VAYU

Aerospace & Defence Review

IV/2024

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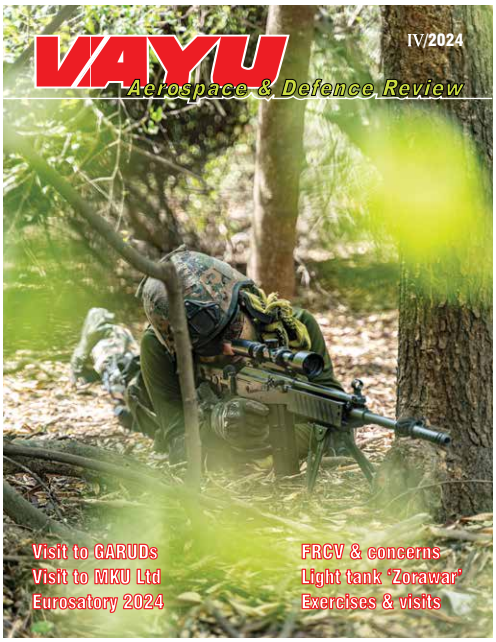

Cover : Our visit to an establishment of the GARUD Special Forces. Photo by Mayyank Kaul of Team VAYU. (Twitter: @MayyankK3246)

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Lt Gen Kamal Davar says…

….Can our forces learn lessons from conflicts in Gaza, Ukraine?

Left: Israeli tanks and the Gaza conflict (Image: WSJ/Associated Press) and Right: Ukrainian anti–aircraft gunners fire in the direction of Bakhmut in the Donetsk region (Image: Getty Images)

The world is, unquestionably, now at war with itself. In the very recent past, as it was slowly recovering from the near apocalyptical Chinese originated Covid–19 pandemic, which ravaged the global economy and also mercilessly inflicted millions of fatalities attributable to the coronavirus, unexpected kinetic disruptions have taken place across the world. In February 2022, the vastly militarily superior Russian Army invaded its western neighbour, Ukraine, an act which was grossly unwarranted. This invasion razed a fair portion of eastern Ukraine, caused millions of hapless Ukrainians to flee to neighbouring European nations, with Ukraine now fighting for its very existence. The Russian forces too have suffered considerably, but the war still lingers, with no end in sight.

Then, in the ever–restive West Asia, on October 7, 2023, Iran–backed Hamas terrorists crossed the Gaza Strip and attacked a music festival being attended by hundreds of innocent civilians, killed over 200 innocents and took well over a hundred hostages. The Israelis expectedly retaliated with great fury, perhaps unjustified in its over–intensity, against the Palestinians and killed hundreds of innocent civilians and inflicted massive collateral damage. That war continues. Palestinians, in particular, must ponder over Hamas terrorists masquerading as fighting for them – over 34,000 Palestinians have perished in this Hamas–originated violence, besides the once bustling Gaza Strip and portions of the West Bank having been razed to the ground.

Just recently, in a surprise act, Iran, otherwise known for its traditional and deep enmity of Zionist Israel, also fired hundreds of cruise missiles and drones at some military targets in Israel. Iran's kinetic action was the first ever by it and reportedly in retaliation against Israel's aerial attack on its embassy in Damascus, Syria, which had killed a few of its senior military commanders. However, the actions by both avowed adversaries appears not to escalate prompting some analysts to conclude that apart from a face–saving gesture, it was no more than "shadow boxing" between the two. Israel will not want its nuclear installations being attacked by the Iranians, and the latter too would not risk its under–developed nuclear reactors becoming a convenient target for the formidable Israeli Air Force. Any further escalation taking place in this region would portend great economic distress for the entire world.

As other regional tensions also simmer in many parts of the world, most nations and professional militaries would now be engaged in studying all these conflicts in detail to draw lessons from them, as relevant in their context, do any course corrections needed and prepare for future wars. India too will be no exception in this endeavour.

The first and most resounding lesson is that the UN General Assembly and Security Council are all helpless in imposing any restraint even on any erring nation, barring some sanctions and verbal censure. Ultimately, the world community is divided into two halves, with each nation just looking at its own narrow interests. Second, it is apparent that kinetic conflicts are possible without much notice and thus India should be prepared for all eventualities at all times — a small act can trigger off a major conflagration.

Wars in the current context and even more so in the future will result in humongous devastation and massive collateral damage to both sides — thus these should be only launched with a clear–cut strategic objective in mind.

OPINION

A column of Israeli military vehicles (AFP via Getty Images)

What is in Russian President Vladimir Putin's mind baffles all. Was it to prevent Ukraine joining Nato, and to ensure that Nato forces do not come to the Russian border, or resurrect the old glory of the erstwhile Soviet Union, or to instal a pro–Russian regime in Kyiv or annex Ukraine's Mariupol to obtain unhindered access into Sea of Azov? The jury is out to decipher President Putin's end objective.

Fourth, these conflicts have clearly brought out the simple yet profound lesson that nations must be prepared to fight for their own security. Notwithstanding any support of military equipment (whether paid for or gratis), no nation will be prepared to "put its boots on the ground" for another. India, ever since Independence, has ensured its security preparedness and combat deployments on its own.

India, however, is more than aware that in case of a conflict involving itself, some nations do impose sanctions as the US had done twice in the 1965 and 1971 operations on India. Thus, self–sufficiency in military equipment, military platforms and critical

The Israeli Iron Dome missile defence system, left, intercepts rockets fired by Hamas. Photographer: Anas Baba/AFP/Getty Images

IDF troops in Gaza (Image: AP)

ammunition supplies is vital. In the same breath, it must be said India's military is heavily dependent on Russia for its military supplies, importing nearly 65 per cent of its requirements.

This glaring drawback must be addressed on a war footing by the government by diversifying its sources of supply and improving indigenisation by ensuring genuine public and private sector cooperation and assistance of foreign defence equipment manufacturers to "make in India". Importantly, Iran could prevent oil supplies through the Strait of Hormuz that links the Persian Gulf and the Gulf of Oman, from where 80 per cent of the oil shipped from the Persian Gulf gets transported, including to India. We thus need to make facilities within India to vastly increase our oil reserves.

These conflicts have also glaringly revealed the criticality of information warfare, nuances of hybrid warfare as a vital instrument, employment of drones, swarm warfare, the importance of air defence, and the like. India's armed forces will do well to study the contours of emerging super technologies for being incorporated in its strategy and employment at the operational and tactical levels. Our armed forces thus need to be fully prepared to fight future wars, confronting newer challenges.

Ukrainian servicemen in the Kharkiv area, Ukraine. Photo: AP/Vadim Ghirda.

Admiral Arun Prakash says....

....Judgement of History

(Some advice rendered in 2022 – but ignored – is recycled for the new dispensation...)

Former Prime Minister Manmohan Singh, disparaged by critics for being weak and powerless to check corruption, had ruefully remarked that history would be kinder to him than the media and political opponents. PM Narendra Modi has no such worries and said on Gandhi Jayanti, 2021: "…this is my conviction, that for my own healthy development, I attach big importance to criticism. I, with an honest mind, respect critics a lot. But, unfortunately, the number of critics is very few."

There is no doubt that PM Modi, by virtue of his political skills, eloquence and popular appeal, would find a suitable place in India's contemporary history. As PM of the world's largest democracy, twice in succession, he has led his party to overwhelming electoral victories and made his mark domestically as well as on the international stage.

History, however, discriminates while according recognition and a nation's achievements matter more than individual attainments. Indians have for long nurtured a sense of exceptionalism, not unmixed with hubris, that India's "manifest destiny" guarantees it the status of a great power with some even fantasising about "Akhand (greater) Bharat".

The reality is that unless the ship of state is steered with strategic wisdom and economic prudence, India may remain an overpopulated and under–developed nation – nuclear–armed and boasting of a huge GDP but facing mass poverty, jobless growth and a restive youth. Our failure, since independence, to assimilate alienated citizens and deliver social justice to the deprived remains a blemish on our republic.

The Modi government has, in the past eight years, launched a host of schemes that aim at providing relief and ameliorating public privation. But its real sense of accomplishment seems to stem from the fulfilment of the Sangh Parivar's long cherished agendas in two separate but related dimensions.

Firstly, Article 370, which entitled Jammu and Kashmir to its own constitution, flag, and "Prime Minister" has been an issue of concern to the Parivar since 1949 when the Jammu based Praja Parishad started agitating for "ek nishan, ek pradhan aur ek vidhan" (one flag, one prime minister and one constitution). In 1953, Syama Prasad Mookerjee, founder of the Jana Sangh, who had joined this agitation, died in a Srinagar jail, lending an emotive edge to this issue.

In 1977, the Jana Sangh joined the Janata Party only to break away in 1980 as the new born Bharatiya Janata Party. Through all these transitions, the Parivar remained consistently focused on the "assimilation" of J&K. Thus, the 2019 abrogation of Article 370 and the fragmentation of India's only Muslim majority state represented the triumphant culmination of the Sangh's long standing aspirations.

The agenda's second dimension relates to the implementation of the "Hindutva project". In 1923, political activist and freedom fighter, VD Savarkar, had explained the concept of Hindutva by defining a Hindu as one "…to whom, Hindustan is not only a fatherland (pitrabhu) but also a holyland (punyabhu)."

Via this definition, Hindutva seeks to render the term "Hindu" synonymous with "Indian", while excluding all other citizens from its ambit. It is in the context of this project that the Citizenship (Amendment) Act and the impending National Register of Citizens must be seen. Nationwide relief at the peaceful settlement in Ayodhya has been replaced by grave apprehensions as new Pandora's boxes are being opened.

While electoral victories are no doubt image–enhancing, the benefits of playing domestic party politics must be weighed against the cost of damage being inflicted on the nation's security and external relations. The balance sheet shows that the law of diminishing returns has been invoked. India's international image has been dented, as seen from our slide on the scale of global indices – from poverty and hunger to democracy and press freedom. To domestic discontent, on account of unemployment and price rise, tensions are being added, fuelled by the exploitation of religion and caste–related issues for political ends. Rather than blaming "foreign conspiracies to defame India", it would be far better for national morale to tackle these problems.

It is time for the nation's political leadership to don the mantle of statesmen. Looking beyond party agendas, they need to privilege national interests — especially where the two are divergent. Herewith, some thoughts of a septuagenarian citizen.

India's influence in the world has been rooted in the "power of its example". The capacity of Indian culture to embrace diversity and assimilate with confidence not only new Indic religions but also foreign faiths attracted universal admiration. Descent into bigotry and public hate mongering is damaging India's image.

The current surge of majoritarianism may help win elections but the steady alienation of India's minorities, constituting a fifth of our population, will irreparably damage national cohesion and undermine the integrity of our multi–religious nation. As religion becomes a convenient tool of polarisation, we must face the reality that the fires of religious strife once lit will be hard to extinguish, and even worse, will sideline our existential struggle against poverty, hunger and disease.

Finally, we must face the reality that India's claims to being a "vishwaguru" now lack conviction. While public discourse has become coarse and abusive, speaking truth to power is equated with "sedition" and political pressures have denuded the media as well as public functionaries of their moral fibre. Disregard for ethical and democratic norms is manifest in the open trading of legislators and in visible rewards for pliant public servants.

Lt Gen Kamal Davar says...

....Govt must be proactive in tackling security challenges

A new government has taken charge under the leadership of PM Narendra Modi, who is beginning his third term as the Prime Minister. Thus, continuity and consistency in major governmental policies can be expected. However, with a coalition at the helm, some transformational decisions may take a back seat. Much serious work awaits the government. Apart from the criticalities that need to be speedily addressed, the emerging security challenges across various domains will also have to be confronted.

That India faces two adversarial nuclear armed neighbours, China and Pakistan, working both independently and collusively, has to be factored in. India's strategic challenges extend in the west from the Strait of Hormuz, running southwards along the eastern coast of Africa to the Malacca Strait in the east, also spanning the Arabian Sea and the Indian Ocean. The Indo–Pacific region, increasingly becoming an area of strategic contestation between the US and China, also impacts India as it is one of the major players in this realm.

