful alliance in the world which is the NATO alliance and that is what keeps the European theatre safe.

Q: Can you tell more about the recent use of Chièvres?

A: Absolutely because it's getting more and more exciting and one of the reasons it's getting very exciting on Chièvres air base is because we have modelled ourselves as a place for different nations to exercise.

So recently we had an incredible Belgian exercise called Storm Tide. Chièvres is a relatively small air base which makes it a little bit more complicated for some larger aircraft to come and exercise here. And that makes it more interesting for exercises so one of the reasons you see more exercises on the air base is because we've created a reputation for ourselves as a good place to do those exercises.

Interview with KC–390 pilot captain David Louis

One of the visitors of the Chièvres Air Fest was the first time visit of the Portuguese Air Force Embraer KC–390.

Captain Luis has some 2000 flying hours in total and he has some 250 flying hours on the Embraer KC–390. He flies with the recently created 506 Squadron "Rinocerontes" at Beja air base (ICAO: LPBJ) in Portugal. After flying the Lockheed C–130 Hercules, he transferred to the KC–390.

In October 2023, the first (of the five in total) arrived in Portugal and in June 2024 number two was delivered. During the next few years, the remaining three KC–390s plus one simulator will be delivered and the existing C–130 fleet will gradually be retired.

Q: What is the status of the KC–390, is there a plan to reach Initial Operational Capability (IOC)?

A: The KC–390 has obtained the operational status for cargo transport and in the coming years will earn qualifications for other tasks like para droppings and air refueling.

Q: Can you tell more about the refueling capacity?

A: The KC–390 has a refueling probe on the nose, to be able to receive fuel from a feeder aircraft with a drogue system. But the KC–390 can also refuel other aircraft and for that purpose, two (Cobham) refueling pods can be attached on the wings.

The refueling operator is located in the cockpit (sitting behind the pilots, facing forward) and uses a special monitor to control the refueling process.

Q: Do you have plans to fly the KC–390 to the Netherlands, as the Dutch Air Force plans to obtain five C–390s?

A: They need to invite us, you know this is how things work, because if the Dutch Air Force does not invite us to go there, probably it will not happen.

Q: Will you visit other NATO countries?

A: In terms of NATO, we are the first country and we have NATO equipment already installed in our aircraft. So probably our aircraft is still more interesting to show to other countries and the Netherlands. Yeah it's a question of inviting us you know. Since we now have two aircraft we are more flexible to go anywhere and show the KC–390.

Q: Anything else you want to say about the KC–390?

A: This is the future and it is probably the best replacement for C–130s for sure.

Text by: Joris van Boven and Alex van Noije
Photos by: Joris van Boven

Normandy 1944–2024, 80th commemoration of D–Day

US Air Force photo by Senior Airman Edgar Grimaldo

173 Airborne Brigade

The 173 Airborne Brigade (nickname 'Sky Soldier') is a US Army paratroop unit based in Europe (Airborne Infantry Brigade Combat Team, IBCT), it has its headquarters in Vicenza (Italy), commanded by Colonel Joshua M. Gaspard. It is the fast response unit for the US Army on the European and African continent. About half of the 173AB is located in Germany (2 battalions) and half in Italy (4 battalions); totalling some 3300 paratroopers. During the years, the 173AB was deployed to Vietnam, Iraq and Afghanistan.

For the IronMike parajump of 2024, 173AB was based at a camp in Ste–Mere–Eglise, between the General Gavin road and the 505E Airborne road (named after the 505th Parachute Infantry Regiment of the 82nd Airborne Brigade). On 8 June 2024, the 173AB paratroopers and German paratroopers exercised together the procedures and commands for the paradrop the next day. Landing techniques were trained and also the procedures to prepare for the drop and the exit from the aircraft were exercised on the ground. A map of the La Fiere environment was shown to inform the paratroopers about the exits from the landing zone.

Photo by Sgt. 1st Class Timothy L. Beery

IronMike parajump

On 9 June 2024, the 80th commemoration of D–Day activities in Normandy ended with a parajump near St–Mere–Eglise. Around 1300 paratroopers were dropped by a formation of 20 aircraft from the United States, the Netherlands, France, Belgium, Germany, United Kingdom and Canada.

The aircraft were based on Base Aerienne Orleans (ICAO: LFOJ) and Airport Cherbourg (ICAO: LFRC); the paratroopers boarded the aircraft in Cherbourg. Two A400M aircraft from the United Kingdom flew from their homebase and joined the formation later.

The first wave of twelve US Air Force aircraft boarded the paratroopers and departed in the morning at around 9 o'clock. Then the first wave flew a track overhead the Normandian coastline for an hour until the second wave of aircraft that flew from Orleans, landed at Cherbourg Airport, took the remaining paratroopers onboard and departed again. During the flight along the Normandian coastline, some aircraft of the formation could be photographed flying along the coastline.

After the departure of the second wave, the formation assembled in the holding area until the 30 minute signal was given.Then a "racetrack" was flown above the drop zone and each aircraft delivered the paratroopers in three or four drops. After the final paradrop, the aircraft from BA Orleans (second wave) flew back to Cherbourg to drop off the yellow static lines that remained onboard the aircraft. And when these aircraft departed again, the US Air Force aircraft of the first wave landed at Cherbourg.

US Air Force photo by Senior Airman Jordan Lazaro

19AW/61AS

This year the 19th AirliftWing/61st AirliftSquadron C–130J (tailnumber 53147/ Little Rock, front painting "Q9/Full House") from Little Rock airbase in Arkansas (ICAO: KLRF) was one of the aircraft that boarded a mix of parajumpers from 173rd Airborne Brigade and from Germany.

The photos in this report were taken during 19AW/61AS C–130J flight: during the flight preparations, the boarding and the paradrop overhead Normandy during the IronMike of 2024. After all parajumpers left the C–130J, the ramp was opened for photos of the tail of the formation.

The 61st Airlift Squadron has a direct lineage back to WW2, as their predecessor '61 Troop Carrier Squadron, 61TCS' flew during the Normandy invasion with Douglas C–47 Skytrain/Dakota coded 'Q9'. In 2024, the 61AS C–130J had painted Q9 as reference to their WW2 code painted on the side of the airplane.

86AW/37AS

The contribution of the US Air Force Europe (USAFE) was special for the 37th Airlift Squadron (part of the 86 Airlift Wing based at Ramstein Air Base, Germany), because this squadron participated in the 1944 invasion by dropping parachutists at St–Mere–Eglise on 6 June 1944. Flying at that time with the Douglas C–47 Skytrain/ Dakota as the 37th Troop Carrier Squadron (TCS), with the squadron code 'W7' painted in the C–47s. In 2024, the 86AW/37AS C–130s were decorated with the black–white invasion stripes and the W7 code.

Ste–Mere–Eglise/La Fiere battle in June 1944

Ste–Mere–Eglise is known for the parachutist at the church tower. Parachutist John Steele of the 82nd Airborne Division came to hang his parachute on the church tower at night and remained silent there for several hours. Later in the day he was released from his plight. This is commemorated by hanging a doll and a parachute on the church tower every year.

The 82nd Airborne Division was parachuted in the night of 5th/6th June 1944, near Ste–Mere–Eglise behind the Normandy beaches to secure several bridges in the area over the Merderet river and the bridge in the village of Chef–du–Pont.

As the German forces flooded the area, it became a fierce battle for the bridges between 6–9 June. On 9 June, General Gavin initiated an assault together with the reinforcements from UTAH beach and the area was liberated, after bitter fights with many casualties.

One of the bridges that was secured was the La Fière bridge and close that bridge, years later the IronMike monument was erected to commemorate all the fallen soldiers in that area in 2024. In 2024 the IronMike paradrop was performed close to the IronMike monument near the La Fiere bridge.

Other D–Day events

During the stay in Normandy, other locations were visited. On the 8th Caen and Cherbourg were visited. At Caen, the 3 US Marines presidential helicopters were based, to fly the US president Biden to the Normandy beaches on 6 June. Two were prepared for take–off later that day. Also some US Army CH–47 Chinooks were based at, just like some C–47s and a Spitfire. 2 C–17s flew cargo and personnel. At Cherbourg airport the aircraft for the Arromanches airshow, took off and landed. A MC–130, Spitfire and some C–130Js could be photographed. In the evening, the IronMike monument was visited and sunset photos were taken of the monument. On the 9th, the Little Rock C–130J flight took–off from and landed at Cherbourg airport. After the flight, the temporary US Army helicopter base at the Carentan hippodrome was visited.

352 SOW

As the only Air Force special operations unit in the European Theatre, the 352 SOW executes specialised airpower and air–ground integration in support of AFSOC and Special Operations Command–Europe objectives. The 352SOW is based at RAF Mildenhall AB in the United Kingdom, flying the special MC–130J Commando II. Two of these MC–130Js were present in Normandy. Captain McClure of 352SOW was the mission commander for all the 2024 Normandy air activities.

Interviews

Two soldiers of 173AB had a special link to Normany and the liberation of Europe in the 2nd World War: Sgt. Dakota Matlock and Spc. Logan Crawford.

Spc. Logan Crawford: Spc. Logan Crawford's great grandfather, Jack Schuyler Gray, fought in the Battle of Metz during World War II. He was injured while serving as a medic and lived with shrapnel in his leg for the rest of his life. "He was stationed just an hour away from where I am today. This means the world to me, even being able to talk to men who were in the 95th Infantry, the same unit my great–grandfather was in. I'm really honoured to get chosen to come out here."

Sgt. Dakota Matlock: Sgt. Dakota Matlock also had a great grandfather who served in World War II, as did his great–great–uncle. While searching for family history, Matlock discovered that the great–great–uncle, Edward John Sharp, was part of the initial unit that stormed Omaha Beach on 6 June 1944. "It's incredible to be not only somewhere where there's so much history, but to be somewhere where I know I had a family member who walked on the beach and was able to make it back home and start a family and live a full life."

Interview with Major McClure (USAF)

Major Kyle McClure flies the MC–130 and he is stationed at Raf Mildenhall with the 67th Special Operations Squadron. Previously his assignments included stops in Florida, Okinawa, Japan and Little Rock Air Force Base. He has flown multiple versions of the C–130 with a total of 2800 hours, 2000 hours in various models of the C–130 and some 800 hours in the MC–130H model.

Q: What did you do to prepare for this commemoration exercise?

A: I am the mission Commander and the senior representative for the MC–130 contingent and so as the lead planner and the organiser of that. I've been involved in about 8 or 10 months worth of planning leading up to several trips to France to do site surveys and to interact with our embassy. So I've been interacting with the embassy, the French government, the French prefectures and town governments to organise the aerial demonstrations of the ceremonies. And I figure out what the airdrop requirements are so we've planned all that out and then I've done extensive planning with the the C–130s that are represented by the 37th Airlift Squadron, to interface on planning considerations and discussing how to conduct formations with different variants of C–130 and the the differences in air speeds and techniques that each Squadron uses to make sure that we can execute the flyovers in a safe and and professional manner.

Q: Is there anything personal you want to say about how it feels for you to be here ?

A: Over the course of the week, I've had a couple of different emotions. One of them is extreme gratitude that I've gotten to be a part of this. It's amazing just to feel the welcoming nature of the French people and to show their appreciation and so we've worked really hard through our aerial demonstrations to show our appreciation back. We've certainly had a good time flying and it's been a lot of fun for us so I'm certainly extremely lucky to be a part of it this year. I think this is a very momentous year and one of the last years that we will get to enjoy it with the veterans themselves. So that's been extremely rewarding for me. There is nothing but gratitude that we were able to participate and to be a part of it for this year. I'm also really happy that the weather's been good, the flying has been good and we've been able to deliver a

good product for the French people. The other good part is our planes specifically are parked here on the civilian side and it's a lot of fun to watch all the civilians run up to the fence to get as close as they can to the airplanes. And so we like to put a smile on their face.

Especially tomorrow is the big international airdrop day and the fact that we are able to integrate with the Netherlands, the British, the Canadians and the Germans means a lot that we're capable of doing it. We have the cooperation and our countries are aligned in our values and we see the benefit of coming together of unifying and presenting a united front and a united capability to ensure that peace that we that we got 80 years ago through the same cooperation can continue to live on today.

Interview with Captain Kyle "MAUL" Partin (USAF)

Captain Partin flies with the 61st Airlift Squadron from Little Rock AFB. He joined the US Air Force in 2017 and he moved to the 61AS in 2022. He has flown some 1800 hours in total, with some 250 of those in the C–130J. The crew flew in one trip over the Atlantic Ocean to Normandy.

Q: How did you prepare?

A: Our squadron volunteered to participate, and I volunteered to represent our squadron here, however some people from our squadron were assigned to come. We practice some of the types of flying done for the celebration regularly – specifically low level, formation, and airdrop. We did have special training before arriving for the flyover and ceremonial flights.

Q: How many missions did you fly in Normandy?

A: I flew 5 of the 9 days we were in Normandy – only one of those was a paradrop. All of our flights in Normandy were in formation, either with other American C–130s, some with C–47s, and many with international partner aircraft (C–130 and A–400).

Q: What was the size of the crew?

A: In general a crew of 4 is required, two pilots and two loadmasters. Due to the nature of these flights though, we regularly flew with three pilots and up to four loadmasters.

A special thank you to the support given during the IronMike paradrop by the following persons: Major Yim, US Army, Captain French, 173AB, US Army, Major McClure,USAF, Captain Partin, USAF, 2LT Cozad Staley, USAF and many, many others!

Text by: Joris van Boven and Alex van Noije

All photos by Joris van Boven except where mentioned

Air Parade over Brussels

Every year on 21 July, the Belgian nation celebrates its national holiday. After the Belgian independence from the Netherlands in 1830, the new king Leopold of Saksen–Coburg–Gotha was sworn in as the Belgian king on 21 July 1831. During this national holiday, a military parade is held with foot soldiers and vehicles on the ground; followed by a military parade of aircraft and helicopters overhead the capital Brussels.

Flight in Airbus A400M

On 21 July, three Airbus A400M transport aircraft were flying near the end of the air parade. Two weeks before the parade, the formation was exercising trial runs and on the actual day, the real parade took place. From Melsbroek AB, an E–3A Sentry, a Falcon 7X and 3 A400Ms took off. The 3 A400Ms flew to a holding area overhead

Position	Group	Aircraft/helicopters	Remark
1	F–16 group	F–16s from Kleine–Brogel AB and Florennes AB	
2	QRA group	F–16s from Florennes AB, E–3A from Melsbroek AB	E–3As are based at Geilenkirchen (DE)
3	Light helicopters	A109 and EC120 from Beauvechain AB	
4	Medium helicopters	NH90 and H145M from Beauvechain AB, NH90 from Koksijde AB,	
5	Initial trainers	SF260 from Beauvechain AB	
6	Medium trainer	Xingu from Beauvechain AB	Xingus are based at BA Avord in France
7	Transport	A400M from Melsbroek AB	
8	VIP	Falcon 7x from Melsbroek AB	
9	Refueling	A330MRTT from Eindhoven AB (NL)	MMU A330MRTT are based in the Netherlands and in Germany

Brugge and turned into the Brussels direction together with the other aircraft, in order to have one big air parade overhead Brussels. After the parade, the A400Ms flew in formation overhead the nearby Beauvechain airbase on course to Kleine–Brogel airbase in the northern part of Belgium. After Kleine–Brogel the formation flew towards Florennes airbase in the south, followed by a landing back at Melsbroek airbase. Next to the regular crew of two pilots, an additional third pilot was seated in the cockpit to control the formation and the schedule.

15 Wing

The Belgian transport command is based at Melsbroek AB (ICAO:EBMB), on the northern perimeter of Brussels International airport. It has a fleet of seven Airbus A400M transport aircraft in the 20th Squadron, which is a combined unit of Belgium and Luxembourg crews. The first delivered A400M (CT–01) has the title "Luxembourg Armed Forces" and a roundel of Luxembourg on the aircraft. The other six A400Ms have the title "Belgian Air Force" and a Belgian roundel on the aircraft. The15th Wing also has the 21st

Squadron for the long haul transport of VIPs, flying with two leased Dassault Falcon 7X aircraft.

Text and photos: Joris van Boven and Alex van Noije

M–346 is stepping up

One of the test aircraft that will be used for the Block 20 upgrade by Leonardo is this M-346F- Leonardo.

During a press conference held on 22 July 2024 at the Farnborough International Airshow, Leonardo S.p.A. announced it had launched a comprehensive enhancement package for the Alenia Aermacchi M–346. The M–346 is a twin engine, two seat transonic jet aircraft, with fully digital flight controls and avionics, equipped with a fly–by–wire flight control system with quadruple redundancy and a modern human–machine interface with display for the "head up" (HUD – Head–up Display) and multifunction (MFD – Multi Functional Display) data presentation. It is one of the pillars of Leonardo's long history in developing and producing training systems.

The development will take place for the two main versions of the M–346, the Trainer (T) and Fighter (F) version. Consistent with the long term strategy of the company, the new Block 20 standard, leverages of the inherent growth capability that is embedded into the M–346 design as well as ten years of proven in–service

A close look in the office. The current HUD will be replaced with a low profile version which will be integrated with the new single display.

experience with leading air forces. The advantage for the operators will be that the new Block 20 standard is not only limited to the airframe itself, but rather to the entire system. This includes the ground based training system and shall be enabled by the widespread implementation of digitalisation, powered by Artificial Intelligence (AI).

These upgrades are needed in order to meet a rapidly changing operational environment. This requires training commands to review the concept of air operations, including the training process. There is a shift in mindset for a more balanced approach between flying skills and information management in a dynamic environment.

This can't be done without leading edge technology, which will be introduced in both the aircraft as well as the ground based training system. Making use of AI will enable virtual and augmented reality as well as hybrid training. With all this new technology, the Block 20 will feature an integrated on–board system for the simulation of tactical training (Embedded Tactical Training System – ETTS), which allows the aircraft to emulate sensors, armaments and Computer Generated Forces (CGF). This will allow pilots to operate simultaneously, and in a combined manner, in LVC mode. This means a combination of Live (real flight), Virtual (the various types of simulators) and Constructive (interfacing with any type of force/threat generated by the computer).

The main new feature, that is clearly visible to the human eye, is the large single display (one for each pilot), replacing the existing three multi–functional displays for each pilot. Together with this large touch screen display, there will be a low profile head–up display. It also means a redesign of other secondary panels and controls. The upgrade will also feature a link to a new digital video and data recorder and a new augmented reality helmet

A student and instructor get out of the aircraft for a debrief. With modern technology, a lot of additional training can be performed on the ground.

A closer look at the cockpit of the M–346 while a student performs some touch and goes after a training flight.

Soon to be modified to Block 20 standard is M–346F on display at Farnborough International Airshow, complete with different options for A2A and A2G weapons.

mounted display. The new cockpit will align the human–machine interface to those of the most sophisticated and future frontline combat air systems, with advantages in terms of quality training and situational awareness in operational missions. The complete system upgrade will see the avionics being enhanced. It will benefit further from new navigation, weapon management system, flight management system and Identification of Friend or Foe (IFF) transponder. Specifically for the M–346F variant, further critical capability enhancements include an Active Electronically Scanned Array (AESA) radar. This will feature a fire control radar capability, which enables the integration of new weapons for both air–to–air and air–to–ground roles in addition to a built–in missile datalink.

An early rendering of how the cockpit of the M–346 Block 20 could look like with the proposed large single display–Leonardo.

Since its introduction in service, the M–346 has established itself as one of the most complete training system for fighter pilots and is meeting emerging needs for cost effective combat operations. With over 100 aircraft delivered to date to different operators over the world, the type has logged over 120,000 flight hours in operational service. Main operators include Italy, Israel, Greece, Poland and Singapore. The first aircraft that will receive the upgraded block 20 variant,

The Hellenic Air Force ordered 10 M–346 trainers of which six have been delivered to date.

The Block 20 upgrade test aircraft for the M–346T. Leonardo expects these to be upgraded by 2026 – Leonardo.

will be rolling of the production line as new aircraft. The package will then also be offered as a retrofit to the operators of existing aircraft as the upgrade does not involve a structural change to the airframe itself.

Currently, work on the upgrade has already started. Leonardo is planning to start integration in laboratory tests during 2025 and begin modification of the two prototypes available to the company. One in the Fighter Attack (M–346FA) configuration. This will be done on test aircraft CPX625 which was on display at Farnborough.

The other will be in the Advanced Jet Trainer configuration. Towards the end of 2025 it is expected that the two test aircraft will be modified so they can start their flight test programme in 2026. This will also mark the launch of the series production aircraft in the Block 20 configuration. The goal is to deliver the first of these aircraft in 2027 to the end customers. This will mark the first key step in the roadmap for Leonardo to continue developing the M–346 further for many years to come.

Article and photos: Erik Bruijns

Dutch maritime NH–90 MLU

Earlier this year, the Dutch Defence Secretary announced a new programme to update the fleet of NH–90 helicopters. The project, "Midlife Update NH–90 Helikopter", is necessary to bring the maritime helicopter of The Netherlands to an improved standard, taking care that the NH–90's remain relevant for operations for another 15 years.

The Mid Life Update (MLU) was declared as essential as the NATO Frigate Helicopter (NH–90 NFH) type is coming closer to its halftime planned lifespan in 2025. Several of the NH–90 systems are from the nineties and these backdated components do need upgrades or replacement. The MLU is mentioned to include new communication systems, an improved sonar system and integration of the Mk54 torpedo.

This weapon system will replace the current operational Mk46 torpedo, of which 2 can be carried aside the helicopter. Additionally the electromagnetic surveillance and collecting systems of the NH–90 will be part of the MLU improvements.

Major element in the update is the replacement of the current tactical datalink system Link 11, which is outdated and expected to lose support as the US has planned to out phase the system in 2025. The new datalink system, Link 22, will provide more functionalities and is better to secure.

Furthermore Link 22 is gaining in military importance as the system is and will be embedded as well in assets of other NATO allies. The new datalink supports the real time exchange of the large numbers of collected data from the NH–90 systems with other flying and sailing units.

The NH–90 manufacturer is NATO Helicopter Industries (NHI) in which European users work together in the NATO Helicopter Management Agency (NAHEMA). The MLU agreement for the maritime NH–90 of The Netherlands will be in a partnership together with co–users Belgium, Germany and Italy. The NAHEMA is addressed to manage the single source process at NHI. The costs for this MLU project for The Netherlands are calculated to amount €661 million and include furthermore a number of supporting systems like flight simulators, a mission planning and analyses system and testing equipment.

The MLU includes 2 phases, where the first phase will provide the design of a prototype helicopter at producer NHI. The remaining helicopters are expected to follow modernisation from 2028 and, after their MLU retrofit, capable for another 15 years of operations. The execution of the modernisation will primarily focus at The Netherlands by own defence personal in combination with the Dutch industry, to control and secure optimal planning and lead times.

The Netherlands operates the maritime version of the NH–90 since 2010. The current fleet counts 19 helicopters and all are in service within squadrons nr 7 and 860, part of the Dutch Helicopter Command (DHC) at Naval Air Station De Kooij. A single NH–90 was lost during a tragic accident in the Caribbean in 2020. The main role for the DHC NH–90 is as a maritime combat helicopter and therefore often deployed at navy frigates. Additionally the helicopters are used for transport duties and in amphibious operations.

A few weeks after the Dutch MLU announcement, the Belgian defence also declared to step into a MLU programme for their maritime NH–90's. This programme which covers the 4 Belgian NH–90's, operating out of Naval Air Station Koksijde since 2014, includes a software

update and is estimated to cost €110 million. The Belgian programme is expected to run for some years, but no indication has been given jet when it will start.

Further expected Italian and German involvement in a MLU programme for maritime NH–90 NFH's was confirmed during June 2024, when the singing of a major contract was announced between NAHEMA and NH Industries. The agreement formalises the development and delivery of Software Release 3 (SWR3) for the NH–90 helicopter and was valued in excess of €600 million.

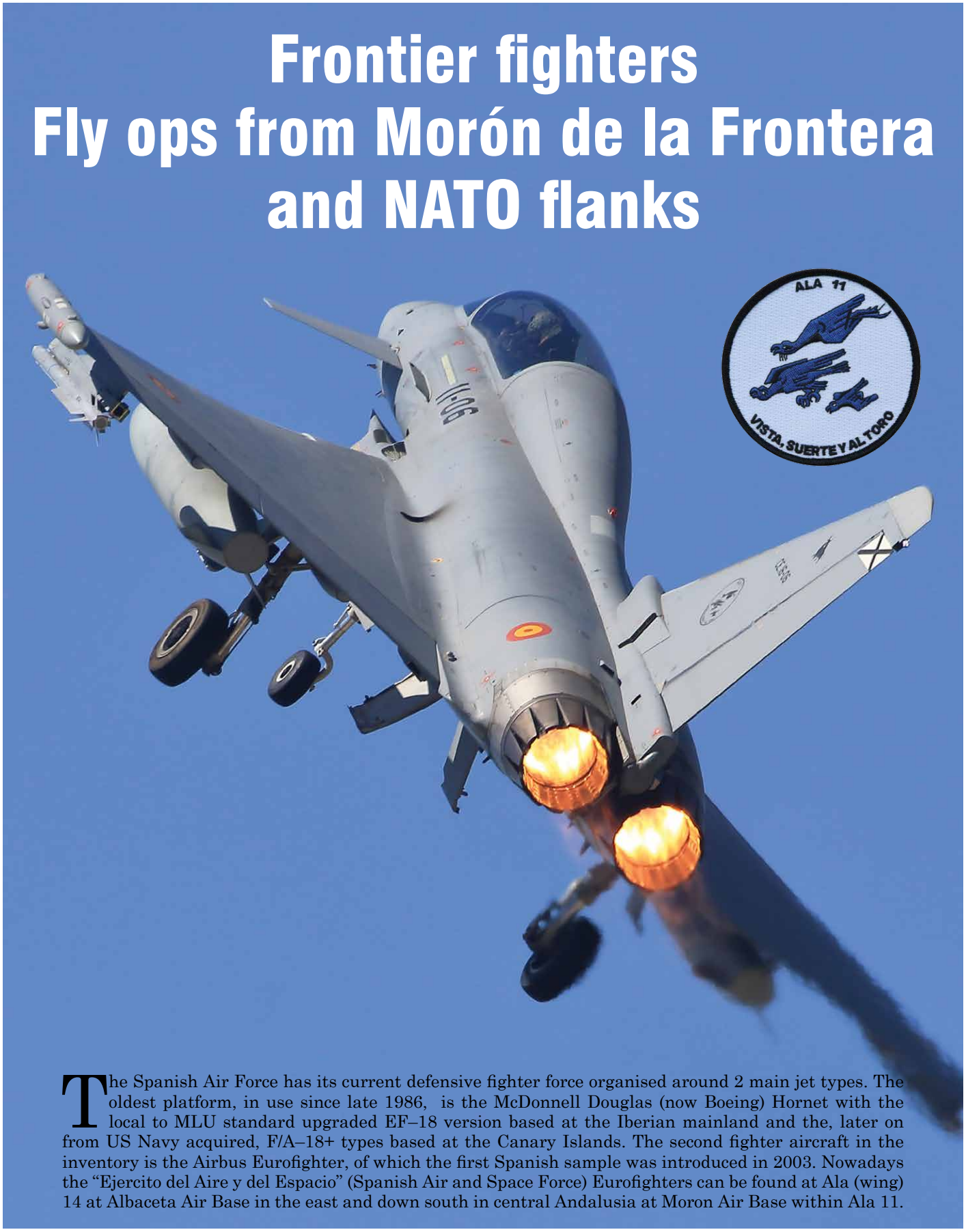
The statement of NAHEMA and NHI, including partner companies Airbus Helicopters, Leonardo and Fokker, declared that SWR3 will further boost the NH–90 operational capabilities, featuring equipment such as the first airborne Data Link 22 on a helicopter, next generation high definition Electro–Optical system (LEOSS–T) and Sonar (OTS–90 Mark II), civil GNSS/FMS and additional weapons integration. Data Link 22 will ensure secure Line–Of–Sight (LOS) and Beyond Line–Of–Sight (BLOS) communications without the use of satellites. Additionally, claiming the NH–90 to be the first and only helicopter featuring the Link 22 standard, it is expected to deliver unparalleled tactical information/data exchange capabilities compared to any other military rotorcraft platforms, and will be uniquely ready to respond to latest and future multi–domain scenario operations.