India has land borders exceeding 15,000 sq km, which it shares with seven nations. India also has a 7,683 km coastline and an exclusive economic zone of over 2 million sq km. Internal security challenges do emerge once in a while in J&K and some of our restive northeastern states, while a fading Naxal/Maoist insurgency still persists. China's continuing belligerence towards India and its unending 'salami–slicing' tactics in the border regions are of major security concern for us. Thus, overall, India has to ensure its territorial and economic sovereignty.

Since Independence, India has witnessed major conflicts in 1947–48, 1962, 1965, 1971 and the Kargil War in 1999, apart from battling many internal security upheavals, including insurgency in the North–East and, countering terrorism emanating from Pakistan. Despite all these kinetic conflagrations, India has not yet promulgated a National Security Doctrine (NSD). Since the past many years, national security has moved far beyond military activities, prosecution of war or managing internal security problems. Today, national security embraces non–military dimensions, including terrorism, economic security, energy security, food security, environmental security and cybersecurity. National security responsibilities span more than the charter of the Ministry of Defence, calling for a "whole–of–government approach". Most powerful nations of the world have enunciated their NSD, which lays down their priorities in a variety of fields. Though the major strategic mission objectives will be military oriented, the NSD will comprehensively lay down prioritisation in various fields of governance and protection of national interests, apart from synergising the nation's geopolitical, military, diplomatic, financial and technological strengths. Accordingly, the new government must lay emphasis on the formulation of the NSD with alacrity.

Another important defence reform which the newly elected government should bring to fruition is the long awaited integrated theatre commands (ITCs) edifice for synergising the operational capabilities of the three Services. Notwithstanding the differences over its implementation by the Services, a way has to be found to get "more bang for the buck". The government should institute a committee of serving officers, renowned veterans and civilian experts to suggest the composition, charter and geographical responsibilities of the ITCs.

As is universally known, India holds the dubious record of being the world's largest importer of arms, ammunition and military platforms. Though the Modi government has laid emphasis on indigenisation of military hardware, much still requires to be done to achieve atmanirbharta (self–reliance in production of military equipment). The government must give a major fillip to manufacturing as per our defence requirements, synergising the work of the Defence Research and Development Organisation, public sector ordnance factories and the technologically adept private sector. Foreign manufacturers of repute should also be encouraged to shift some of their production units to India–genuine public–private sector cooperation will be of great assistance to meet Indian defence's burgeoning needs.

The Navy's requirements to ensure the security and independence of our sea lanes need to be met by adequate capital budget funds. Work must commence on the demand for a third aircraft carrier and additional submarine capability. Simultaneously, the strategic Andaman and Nicobar Command must be strengthened to safeguard India's interests in the Indian Ocean and keep China's misplaced maritime ambitions in check. One area where the government will have to arrange funds is for the Indian Air Force's long pending requirement of 114 fighters as its present holdings are precariously down to unacceptable levels.

Importantly, the government must oversee the three Services collectively, analysing the lessons from the ongoing Russian–Ukraine war and the Israeli–Hamas conflict. These conflicts have put to rest many traditional concepts which were being practised by many armed forces across the world. Besides the nuances of artificial intelligence and information warfare, the employment of drones, air defence systems, missiles, tanks and infantry combat vehicles need to be looked at afresh.

The government should remember that it takes time to improve defence capabilities, and procrastination in defence matters will only be at the nation's peril. The need to strengthen all the constituents of Comprehensive National Power should be the guiding principles in our march forward to deservingly take a seat at the global high table.

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.

RudraM–II ASM tested by DRDO

Defence Research & Development Organisation (DRDO) successfully flight tested the RudraM–II air to surface missile from the Su–30MKI platform of the Indian Air Force (IAF) off the coast of Odisha on 29 May 2024. RudraM–II is an indigenously developed solid propelled air launched missile system meant for air to surface role to neutralise many types of enemy assets.

'Abhyas' completes developmental trials

Defence Research and Development Organisation (DRDO) successfully completed six consecutive developmental trials of High Speed Expendable Aerial Target (HEAT) 'Abhyas' with improved booster configuration from the Integrated Test Range (ITR), Chandipur, Odisha. With this, Abhyas has successfully completed 10 developmental trials demonstrating the reliability of the system.

DRDO's MR–MOCR

Defence Research and Development Organisation handed over the Medium Range Microwave Obscurant Chaff Rocket (MR–MOCR) to the Indian Navy at a ceremony held in New Delhi on 26 June 2024. Microwave Obscurant Chaff (MOC), a niche technology developed by DRDO's Defence Laboratory, Jodhpur, obscures radar signals and creates a microwave shield around platforms and assets, thus reducing radar detection.

Keel laying of 1st next gen OPV

Keel laying ceremony of the first NGOPV (ex–GSL) was held at Goa Shipyard Ltd, Goa on 3 May 2024. The contracts for indigenous design and construction of 11 Next Generation Offshore Patrol Vessels (NGOPV) were concluded on 30 March 2023 between MoD and Goa Shipyard Ltd (GSL), Goa and Garden Reach Shipbuilders and Engineers (GRSE), Kolkata, with seven ships to be constructed by Lead Shipyard GSL and four ships by Follow Shipyard GRSE.

Keel laying of 8th ASW SWC at GRSE

Keel laying ceremony of the 8th ASW SWC (ex–GRSE) was held at GRSE, Kolkata on 10 May 2024. The contract for indigenous design and construction of 8 x ASW SWC ships was concluded on 29 April 2019 between MoD and GRSE, Kolkata. As on date, six ships of the project have already been launched with delivery of first ship (Arnala)

planned in August 2024. Arnala Class of ship will replace the in–service Abhay class ASW Corvettes of Indian Navy and are designed to undertake anti–submarine operations in coastal waters, low intensity maritime operations (LIMO) and mine laying operations.

MDL unveils midget submarine

MDL unveiled the platform design and hull of the midget submarine named 'Arowana'. It has also commenced the design and development of an indigenous conventional submarine. Midget Submarine is being developed as a proof of concept. The team is also working on the development of design of full scale conventional submarine by 2028.

Steel cutting ceremony of NGOPV

31 May 2024 marked a significant milestone in India's maritime security endeavors as the Indian Coast Guard (ICG) conducted the steel cutting ceremony for the first Next–Generation Offshore Patrol Vessel (NGOPV) at Mazagon Dock Shipbuilders Ltd (MDL) in Mumbai. Powered by two diesel engines, these vessels are capable of achieving a maximum continuous speed of 23 knots and covering a distance of up to 5000 nautical miles. Furthermore, they boast integral twin engine helicopter facilities and staging for heavy helicopters, enabling swift and effective aerial surveillance and response capabilities.

BEL in growth of 34% in FY 2023–24

Bharat Electronics Limited (BEL) has achieved a turnover of Rs.19,820 crore, registering a growth of 14.35% during FY 2023–24 over the turnover of Rs.17,333 crore recorded during the previous year. The order book position of the company as on 1 April 2024 stood at Rs.75,934 crore.

BEL in orders worth Rs. 1,150 crores

Bharat Electronics Limited (BEL) received orders worth Rs. 1,150 crores till mid–May 2024 during the financial year 2024–25. The major orders include AMC of Akash missile system, combat management system for ships, missile fire control system for ships, laser range finders, communication network centre, etc.

BEL receives orders worth Rs. 3,172 Crores

Bharat Electronics Limited (BEL), has signed a contract valued at Rs. 3,172 crs with Armoured Vehicles Nigam

Limited (AVNL) on 28 June 2024, at AVNL Headquarters in Chennai.

The project entails the supply and installation of an advanced, indigenously designed and developed Sighting and Fire Control System (FCS) for the upgrade of BMP 2/2K Tanks of the Indian Army, along with a comprehensive Engineering Support Package. Additionally, BEL has secured other orders valued at Rs. 481 crs following the last disclosure on 22 May 2024 which comprises Doppler Weather Radar, Classroom jammers, spares and services etc.

Great feat by AgniKul Cosmos

As stated by the company, "Humbled to announce the successful completion of our first flight Mission 01 of Agnibaan SorTeD on 30 May 2024, from our own and India's first and only private launchpad within SDSC–SHAR at Sriharikota. All the mission objectives of this controlled vertical ascent flight were met and performance was nominal. The vehicle was completely designed in–house and was powered by the world's first single piece 3D printed engine and also happens to be India's first flight with a semi cryo engine. Our greatest thanks to INSPACeIND, ISRO and IIT Madras and our incredibly committed team in helping us prove that a private player can design and fly original space tech hardware in India".

ICG inducts upgraded Dornier 228s

Indian Coast Guard (East Region) augmented its air fleet with two state of the art Dornier–228s upgraded with latest avionics at HAL (TAD) Kanpur on 22 May 2024. The Midlife Upgrade includes installation of modern avionics systems and primary role sensors.

Landmark 350th iDEX contract signed

Innovations for Defence Excellence (iDEX), the flagship initiative of the Ministry of Defence, signed the landmark 350th contract in New Delhi on 25 June 2024. The contract was inked with SpacePixxel Technologies Pvt Ltd for the design and development of a 'Miniaturised satellite capable of carrying Electro–Optical, Infrared, Synthetic Aperture Radar, and Hyperspectral payloads up to 150 kgs'. The 150th iDEX contract was signed in December 2022, and within a span of 18 months, the 350th contract has been signed.

AZAD to build advanced turbo engines for GTRE

AZAD Engineering Limited, a leader in precision engineering and manufacturing, has secured a prestigious contract from GTRE (Gas Turbine Research Establishment), a renowned Research and Development Organisation under DRDO (Defence Research and Development Organisation) and the Ministry of Defence, Government of India, to play the role of a production agency. The long term contract involves the complete manufacturing and assembly of an advanced gas turbine engine, crucial for defence applications. AZAD will start delivering first batch of fully integrated engines by early 2026.

Godrej & Boyce innovates for Aero Engines

Godrej & Boyce, announced that its business Godrej Aerospace, is developing a high temperature brazing process crucial for aero engine performance, marking a

first for India. This significant stride "aligns seamlessly with Godrej Aerospace's steadfast dedication to innovation and excellence, reaffirming the business's commitment to fostering indigenous capabilities within India's aerospace landscape".

ISRO Chairman inaugurates HAL facilities to support LVM3

Mr. S. Somanath, Chairman, ISRO inaugurated a Propellant Tank Production and CNC Machining facilities at HAL's Aerospace Division in the presence of Mr C B Ananthakrishnan, CMD (Addl. Charge), HAL and senior officers from ISRO and HAL. The newly established facilities will provide a major boost to ISRO's ability to meet its growing production needs, particularly for the Launch Vehicle Mark–3, India's heaviest and most powerful rocket.

IAF effort: General Elections 2024

During the General Elections 2024, substantial flying effort has taken place over the last few months by the medium lift helicopters (Mi–17 Variants), light utility helicopters (Chetaks) and the indigenously manufactured Advanced Light Helicopters (ALH) Dhruv. IAF has been actively involved with the task of airlifting electronic voting machines and deploying Election Commission of India (ECI) personnel on election duties, as has been carried out during previous General/ Assembly elections. IAF played a vital role in five of the seven phases of General Election 2024, flying over 1000 hours in over 1750 sorties.

Kadet Defence Systems LAM for Armed Forces

Kadet Defence Systems announced a groundbreaking achievement in India's defence sector with the successful development of Loitering Aerial Munitions (LAM) under a unique Development cum Production Partner (DCPP) model with the Defence Research Development Organisation (DRDO).

In a significant milestone, Kadet has inked a contract for the delivery of over 50 systems by year end, fulfilling the Indian armed forces' operational requirements for the near future.

New Space's HAPS in benchmark

The India iDEX supported, NewSpace Research & Technologies's NRT solar powered scaled HAPS platform set a new benchmark of 27 hours endurance and altitude of 26,000 feet as part of its envelope expansion flight test campaign mid–May 2024.

This is a new national endurance record for an unmanned aerial vehicle designed and developed in India.