The introduction of the latest high–definition technologies will further enhance the maritime mission capability, particularly for long range surveillance, target identification, acquisition, tracking and designation. The NH–90 is regarded to deliver a seamless integration of all the tactical information coming from its Naval Mission System and also featuring the latest generation electro–optical system and sonar. These elements will reduce the crew workload and so ensuring the maximum effectiveness during all the most demanding missions, such as day/night MSO (Maritime Security Operations), SAR (Search And Rescue), ASuW (Anti–Surface Warfare) and ASW (Anti–Submarine Warfare).

The NHI statement further shows involvement of army helicopters as the contract mentions to cover an initial development and qualification phase: "The first phase will see intense flight test activity in Tessera (Italy) on the Italian Navy and Army variants. A second phase, which is still under finalisation, will see the deployment of the SWR3 as a retrofit solution for up to over 200 NH–90 helicopters. The upgrade plan will involve both naval (NFH) and terrestrial (TTH) variant of the type for the relevant customers in the four countries: Belgium, Germany, Italy, and The Netherlands."

Photos and text: Peter ten Berg

Frontier fighters
Fly ops from Morón de la Frontera and NATO flanks



The Spanish Air Force has its current defensive fighter force organised around 2 main jet types. The oldest platform, in use since late 1986, is the McDonnell Douglas (now Boeing) Hornet with the local to MLU standard upgraded EF–18 version based at the Iberian mainland and the, later on from US Navy acquired, F/A–18+ types based at the Canary Islands. The second fighter aircraft in the inventory is the Airbus Eurofighter, of which the first Spanish sample was introduced in 2003. Nowadays the "Ejercito del Aire y del Espacio" (Spanish Air and Space Force) Eurofighters can be found at Ala (wing) 14 at Albaceta Air Base in the east and down south in central Andalusia at Moron Air Base within Ala 11.

Furthermore, the Spanish Eurofighters are stationed regularly throughout Europe, when deployed close to NATO's European frontier edges, fulfilling NATO Air Police missions or also called Air Shielding missions.

To have a close look at the normal daily life of the Spanish Eurofighter community, we visited them at Ala 11 home base close to Moron de la Frontera.

Base Aerea

Base Aerea (Air Base) de Moron with ICAO LEMO, can be found east of the cultural city of Sevilla, close to the rural town of Moron de la Frontera. The name of "de la Frontera", which can be seen in more nearby town names, goes back to around the end of the first century, referring to the previous borderline where invading Moor troops were brought to a halt avoiding further entry into the Iberian peninsula. The military airbase was constructed in 1940 and then known as the Vazquez Sagastizabal Military Aerodrome were pilot training was conducted. By 1953 Moron air base was, together with Zaragoza and Torrejon, part of an agreement with the USA to increase capacity and develop them into strategic co–operated bases. With an enlarged runway of almost 12,000 ft, Moron was previously also appointed as one of the diversion bases for the NASA Space Shuttle.

As per today, Moron still has the Spanish and US dual operated air base status. The immense central main ramp of the base is largely in use by the US. Although there are

no aircraft based here, Moron is important for the US as an entry point to Europe as well as a transit station of aircraft flying between the US and Middle East. Not only the daily logistic and supportive flights of aircraft like C–17's, Galaxies and tankers can be seen, but also regularly fighter aircraft squadrons on their way to, or returning from a deployment in the eastern Mediterranean regions or beyond.

These deployment relocation flights includes all US military main branches like Air Force, Navy and Marines Corps. During our visit to Moron we could witness such a relocation flight from the US through Bangor airfield to Moron of TX and FM tail coded F–16C's. Late afternoon, after making the transatlantic crossing, flight "Tabor XX" representing Fighting Falcons of 93rd "Makos" Fighter Squadron (FS) and 457th FS "Spads", both from the US AF Reserve Command, touched down at Moron to be followed by 2 KC–135 tankers for aerial refuelling flying under callsign "Gold XX". A total of 12 F–16's continued a few days later with their flight towards one of the Persian Gulf states, relieving F–16's from Shaw AFB from their duty after their 6 months deployment. Occasionally the US also uses Moron as a Forward Operating Base (FOB), like recently with temporary detached USAF Global Strike Command B–52's "Stratofortress", or earlier with US Marines Corps MV–22 Ospreys. Always present, as permanent inhabitants of Base Aerea Moron, are the Eurofighters of Ala 11.

Eurofighter

Although no longer operational within the Spanish Air Force, it is per 1999 that Ala 11 moved from Manises Air Base, Valencia, to its current home ground at Moron. The Andalusian air base had plenty of space for the new unit, after the earlier relocation of Ala 21 with their SF–5 "Freedom Fighter" aircraft from Moron to Talavera de la Real air base. The unit at Talavera, Ala 23, became from that moment the sole F–5 operating base for Spain. With the move to Moron, the 11th wing brought along its operational EF–18 Hornet aircraft. It is from 2004

that Ala 11 started to replace its Hornets by the newly acquired Eurofighter for the air defence role in Spanish military service. The initial order for Spanish Eurofighters counted 73 "Tranche 1" aircraft for which meanwhile upgrade programmes are running. The upgrades include installing Tranche 2 and 3 equipment into the airframes and foresees an extended operational life span towards 2040 and further.

As the Spanish F/A–18+ Hornets based at the Canary Islands are coming at age and need to be replaced, an order for 20 "Tranche 4" Eurofighters was placed in 2022 with deliveries to start in 2025. Late 2023 another 25 Eurofighters have been ordered to partially replace the remaining fleet of EF–18 Hornets, with initial deliveries scheduled for 2030. This partial solution may leave some space for a future decision of another platform, potentially a 5th generation aircraft, while unmanned aerial vehicles are also rumoured as a future option.

Ala 11

At Moron we are warmly welcomed by the community of Ala 11 represented by General Staff Commander Major Guirado and immediately being invited to the (secured) operations buildings were we meet several of the pilots in the units crew room. While some of them are engaged in their preparations for their morning flights, we are guided around by Captain Enrique and hear more about the fighter unit. "We have 2 active squadrons in our wing, being 111 Escuadron, responsible for frontline operational missions and 113 Escuadron which is an Operational Conversion Unit (OCU) to train pilots on the Eurofighter. OCU training is not only for the pilots at Moron, but also for Ala 14 at Albacete, the other Spanish Eurofighter air base". Next to the national OCU tasks, 113 Escuadron gives also training to other nations, like Germany who has their pilots following the OCU training at Moron on a regular base for already a couple of years. The Spanish pilots who have completed their 1 year OCU training, stay at Moron to become part of operational 111 Escuadron or transfer to Escuadron 141 or 142, both operational units at Albacete. Captain Enrique continues: "Our 111 Escuadron Eurofighter operations include more or less the full range of a fighter aircraft missions, which means all kinds Defensive Counter Air (DCA) and Offensive Counter Air (OCA) operations. Other missions also include High Asset Value (HAV) protection, when escorting radar or tanker aircraft, or concentrating on an air to ground role, like with Close Air Support (CAS). Nowadays we also regularly train together with the MQ–9B "Reaper" Remotely Piloted Aerial Systems (RPAS) from Ala 23 at Talavera Air Base. These trainings missions can be focusing at escorting and protecting the MQ–9's by our jets, or that we don't see the Reapers at all but receiving target information from their sensors".

The operational flights of Escuadron 111 are often conducted under "Dollar" call sign, of which a symbol is also part of the squadrons badge, together with the units prominent mascot, the coyote.

The Eurofighters of 111 and 113 Escuadron at Moron are normally in basic identical and wearing the Ala 11 wing badge at the tail. This makes the aircraft multi usable for operations of both squadrons. The badge shows 3 birds and displaying the moto "Vista, Suerte Y Al Toro" ("sight, luck and the bull"). Furthermore all Spanish Eurofighter aircraft are marked with a bull symbol on top of the tail and are applied with the typical Spanish aircraft identification code, starting with C.16. The ID code consists out of a character like C (Caza = fighter), A (Ataque = attack) and E (Escuela = training), followed by an aircraft type unique number and completed with a sequential number per aircraft.

The Eurofighter community at Moron also works closely together with their Eurofighter flying colleagues at Albacete and help each other out, which is beneficial when flying the same platform. This morning Captain Félix, the 111 Escuadrón Operations Chief and pilot, with more than 2300 flight hours of which 1700 in the Eurofighter and his colleague pilot Lieutenant Pablo fly together in a twin seater to Albacete. "Here we will pick a single seat Eurofighter which is needed in Moron. The return flight with our 2 aircraft is used to conduct air combat training over central Spain and subsequently perform a low level flight towards Moron" as the OPS Chief explains. "Flying low means full concentration when navigating towards the way points of our flight plan and continuously scanning visually the direct environment for other traffic or obstacles".

At Moron, the Ala 11 Eurofighters can be found at the huge platform of the base and are parked beneath sun sheds. This is no luxury as the temperatures in Andalusia easily pass the 40 degrees during the summer. Next to the sun sheds you can find the hangars where maintenance is conducted of the aircraft upto the medium level. The larger levels of maintenance, are carried out by manufacturer Airbus at their own facilities. Specific maintenance of aircraft or systems can also be done by specialists of the manufacturer or supplier on site at Moron. Opposite of the maintenance hangar a P–3M "Orion" maritime patrol aircraft can be found. This sample was the last operational Orion belonging to Grupo 22 and withdrawn from service at home base Moron late December 2022. Grupo 22 will resume operations again when their newly acquired C–295MPA aircraft will be delivered, likely to take place in 2024.

QRA and NATO

Near the runway of Moron there are also some Eurofighters on Quick Reaction Alert (QRA) duty which is on a 24/7 base and covering Spanish air space. Pilots and ground crews rotate at the air base in continuous schedules to guarantee being airborne within minutes after an alarm call. The order for a QRA assignment is given by the Combined Air Operations Centre (CAOC) Torrejon, Spain. This CAOC is in charge over the European NATO airspace south of the Alps. The QRA missions out of Moron mostly involve the intercept of civilian aircraft, due to no radio contact with Air Traffic Control centers. The second CAOC is located in Uedem, Germany and is in control over the European air space north of the Alps. "We also work closely with this CAOC when we are on NATO Air Policing missions, for example in the Baltic states".

These countries have no or insufficient means to conduct QRA and that is why NATO is helping these countries by deploying aircraft of other members for a specific period and keep the local airspace safe. The intercepts in these regions often involve Russian military aircraft flying to and from the Russian isolated enclave of Kaliningrad. These aircraft have no published flight plans and do not respond to radio contact. Therefore, we intercept them and escort them away from our territories and keep the international airways, close to NATO airspace, safe." as Captain Enrique explains.

Recently, Spanish AF Eurofighters, including those from Ala 11, participated in the multinational exercise Pitch Black 2024 at Darwin AB, Australia. Together with other European Eurofighter operators like Germany and Italy, mutual transport, refuelling and maintenance capacity could be shared to bring the Eurofighters back and forth. The opportunity to work together with other nations using the same platform is beneficial and cost efficient to enable training and flying with aircraft and nations which do bring new experiences to the Eurofighter pilots.

On the way back to Spain the Eurofighters also took the opportunity to join the exercise Tarang Shakti 2024 at Sulur AFS, India.

Text and photos by Peter ten Berg

Defence Pace Quickens

Richard Gardner reports from Farnborough UK

F–35B taxies out for a demonstration

The global pace of development of advanced defence programmes is now at a new high, as reflected at the recent Farnborough International air show in the UK, where more than 250 official delegations from around the world attended, and with over 1,600 companies and organisations on show, revealing progress across a sector wide range of aerospace activity. While the inevitable multi–billion announcements of new orders for commercial aircraft attracted media attention, it was in the defence sector that much more significant news was forthcoming throughout the duration of the week providing a constant flow of company briefings on a huge range of update and all new programmes, national and international.

BAE Systems, permanently resident at Farnborough, provided a large exhibition hall of its own containing examples of current cutting edge development activity highlighting its dedication to growing sovereign capabilities as well as wider international partnerships and next generation technologies, touching on training and support for the new era and introducing new manufacturing concepts. All domains from sub–surface to sea, air, land and space were covered but without a doubt the most eye–catching single focus of attention was the revealing of a new full size concept model of the next generation Global Combat Air Programme (GCAP) aircraft being developed by the UK, Italy and Japan at a rapid pace by the three partners – BAE Systems, Leonardo and Mitsubishi. This latest iteration features a much evolved design with a larger wing, and a capacious weapons bay and the overall airframe now looks significantly bigger than the

Air India A350–900

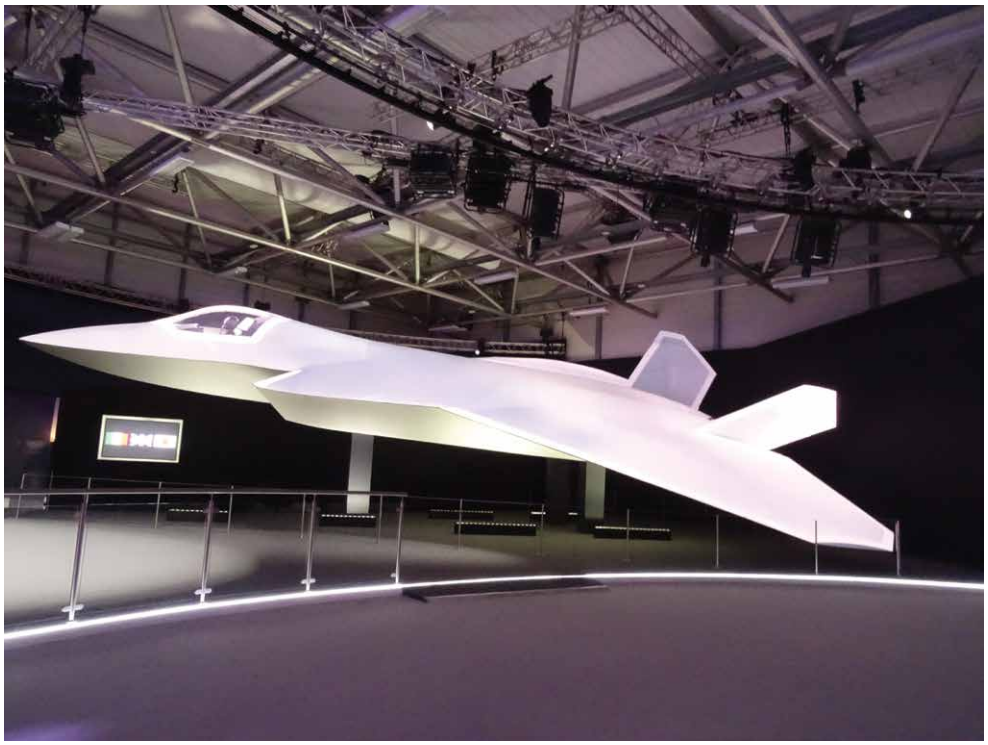
previous display mock–ups. Within a stealthy airframe there is provision for the bigger weapons and air launched platforms now anticipated, with the larger wing bringing longer endurance and a high performance. Much effort at government and industry levels has been devoted to bringing together the key aspects of common operational requirements with appropriate systems reviews, and all within a highly digital environment, incorporating an accelerating level of Artificial Intelligence (AI) on a scale not attempted before in such an international project.

At a GCAP briefing Herman Claesen, Managing Director FCAS at BAE Systems, told VAYU that speed of developing the concept design involved an impressive level of computing power to arrive at this milestone design stage. GCAP is seen as a central crewed platform at the heart of a system–of–systems configured to work seamlessly with existing 4th and 5th generation aircraft as well as emerging new assets across multi–domains which will allow an unprecedented level of integration sharing data with crewed and uncrewed platforms, including autonomous air vehicles and other aircraft, and surface assets. He stated, "We are making fantastic progress".

Interoperability with the air forces of allied nations is being factored into the design but clearly the issue of sovereign capability is a driving factor. Introducing national upgrades to non–sovereign built air platforms inevitably adds costs and delays and so freedom to introduce new weapons and systems as required in the future is seen as an important factor in taking GCAP forward as the core future 6th generation combat aircraft. It is also important to safeguard and encourage new technological expertise building a new generation of highly incentivised specialists across a wide range of 21st century industrial capabilities. Government research centres in all three partner countries are contributing to the fast expanding programme with 1,700 project employees involved already within BAE Systems in the UK, and by the end of this year Leonardo will have 2,000 specialists working on GCAP.

Open architecture is a key design feature and every effort is being expended to ensure that the emerging aircraft platform will be able to adapt over its lifetime to meet new threats and requirements. Digital tools are being used speeding up progress to design, evaluate and test every aspect of the GCAP even before it emerges in the form of the first flying development aircraft, known in the UK as the Tempest. This is now well underway with the first airframe parts being assembled in what has been described by the company as the most innovative and advanced "Factory of the Future".

The multi–phase testing of the Tempest demonstrator of key aspects of the GCAP configuration and potential performance will inform the detailed refining of the core aircraft design and what it must deliver before important pre–production decisions are made. The highly digitised nature of the programme is in constant evolution so the traditional timescales involving multiple changes during the development and testing period are now being severely reduced, which can be seen by the fact that the initial demonstrator will be completed next year with "a jet in the air in 2027". Asked about any slowdown due to the change in government in the UK Claesen said Sir Kier Starmer the new Prime Minister had offered very assuring words during his visit to the exhibit on Day 1 of the show and



A view of the GCAP full–size model

Embraer KC–390

HAL chalet exterior

"No toe brakes are being applied!" He added that the PM understood the strategic value of GCAP as important in many ways to the UK as well as being an important international project. Hitoshi Shiraishi the GCAP partner lead at Mitsubishi said, "We expect to obtain better results and deeper knowledge than ever before by combining the different cultures, experiences and knowledge of the three industries involved. I also hope with the broad participation of Japan's defence companies it will foster innovation in the country's industrial sector, such as digital transformation, as well as the development of human resources in the field of science and technology."

Claesen ended by pointing out that as a measure of the level of advancement of GCAP's capabilities its next generation radar will be capable of providing 10,000 times more data than other combat radars giving it a battle winning advantage. The plan is to see initial deliveries of production GCAPs starting in 2035, and as numbers build, the type will operate alongside upgraded Typhoons and F–35s in UK and Italian service, which are both expected to continue into the 2040s and beyond, and also alongside Japan's F2s and F–35s. The fact that all three GCAP partners already operate F–35s of their own is providing important inputs and operational experience to help inform decisions relating to how the next (6th) generation aircraft will be able to deliver another step–change in adaptability and flexibility beyond today's best 5th generation combat jet.

The UK has funded a converted Boeing 757, the Excalibur Flight Test Aircraft (FTA), as a flight test platform for developing advanced radar and sensor developments and this will include supporting the GCAP Integrated Sensing and Non–Kinetic Effects and Integrated Communications System (ISANKE & ICS). Leonardo UK is the lead on developing these technology demonstrators for Tempest, GCAP, and other UK defence air projects. It is intended that into the future the advanced open architecture design and AI–assisted cross–domain capability will make it much easier to provide upgrades and the addition of new weapons and systems throughout the 30–40 year anticipated operational life of the GCAP programme. This should help overcome the complications and delays that can be associated with upgrading existing advanced air platforms that feature extended multi–block delivery timescales. This capacity to be able to adapt to new requirements will be built–into the design and the GCAP air platform will be just one inter–connected element in a broad range of effectors that will include other aircraft, piloted and un–crewed, and across the air, surface and space domains.

MBDA Sky Warden anti-drone mobile unit with laser effector and telescopic mast with 360 D radar, EO and IR sensors on the mast.

BAE Falcon Works

The BAE Systems Falcon Works is the group's centre for advanced and agile research and technology development for the group's air sector, with a focus on early lifecycle development of game changing technologies that have potential to shape future programmes. Its current highly innovative products are designed to address the speed at which warfare is now changing, and are aimed at keeping ahead by accelerating selected new solutions. As well as developing practical answers to evolving operational requirements the activities consider such factors as introducing advanced additive materials and manufacturing technologies with secure cloud processing, AI, autonomous operations and Nano technologies. Sustainability in manufacture, operation and disposal all feature in the efforts to do things differently and better, while helping to keep effective defence initiatives affordable and ahead of evolving threats. With the new technologies come new opportunities to exploit wider export markets as well as ensuring that home defence forces are equipped with genuine 21st century solutions.

Amongst the Falcon Works futuristic projects on display at the show was the T–650, an all–electric heavy lift UAS concept vehicle designed to be used to transport essential frontline battlefield supplies with a rapid response capability. Consisting of a rugged VTOL frame capable of underslung loads of ammunition, fuel or even a casualty pod, the air vehicle is un–crewed eliminating risk to human pilots. A representative full size torpedo was also on display alongside the other typical payloads, indicating a potential ship based role for small naval or coastal patrol vessels. The concept vehicle can be scaled up if required.

A long–time Vayu reader is Air Marshal D C Kumaria (Retd), a former Indian Air Force senior fast–jet veteran, and now a Military Advisor, based in New Delhi. Both of us sharing a long–time friendship with the late, great, Vayu founding editor, Pushpindar Singh, it was a delight to have his company as we toured the comprehensive displays in the BAE showcase exhibition.

Another exhibit that is on order for military customers and at an advanced stage in development is the Phasa–35, an all–electric solar powered, high altitude (stratospheric) autonomous, uncrewed, long–endurance air vehicle (HALE) that is robust in construction with inter–changeable mission pods that can provide continuous surveillance or secure communications for months above the selected area as an alternative to far more expensive and less flexible Low Earth Orbit satellites.

IAF Air Marshal DC Kumaria (Retd) with T650 BAE Heavy lift eVTOL

Another highly innovative battlefield support uncrewed air vehicle designed by BAE Systems in Australia was displayed in model form, in the colours of the Royal Australian Navy. This air vehicle is far larger than the T650 design, and resembles a giant insect sitting on long legs, and features an ability to take–off and land vertically and can thus operate in very restricted spaces carrying a wide variety of stores. Possible operational uses include in a ship stores re–supply or anti–submarine role, flying off a small platform pad. A large mock–up was first seen at the UK's DSEI show last year in Army colours and logistic support configuration. A computer generated video sequence depicted how it can transition from vertical to forward flight, and back down again, and all without having complex and heavy moveable engine pods. The propulsion pods are fixed. Again, it is seen as a force multiplier in the battlefield, being able to act as a logistics support air vehicle, or in a surveillance or armed role.

Global air programmes

Boeing concentrated its Farnborough presence on commercial aviation, with a new B787 Dreamliner in prime position in the static aircraft park. On the eve of the show it announced its latest 20 year business forecasts, predicting the world's civil air carriers will require 44,000 new aircraft to replace ageing fleets and to allow for new growth. The biggest segment, 76%, will be in the 150–200 seat category of narrow body jets dominated today by the A320 and 737. Until breakthrough technologies and associated radically more sustainable propulsion and aerodynamic advances are proven as being an improvement over the steady evolution of today's jet airliner families, it is difficult to see what might provide the next step designs to seriously challenge their established efficiency and flexibility – and popularity.

Graphic on General Atomics stand showing folding wing MQ–9B Sea Guardians on UK aircraft carrier. Same display also depicted various EMALS electro magnetic launchers.

New Airbus A321XLR on approach (taken pre–show opening from my garden!)

Though on a much reduced visible level Boeing's military contribution at the show included a P–8A and four F–15QA Eagle multi–role fighters, one of which was loaded up with no fewer than 12 AMRAAM air–to–air missiles. These aircraft were flown direct to customer, Qatar, immediately after the show, having provided daily flying displays that illustrated why, in its latest updated form, with fly–by–wire controls, upgraded engines and avionics, it is still in production, some five decades after its first flight. RX used the show to highlight its progress on upgrading the GE F135 engine for the F–35 with a power management system upgrade and also the Engine Core Upgrade (ECU) where the preliminary design review is now complete. The full service life of the F–35 engines is being upgraded and readiness levels are being met in the meantime. New deliveries of Block 4 aircraft will incorporate the upgrades. GE is actively progressing the adoption on a wider range of engines the manufacture and testing of additive manufactured engine parts to reduce component parts count and reduce the pressures on the supply chain. Evaluations have been underway to ensure the resilience of these parts.

There was little update news, unsurprisingly, announced at Farnborough on the Franco–German–Spanish Future Combat Air System, FCAS, the rival to GCAP, though it would appear that the in–service timetable is slipping back towards 2040. This is presently of little concern to the partners as the French forces have many more Rafale combat jets on order with a healthy and still growing export backlog, the envy of Eurofighter, so there is no hurry making FCAS a priority. The internal rivalry between Dassault and the Eurofighter elements within Airbus, both partners in FCAS, and the undecided workshare role by Spain, is not helping, but there is undoubtedly great collective experience within these partners through involvement in both the Rafale and Eurofighter programmes to ensure that initial difficulties will be sorted in due course.

In the exhibition halls there were plenty of large scale models of new design military fighters and helicopters, including the South Korean KF–21 and Turkish Kaan. The KF–21 now flying is a very impressive, compact, interceptor, though its lack of a full internal weapons bay compromises its low observability aspirations with only semi–sunk weapons bay and wing pylons for ordnance carriage. The possibility of re–designing the fuselage to overcome this has been considered, but so also has the design of a completely new follow–on aircraft which would

Latest GCAP full–size model

be larger and more capable. Hanwha's indigenous engine development aimed at powering future Block 3 KF–21 aircraft, with a 15,000lb thrust alternative to the current GE F414 is an aspiration, which the company admits is a challenge, but it is determined to grow this expertise, having licence–produced F404s for its successful T50/ FA50 fast jet family.

India's rising aerospace status in competitive world markets was much in evidence at the show, with impressive company chalets for Tata and Hindustan Aeronautics while out in the static park a brand new Airbus A350–900 dominated in Air India colours. With over 1,000 new aircraft in India's aircraft backlog, the revitalised Air India, under Tata ownership, is poised to take full advantage of the ever expanding domestic and international commercial aviation business. The show also saw the announcement that Airbus and Tata were to set up a joint final assembly line in India for the H125 helicopter, with first deliveries as early as 2026. Part of the "Make in India" initiative, the move is seen as opening up an important potential new export market for the helicopter as well as being used across the country in a wide variety of roles.

Missiles galore

With the war in Ukraine raging, the Ukrainian military, supplemented by an ad hoc national army of volunteers, has developed an amazingly effective self–help array of modified drones, modified from commercial products, some armed, to counter larger but badly trained and led Russian groups fighting in the field and dug–in within ruined occupied cities and towns. This has provided new surveillance and battlefield attack capabilities at low cost, but defending cities and key strategic targets from Russian missile and armed drone attack has become a task relying on sophisticated Western ground based air defence assets, informed by Western intelligence assistance, including satellite data and imagery with additional supporting NATO air assets operating outside Ukrainian air space. Whilst remaining at a relatively safe distance from the Russians these surveillance and intelligence gathering assets provide essential early warnings of enemy intentions and movements including the locations where preparation sites are based.

The West has started supplying Ukraine with more capable longer range weapons, including surface launched missiles, precision attack weapons and even long range cruise missiles. At the Farnborough show there was much evidence of international companies developing or supplying the latest missiles with accompanying new capabilities and supporting infrastructure to take maximum benefit from the technologies that are emerging to integrate multiple sensors and effects across the new battlespace. Precision (from initial and changing target intelligence) to weapon and launch equipment interoperability, and such factors as appropriate crew training, deployability and sustainment in the field are all key factors, but every weapon is expensive and it has been difficult to ramp up production because of under–prepared schedules established in the supply chain. This is now all changing at a pace, but so too is the focus on ensuring every weapon fired at a specific target reaches that target and achieves the desired effect.

Behind the scenes within the missile companies, the introduction of AI–assisted development and testing activity is now showing true game changing results. One example is the integration of AI enhanced collaboration into the Spear family of cruise missiles from MBDA within a spiral development process. It will result in a force multiplier effect in how an operator can deliver a winning effect in an engagement involving multiple high priority targets. In just 12 months a new initiative, Orchestrike, has brought together a combination of AI hardware, network–enabled datalinks and Spear missile technology to enhance platform survivability and overall mission performance. The stand featured a simulation of how the AI assisted data for an air strike on four chosen priority targets could be integrated onto the four missiles carried by the aircraft, which would launch the weapons automatically at the optimum time in the preferred order, and if that priority changed or was affected by an unplanned attrition effect on the way, the remaining missiles would re–allocate to that original priority target and then the next ones. Each weapon would be fitted with a network enabled datalink to share information within the formation. The company has also developed algorithms to support simultaneous time–on–target performance by multiple weapons to enable attackers to manoeuvre around known enemy air defence systems. Spear is due to be carried externally aboard RAF Typhoon GR4 multi–role fighters on three–round launchers, but four–round launchers are due to be part of the F–35B Block 4 weapons capability, carried internally. Spear has now become a whole family of strike missiles in glide and powered formats, just as the company's vertical launch Ceptor has evolved into a sea and army surface–to–air weapon.