Biggen Technologies unveils Chakra UAV

Biggen Technologies (BGT) Chakra version 1.0 helicopter can carry 4 kg of cargo for 45 minutes at a speed of 60 km/h. Another variant of version 1.0 can lift 10 kg and fly for 90 minutes, both of which are battery powered. Chakra version 2.0, a petrol powered model, can lift 6 kg and travel 60 km in 40 minutes. A newly developed petrol powered helicopter can lift 10 kg and fly for 120 minutes at 60 km/h.

Kadet DS's jet powered aerial targets

Kadet Defence Systems (KDS) has announced the successful launch of jet powered aerial targets. It is the first Indian aerospace company to design and develop indigenous jet powered aerial targets, which have been also exported to foreign friendly countries. These advanced aerial targets are crucial for military training and evaluation, marking a significant leap in atmanirbhar defence technology.

Ramjet fuel tested

DRDO's DMSRDE made a landmark achievement by developing liquid ramjet fuel for advanced air breathing engine. This fuel has been tested successfully at Ramjet Test bed at DRDL on 8 May 2024. BPCL and Mineral Oil Corporation Pvt Ltd are industry partners in this development.

MIL exports increase

Munitions India Ltd. has achieved a significant milestone with export of ammunition and explosives valuing INR 1726 crores for the Financial Year 2023–24.

HHV Group certification from ISRO

Hind High Vacuum Advanced Technologies (HHVAT), a subsidiary of the Bengaluru–based HHV group, has announced that its Hybrid Micro Circuit (HMC) Lab has once again bagged the prestigious Qualification Validity Certification from the Space Applications Centre (SAC), Indian Space Research Organisation (ISRO) for its metallisation and lithography processes on alumina substrates for space flight applications. The HHV Group has been associated with ISRO for the last 6 decades and has built and supplied India's first space simulation chamber. From providing machines and components for various applications, HHVAT has a long history with various ISRO units.

Dassault Systèmes' 3DEXPERIENCE for Dhaksha UAVs

Dassault Systèmes announced that Dhaksha Unmanned Systems (Dhaksha), an Indian innovator in unmanned aerial systems (UAS) technology, has adopted Dassault Systèmes' 3DEXPERIENCE platform to accelerate the development of next generation autonomous and semi–autonomous drones. Dhaksha is leveraging the 3DEXPERIENCE platform, including its SIMULIA software applications, to design and develop a comprehensive range of UAS solutions for agriculture, defence, surveillance and delivery applications.

ideaForge Partners with Skylark Labs

ideaForge Technology Inc (a subsidiary of ideaForge Technology Limited) announced its partnership with Skylark Labs, a US based AI solutions company, to integrate advanced proprietary self–evolving AI capabilities into its drones for public safety and security applications. The collaboration aims to revolutionise public safety operations by integrating cutting edge proprietary self–evolving AI technology on drones to autonomously detect and identify suspicious weapons, persons, vehicles, fires, and smoke in real–time including for its Netra V4 PRO UAV and Switch UAV.

Zen Technologies delivers ADS HK

Zen Technologies announced the delivery of its innovative Zen Anti–Drone System with Hard–Kill (Zen

ADS HK) to the Army Air Defence College in Gopalpur, Odisha. The Army Air Defence College, responsible for training India's Air Defence Corps, placed an order for the Zen ADS HK 18 months ago, based on preliminary successful trials in accurate cueing of automatic gun platform. Building upon its proven soft kill anti–drone systems deployed by the Indian Air Force, Zen ADS HK offers a new layer of protection.

Airbus Helicopters and SIDBI sign MoU

Airbus Helicopters and Small Industries Development Bank of India (SIDBI), the Government of India's principal financial institution for promoting, financing and developing the Micro, Small and Medium Enterprise (MSME) sector, have signed a Memorandum of Understanding (MoU) for financing the purchase of Airbus' helicopters in India.

Universal Vulkaan orders 16 Leonardo Helicopters

Universal Vulkaan Aviation Pte Limited, the India distributor for Leonardo Helicopters, is bringing the latest range of Leonardo helicopters to the Indian civil aviation market following their recent partnership announcement. After already signing the pre–sales contract for 5 units of AW09 machines in January 2024, UVA has ordered 11 units from types AW109 Trekker, AW139, AW169, from the Leonardo Helicopters range to serve the growing needs of this sector.

Airbus Helicopters partners with Heligo

Airbus Helicopters' H145, has entered India's energy sector with Heligo Charters Private Limited (HCPL). The first of these helicopters has been deployed for offshore transportation with the Oil and Natural Gas Corporation (ONGC).

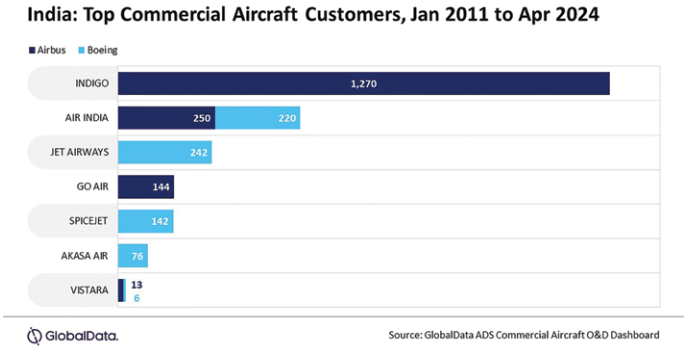
Current fleet of Heligo consists of four AS 365 N3, four Bell 412, four AW 139 and six H145 helicopters. Heligo has the largest H145 fleet in India.

"Indigo biggest buyer of Airbus aircraft in APAC"

Indigo recently ordered 30 A350–900 wide–body aircraft from Airbus, as it looks to expand its international network to long haul destinations.

The Indian carrier's expansion plans into more international destinations underscore the strong growth witnessed in the country's travel landscape, propelled by factors such as a steady uptick in business travel, rising disposable income, and economic growth. Driven by the booming international travel sector and passenger traffic from India, Indigo continues to remain the biggest buyer of Airbus aircraft in the Asia–Pacific (APAC) region, says GlobalData, a leading data and analytics company.

Indigo ordered more than 1,270 Airbus aircraft between 2011 and 2024, accounting for almost 25% of the total orders that Airbus received from the APAC region during the same period.



Simaero enters India with big investment

International flight simulator provider, Simaero, will invest $100 million in India to train up to 5,000 pilots over the next five years.

Simaero's decision to enter the Indian aviation market is driven by the record setting aircraft orders, which have exceeded the current active fleet. Indian carriers have over 1,200 Airbus aircraft and 470 Boeing aircraft on order.

APPOINTMENTS

Mr. Rajnath Singh is RM for second consecutive term

On the back of a successful tenure from 2019–2024, Mr. Rajnath Singh has been allocated the portfolio of Ministry of Defence for the second consecutive term by the President, as advised by the Prime Minister on 10 June 2024. A Member of Parliament from Lucknow, Uttar Pradesh, Mr. Rajnath Singh had taken over the responsibility to head Ministry of Defence for the first time on 1 June 2019.

Mr. Sanjay Seth is new Raksha Rajya Mantri

Mr. Sanjay Seth, a Member of Parliament from Ranchi, Jharkhand was given the portfolio of Minister of State in the Ministry of Defence on 10 June 2024.

Mr. Sanjay Seth became an MP from Ranchi for the first time in 2019, and he was a member of Standing Committee on Information Technology. In 2024 also, he was elected to the Lok Sabha from Ranchi.

Rammohan Naidu is new Minister for Civil Aviation

36 year old Kinjarapu Ram Mohan Naidu of Telugu Desam Party (TDP) and the Member of Parliament to the Lok Sabha from Andhra Pradesh Srikakulam constituency, has been allocated the Ministry of Aviation as Civil Aviation Minister.

He is also the youngest union cabinet minister and he will replace Jyotiraditya Scindia as the minister of civil aviation who becomes the minister of communications plus minister of development of North Eastern region.

APPOINTMENTS

General Upendra Dwivedi is new Chief of the Army Staff

General Upendra Dwivedi took over as the 30th Chief of the Army Staff (COAS) from General Manoj Pande, who superannuated after more than four decades of service to the nation on 30 June 2024. General Dwivedi is an accomplished military leader, with 40 years of service in the Armed Forces. An alumnus of Sainik School, Rewa (MP), he was commissioned into Regiment of Jammu & Kashmir Rifles in 1984. The General officer has a unique distinction of balanced command as well as staff exposure across Northern, Eastern and Western theatres, in varied operational environment.

Vice Admiral Sanjay Bhalla is Chief of Personnel, Indian Navy

Vice Admiral Sanjay Bhalla assumed charge as the Chief of Personnel of the Indian Navy, on 10 May 2024. He was commissioned in the Indian Navy on 1 January 1989. In a career spanning 35 years, he has held a number of specialists, staff and operational appointments, both afloat and ashore. After completing his Specialisation Course in Communication and Electronic Warfare, he served as a specialist onboard several frontline warships. He subsequently had the privilege of holding challenging, fulfilling and eventful Commands at sea, which include, INS Nishank, INS Taragiri, INS Beas and the coveted appointment of Flag Officer Commanding Eastern Fleet (FOCEF).

Lieutenant General NS Raja Subramani is new Vice Chief of Army Staff

Lieutenant General NS Raja Subramani assumed the appointment of the Vice Chief of Army Staff on 1 July 2024. The General Officer was commissioned into The Garhwal Rifles in December 1985. He has graduated from the prestigious National Defence Academy and Indian Military Academy. He is an alumnus of Joint Services Command Staff College, Bracknell (UK), and National Defence College, New Delhi. He has in his illustrious career spanning over 37 years served across a wide spectrum of conflict and terrain profiles and has tenanted a host of Command, Staff and Instructional appointments.

Mr Manoj Jain is new CMD, BEL

Mr Manoj Jain took charge as the Chairman and Managing Director of Navratna Defence PSU Bharat Electronics Limited (BEL) on 20 June 2024. He was Director (R&D) since 26 September 2022, and was also assigned with the additional charge of Director (Bangalore Complex) from 1 August 2023. He was General Manager of the Electronic Warfare & Avionics SBU at BEL's Bangalore Complex prior to his elevation as Director (R&D).

India unveils light tank "Zorawar"

6July 2024, marked a red letter day as the first prototype of the indigenous "Zorawar" light tank rolled out of the Hazira facility of L&T in Gujarat. Jointly developed by L&T and CVRDE, DRDO, in a very short span of two and a half years, it will soon enter development trials over the next six months, followed by user trials. It's expected to be inducted into the Indian Army by 2027.

The platform was developed under "Project AFV–LT" to be deployed mainly in the high altitude region in the aftermath of Chinese aggression against India in the Himalayan region in 2020. It is named after the legendary general Zorawar Singh, who, as governor of Maharaja Gulab Singh Jamwal of the princely state of Jammu and Kashmir, successfully recovered Baltistan and Ladakh from Tibetan grip who were under the suzerainty of the Qing Empire of China. Even after so many years, China is eying to usurp swathes with acrimonious affront. As China increased the presence of their own ZTQ–15 light tank supported by older tanks (like the ZTZ–88A), a necessity to counter was felt by India.

As deployment of even the T–72 at a certain altitude is impossible, only a lighter platform seems like a viable option. Designed for rapid deployment and manoeuvrability in the mountainous region, "Zorawar" is a 25 tonne platform. Though it's a light platform, utmost attention has been given to lethality, survival, mobility and situational awareness! An indigenised turret (eerily similar to the John Cockerill 3105 turret) equipped with a 105mm high pressure rifled gun (reportedly designed by the Kalyani Group) is integrated into a hull designed and developed by CVRDE (possibly the composite hull developed for the Abhay ICV project). There is a 7.62mm co–axial gun as well as a 12.7mm remote weapon system from BEL.

Taking lessons from the recent conflicts around the world, twin launchers for loitering munitions have also been integrated. The main gun can attain a very high elevation, which is crucial to engaging targets on higher ground. It's equipped with an auto–loader with bustle storage for enhanced crew safety. New generation optronics could be spotted, which will allow excellent mobility as well as accurate engagement even in the pitch dark night. While there is a limitation of protection in such a light category, the hull is equipped with modular armour blocks as a measure against enemy attacks. "Zorawar" is reportedly powered by a 750hp engine from Cummins and a Renk transmission.