At the show RTX, under its Raytheon banner held an update on its global missile developments, many of which have been supplied to Ukraine. Some 19 customers have bought and ordered the company's Patriot mobile surface–to–air missile system, recent new customers being Romania and Spain. Germany and Poland are important customers and Patriots will be part of a shared European

Orchestrike project from MBDA showing AI–enabled sensor inside Spear missile model to ensure priority targets are always hit automatically after launch.

Sky Shield programme. NATO is ordering Patriots across four European nations which can be distributed to meet priority NATO needs. A comment was made that building a Patriot system takes 12 months but it takes 24 months to get the parts! This is now being resolved! On other Raytheon missile sales in Europe bulk buys of Stinger close range MANPADS missiles are being bought in bulk bringing economies of scale. Production of AIM–9 and AMRAAM air–to–air missiles is being ramped up and high energy laser systems have been developed as part of a layered mixed effects product line.

These defensive lasers range from generating between 15KW and 50KW. The company stated that there was scope for collaboration on future laser developments beyond those already in use. New threats from ultra high speed long range missiles were particularly worrying, especially in the Pacific region, led by China, and ways of best countering this were being addressed, including threats from space.

Defences against drones and other UAVs have been developed by very many companies and are becoming available at a scalable level to meet all operational requirements for defence or civilian protection of key locations and facilities. The MBDA small scale answer was on view in the form of its Sky Warden package, consisting of a compact transportable, or mobile, base unit featuring a telescopic mast and platform with 360 degree radar surveillance, electro–optical and IR tracking sensors and a variety of effectors to disable drones.

These range from radio link disruption to drone netted capture, sensor and propulsion destruction to total destruction. Effectors within the unit can include automatic radio link jamming equipment, gun or laser fire, depending on the immediate location and level of threat. At the upper end of the scale of directed energy effectors from MBDA is the UK's Dragonfire high–energy laser defence system for defeating all types of incoming threats to Royal Navy ships, from aircraft to missiles, armed drones and uncrewed attack boats.

New from General Atomics

The highly successful General Atomics MQ–9B Sky Guardian family of advanced long endurance Remotely Piloted Aircraft is being offered with an upgraded Pratt & Whitney Canada PT6 E–Series turboprop engine that will provide a 33% increase in power over the current engine. Now in service with the Royal Air Force, where it is called the Protector RG1, the MQ–9B family has been extended in almost every respect following after the original MQ–9B Reaper became a significant armed RPA in use by the UK and USAF over Afghanistan. This latest version is also suitable for maritime use with search radar and anti–submarine sensors fitted in pods. It can provide up to 40 hours of continuous surveillance capability day or night in all climates and can transit in unsegregated airspace using its own company developed detect and avoid system.

Late last year, the smallest member of the MQ–9B family of air vehicles took part in carrier deck flying trials, proving the ability of the aircraft to operate safely in a short take–off/landing mode without the use of catapults or arrester wires. A STOL wing provided ample lift to demonstrate its capability to use unimproved landing sites as well as carrier decks. At the company stand there was a large computer generated image at the Farnborough International air show depicting several navalised MQ–9B aircraft parked up in line on the deck of HMS Queen Elizabeth with folded wings (a possible new development). The same carrier image depicted a jet–powered Collaborative Combat Aircraft (CCA) based on the XQ–67A drone developed by General Atomics and in receipt of a demonstrator contract placed for the US Air Force. It was positioned on a forward electromagnetic launch system alongside the deck's bow ski–jump structure and it is believed such a proposal has generated much UK interest as the operation of unmanned air platforms alongside the UK's F–35B combat jets aboard its large aircraft carriers is seen as a potential cost–effective and operationally beneficial way of generating more weaponised critical mass from the carriers. General Atomics is also the supplier of the EMALS electromagnetic launch and recovery systems aboard the latest US aircraft carriers.

The author of this piece, Richard Gardner, as a passenger in the Lillium e–airtaxi!

Royal International Air Tattoo 2024

The Royal International Air Tattoo (RIAT) is the world's largest military air show, held annually in July, usually at RAF Fairford in Gloucestershire, England. The first Air Tattoo was staged at North Weald Airfield in Essex in 1971, with just over 100 aircraft taking part. The event was founded by Paul Bowen and Timothy Prince, who were CAA air traffic controllers, and Air Marshal Sir Denis Crowley–Milling. From 1973 to 1983 it was held intermittently at RAF Greenham Common, initially under the title of the Royal Air Forces Association, South Eastern Area, Air Tattoo before moving to RAF Fairford in 1985. The show became the International Air Tattoo in 1976, and recognition of its unique status was granted by Elizabeth II in 1996, when the current Royal International Air Tattoo title was adopted.

The show took place at Fairford every two years until it became an annual show from 1993. Due to redevelopment work at RAF Fairford the show was held at RAF

Cottesmore, Rutland in 2000 and 2001. Guinness World Records have recognised RIAT 2003 as the world's largest ever military airshow, with 535 aircraft in attendance. RIAT 2022 saw 266 aircraft from 33 nations on display, as the show returned from an extended hiatus due to COVID–19.

The event has had a number of air show firsts, including the first display and landing of the B–2A Spirit stealth bomber outside the United States of America during the 1997 "50 Years of the USAF" event and in 2008 the first landing of the Lockheed F–22 Raptor in Europe.

The organisers of The Royal International Air Tattoo 2024 (19–21 July) neatly sum up the experience: "RIAT is more than just an airshow. It is a three day event that will overwhelm your senses. From the roar of jet engines


BAE SYSTEMS

ripping through the air to the cheer of the crowd line – it's an experience like no other. Experience sights and sounds that will leave your heart racing and raise the hairs on the back of your neck as aircraft and nations descend on RAF Fairford, in the glorious Cotswolds Fairford, for a festival of flight. And you can elevate that experience by doing it all from one of our unique hospitality areas".

The Royal International Air Tattoo has been running for 52 years and is staged in support of the Royal Air Force Charitable Trust. The Royal Air Force Charitable Trust's purpose is to promote the Royal Air Force and inspire young people and RAF personnel to fulfil their potential in air, space and technology. Every event attracts approximately 150,000 visitors along with hundreds of aircraft either on static or flying display.

Each year at the Air Tattoo, RIAT celebrates aviation and airpower across its broadest spectrum; however, "we also designate annual themes to promote the attendance of different aircraft types and focus professional discussion at the event".

"For RIAT 2024, we are focusing on the following themes: 50 Years F–16, Pushing the boundaries in air and space, NATO 75th Anniversary and 100th Anniversary of the Royal Canadian Air Force".

Text courtesy: RIAT, Wikipedia and The Vayu Team

All photos: KSC/Vayu

Royal International Air Tattoo 2024

YOUR AIR FORCE
VOTRE FORCE AÉRIENNE

Celebrating RCAF at 100 in Europe

In April this year, the Royal Canadian Air Force (RCAF) reached its 100th birthday. Under the motto "Your Air Force", this is celebrated throughout the year during all kinds of smaller and larger events all over Canada. But also in Europe attention was paid to this milestone. At the Royal International Air Tattoo (RIAT), the large air show held from 19–21 July at RAF Fairford in the United Kingdom, a large delegation of the RCAF was present.

During the airshow, Lieutenant–General Eric Jean Kenny, Commander of the RCAF since 2022, and all other Canadian crew members present were given a birthday cake from RIAT. There was a large tent where the public could learn more about the RCAF and its rich heritage. And here they could also meet and photograph the official RCAF centennial mascot eagle Astra, that acts as a symbol of the Canadian heritage and commitment to excellence.

After giving a very spirited solo display, the CF–188 of the CF–18 Demonstration Team joined up with Spitfire EP120 that is painted in the markings of 402 (RCAF) squadron. As a Heritage Flight they performed three flypasts, giving the audience a good chance to admire both the old and new fighter. The Hornet was flown by Captain Caleb "Tango" Robert from 325 squadron at Bagotville and painted in a special commemorative scheme especially for the centennial celebrations. The Spitfire is operated by The Fighter Collection at Duxford aerodrome in Cambridgeshire, home of the biggest number of warbirds in the United Kingdom.

Star of the show for many was the sole CH–146 Griffon of the Aerospace Engineering Test Establishment (AETE). It was parked in front of the CC–177 Globemaster that transported it across the ocean, and which was adorned with special centennial markings on its tail. The Griffon is rarely, if ever, seen outside Canada, so its appearance at Fairford was very welcome. As mentioned it was flown to Europe in the belly of the CC–177, a flight of approximately 5.5 hours. Dismantling and reassembling the helicopter was done by members of 400 tactical helicopter squadron, taking some 4.5 and 3.5 hours respectively. Quite a lot of effort altogether, but it was certainly appreciated by a large part of the public at Fairford.

AETE recently moved from Comox to Ottawa International Airport, but as a new hangar is still being built for them, the Griffon is currently maintained and parked in the hangar of 438 squadron at Saint–Hubert. The markings of

438 squadron 'Wildcats' have therefore been applied to the nose of the aircraft as well, next to the recognisable colours of the AETE. The Griffon is mainly used by AETE for all kinds of transport, including passengers, VIPs and cargo.

Interesting sidenote is that currently the GLEP or Griffon Life Extension Programme is ongoing, during which the CH–146s will receive amongst others new engines and a fully digital cockpit. This has given cause to debate whether a flight engineer is still needed in the future, as he or she is supposed to keep an eye on all limitations during flight, but the computers will do that in the future. Time will tell what will happen to the flight engineers.

Not to be missed, if only because of the bright yellow colour scheme, was this CC–295 Kingfisher that formed part of the static show. The RCAF is currently working up 19 Wing at Comox to be the first operational wing with the CC–295 for search and rescue duties.

They are intended to replace the CC–115 Buffalo that used to form the fixed wing part of the RCAF search and rescue fleet. As this was already retired in 2022, its tasks are currently temporarily performed by the CC–130H Hercules.

This aircraft probably travelled the longest distance to RAF Fairford, with a 7.5 hours flight from Comox to Iqauliet, followed by 5 hours to Reykjavik (Iceland) next day and finally another 5 hours to RAF Fairford in the UK on the third day. After the show the aircraft was flown to Seville in Spain, where it will be temporarily stored at the Airbus factory where it was built in the first place.

When the current test and evaluation phase of the CC–295 is finished and 19 Wing will be operational, 14 Wing at Greenwood is the next in line to receive the Kingfisher. And then some of the stored aircraft at Seville will return to the skies again.

Adding to the atmosphere at RIAT was the Royal Canadian Air Force Band, performing multiple times a day. The band currently consists of 35 full time professional musicians who mostly perform throughout Canada, but were also flown to the United Kingdom to participate in the celebrations.

Its history goes back all the way to 1946, when No. 2 Training Command decided it would be nice to have a professional marching band.

Since then many name changes, mergers, expansions and such have happened, but the band still plays all kinds of contemporary music that the crowd could sing along with.

The DeHavilland Canada DHC–1 Chipmunk was one of the most numerous aircraft of the RCAF. 217 Canadian built Chipmunks served the armed forces for 23 years. It was designed as replacement for the DH.82 Tiger Moth as a primary trainer.

The type was an even bigger success in Great Britain, where no less than 1,000 examples were built.

The example on show at RIAT was a former Royal Air Force one, despite the Canadian colours. The biggest difference is

the canopy, which is multi–panelled while (most) Canadian built examples have a bubble canopy. However there are also numerous other internal differences, as the Canadian built examples were designed to be able to withstand the harsh Canadian climate. This aircraft is operated by the Shuttleworth Collection based at Old Warden, a collection of vintage aircraft. Here it is used for what it was designed for: teaching pilots how to fly. And more specifically in this case: how to fly a taildragger, an art in itself.

a very impressive display, that won the team the title of 'best solo jet display' at the Royal International Air Tattoo 2024. A well deserved title! And to top it off, the aircraft was also rewarded with the 'best livery' award. After the show at Fairford, the CF–188 was flown directly to the United States to perform again at EAA Venture 2024 at Oskosh. This Atlantic crossing was possible with help of an external fuel tank under the belly plus some air to air refuelling by the CC–150 Polaris.

A DeHavilland Vampire was parked in front the two biggest heavies of the RCAF, the CC–177 Globemaster and the CC–150 Polaris. The aircraft is owned and operated by the Royal Norwegian Air Force Historical Squadron, and has been flying in multiple different colour schemes and markings over the years.

For the occasion of the RCAF centennial celebrations it received Canadian markings, thereby forming a nice addition for the static park. It was adorned with the markings of No. 438 (Fighter) "City of Montreal" Squadron (Auxiliary), when this was based at Montreal.

The Vampire F.3 became the first jet fighter to enter RCAF service in significant numbers, after 5 Gloster Meteors had been test flown but were never used operationally. In total 86 aircraft were operated by the RCAF from 1948 until the end of the 50's. The relatively short service life was purely due to the quick pace of jet aircraft development at the time, it was really loved by most pilots due to its easy flying.

Although the formal designation is CF–188, people often refer to the Hornet in Canadian service as CF–18. That is also the designation used by the official CF–18 Demonstration Team. Their Hornet is seen here performing

Text and photographs by Patrick Dirksen & Frank Mink of Tristar Aviation

Red Arrows in their 60th season

Red Arrows Miniature Sheet

For six decades, the Red Arrows – the Royal Air Force (RAF) Aerobatic Team – have thrilled and entertained millions of people around the world with their aerobatic displays and colourful close formation flypasts. Officially established in 1964 and with their first public display taking place seven months later, the Red Arrows and their red painted Gnat jet trainers soon became the showpiece of the RAF – and one of Britain's most important international ambassadors. Now in their 60th season and flying BAE Systems Hawks in displays since 1980, the Red Arrows continue to demonstrate their awe inspiring teamwork and excellence around the globe.

Initially formed and beginning training in late 1964 as part of the Central Flying School (CFS), the Red Arrows first flew seven red painted Folland/Hawker Siddeley Gnat advanced jet trainers from RAF Fairford, Gloucestershire. The team, under the leadership of Flight Lieutenant Lee Jones, was first presented to the media on 6 May 1965, at RAF Little Rissington. Nine days later, the Red Arrows made their UK public debut at the Biggin Hill Air Fair. In their first year, they performed 65 public displays, including five in mainland Europe.

In 1966, after moving to nearby RAF Kemble, with Squadron Leader Ray Hanna in charge, the team gave 85 displays, including a tour of the Mediterranean. For the 1967 season, the Gnats were given a redesign, with their tail fins painted with flashes of red, white and blue and a Union Jack added to the white stripe.

In 1968, the RAF's 50th anniversary year, the Red Arrows' team of pilots was increased to nine, and the

Red Arrows (Booklet Pane 1)

new Diamond Nine formation became a trademark of their displays. Previously a detachment of the CFS, the Red Arrows were established permanently as a standard RAF squadron in 1969. Their 1,000th Gnat display was given in 1977 at the International Air Tattoo, held at RAF Greenham Common. A further change to the Gnats' markings came in 1978, when the white nose flash was 'broken' to accommodate the words 'Royal Air Force' in white lettering. The team's first training camp was held at RAF Akrotiri, Cyprus, in April 1979, before their 15th and final season flying the Gnats. After performing at the Battle of Britain Air Days at RAF Abingdon and RAF St Athan in September that year, and with 1,292 displays behind them, conversion to the then new Hawker Siddeley Hawk T1 commenced.

In April 1980, official permission was granted for the Red Arrows to have their own Diamond Nine badge, bearing the motto 'Eclat' (French for 'excellence'). That same month, the team gave their first UK display flying the new Hawker Siddeley Hawk, at Sywell, Northamptonshire. In 1983, after 17 years at RAF Kemble, the Red Arrows moved to RAF Scampton, Lincolnshire, following completion of their training in Cyprus.

In the summer of 1986, the Red Arrows embarked on a major tour of the Far East, during which they gave 22 displays in 15 countries. After their return to the UK, they flew their 2,000th display, at Bournemouth Airport. To mark the retirement of the RAF's last Vulcan bomber, the team made a formation flypast with a Vulcan XH558 at Cranfield, Bedfordshire, in September 1992.

During a world tour that lasted from October 1995 to February 1996, the Arrows visited the Middle East, South Africa, Malaysia and Australia. Once back in the UK, they were based at RAF Cranwell, Lincolnshire, before returning to RAF Scampton in December 2000. In July 2014, the Red Arrows celebrated their 50th season while taking part in the Royal International Air Tattoo at their original home at RAF Fairford. Throughout that year, their Hawks carried special 50th anniversary markings on their tails. In 2015, a new livery with a flowing Union Flag was unveiled.

On 2 June 2022, a special Platinum Jubilee flypast, with the Red Arrows bringing up the rear, was flown over Buckingham Palace and watched by Queen Elizabeth II and the Royal Family. Less than a year later, on 6 May 2023, the newly crowned King Charles III and Queen Camilla were honoured with another flypast over the palace, following their coronation. On 13 October 2022, after 35 years at RAF Scampton, the Red Arrows relocated to RAF Waddington, Lincolnshire, by which time they had flown some 5,000 displays in 57 countries around the world.

Stamps

A set of eight special stamps celebrating the history of the RAF aerobatic team, the Red Arrows as they embark on their milestone Diamond 60th display season in 2024 has been released. Captivating snapshots capture some of the Red Arrows' breath taking manoeuvres and iconic formations. Each stamp tells a story of precision, skill, and sheer exhilaration as the Red Arrows paint the sky with their trademark red, white, and blue trails.

Miniature sheet

This embarks on a journey across continents with the Red Arrows Miniature Sheet, showcasing the Red Arrows' electrifying performances on the world stage. From their first season in 1965 which included five overseas displays, the Red Arrows quickly established themselves as one of Britain's most significant international ambassadors. These four stamps capture the Red Arrows in mesmerising displays over iconic international landmarks, including Niagara Falls and the Pyramids in Egypt.

Prestige stamp book

A 24 page booklet packed with everything you need to know about the Red Arrows as they celebrate their 60th Display Season in 2024 has also been released. Written by aviation author, photographer and journalist Peter March, the book traces the beginnings of the 'Reds' from their first public display in 1965 and uncovers the fascinating precision and teamwork that goes into every jaw dropping display. The book includes all 12 stamps in the Red Arrows stamp issue, perforated into three panes within the book. The stamps feature captivating snapshots of some of the Red Arrows' breath–taking manoeuvres and formations performed in the UK and over iconic landmarks overseas.

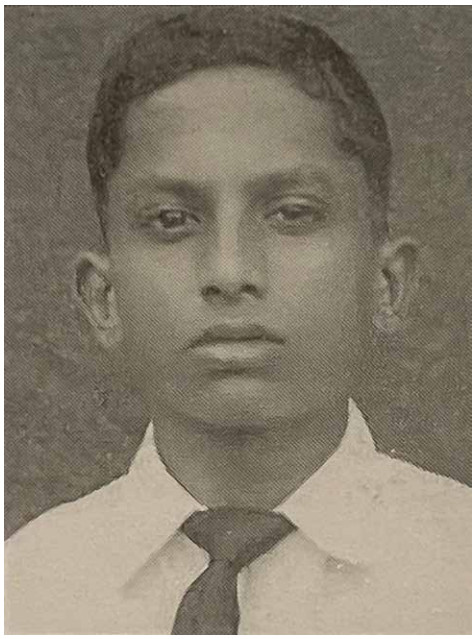
An additional pane of stamps and photos evoke memories of some of the spectacular flypasts seen over Buckingham Palace during royal celebrations.

Red Arrows (Booklet Pane 2)

By Vijay Seth
Aerospace Heritage Trust
Images courtesy: Royal Mail

Air Marshal (R) Harish Masand says...

I learnt more than flying from them: Vaps Nair



I first met Vappale Ramchandran Nair, better known as "Vaps" to all in the Air Force, pretty early in my service career when I went for the Flying Instructors' Course in FIS Tambaram in January 1974. At that time I had six years of service and under 500 hours of fighter flying under my belt. Vaps was a senior Flight Lieutenant, an A2 instructor on the staff of FIS and with a MiG–21 background and thus over a 1000 hours on MiG–21s itself apart from the other fighters he had flown. So, he had that fighter pilot's swagger and looked at most other junior fighter pilots with disdain. To add to the kind of looks I got from him was the fact that three of his blue–eyed boys, Anil Bhalla, NM "Goofy" Gupte and SBS Paul, were also on the same course with me and had been on MiG–21s from the beginning of their careers and Vaps had known them from Tezpur days. While they were all a year junior to me, because of being in MiGs, they all had around 800 hours on fighters and were also better known in Air Force circles where the MiG–21 boys were the elite high–level lot as compared to us from the low–flying strike pilots, like me from Hunters with a touch of the Su–7. I had already been cautioned by Sqn Ldr Arjun Ranganadhan in my very first week in Tambaram, who had seen me earlier in Hasimara when he was in 17 Squadron and I in 37 Squadron, to pull my socks up or go home in disgrace since he also felt that these MiG boys had far more experience than me and were expected to do far better than me on the course.

While Vaps was not my instructor during the course and I had no direct interaction with him except the odd time that he would take a lecture on supersonic aerodynamics or some such subject, I did see him around and even met his charming athlete of a wife, Durdana or "Dana" in socials, Madras Gym and the Officers' Mess. Dana had been a national champ in basketball and obviously came from a very cultured family. Because of this, she was fun to talk to and one always learnt something from any interaction with her. In those occasions, while Vaps was polite and informal, he did give me the same disdainful look since I did not belong to "his club", the MiG–21 one. At the same time, Vaps was very often in the Officers' Mess, sometimes pretty late when generally a cook or a waiter faced his wrath for some slip–up or another and got the full treatment from him. Most of us were in the bachelors' block in Tambaram which was just behind the Mess itself and close to the cookhouse/pantry in the rear. Due to this, we frequently heard the commotion and I felt for the poor mess staff. To be honest, at that time, I personally felt that Vaps should have been eased out of the Air Force due to such acts of indiscipline, as I personally termed it, no matter how good a fighter pilot he may be. Little did I know then how wrong I was and how soon I was to change my opinion about Vaps because, later, seeing him at close quarters and being privy to his vast knowledge and decision making abilities, I strongly formed the opinion that Vaps would make a great leader and senior officer and should go up the ladder. But then, let me unfold this story progressively.

Having parted amicably from Vaps and FIS in June 1974 after having done well there and perhaps a notch up in Vaps's eyes, I next bumped into Vaps and Dana in Iraq in 1979. We reached Al–Kut in July 1979 while Vaps and Dana had been there in Tikrit since late 1977. So, we did meet, though briefly in those six months, before Vaps left for India at the end of 1979. Kut was also enroute to Kuwait

from Tikrit and Baghdad and it was quite common to see folks from there in Kut when they went shopping in Kuwait. Our paths again crossed in 1981 when I visited Halwara as a member of and inspector of DASI. Under Air Commodore "Mally" Wollen, we landed up in Halwara for the usual routine inspection in early October 1981. Vaps was then commanding 17 Squadron there while Sukrat "Scooter" Raj was commanding the sister squadron, 23 Sqn, at that time. Both Vaps and Scooter quite obviously had a wonderful and close relationship from their Tikrit days and I could not sense any rivalry or one–upmanship, as was generally to be seen in most bases with two squadrons operating similar types. Even the wives, Dana and "Sughi" Sughandha were close to each other and one could easily see that both squadrons were well–knit together in professional and social activities. I had met Scooter in November 1972 when we had received our Vir Chakras from the President in Rashtrapati Bhavan and then again in Iraq when we were in Al–Kut and Scooter and Vaps were in Tikrit. As inspectors, we had a code of conduct wherein we did not let our earlier relations or friendships affect our conduct or assessments during inspections. As it happened the very first day in Halwara, I got into a jam on this issue in a very strange manner.

That day, we had first conducted the written test for all pilots of both squadrons and I had then flown a 2 Vs 1 mission with Scooter's 23 Squadron as the attacker. 23 Squadron had formulated some new tactics for the mission which were significantly different from what was standard in the Air Force by then. While there were objections from within the inspector community within DASI about letting squadrons try new tactics in DASI visits, I had argued that we should let the squadrons try out such tactics after making sure that there were no likely flight safety implications. Fortunately, my Joint Director, then Group Captain JP Singh, had agreed with me and let 23 Squadron try out their tactics against me. If I now recall correctly after all these years, because of these tactics, Vaps had also brought his pilots over to 23 Squadron for the debrief. With Vaps was my course mate and earlier room mate, Anil "Sinch" Sinha who was one of the flight commanders of 17 Squadron.

The debrief lasted till a little late in the evening because of the new tactics and by the time we finished, it was dark. When we came out to get back, we found that the drivers were missing and there was none to take us back to the living area. We waited a while but the squadrons could not get hold of an air crew van driver. Sinch had earlier seen me drive all kinds of trucks and other vehicles from our Pilot Officers days and suggested that I drive the Matador air crew van and take them all home. I was already getting a little late to finish evaluating all the written test papers, grab a drink and a bite before getting into bed to be ready for the next day so I agreed. All the pilots squeezed into the aircrew van including the two commanders, Vaps and Scooter, and I drove them back dropping each one off at their residences. Last stop was Vaps' house and he insisted I come in for a few minutes, at least to say hello to Dana. That led to a drink which I wouldn't have got in the Mess because the bar was already closed by then. Vaps had obviously very cleverly planned this because while we were having a drink, Scooter and Sughi and Sinch and Pushpa landed up to see me. I tried to quickly walk out after the usual greetings but was literally "ordered" by Vaps to sit down and have a quick bite after which he would drop me at the bachelors' quarters in the Officers' Mess. I now realise that I did not protest hard enough or remain firm in my resolve to leave and walk back to the Mess which was barely 2–300 yards away and stayed on, perhaps fascinated by the camaraderie on display and, later, a friendly argument on some issue between the two buddies, Vaps and Scooter. However, I did stick to just two drinks to be able to perform without any ill–effects the next day.

With a few drinks under their belt, both Vaps and Scooter were loud and their voices carried over to the AOC, Air Commodore Upkar Singh's house which was just a 100 yards away across the street. Finally, it was close to midnight when I finally walked home to my room and stayed up till about 2 am correcting all the papers before I got to sleep. The next morning, I got a solid dressing down by the Director, Air Commodore Mally Wollen and the JD, Group Captain JP Singh. It transpired that Air Commodore Upkar Singh had reported this late night party to the Director and while he took

Vaps and Scooter to task, I was left to face the Director. Fortunately, and perhaps because I made no excuses and admitted my fault outright, the Director left me with a caution that this should never happen again and told me not to fly that day. This was a story that Vaps, Scooter and I shared many times in the years ahead as a lesson learnt with a big sigh of relief, fortunately, without long term adverse consequences for anyone.

Vaps and I were again together in Staff College, Wellington. When I reached there as a DS in October 1984, Vaps had already been there since early 1983 on staff. While we were teaching DS in 1985, Vaps and Dana paid Malini and me a bit of special attention and made sure we were in the sports and social circuit with them soon. It was during this tenure that I found out that both Vaps and Dana were good in sports; both played tennis regularly, went riding and I got included in the 4–ball of Vaps for golf on many an occasion. Needless to say, he excelled at all the sports and encouraged me in golf, a sport in which I was just a beginner. I also found out during the walks in golf as also other social occasions that his knowledge on the sporting events was simply amazing. As an example, he could rattle off at the drop of a hat who had won what in Rome Olympics of 1960. Vaps and Dana were also excellent hosts and we spent many pleasant evenings at their home. Their charm and his wit were invigorating, to say the least. In those days, without internet, and access to encyclopedias difficult, I found Vaps a storehouse of information and regularly asked him questions and then just listened, soaking in all that knowledge. In addition, we had frequent bridge sessions in his house, particularly on Sundays when the weather prevented us from golf or any outdoor activity. I was also impressed by his professional knowledge in the DS meetings whenever we discussed the syllabus or teaching methodology for the students. Though he said little in these meetings, whatever he did say was right and, most importantly, he never compromised on his principles and say yes just because the boss wanted to hear it. Unfortunately, I spent most of the latter part of 1985 till mid–November in Madras representing the College for a court case that became quite well–known so I won't dwell on that anymore so as not to embarrass anyone.