Thus, with a power–to–weight ratio of 30, it can attain excellent mobility in rough terrain. It uses composite rubber tracks (CRT) to reduce vibration and decrease fatigue, which will help enhance the combat preparedness of the crew. While the platform currently lacks any active protection system or dedicated C–UAS system, including a jammer, indigenous options will be integrated into the platform in the near future.

Overall, it's an excellent development and a testimonial to Indian prowess. Currently, there is a requirement for a total of 354 light tanks. The Indian Army has placed an initial order of 59 "Zorawar." The remaining 295 tanks will be manufactured under the government funded design and development project for the Indian industry in the `Make–I' category of the Defence Acquisition Procedure (DAP). Multiple entities are taking part in this project. So, it can be said that "Zorawar" is the pioneer of the highly complex industrial development towards self–reliance.

(All the information given is taken from various reports and does not reflect personal opinion of any kind. The actual configuration could be asserted only after official statements).

By Sankalan Chattopadhyay
(Twitter/X: @vinoddx9)

All photos: Manu Pubby
(X/Twitter: @manupubby)

ISRO completes RLV demonstrations through LEX trio

The Indian Space Research Organisation (ISRO) has "proudly achieved a third consecutive success in the Reusable Launch Vehicle (RLV) Landing EXperiment (LEX) on 23 June 2024. The third and final test in the series of LEX (03) was conducted at 07:10 1ST at the Aeronautical Test Range (ATR) in Chitradurga, Karnataka".

Following the success of the RLV LEX–01 and LEX–02 missions, RLV LEX–03 re–demonstrated the autonomous landing capability of the RLV under more challenging release conditions (cross range of 500 m against 150 m for LEX–02) and more severe wind conditions. The winged vehicle, named 'Pushpak', was released from an Indian Air Force Chinook Helicopter at an altitude of 4.5 km. From a release point 4.5 km away from the runway, Pushpak autonomously executed cross–range correction manoeuvres, approached the runway and performed a precise horizontal landing at the runway centreline. Due to this vehicle's low lift–to–drag ratio aerodynamic configuration, the landing velocity exceeded 320 kmph, compared to 260 kmph for a commercial aircraft and 280 kmph for a typical fighter aircraft. After touchdown, the vehicle velocity was reduced to nearly 100 kmph using its brake parachute, after which the landing gear brakes were employed for deceleration and stop on the runway. During this ground roll phase, Pushpak utilises its rudder and nose wheel steering system to autonomously maintain a stable and precise ground roll along the runway.

This mission simulated the approach and landing interface and high–speed landing conditions for a vehicle returning from space, reaffirming ISRO's expertise in acquiring the most critical technologies required for the development of a Reusable Launch Vehicle (RLV). Through this mission, the advanced guidance algorithm catering to longitudinal and lateral plane error corrections, which is essential for the future Orbital Re–entry Mission has been validated. The RLV–LEX uses multisensor fusion including sensors like inertial sensor, radar altimeter, flush air data system, pseudolite system and NavIC. Notably, the RLV–LEX–03 mission reused the winged body and flight systems as such without any modification, from the LEX–02 mission, demonstrating the robustness of ISRO's capability of design to reuse flight systems for multiple missions.

This mission simulates the approach and landing interface and high speed landing conditions for a vehicle returning from space, which will reaffirm ISRO's expertise in acquiring the most critical technologies required for the development of a Reusable Launch Vehicle (RLV).

The mission, led by VSSC, was a collaborative effort involving multiple ISRO centres SAC, ISTRAC, SDSC–SHAR, with significant support from the Indian Air Force (IAF), Aeronautical Development Establishment (ADE), Aerial Delivery Research and Development Establishment (ADRDE), Regional Centre for Military Airworthiness (RCMA) under Centre for Military Airworthiness and Certification (CEMILAC), National Aerospace Laboratories (NAL), Indian Institute of Technology, Kanpur, Indian aerospace industrial partners, Indian Oil Corporation of India and Airport Authority of India.

S. Somanath, Chairman, ISRO/ Secretary, Department of Space, congratulated the team for their efforts in maintaining the success streak in such complex missions. Dr. S Unnikrishnan Nair, Director of VSSC, emphasised that this consistent success boosted ISRO's confidence in the critical technologies essential for future orbital re–entry missions. J. Muthupandian was the Mission Director and B. Karthik was the Vehicle Director for this successful mission.

Indian Navy bids farewell to UH–3H helicopter

Indian Navy bid farewell to the UH–3H helicopter after 17 years of glorious service during a de–induction ceremony held at INS Dega, Visakhapatnam on 28 June 2024. The event was presided by Vice Admiral Sameer Saxena, Chief of Staff, Eastern Naval Command. Veteran officers and sailors of the UH3H squadron graced the event with families reminiscing the yeoman service of the helicopter. The UH–3H helicopter will be replaced by Sea King 42C helicopter at INAS 350, to continue and deliver operational power and capability.

The de–induction ceremony of the UH–3H helicopter marks the end of a remarkable era that introduced innovative capabilities in Special Operations and Search and Rescue (SAR) missions. The operational role of the UH–3H in the constantly evolving and dynamic maritime environment will remain forever etched in the history of Indian Naval Aviation.

Brought to Indian shores in 2007 along with INS Jalashwa, the UH–3H helicopter was inducted into INAS 350 christened 'Saaras' on 24 March 2009 at INS Dega, Visakhapatnam. This versatile helicopter played a crucial role in Humanitarian Assistance and Disaster Relief (HADR) operations, security of offshore installations and special operations. Its advanced Search and Rescue (SAR) capabilities and logistical support were vital during natural disasters, often making the difference between despair and relief, and saving countless lives. The mighty 'Saaras' adorns the squadron crest embodying the motto "Strength, Valour and Perseverance." The helicopter diligently upheld its commitment, maintaining a vigilant watch, ensuring the security of our nation's maritime boundaries with unwavering dedication.

As it comes to the end of service life, one UH–3H will be permanently displayed at a prominent location in 'City of Destiny', Visakhapatnam, inspiring future generations. The Chief of Staff, ENC handed over a commemorative plaque to the State Government. The plaque was received by Mr. K. Mayur Ashok, IAS, Joint Collector, Visakhapatnam to mark the transfer of aircraft.

Text and photos: Indian Navy

Rostec/Rosoboronexport and India developments

Indo–Russian JV delivers 35,000 AK–203s to Indian Army

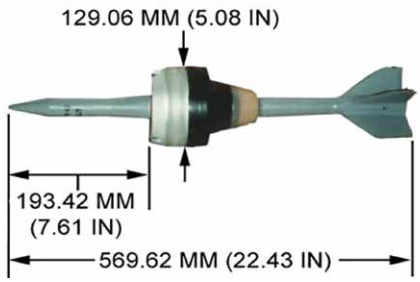
Indo–Russian Rifles Private Limited, registered and located in India, has produced and transferred 35,000 Kalashnikov AK–203 assault rifles to the Indian Ministry of Defence. The founders of the enterprise from the Russian side are Rosoboronexport JSC and the Kalashnikov Group (both are subsidiaries of the Rostec State Corporation).

The Kalashnikov AK–203 assault rifle is a version of the AK–200 rifle chambered for the 7.62×39mm cartridge used in the Indian Army. The weapon has the traditional advantages of Kalashnikov assault rifles: reliability and ease of maintenance. The AK–203s are manufactured in India in compliance with exclusive Russian technologies on certified equipment. This ensures high product quality and compliance with the stated characteristics.

"The Indo–Russian Rifles Private Limited joint venture, co–founded by Rosoboronexport on the Russian side, has completed the first phase of the project to produce AK–203 Kalashnikov assault rifles in India. To increase the degree of localisation, all necessary equipment has been shipped to the Korwa Ordnance Factory in Amethi, Uttar Pradesh state, and production facilities are now fully equipped. This made it possible to produce and deliver a batch of 35,000 Kalashnikov assault rifles to the Indian Army within the timeframe agreed with the Ministry of Defence of India," stated Alexander Mikheev, Director General of Rosoboronexport. "The Indo–Russian joint venture is a vivid example of fruitful cooperation between our countries in the defence sector."

Rostec launches manufacturing of 125mm Mango APFSDS rounds in India

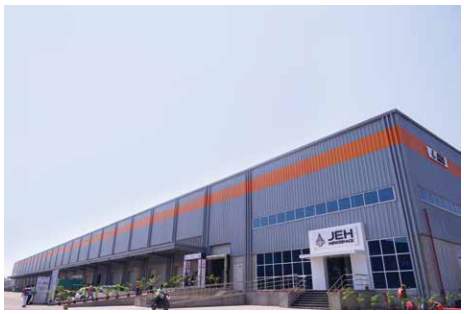
Rosoboronexport JSC (part of Rostec State Corporation) has established manufacturing of 3VBM17 Mango armour piercing fin stabilised discarding sabot (APFSDS) rounds in India. The ammunition is designed to defeat armoured vehicles fitted with composite armour. The project is being implemented under the Make in India programme. The 125mm Mango round is designed to be fired from the guns of T–72 and T–90 MBTs. Various versions of these combat vehicles are in service with the Indian Army.



"Rostec has extensive experience in industrial partnership with friendly countries. Many projects include technology transfer and exchange of competencies. Such a partnership allows the importing country to develop its production capacity – this is a competitive edge of Rostec as a leading supplier of defence solutions. We have implemented several such projects in partnership with India. These include licensed production of T–90 tanks, Mango APFSDS projectiles and other weapon systems. To achieve the highest degree of localisation of the production of Mango projectiles it is planned to launch manufacturing of powders on the territory of India," stated Sergey Chemezov, General Director of Rostec.

The Mango rounds include the 3BM42 APFSDS projectile capable of engaging modern tanks fitted with composite armour.

Jeh Aerospace in pursuit of excellence and growth



In the dynamic realm of aerospace and defence (A&D) manufacturing, where precision, innovation, and reliability are paramount, Jeh Aerospace has emerged as a beacon of excellence. Founded with a vision to harness India's untapped technological prowess and propel it onto the global stage, Jeh Aerospace has swiftly carved a niche for itself in an industry known for its rigorous standards and demanding clientele.

From its inception, Jeh Aerospace set out to redefine the landscape of A&D manufacturing. Co–founders Vishal R Sanghavi and Venkatesh Mudragalla each brought a wealth of experience from their illustrious careers in the corporate world, with Vishal notably holding the position of being one of the youngest CXOs within the TATA group. Together, they envisioned a company that not only met but exceeded industry expectations. Their journey began with a deep rooted commitment to leverage India's vast potential in aerospace capabilities and position the country as a global manufacturing leader in critical aerospace components.

At the heart of Jeh Aerospace's success lies its state of the art aerospace manufacturing facility, which is being set up in Hyderabad. Equipped with cutting edge technology and adhering to the highest international standards, the facility serves as a testament to Jeh's dedication to quality and precision. Here, skilled engineers and technicians will work tirelessly to manufacture a wide array of components, from intricate aero–engine parts to aero–structure products, catering to the diverse needs of global clients. Innovation is ingrained in Jeh Aerospace's DNA. The company prides itself on its ability to innovate and adapt swiftly to meet evolving industry demands. Whether it is pioneering new manufacturing techniques, implementing advanced quality control measures, or optimising supply chain logistics, Jeh Aerospace remains at the forefront of technological advancement.

Recently, Jeh Aerospace partnered with GS Precision, a global manufacturing leader of critical components for the aerospace and defence industries, to produce precision machine components for commercial aero–engines. This collaboration aims to enhance GS Precision's global supply chain, ensuring world–class quality, timely delivery, and adherence to cost commitments for their original equipment manufacturer (OEM) customers. The partnership will also capitalise on India's robust talent pool and reinforce the concept of "friendshoring" critical components within the aerospace industry in the United States. Through strategic global partnerships like these, Jeh Aerospace is cementing its position as a trusted supplier with advanced technological capabilities while underscoring its commitment to delivering world class products and solutions to clients worldwide.

USA with the largest aerospace industry and market in the world, has been one of the company's key focus areas. The emphasis on the US–India corridor is driven by the understanding that the former is not only a global leader in aerospace but also one of the most entrepreneurial markets, constantly seeking to explore and leverage global opportunities. This makes the USA the perfect avenue for Jeh Aerospace to scale further and effectively address the global supply chain disruptions.

Recognising the environmental impact of aerospace manufacturing, Jeh Aerospace upholds a strong commitment to sustainability and environmental responsibility. By reducing its carbon footprint through efficient manufacturing processes and promoting green initiatives within its supply chain, the company strives to integrate eco–friendly practices to minimise its environmental impact while maximising operational efficiency.

Looking ahead, Jeh Aerospace remains steadfast in its pursuit of excellence and growth. With ambitious plans to expand its manufacturing capabilities and diversify its product portfolio, Jeh Aerospace is poised to scale new heights in the global A&D market. The company's vision extends beyond mere expansion; it encompasses a commitment to continuous improvement, technological advancement, and sustainable practices that uphold its legacy of excellence.

L–R, Venkatesh Mudragalla and Vishal Sanghavi, Co–founders of Jeh Aerospace

INS Delhi, Shakti and Kiltan at Singapore

Indian Naval Ships Delhi, Shakti, and Kiltan led by RAdm Rajesh Dhankhar, Flag Officer Commanding Eastern Fleet arrived at Singapore on 6 May 2024 to a warm welcome by personnel of Republic of Singapore Navy and the High Commissioner of India in Singapore.

The visit was part of the Operational Deployment of the Indian Navy's Eastern Fleet to the South China Sea.

During the ships' stay in harbour, various activities were undertaken and included interactions with the High Commission of India, professional interactions with the Republic of Singapore Navy as also academia and community outreach amongst other activities, reflecting the shared values of both navies.

IAF Apaches exercise with IA

Apaches of the Indian Air Force and mechanised forces of the Indian Army carried out integrated training with forward area replenishment and manoeuvre ops on 6 May 2024. The integrated training "enhanced combat capability towards joint operations in the tactical battle area".

French and Indian armies in joint exercise SHAKTI 2024

The military exercise between the Indian and the French Armies, 'SHAKTI 2024', took place at the Eastern Command's Joint Training Node, Umroi, Meghalaya. This was the seventh edition of the SHAKTI joint exercise series, held alternately in India and France.

The Ambassador of France to India, H.E. Thierry Mathou, delivered a speech on Indo–French defence cooperation at the opening ceremony.

This year's exercise focussed on training for ground control operations in semi–urban and mountainous terrain under United Nations mandate, and lasted until 26 May 2024.

It marked a new level of complexity compared to previous editions as it has fielded twice as many troops as before, has started with a brigade level command post exercise, and included for the first time Air Force assets as well as Navy and Air Force observers.

The French contingent comprised 90 personnel from the Légion étrangère (Foreign Legion), an elite corps of the French Army.

On 26 January 2024, another contingent from the Légion étrangère had taken part in India's Republic Day parade with France as guest of honour.

Indian naval ships at Kota Kinabalu, Malaysia

Two Indian Naval ships Delhi and Shakti under the command of R Adm Rajesh Dhankhar, Flag Officer Commanding Eastern Fleet arrived at Kota Kinabalu, Malaysia as part of the Indian Navy's Operational Deployment. The ships were accorded a warm welcome by the Royal Malaysian Navy and the High Commission of India in Malaysia. The Indian Navy ships, on completion of harbour visit, also participated in a Maritime Partnership Exercise (MPX)/PASSEX at sea with ships of the Royal Malaysian Navy. INS Delhi is the first indigenously designed and built Project–15 class guided missile destroyer and INS Shakti is a Fleet Support Ship, both ships are part of the Indian Navy's Eastern Fleet.

Visit to Cam Ranh Bay, Vietnam

INS Kiltan arrived at Cam Ranh Bay, Vietnam on 12 May 2024 and received a warm welcome by Vietnam People's Navy and Indian Embassy. The visit was part of the Operational Deployment of the Indian Navy's Eastern Fleet. The visit concluded with a Maritime Partnership Exercise at sea between the Indian Navy and Vietnam People's Navy. INS Kiltan is an indigenous ASW corvette, which was designed by the Indian Navy's Directorate of Naval Design and built by Garden Reach Shipbuilders and Engineers (GRSE), Kolkata. INS Kiltan is the third of four P28 Anti–Submarine Warfare (ASW) corvettes.

Indian naval ships at Manila, Philippines

Indian Naval Ships Delhi, Shakti and Kiltan visited Manila, Philippines as part of Operational Deployment of the Indian Navy's Eastern Fleet to South China Sea on 23 May 2024. The visit "demonstrated India's strong ties with Philippines and its commitment to further deepen the partnership". The port call included Subject Matter Expert Exchange (SMEE) between the Indian Navy and personnel of Philippines Navy, sports fixtures, cross deck visits, cultural exchanges and collaborative community outreach programmes.

Visit to Muara, Brunei by INS Kiltan

Indian Naval Ship Kiltan arrived at Muara, Brunei on 25 May 2024, and was accorded a warm welcome by

the Royal Brunei Navy. The visit was part of Operational Deployment of the Indian Navy's Eastern Fleet to South China Sea. The visit by Indian Naval Ship Kiltan is focused on professional interactions, sports fixtures, social exchanges and community outreach reflecting "the shared values of both nations and navies". The visit concluded with a Maritime Partnership Exercise at sea between the Indian Navy and Royal Brunei Navy.

IAF at Red Flag 2024

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.

Japan India JIMEX–24

Indian Navy's indigenous stealth frigate INS Shivalik arrived at Yokosuka, Japan to participate in the bilateral Japan–India Maritime Exercise 2024 (JIMEX 24). This was the eighth edition of JIMEX, since its inception in 2012. The ship was accorded a warm welcome by VAdm ITO Hiroshi, Commander JMSDF Yokosuka District and Ambassador Sibi George, Ambassador of India to Japan. The exercise included both harbour and sea phases. The harbour phase comprised professional, sports and social interactions, after which the two navies jointly honed their war fighting skills at sea. The IN was represented by INS Shivalik and the JMSDF by the guided missile destroyer JS Yugiri. Integral helicopters from both navies also participated in the joint exercise.

INS Sunayna in Seychelles

INS Sunayna, an Offshore Patrol Vessel based at Southern Naval Command, entered Port Victoria, Seychelles on 15 June 2024 in the company of Seychelles Coast Guard Ship (SCGS) Zoroaster. Zoroaster had recently completed her short refit at Garden Reach Shipbuilders & Engineers Ltd (GRSE), India.

IAF completes participation at Exercise Red Flag 2024

An Indian Air Force (IAF) contingent participated in the Exercise Red Flag 2024 conducted at Eielson Air Force Base, Alaska of the United States Air Force, from 4–14 June 2024. This was the second edition of Ex Red Flag 2024, which is an advanced aerial combat training exercise, held four times in a year by the US Air Force. The exercise witnessed participation of the Indian Air Force along with Republic of Singapore Air Force (RSAF), Royal Air Force (RAF) of the United Kingdom, Royal Netherlands Air Force (RNLAF), German Luftwaffe, and the US Air Force (USAF).

The IAF contingent participated with the Rafale aircraft and personnel comprising of aircrew, technicians, engineers, controllers and subject matter experts. The transatlantic ferry of Rafale fighter aircraft was enabled by the Il–78 Air to Air Refuellers (AAR), while the transportation of personnel and equipment was undertaken by the C–17 Globemaster aircraft. The contingent landed at Eielson, USAF base in Alaska on 29 May 2024.

Red Flag is an air combat exercise conducted with multiple scenarios designed to provide realistic combat settings. A demarcation of forces is done for simulating the desired environment, with the Red Force simulating Air Defence elements, and the Blue Force simulating the Offensive Composite elements. During this Exercise (Ex), the Red Force was mainly constituted by the USAF Aggressor Sqn flying the F–16 and the F–15 aircraft.

This was the first time the IAF Rafale aircraft participated in Ex Red Flag, wherein, they operated alongside the RSAF and USAF F–16 and F–15s, and the USAF A–10 aircraft. The missions included Beyond Visual Range (BVR) combat exercises as a part of Large Force Engagements (LFE), in Offensive Counter Air and Air Defence roles. The IAF crew were actively involved in mission planning and also assumed the role of Mission Leaders for designated missions during the exercise.

Despite challenging weather and almost sub–zero temperatures, the IAF maintenance crew worked diligently to ensure serviceability of all the aircraft throughout the duration of the exercise and all assigned missions could be undertaken with more than 100 sorties being flown during the exercise. Key takeaways from the exercise included insight on interoperability with international partners and a collaborative understanding of employment philosophy in a multinational environment. Experience of ferrying long distances, while undertaking air to air refuelling enroute, was both an enriching and thrilling takeaway, especially for the younger crew.

Undertaking their return journey, the contingent split enroute along with their mutual support elements and participated in exercise with air force elements of Greece and Egypt, before landing back in India on 24 June 2024.

"Enriched with the Red Flag exercise experience, the IAF keenly looks forward to hosting the participating contingents from other countries during Ex–Tarang Shakti–2024, which is the first ever Indian multinational air exercise to be held later this year," stated the IAF.

VAYU on–the–spot report

MKU Ltd: Pioneering excellence in defence manufacturing and global reach

MKU's stand at Eurosatory 2022 and 2024 at Paris.

Emerging as M Kumar Udyog in 1985, it did not take long for the company to establish itself in the defence manufacturing industry. By 1989, it was already supplying critical protection systems, such as fibreglass helmets, to the Indian Army. In 2003, MKU secured its first international order for body armour from the Spanish Army. By 2005, the company rebranded as MKU Ltd and has since catered to nearly 250 clients across more than 100 nations. MKU also operates two international production facilities, one in Germany and another in the UAE, and collaborates with approximately 3000 channel partners to ensure smooth operations globally.

Vayu visited the MKU key facilities based in Kanpur, which serve dedicated roles in production, finishing and testing of MKU products. We were introduced with the complex machinery and meticulous human oversight. MKU's products are not only cost–effective compared to leading industry entities but also meet high–quality standards, evidenced by international certifications like NATO AQAP and ISO 9001:2015. The company's Research & Development (R&D) division focuses on testing new designs and enhancing existing products. We observed several products in the final stages of testing, like Aviation Night Vision Goggles (ANVGs) for helicopter pilots and SCH–111T helmets for Sikh soldiers.

MKU product range is divided into two main categories: KAVRO for self–protection and NETRO for Electro–Optical (Optronics) systems, with both categories further sub–divided to serve individual and platform demands separately. There exists more than 25+ products in the Netro (optronics) segment itself and for the other segment i.e Kavro (self–protection), they have 4 different verticals (Body armour, Armour insert, Ballistic shield, Ballistic helmet).

KAVRO
Armour solutions

The KAVRO armour lineup for individual and vehicle self–protection is a primary highlight of the MKU portfolio. Firstly, the individual body vests come in various ranges, like soft body armour, hard body armour, tactical vests and more. The plate carriers, are made compatible to offer both protection and comfort to the user, dealing with threats like direct bullet hits, shrapnel or trauma. The Strike Face armour plates are designed to withstand Level III to Level IV protection, which covers pistols, rifles and most of the small arms (depending on the level).

Speaking of vehicle protection, MKU Ltd offers high–grade protection provisions for both aerial and ground vehicles belonging to military and law enforcement units. Their modular armour solutions use cutting–edge materials like composite laminates, advanced ceramics, High–Performance PolyEthylene (HPPE), and aramid fibres. These materials provide high protection levels

while keeping the vehicles lightweight and manoeuvrable. The add–on armour kits are easy to install and maintain, allowing quick field upgrades.

MKU also provides mine protection and IED defence systems, including blast–resistant seats, floor protection, and underbelly armour made from high energy absorbing materials. These systems absorb and dissipate explosive energy, reducing the impact on vehicles and occupants. By advancing their technology and materials, MKU ensures top tier vehicle protection against evolving threats.