In early 1986, Vaps was promoted to the rank of Group Captain and took over as the Head of Training Team (Air Wing) or HOTT (Air). While the title may elicit some mirth, it was totally inappropriate for Vaps since he was not used to letting out just hot air but always spoke in a measured manner backed by knowledge and wit. Vaps asked me to join him in the training team and I gladly accepted since I had some ideas about how to rework/reset some of the exercises, reduce the donkey work and give the air wing students more time to interact with their counterparts in the Army and the Navy to learn more about the sister services as also have time to gain from "Chanakya", the well–stocked library. Working closely with Vaps on this mission, I was even more impressed with his grasp and decision making. Most times, when I went to him with an idea or suggestion, he would say, "do it", before I even completed my first sentence or two. When I told him that he hadn't fully heard me out, he would respond in detail with what I was proposing and thus put my doubts at rest by adding that he, as the boss, took decisions but the work was to be done by people like me. That is a lesson that remained with me through the rest of my career and helped me in delegating work while ensuring professional growth of my subordinates. It was also

during this tenure that I found Vaps would support his subordinates even against the Chief Instructor's ideas if the subordinates had professionally sound ideas and logic. And, he did this in a manner which did not offend anyone, particularly his seniors. That is when my initial assessment of Vaps changed 180 degrees and I realised how wrong I had been initially in forming an impression because of his somewhat wild ways. I now realised that Vaps was great senior officer material because of his decision making abilities backed by knowledge, wit and charm. Unfortunately, that was not to be and Vaps was snatched away from the Air Force and us pretty early in life.

In August 1986, Vaps and I were sent to TACDE in Jamnagar for a refam on the MiG–21 before proceeding to the Soviet Union for the MiG–29. Vaps and Group Captain Bharat Kumar were to do just the ground school on the aircraft to enable them to man the controlling cells in Command and Air HQ while I was nominated as the CO–Designate for 28 Squadron. We spent over 2 months in Lugovaya from 1 October 1986 before Vaps and Groupie Bharat headed back to India in mid–December after finishing the ground school. During these two months, I got to know Vaps even better since there was little to do after working hours and theory classes in Lugovaya except play Bridge, drink and walk around before and after meals together. By late October, it started snowing in Lugovaya and even our walks before and after dinner in the "stolovaya" stopped. That meant more Bridge and general talk.

By the time I got back in March 1987 to Staff College to clear out and move to Poona, Vaps was already in SWAC in Jodhpur as Ops 1 looking after the MiG–29 induction and operationalisation so we spoke regularly on phone. We also met every time I went over to Jodhpur either for a meeting/conference or on detachment with the aircraft for an exercise. The very first meeting was in June 1987 itself when AOC Poona, Air Cmde JP Singh, and I were in Jodhpur for a command paper exercise. JP Sir was made AOC Sindh (the Red Force Commander) and was required to present a plan to counter SWAC. Since I had just come from Staff College, JP Sir tasked me to make out our paper and presentation. When I showed an out–of–the–box draft to him which put SWAC in a lot of trouble, JP Sir said, "Harish, you will have me fired for sure" but went along with it because our job was to highlight the chinks in SWAC's plans so that these could be taken care of and plugged. Vaps said almost the same thing for me that I was also doomed as the brain behind such an audacious plan when I discussed it with him before the presentation. Fortunately, the Chief, Air Chief Marshal DA Lafontaine and the C–in–C, Air Marshal Polly Mehra, took the whole presentation in the right spirit and JP Sir and I survived.

Thereafter, whenever I called Vaps for any issue regarding the squadron, like in Staff College, he would say "Go ahead and do it". One of these issues was that in February 1988 itself, we were deployed in Jamnagar for an exercise and the AOC, Air Cmde Ben Brar, and others including TACDE guys and wives asked me to put up a low level display on the MiG–29 for their men's families and them. I asked Vaps since I knew some others in Command were just waiting for me to do something like this without authorisation. Vaps gave me the go–ahead and even said to take his name if anyone asks who had authorised such displays. As a matter of fact, he told me not even to bother asking him the next time whenever I wanted to do such displays and take this as a blanket clearance since I was the nominated display pilot and had to keep in touch by regular practices. The same went for flying other squadron pilots in the trainer for the exercise missions since I felt that apart from engaging the others in dissimilar combat training sorties, it was also more beneficial if we took one of their pilots to see what we do and what an ASF like MiG–29 was capable of doing. This, I felt, would prepare them better to face the enemy's ASFs like the F–16s in the real deal. Sure enough, one time I was asked by another senior officer to explain how I was flying anyone I wanted in the trainer and just Vaps's name was enough.

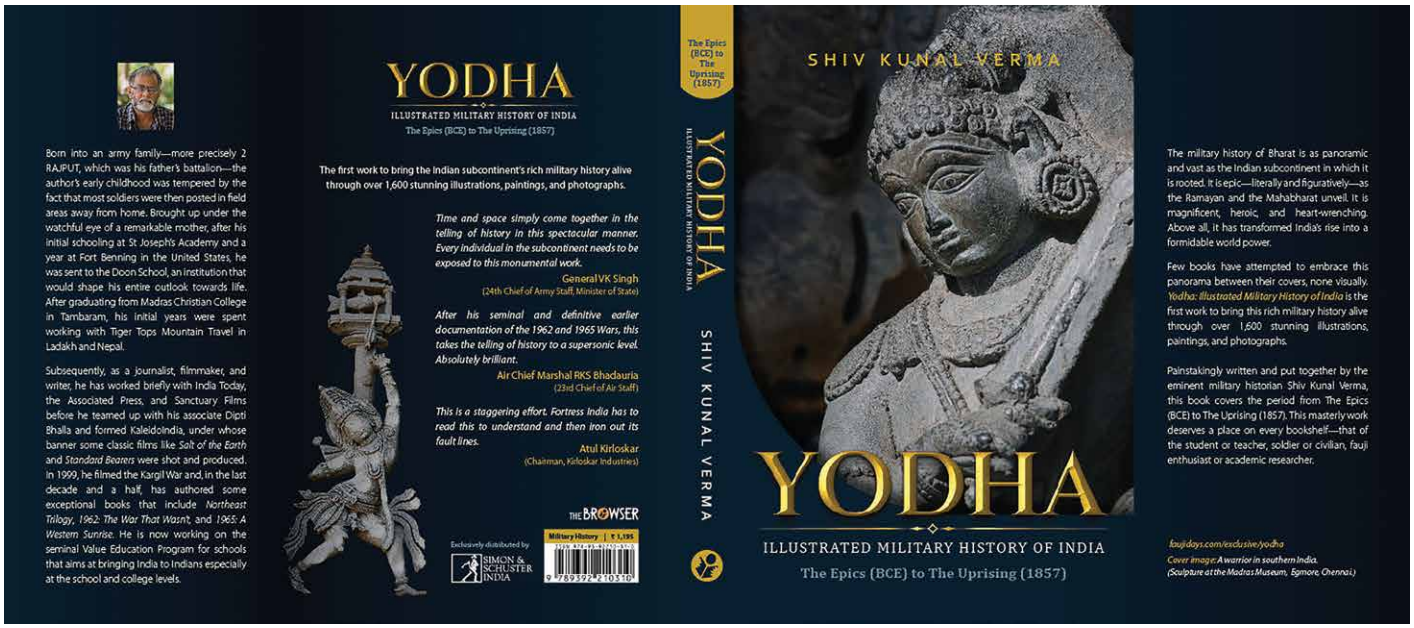
I was in Jodhpur in mid–1988 for some meeting when we had a late night party at Vaps and Dana's house. I then noticed that Vaps did not have any food. On asking, he said he had a stomach ache and didn't feel like eating. Concerned about his health due to his lifestyle, I advised him to have this checked ASAP since it just didn't sound right. Unfortunately, my worst fears came true and Vaps was soon in combat with cancer. Unfortunately also, he did not last too long after that and we lost a good professional.

In sum, while Vaps was a human being with all the frailties and faults, like all of us do, he knew how to use his talents and abilities well, particularly for his subordinates. I admired Vaps for his general knowledge; he obviously devoured books and retained a lot of useful information which obviously helped him in his quick decision making. Vaps was also a very social person who got along well, particularly with his subordinates for whom he cared a lot. His humour and ready smile, though at times laconic, are still fresh in my mind. With seniority, I think Vaps also got over his quick temper, particularly against people he could not suffer. In all, Vaps was a good leader and I learnt a great deal about leadership from him. He was also great company socially and I am sure he is missed by most of his friends.

Photo above: The author of this series, Air Marshal (R) Harish Masand is 3rd from the left. Photo at the bottom : Air Marshal Harish Masand.

Lt Gen Kamal Davar reviews Shiv Kunal Verma's…

…Yodha—Illustrated Military History of India



History down the ages and right across the world generally suffers from innumerable voids in its compilation of empires, personalities and events. Regrettably, there are, at times, attempts to distort history by some through the truth has an uncanny way of surfacing to present a wholesome record of important events gone by. What would the world be without a faithful rendition of significant happenings, far and near, painstakingly and accurately chronicled by some dedicated individuals for posterity.

Call it a quirk of fate, but human history since the beginning of time is an endless saga of wars and conflicts, around which history wraps itself. The canvas, dating back almost two and a half thousand years, to the uninitiated is a huge blank, with some random dates and names standing out which made it to the history textbooks that were our selective window into the past. We had heard about Ashoka, the Mauryas, the Guptas and a few names from the Islamic period culminating with the Mughals, but other than the dates, there was little or no further information.

Accordingly, renowned military historian Shiv Kunal Verma, has zealously endeavoured to compile the rich military history of the ancient Indian sub–continent from the Vedic times to the 1857 soldiers mutiny (he prefers to call it the 'Uprising') in his latest book YODHA. That he has used over 1800 rare illustrations, photographs and paintings in the two volumes to support his carefully researched text, makes these books a unique venture in history telling, and a virtual collector's item. Breathtaking in its scope, it is perhaps the first time in the annals of publishing in India that the subcontinent's rich military history has been made to come alive through visuals that makes the experience not only enriching, but is akin to watching a virtual film in print before our very eyes.

1700s – Decline of the Mughals – 1705 Battle of Muktsar – Mata Bhag Kaur

BOOK REVIEW

Shiv Kunal Verma has been a journalist, writer and a film maker. Born in an army family to an illustrious father, his literary efforts have naturally spanned stories emerging from military folklore including recent battles that India has fought since its independence. Shiv Kunal Verma has in the past produced the spectacular three volume 'Northeast Trilogy', the highly acclaimed Northeast Palette that was done for the Dimapur based 3 Corps and two books on the Assam Rifles, his take on geopolitics in the Long Road to Siachen, and then his two magnum opuses, '1962: The War that Wasn't' and '1965': A Western Sunrise.

Before turning into a full time writer, he has also made benchmark films on the air force ('Salt of the Earth' and Aakash Yodha), navy ('The Naval Dimension') and the army (culminating with his having filmed the Kargil War – Baramula to Kargil that was screened for the US President Bill Clinton). His films on the National Defence Academy (Standard Bearers) and the Indian Military Academy ('Making of a Warrior') are modern day classics. For those who have not read Industani, his autobiography, they have missed laying their hands on a book that takes contemporary Indian writing to an altogether different level, for it is more of a look at contemporary Indian history through the eyes of a man who has somehow managed to pack into his lifetime the quintessential '60 seconds of distance run'.

Browsing through the first volume of this brilliant work, even an ardent student of Indian history will realise how much he or she does not know and thus Shiv Kunal Verma has done a yeoman's service to both teachers and students of military history. In this monumental, painstaking endeavour, the writer has covered this huge ancient land's stories of conflicts, right down the ages, spanning the entire length and breadth of the subcontinent, giving adequate emphasis to all those kingdoms and personalities who have shaped Bharat that is India.

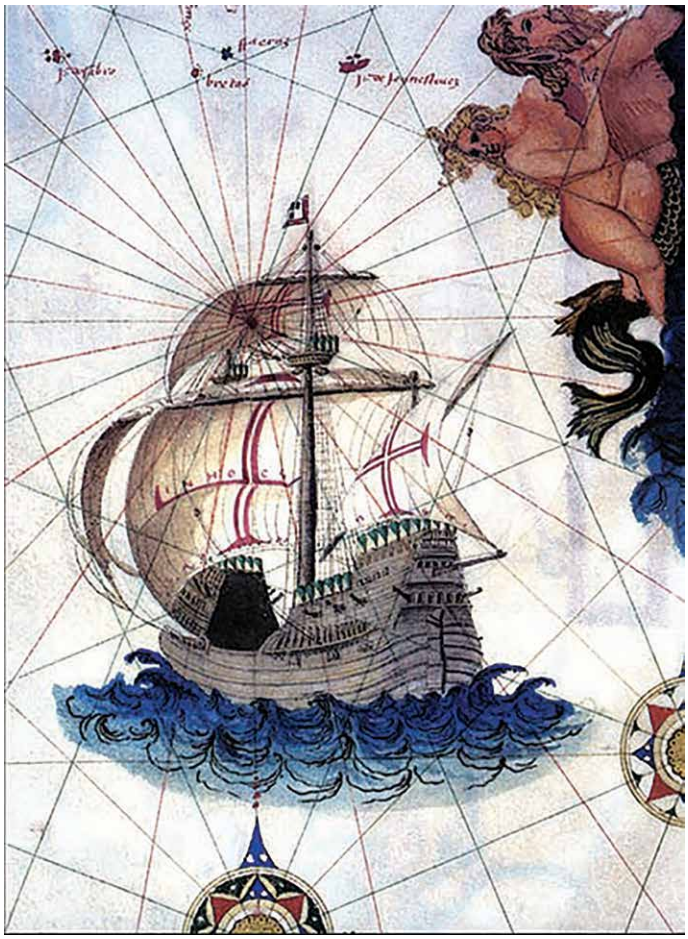
Alexander vs Porus

Shiv Kunal Verma in the pursuit of truth uncovers many historical events that have laid to rest some of the oft quoted but necessarily not true facts from the Islamic and colonial periods in India. He explains how just a sketchy knowledge of Indian history was considered adequate and as Indians, we tend to downplay major events which shaped India as we on our part remained glued to the half truths and misconceptions, a legacy of the British education system that replaced the gurukuls and madrasas after 1857.

1192–1526 Delhi Sultanate – 1192 Second Battle of Tarain

This half–baked history, ever since Independence has created inadequacies that we now simply have to bridge. However, in the current political environment, we also owe it to future generations that we do not succumb to perpetuating what is not the reality!

Though the book is extremely well written, there are particular sections from our past that are indeed memorable, especially since the author has painstakingly photographed many ancient sites where war scenes have been carved out in stone or traced paintings that help tell the story. It is a major tribute to the Indian artists whose works adorn the ancient temples, caves and monuments, that have survived the vagaries of time over the centuries; the book is indeed a tribute to the Indian



Portuguese ship

artists of yore whose genius helps us uncover our hidden DNA.