Head protection

The ballistic helmet range of MKU is globally acclaimed due to its success in both domestic and foreign markets,

empowering and strengthening the personnel belonging to military and law enforcement. The ballistic helmet lineup has are Advanced Combat Helmet (ACH), High Cut Helmet (HCH), Mid Cut Helmet (MCH) and Personnel Armour System for Ground Troop (PASGT). The helmets also come with an optional add–on kit called Modular Accessory Connector System (MACS) that is a patented product of the firm itself. It offers seamless, on–the–go, compatibility with nearly all kinds of head mounted sensors and modern combat equipment like communication systems, night vision goggles, cameras, torches, etc.

MKU Sikh helmets: Modern protection for modern warriors

From the outset, Sikh warriors have worn their customary turbans on the frontlines, while their comrades had modern protective headgear. Now, the SCH 111T is the world's first advanced combat helmet designed specifically for Sikh soldiers. The Kavro SCH 111T accommodates the traditional 'cloth patka' worn by Sikh soldiers, providing comprehensive ballistic protection, a lightweight design, and a 40% reduction in behind–helmet blunt trauma. It supports attachments like night vision goggles, flashlights, and cameras, ensuring no limitations during operations.

Kavro SCH 111T (Image: MKU)

MKU's SCH 111T addresses a significant gap in protective headgear for Sikh soldiers globally, including those in the US, Canada, and the UK. The helmet's bolt free design ensures uncompromised protection, and the Twisfit stability harness offers excellent stability with accessories. This initiative by MKU not only enhances safety but also brings awareness to the need for specialised protective equipment for the Sikh community, both in military and civilian contexts. MKU's portfolio also includes platform armouring solutions for land, sea, and air vehicles, offering both internal and external armour plating. Their armouring solutions are deployed in various helicopters, armoured vehicles, and naval vessels for both Indian and international customers.

NETRO

Aviation night vision goggles

NETRO NB–3101 Aviation Night Vision Goggles (ANVG) is one of the latest products by MKU which has gained interest from the Indian Armed Forces. The Indian Air Force had contracted the company to procure the system for Mi–17 and Advanced Light Helicopter (ALH) crew. The Gen III Night Vision system has 10,000 hours of service life, until the tube gets burned. It can provide effective visual aid in the night and pitch dark conditions, safeguarding the life of the crew and helicopter during mission in the hours of darkness. We had the opportunity to closely interact with the system, looking at its functionality and adaptability. ANVG can be fitted on different types of aircrew helmet, as per the requirement by the client. The Indian Air Force currently equips the helicopter pilots with French MSA Gallet helmet.

Tank night sight system

The Indian battle tank fleet has started getting integrated with night sight systems by MKU. The Netro TD–5100 Driver Night Sight is a sophisticated solution currently being integrated on T–90S "Bhisma" tanks. It utilises a fusion of thermal core and day optic technologies to provide enhanced situational awareness, allowing tank operators to manoeuvre their tanks efficiently at night and in pitch dark conditions. Offering improved depth perception, situational awareness, and detection ranges, the driver night sight compatible with other T–series tanks, BMPs, and armoured vehicles.

Future MRSAS: VR for tank crew

In efforts for modernisation of armed forces, MKU Ltd. is jointly working with Vegvisir to develop Mixed Reality Situational Awareness System (MRSAS), a state of the art visual aid system for armoured crew, which will be tailor made to cater Indian requirements. The system will be based on the existing CORE platform, which is tested across certain armoured vehicles. The new version will be introduced with better and more functionalities, and suitable for assets in Indian mechanised infantry and armoured units, including Main Battle Tanks. MRSAS for vehicle crew is same as a Helmet Mounted Display (HMD) for fighter pilots. It will digitally display most of the information to the personnel without looking at external screens or dials.

The system includes vehicle mounted cameras, sensors, and a headset for crewman. It is capable of offering obstruction less view, so that the crew don't need to fully rely on manual sighting systems. It will be similar to a Virtual Reality (VR) experience, providing a 360° view to the operator, though with complex, realistic and serious applications. MKU Ltd and Estonian company Vegvisir had signed the Memorandum of Understanding (MoU) in February 2024 for co–operation in development of situational awareness systems. However, it is confirmed

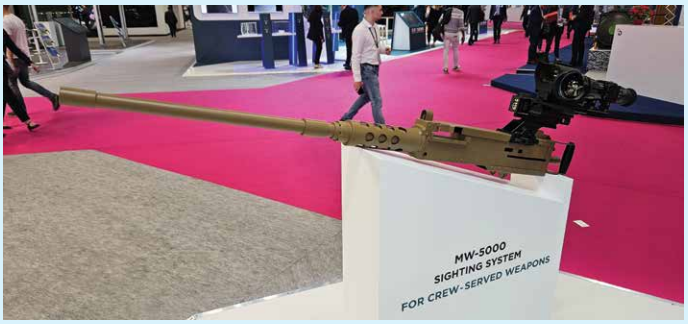
that MRSAS is currently one of the systems on which the work is undergoing.

MKU's legacy is built on producing a wide range of state of the art products that undergo rigorous testing before delivery. Customer feedback consistently confirms the effectiveness and quality of their products, with MKU addressing any issues that arise. With a strong presence in Western Europe, the Middle East, and North Africa (MENA), MKU is poised to further expand its global footprint. MKU's dedication to innovation, quality assurance, and global outreach firmly positions it as a notable contributor to the defence manufacturing sector, promising modern military technology with high grade quality and proven performance.

Article by Nitin Konde and Rishav Gupta

Photos (positioned in no particular order): The Vayu Team

New products from MKU displayed at Eurosarory 2024– the MW–5000 Sighting System for crew–served weapons.



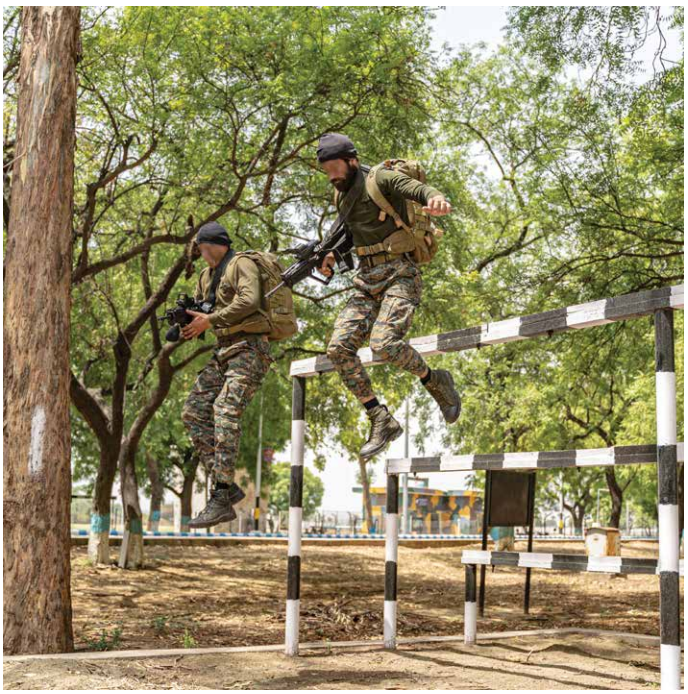
Flying High, Fighting Hard: The GARUD Special Forces

GARUD momento

GARUD badge

The IAF Special Force aka the GARUD SF is a creed of elite warriors always ready to take on the most daunting and heart wrenching challenges. The GARUD SF is the dedicated Spec Ops unit of the IAF and one of the three SFs of the Indian Armed Forces, rest two Navy's MARCOS and Army's PARA SF. Raised in February 2004 as a specialised force to counter both conventional and unconventional threats, the GARUD SF have evolved from a new raising to a well trained and established SF at present. The GARUDs have seen immense amount of combat, be it in the Kashmir Valley or the Naxal prone jungles of Chhattisgarh. They have always proven their mettle on the battlefield and came out as a very effective force and will continue to do so.

The GARUD SF is specialised in a very vast spectrum of skillsets, some of which are the CCT, TACP, Para Rescue, S&R, etc. These are some of the core specialisations that are very difficult to achieve but on the other hand very necessary for a SF unit like the GARUDs. The IAF SF is also showcasing jointness by improving in these skillsets with the rest of the Tri–services SFs.



GARUD buddy pair

Before moving further, let's have a look on the inventory of weapons used by the GARUD SF.

Some of the weapons currently in service with the IAF SF are:

- Tar–21 assault rifle and variants (CTar, GTar and STar)
- Ak–103 assault rifle chambered in 7.62x39mm catridge
- Sig–716i BAR chambered in 7.62x51mm NATO
- Type–56–1(some rifles are also moded with Israeli FAB Defence mods) assault rifle chambered in 7.62x39mm cartridge
- Glock–26 pistol chambered in 9x19m NATO
- Galil sniper chambered in 7.62x51mm NATO
- Negev NG5 SF LMG chambered in 5.56x45mm NATO

The above mentioned small arms are just a very small glimpse of the IAF SFs weapons and equipment capabilities, the GARUDs have also been using tactical UAVs for specific type of missions.

We conducted an interview during our visit to an establishment of the GARUD SF. Some highlights:

GARUD with G26

***VAYU**: Where did the requirement for a dedicated Special Forces Unit for the Air Force come from?*

Ans: Constant evolution has been a priority for progress in any organisation. Going by these principles, IAF draws lessons from past campaigns, operations and periodically reviews its operational structure, inventory (both human and material) and procedures. The requirement of an organic Special Force was felt post Kargil War and developing security environment in South Asia. IAF decided to create a force that can act as a force multiplier for operations and a robust counter measure to thwart sub–conventional threats. Hence, Garud Force.

***VAYU**: When and where was the unit raised?*

Ans: The first unit, i.e. Garud Regimental Training Centre (GRTC) was raised in AF Stn Mohammedpur on 15 September 2003. First batch of Garuds passed out from this Trg Institute on 5 February 2004. Subsequently, the unit moved to AF Stn Hindan in 2005 and later to its current location. Chandinagar in 2006. The operational units were raised in a phased manner from 2005 onwards.

***VAYU**: How did the unit perform initially after being raised?*

Ans: The question has to be answered in two parts:

(a) GRTC, when raised had very limited expertise in imparting training. This is when officers and air warriors from initial batches were trained in other specialised training institutes in India, such as NSG, Commando Schools of CAPFs, Army Commando School, Counter Insurgency and Jungle Warfare School, and other institutes offering specialised training on various skills. Expertise gained over the years was refined and customised to meet own requirement, and GRTC became self–sustained in conducting complete Special Forces training pipeline for Garuds since 2015.

(b) As far as operational units are concerned, initial few years were spent on establishing at deployment location, developing initial training programmes and procedures. Operational detachments, that began shortly, and continued thereafter, weapon and equipment configuration, training on newly inducted weapon systems and other specialised equipment, etc were the priorities. In about five to six years, operational deployment and tasking increased as the capability grew.

***VAYU**: What is the organisational structure of the force?*

Ans: The force is structured in small combat units, as is the case with any Special Forces formation, and is deployed across the country based on operational and training requirement.

***VAYU**: What is the approximate size of the force?*

Ans: These are operational details and need not be shared.

GARUD CDOs during Vayu Shakti 2024

***VAYU**: There was discussion in expanding the force, how much was the force expanded?*

Ans: These are operational details and need not be shared.

***VAYU**: We've seen Garud Force members with modern weapons and equipment, what is the standard issue for a Garud operator?*

Ans: The weapon and equipment profile in Special Forces is wide. It often depends on requirement, which defines what configuration to adopt. The primary weapon system in Garud Force, presently, is Israel made TAR–21 Tavor Assault Rifle.

***VAYU**: Forces are now focusing on procuring indigenous weapons and equipment under Make in India project, how does the Garud Force see and take its fair share in the project?*

Ans: AF as a whole, is encouraging Atmanirbhar Bharat to the fullest. Accordingly, Garud procurement focus on indigenous sources.

***VAYU**: We've seen Garud Force being active in the Kashmir valley and conducting CI/CT Ops while being attached to the local RR Battalions, how much of a difference has this made while calculating the success rate and the casualties on our side?*

Ans: It may not be appropriate to try and quantify or gauge the success or otherwise of any op in terms of causalities on either side. Calculating success rate of ops can never be done wholly in terms of hits or kills alone.

There are far too many other tangibles and non–tangibles contributing to outcome of ops, including psychological. The end state is to defeat the nefarious

GARUD with G26

designs of the adversary and neutralise and demotivate its proxies. This has been achieved in all Garud contacts or engagements alongside Indian Army (IA) till now.

To give a brief background, Counter Insurgency and Counter Terrorism Operations (CI/CT Ops) are being conducted in Kashmir valley by IA over the past many decades. In view of the fact that exposure to live ops is irreplaceable, the IAF decided to induct its Garud SF personnel into the valley, where they have been operating along with IA.

The Garud squads are operationally enmeshed with IA RR units at the ground level, in the true spirit of jointness. This has not only led to mutual exchange of good practices but also to evolving of common TTP for this specific role. This induction has given the IAF SF i.e. Garud an understanding of the methods of op of the terrorists and the process of countering the same. With their intense training, proper op orientation and well imbibed situational awareness the Garud SF has been extremely successful whenever contacts have happened with terrorists.

***VAYU**: Garud Force also have been actively participating in the tri–lateral excises under the Armed Forces Special Operations Division, what is the role of Garuds in the formation and the experience the force has got from working with other Special Forces?*

Ans: IAF fully supports inter service cooperation and jointmanship step.

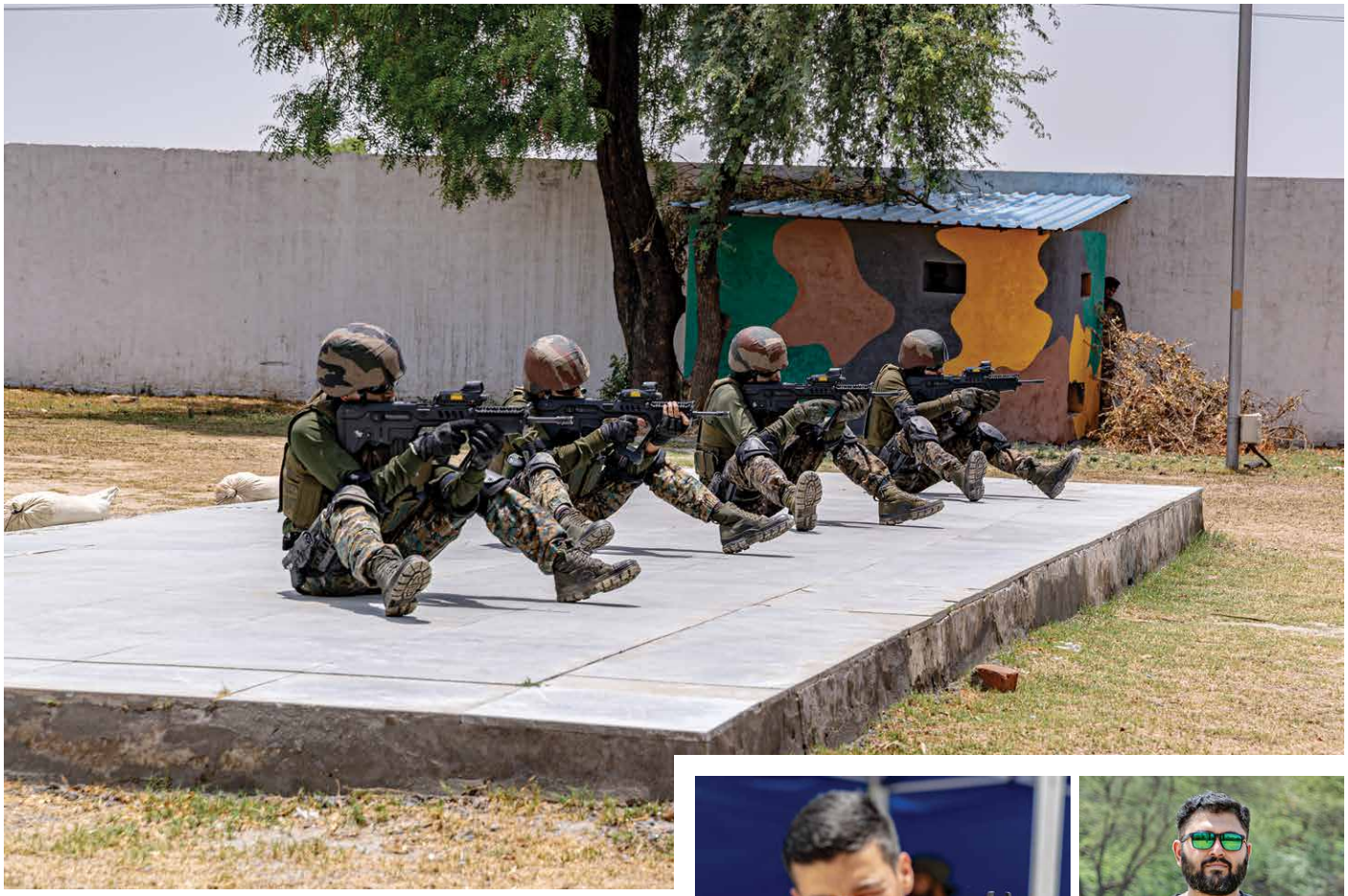
***VAYU**: How has the Garud Force evolved with time since it was raised and until now?*

Ans: Garud Force has come a long way and the growth has been steep. When compared to the Special Forces of sister services, this force has achieved a lot in two decades of its existence. This force offers unique capabilities that provide operational edge especially when air power is engaged.

***VAYU**: What will the future of the force look like?*

Ans: We are a constantly evolving force, and totally committed to it. IAF is all about gaining the technological edge, and keeping pace with technological advancement. Being in the same environment, there has been progressive development in terms of training, equipment profile and operational capability, which in future would definitely be different and of better standard, as compared to the present.

As we concluded our visit to the GARUD Special Forces, we left with a profound sense of respect and admiration for these elite warriors. Their unwavering dedication, unrelenting spirit, and unbridled passion for their craft are a testament to the highest standards of military excellence. The memories of our time spent with the GARUD commandos will forever be embedded in our minds, and



we feel honoured to have had the privilege of witnessing their prowess firsthand. Their selfless service and sacrifice are a reminder of the bravery and heroism that defines our nation's special forces, and we here at Vayu Aerospace & Defence Review are grateful for their service.

At the end of this article, I would like to thank Cmdt and all ranks of GRTC and IAF as a whole for making this very special visit come true and making this visit a memorable one!

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FRCV– India's future battle tank and concerns: Part 2

Leopard 2A7 (Image from Wikipedia)

The ambitious Future Ready Combat Vehicle (FRCV) project India seeks to develop, to survive challenges of the future, will have a lot of obstacles to overcome. Many have expressed concerns about the viability of the intended requirements ever since the project's inception. We are trying to explore all of these one by one. In the previous part, we tried to explain some of the aspects. It's time we went through the rest of the concerns.

Lethality

The RFI mentions the main gun has to be of a minimum 120mm and above caliber. Now, this is actually quite significant. Clearly, the FRCV doesn't set up any bars for the main gun. Rather prudently, it paves the way for the integration of any armament of choice with a higher caliber. And this coincides with the other future battle tank programmes as well (Rheinmetall 130mm/51 caliber and ASCALON 140mm/48 caliber). The US on the other hand is working on ARDEC XM360 (a 120mm/58 calibre one, to be integrated into the Abrams X, for M1E3 project and eventually M1A3) electrothermal chemical technology. While different western countries are approaching differently, at the end, most probably there would be a commonality in both the calibre and mechanism to be integrated into their respective tanks. Similarly, the nature of both the co–axial and turret mounted ones has changed. Gradually, the choice is shifting in favour of bigger 20mm and 30mm. The new generation of turret mounted RWS even has integrated weapons of two different calibres for customised roles. While the FRCV requirement has not yet shifted from the traditional armaments (7.62mm co–axial and 12.7mm RWS) the development must take care of the provision of inclusion by choice. FRCV at the same time eyes incorporation of loitering munitions for

KF51–U

Leclerc Evolution

LOS and NLOS engagement. The new trend to integrate projectiles into tanks has been reflected in several new programmes around the world. The only prominent thing missing in the FRCV requirement is a turret independent weapon system, which could be crucial in case of any unexpected close encounter or to thwart a breach assault. It should not be ignored.

Fire Control System (FCS)

Integration of advanced situational awareness and a human–AI interface will provide a fully digitised architecture for seamless target engagement. Along with the "Hunter–Killer", the "Killer–Killer" capability will allow the commander to detect, identify and engage enemy targets without any dependence on the gunner. It also suggests that the crew will have common displays, allowing them to check every piece of information and make quick exchanges. To successfully commence the projects, India will need proficiency in metallurgy, chemicals and explosives, and optronics. While India's progress in these areas has been remarkable, more will be needed with a constant push for betterment. Other than Bhishma, Arjun could be a crucial platform for steering success. In fact, Arjun must be integrated with a better gun and ammunition. With the integration of newer armaments into Arjun, the developers could test, rectify, modify and mature the necessary technologies, which could then be pushed even further. It will de–risk the chances of a sudden setback. But yes, there must be a provision of integration by choice without the need for major changes to the mantlet.

Otherwise, in the future, the user might find themselves in an odd situation where the integrated armaments seem insufficient, but up–gunning will not be possible! Another big challenge will be designing the auto–loader. The challenges are: one, integration of multiple types of ammunition; two, making provisions for storage

Leopard 2A8

in adequate numbers for high calibre ammunition; three, ensuring the safety of ammunition loaded in the auto–loader; fourth, safe storage of the rest of the ammunition; and fifth, provision for semi–automatic and manual loading.

Crew

The required crew number has been a matter of debate, as the FRCV requires a 4–man tank equipped with an auto–loader! Generally, all tanks equipped with an auto–loader (ex: Russian T–90, French Leclerc, Japanese Type 10 or Korean K2) automatically negate the necessity of the fourth crew. However, as the importance of UAS and advanced situational awareness have increased, a new concept for future eyes to include a fourth man only to operate drones, keep an eye on data, and monitor the health of the tank.

Survivability

To sustain the battlefield, the FRCV will have both the soft–kill and hard–kill APS, as well as a jammer and AD gun for the C–UAS role. In the previous edition, it was discussed how the use of advanced lighter and modular armour can provide extensive protection without any

penalty to the weight. Rather, here we will discuss the challenges ahead. The foremost challenge will be to design an APS capable of effectively defeating KE rounds. A quick identification, reaction, engagement and damaging fruitfully will not be an easy task. Besides, India will need a system equally effective against top–attack threats.

The solution to ensuring safe storage of ammunition could be rather easier. The FRCV requires all ammunition to be stored in easily accessible, containerised compartments with bustle loaders and blow–off panels. Arjun has already paved the way by featuring CABIS and BOP. The M1 Abrams has further enhanced crew safety by placing CABIS and BOP inside separate capsules with blast doors in the turret and hull! However, FRCV now requires a 4–man crew, and currently no such design exists where a 4–crew tank is equipped with an unmanned turret! So, there could still be a risk from ammunition cooking! Other than these, the crew could be susceptible to chemical attacks. A robust solution to this has already been integrated into the Arjun tank. Once the sensors detect the presence of detrimental substances in the air, the NBC system adjusts the air pressure accordingly, denying the entry of harmful materials.

EMBT-ADT 140

Situational awareness

It's a complex architecture consisting of optronics for the crew, integrated cameras for 360° vision, an acoustic sensor, radar and laser warning receivers, a weapon appreciating warning system, C4I (command, control, communication, computers, and intelligence), and many more. A well–developed structure will allow the platform to have seamless data sharing with other friendly platforms, allowing a collaborative optimum performance crucial for triumph. The integration of augmented reality (see through armour) and AI could enhance the performance even further.