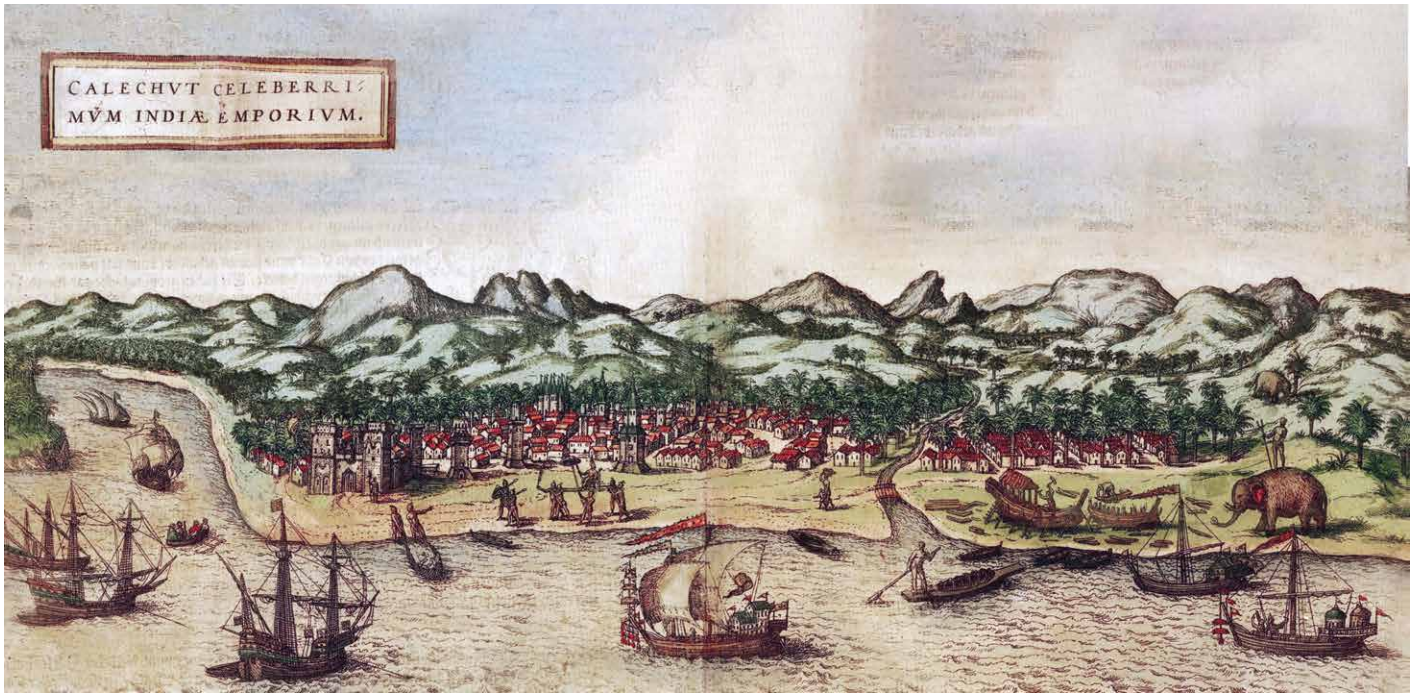
Interestingly, at the commencement of the book, the writer has focused on the two epics, the Ramayan and the Mahabharat and his analysis of the advent of Buddhism. I found this introduction to be truly memorable as it leaves an indelible mark on one's mind.

Subsequently, the writer's views and narration of the great Chandragupta Maurya, Ashoka, the Gupta Empire and his account of the famous Porus vs Alexander battle in 326 BCE are indeed pacy and stimulating to read. Moving closer chronologically, the author has traced the changes in those who ruled this ancient land. Personally, in all my years in the army, I have never come across such a comprehensive coverage with such rare clarity and finesse.

Though most of the battles which distinguished Indian soldiery with rare acts of valour and sacrifice are well narrated, one of the most important and yet not fully known or appreciated is the battle fought between the Ahom under the generalship of Lachit Borphukan in Assam. It recounts how young Lachit regained control, against all odds, from the vastly superior in numbers Mughal army.

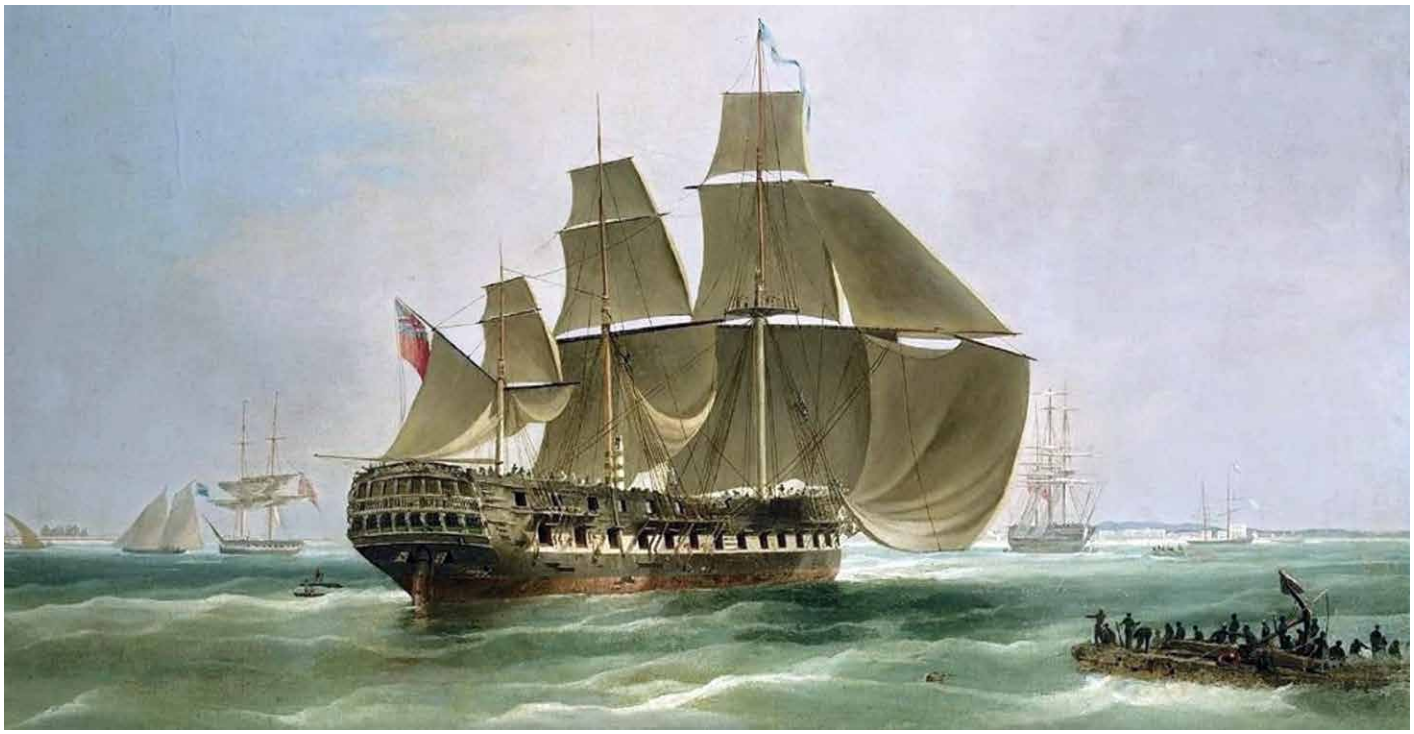
The battle between the Mughals and the vastly outnumbered and out gunned Ahoms along the Brahmaputra River at Saraighat just off Guwahati is indeed fascinating. Similarly, the narrative pertaining to Guru Gobind Singh, a contemporary of Shivaji Maharaj and Lachit Borphukan (all of whom fought the same enemy, Aurangzeb) makes for inspiring reading.

If Shiv Kunal Verma's earlier two books on the 1962 and 1965 are anything to go by, the second volume of



Portuguese – 1498

BOOK REVIEW



British Expansion – East India man entering Madras Harbour

British Expansion–French and British Ships at War

Yodha that spans the period between 1858 and the Kargil War at the turn of the millennium, promises to be a mouth watering experience. Already, quite a few educational institutions like the Assam Valley School in Tezpur and a host of other public schools, have ordered these books for all their students for the two books are indeed a game changing experience. With grandiose plans to bring out the two books not only in Hindi, but also in regional languages that include Gurmukhi, Gujarati, Marathi, Tamil, Telugu, Bengali, Oriya, Assamese, Nagamese etc among others, the publisher, both Shiv Kunal Verma and Pankaj Singh of the Chandigarh based Browser Group, may just succeed in achieving what entire governments have failed to do in the past, which is to make military history a virtual and vital part of our education system.

Burma – Attack on Rangoon

At a time when new educational policies are being drawn up, here is a gift wrapped opportunity for those in power to step up to the plate and help take these two books to every section of society. National Security concerns every Indian, and the first step towards understanding what is at stake in the future is to understand our past. I have absolutely no hesitation in recommending this phenomenal work that in my opinion, is a game changer.

Yodha—Illustrated Military History of India
Written by Shiv Kunal Verma

Published by The Browser, Chandigarh
Exclusively distributed by Simon & Schuster, India

25 Years Back

From Vayu Aerospace Review
Issue V/1999

Additional Mirage 2000s sought by IAF

The Indian Air Force had requested procurement of ten additional Mirage 2000Hs several years ago for attrition make up and reserves (8 single and 2 twin–seaters), but there were protracted negotiations on and off since 1995.

India's Draft Nuclear Weapon Doctrine

The National Security Advisory Board (N.S.A.B.) has put together a draft of the country's nuclear weapon doctrine for "debate and discussion", ahead of its formal adoption by the next elected Government.

China's Reaction...

China has urged New Delhi to renounce its nuclear weapons programme and induction of the ballistic missile by implementing the UN Security Council resolution to this effect.

....Pakistan's Threat

Pakistan has threatened to enhance its missile and strike capabilities and operational readiness to preserve deterrence if India goes ahead with its draft nuclear doctrine. New Delhi's "plans to acquire and deploy a huge arsenal of land, air and sea–based nuclear weapons ... against Pakistan ... had shattered hopes for (nuclear) restraint", Islamabad stated.

Kargil Conflict costs are Rs 5000 crore

The direct and fallout costs of the Kargil operations have been estimated at around Rs 5000 crore (US $ 1.2 billon) by Finance Minister Yashwant Sinha, who said that the matter of additional mobilisation of resources would have to be addressed by a new Government after October 1999.

The Israeli arms industry and India

According to informed sources in Washington DC, Indian defence deals with Israel worth near $200 million are in the offing. The visit to Israel by Brajesh Mishra, who is the NSA to the Vajpayee Government, was to endorse Indian requirements.

China objects to XIV Corps

According to usual reliable sources, the Chinese have shown marked resentment to the raising of the Indian Army's XIV Corps which will be headquartered in Leh and exclusively concerned with the Ladakh region, also including the Kargil sector to the west.

IAF MiG–21s shoot down PN Atlantique

An intruding Pakistan Navy Brequet Atlantique MR/ASW aircraft was detected by Indian air defence radars overflying Indian territory over the Kori Creek in Kutch at 10:57 on 10 August. Subsequently, it was shot down.

Bangladesh AF expands

In addition to recent procurement of new aircraft from both China and Russia, negotiations have been reported for further purchases of combat and support types. Delivery of four more Guizhou, GAIC FT–7B two–seat combat trainers between 1997 and 2000 will double the Bangladesh AF equipment of this type.

Pakistan F–16 funding returned

The advanced funding of $463.7 million has been returned by the United States to Pakistan following the RNZAF's lease agreement for the 28 GD F–16A/B Block 150CU fighters brought by Pakistan for $ 658 million, subsequently vetoed by the State Department.

First Chinese built Su–27 flown

Initially flight tests in December 1998 of the first two Sukhoi Su–27SK fighters from 200 scheduled for assembly by the Shenyang Aircraft Industry Group was a major milestone in a licence production programme which will build up slowly over the next few years.

First RAF Eurofighters

Coningsby will be the main RAF station to take delivery of the Eurofighter, with planned establishment of an Operational Evaluation Unit, an Operational Conversion Unit, and two frontline squadrons from 2002.

Tale Spin

Hello—what's this?

Indian villages with rooftop sculptures of planes, tanks, bottles and cars. Photographer Rajesh Vora's search for a unique architectural tradition across the hinterlands of Punjab brought him to villages like Daulatpur, where buildings are topped with aspirational sculptures. These are actually elaborate rooftop water tanks of private homes! (Courtesy the artist/Photoink and CNN).

Can you see me?

At the recently concluded Army 24 expo in Moscow, the outdoor displays showcased various camouflage concepts including in the photo above. As officials stated, "If you can't see it, you can't hit it!"

Wow times for IAF

The Indian Air Force has been very busy over the past few months. Starting from Red Flag in Alaska, then exercises with Greek AF and Egyptian AF, followed by exercises with Indian Army with Apaches, then the big Pitch Black in Australia, post that exercise with the Malaysian AF to the

granddaddy of them all: the large multinational Exercise Tarang Shakti in Aug/Sep held at Sulur and Jodhpur in India. Just wonderful!

Indian Army marches ahead

At more and more Indian Army exercises, one is beginning to witness UAVs/UGVs. Perhaps soon, at the Republic Day Parade on 26 January, one might see a contingent of these machines?

Afterburner

VAYU

Aerospace & Defence Review

50

years of Vayu

Continuously, ASIA's finest Aerospace & Defence Magazine

Visit us at www.vayuaerospace.in Follow us on Twitter @ReviewVayu

Vayu Aerospace Review, D-43, Sujan Singh Park, New Delhi 110003 India
Tel: 91 11 24626183, 24617234 Fax: 91 11 24628615 • E-mail: vayuaerospace@lycos.com

RNI NO. DELENG/2003/9958

SAFRAN ELECTRONICS & DEFENSE, INTELLIGENCE ONBOARD

Day after day, you face critical challenges. The products and services developed by Safran Electronics & Defense, whether civil or military, deliver the technological superiority, effectiveness, reliability and competitiveness you expect. We're with you every step of the way, building in the intelligence that gives you a critical advantage in observation, decision-making and guidance. You can count on Safran Electronics & Defense, your strategic partner on land, at sea, in the air and in space.

safran-electronics-defense.com
X : @SafranElecDef

SAFRAN