The requirement for FRCV stands logically in this domain. The 360° situational awareness; digital inter–crew communication system; hands free internal communication for crew; high frequency radio set, software defined radio, and tactical Wi–Fi network for local communication; network enabled for supporting additional feeds from in–service other friendly platforms; compatibility with existing and indigenous positioning and navigation systems; integrated battle–field management system; identification of friend or foe; C4I; capability to withstand cyber and electronic warfare; and contested electromagnetic spectrum—all of these will be settling factors in the battlefield.

Leopard 2 A–RC 3.0 unmanned turret

Another view of the KF51-U

Mobility

The mobility solution is an entire architecture with drivetrain, suspension, and running gear. The FRCV has a powerful engine with a minimum output of 1,500 hp and a P/W ratio of a minimum of 27 hp/T. Besides, the nominal ground pressure must not exceed 0.90 kg/cm2. These are necessary to provide excellent mobility against rough and tough terrain as well as smooth driving even on soft soil. There must be a fording capability of a minimum of 5 meters. This will be necessary to overcome water obstacles. India has recently test fired the DATRAN 1500, an indigenously built engine for the Arjun and FRCV. However, it has to go through extensive tests and trials to prove its mettle for integration with current generation platforms. Then there have to be constant improvements to remain relevant. The use of hydro–pneumatic or hydrogas suspension unit (HSU) has gained momentum. The HSU provides excellent stability while moving on the irregular surface and allows the platform to adjust ground clearance according to the need. Thankfully, India has already successfully developed and integrated HSU into the Arjun tank. This will allow India to further improve the system in the future. At the same time, work has to be done on hybrid power packs, hydrogen fuel cells, electrified propulsion, advanced driver assistance system, lighter wheels, polyethylene sprockets, and CRT etc.

Another view of the Leclerc Evolution

Another view of the Leopard 2A8

Conclusion

The formulated parameters are definitely well calculated, which reflects the meticulous effort to study the trend around the world. Still, it might not be the best idea to jump imminently. With the emergence of newer threats in the multi–domain collaborative combat environment, adaptation accordingly is inevitable. Technologies are evolving fast. From firepower to protection, drive solution to situational awareness, newer solutions are emerging. But many of these are yet to be proven practically. Combat worthiness might not be possible to assess so quickly, but functional and financial feasibility definitely have to be certified. And here, more than what works, we must know what doesn't and exactly why! So that we can be better prepared, either by solving the problems or by investing in a better alternative. And this will take a considerable amount of time. Even nations with established technological prowess will face mitigated yet considerable risks of not having the desired results. But still, they will hold alternatives thanks to investment in the continuous improvements to existing technology. In the case of India, things will not necessarily be so bright. A hurried jump into so–called FRCV might result in a good yet not–so–futuristic platform. That will bring the game back to zero, where we might be overshadowed by the much mature, superior technology of both the potential adversaries and friendly rivals in the export market! So, in my opinion, it will be better to first study and watch the progress of other similar projects globally.

Meanwhile, Arjun should be continued with modernisation block by block, either through cooperation with friendly countries or completely indigenously. Instead of investing instantly in an entire system, it might be better to work on sub–systems that would be integrated into the platform. We should not forget the progress of M1, Leopard 2, Merkava and K1 to the current phase (M1A2 SepV4, Leopard 2A8, Merkava 4 Barak, K2PL/EX), where they hold the top position. It will not only allow rapid progress and modernisation of indigenous technologies but also their incorporation into other platforms for moderation. Thus, a highly advanced and matured future variant of Arjun itself will be the bridge to the FRCV we will need. Meanwhile, studying the progress of current MBT programmes and changes made accordingly by the respective users to nullify potential problems will allow us to be better prepared. With the concept and achieved technology prowess, we will, ultimately, be ready for a FRCV in the true sense.

Sensors for future

Another view of the Leopard 2 A–RC 3.0 unmanned turret

Article by
Sankalan Chattopadhyay

All photos:
The Vayu Team
(Twitter/X @vinoddx9)

EUROSATORY
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Eurosatory 2024: A record breaking edition (Part-1)

The tradeshow Eurosatory 2024 (17–21 June) ended the five day extravaganza with extremely intense and busy days. This 28th edition reported record attendance by exhibitors, public and private sector decision makers, armed forces and homeland security representatives, high authorities, civil security and crisis response professionals, official delegations, experts and journalists.

With 2,028 exhibitors from 61 countries, Eurosatory confirmed its role as a catalyst for user available and emerging innovation and new generation technology, providing the most extensive global spectrum of solutions to enhance defence and security capabilities.

The French Armed Forces Minister Sébastien Cornu, during his visit to inaugurate the exhibition, took advantage of the occasion to highlight its importance, global reach and strategic role: "This exhibition is without a doubt an exhibition for the military and not just for industry, to take stock of all the operational needs of the armed forces. And it is ultimately also this change of culture that we are seeing, where there is a tightening of ties between the soldier/customer and the manufacturer/producer. This exhibition was designed in this perspective, and for that I extend my thanks to you."

With 2,028 exhibitors from 61 countries (compared with 1,743 in 2022), more than 42,000 professional visitors including 44% from outside France (up 23% on 2022), and 355 official delegations from 92 countries, Eurosatory illustrated once again that it is the premier event for the international defence and security community. The 120 round table discussions and nearly 500 speakers helped to confirm the exhibition's role as a global platform for experience sharing, and offered further insights into the leading underlying trends that are shaping our century for the long term.

The 2024 show was held on a global backdrop

protecting the population from the effects of humanitarian and environmental crises. At Eurosatory, we offer a range that is exhaustive, competitive and selected. We are the only ones to do so.

The state of the world we are in is one of the reasons behind this success, in particular with the urgency shown by European countries in upgrading their defence capabilities while also taking into account new forms of warfare. At each edition of Eurosatory; the teams at Coges Events strive to offer exhibitors, visitors and official delegations in all domains a unique range of equipment and

featuring five megatrends that combine and contrast with one another, ultimately impacting the Defence and Security world: The geopolitical sphere with the return of superpowers and claims of sovereignty; The economic sphere, which has become unpredictable following the impacts generated successively by the global pandemic and the war in Ukraine, and which is still putting pressure upon international markets. The technological sphere, with a new digital revolution, that of AI and quantum science; The societal sphere, rapidly changing, marked by increasing violence in society and finally the environmental sphere which, under the effects of climate change, is seeing an ever greater frequency of humanitarian and environmental disasters and higher migratory movements.

"In many respects, Eurosatory marked a break with previous editions, catapulted to an unrivalled position among Defence and Security tradeshows. It confirmed its status as the reference event for sovereign action (land and air). It owes this position to an in–depth capability consideration of the new geopolitical era in which we are now living. We have analysed the megatrends marking this 21st century, with the ambition of offering States solutions in terms of products and services to meet their expectations in response to today's and tomorrow's Defence and Homeland Security challenges, but also those of innovation to extremely stringent standards. Eurosatory 2024 has been a huge success. The 2026 show on which we are already hard at work will have even more surprises in store," stated Charles Beaudouin, Eurosatory Exhibition Director and CEO of Coges Events.

Ground–based action in all its forms, from high intensity conflict to humanitarian disaster response, calls on the integration of all domains (land, air, space, naval, cyber). In light of this, the air–to–ground action of helicopters is of predominant importance. As leader in its category, Eurosatory had a duty to develop this segment more extensively. As a first for Eurosatory in 2024, exhibition space was given specifically to helicopters, drawing notably on the resources of the French Army, the Gendarmerie Nationale and the US Army, along with French and international manufacturers.

Eurosatory Lab gave start–ups a chance to present their novel solutions to an international audience, while benefitting from an environment conducive to networking and collaboration.

The space brought together more than 60 promising French and international startups and established industry players, giving them the opportunity to showcase their 'disruptive' solutions and technologies in the fields of new materials, 3D printing, inexhaustible energy resources, genomics, artificial intelligence, big data, blockchain, etc.

A big presence with nearly two dozen companies including DPSUs and private players

Glimpses of the India Pavillion from various angles.
A sizeable number of defence public sector companies graced the event.

Ametek

BEL

AWEIL

DRDO

Yantra India Ltd

India Optel Ltd

BitMapper

Kalyani

Zen Technologies Ltd

Gliders India Ltd

Raphe mPhibr

MKU

Rotory Connectors and Sandeep Metalcraft Pvt Ltd

Precision Electronics Ltd

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India at Eurosatory

Kusumgar

SMPP

MBDA at Eurosatory 2024, Paris

Photo 1: Loïc Piedevache and Ludovic Dumont from MBDA. Photo 2: Outdoor display at Eurosatory of missile systems. Photo 3: Bertrand Dumoulin and Nick de Larrinaga of MBDA

Photo 1: Select Indian media at a customary reunion at the MBDA stand—always a pleasure to catch up! Photo 2: Some more missile systems at the MBDA stand.

MBDA's Land Cruise Missile system

MBDA unveiled the Land Cruise Missile (LCM) system, a new ground–launched Deep Precision Strike capability, to meet the needs of the new strategic environment on the battlefield for the first time at Eurosatory 2024. LCM builds on all of MBDA's expertise in the field of Deep Precision Strike, and is based on the combat proven Naval Cruise Missile (NCM) in–service on French Navy frigates and attack submarines.

The LCM system constitutes a unique European sovereign solution for a deep strike ground launched cruise missile system, designed, produced and assembled in Europe. Customers operating NCM missiles and LCM system will "belong to an exclusive club of countries possessing very long range Deep Precision Strike capability from below and from the surface of the sea as well as from the ground".

The LCM system will offer the same unique capabilities as the NCM, including: metric precision at very long range; high survivability when penetrating through enemy integrated air defence systems owing to reduced radar cross section and terrain following capability; and high lethality against targets.

It will also allow highly accurate synchronised time–on–target (STOT) capability as already demonstrated by the simultaneous NCM strike from a frigate and a submersed submarine, performed by the French Navy with the support of DGA in April 2024. The LCM brings the capability to inflect aggressive behaviours from peer adversaries by imposing a permanent and immediate threat against enemy high value assets.

With the LCM concept of operation, MBDA will offer a comprehensive integrated system including the mission planning suite and ground launchers mounted on dedicated land platforms offering flexibility, survivability and reactivity to ground forces in high intensity contexts.

Europe advances on the joint acquisition of Mistral 3

France, Belgium, Cyprus, Estonia and Hungary have signed a framework co–operation arrangement for the joint acquisition of the Mistral 3 ground based air defence system on 19 June 2024 at Eurosatory. Managed by the DGA with MBDA support, the arrangement gives partner nations access to an improved acquisition process that meets armed forces' requirements. Following in the steps of the first five countries, several other states have also indicated their strong interest in this co–operation.

Mistral 3, which is currently in service with the French Army and many other users, is an air defence missile that has an infrared imaging seeker and advanced image processing capabilities. With an over 96% success rate and the best reliability of all current ground launched short range air defence systems, it has the ability to engage targets with low thermal signatures, such as drones, turbojet–powered missiles and fast attack craft from long distances.

EUROSATORY 17-21 JUNE 2024 PARIS
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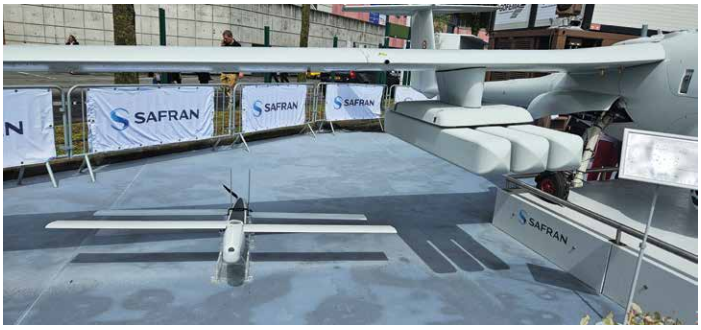
Safran at Eurosatory 2024, Paris



Glimpses of the Safran stand and display area at Eurosatory 2024.

Safran launches Skyjacker counter drone system

At Eurosatory 2024, Safran Electronics & Defense announced the launch of its Skyjacker counter drone solution. Skyjacker is an effective response to the growing threat posed by drones in the battlespace and at sensitive installations. Skyjacker's strength lies in its unique spoofing capability: it alters the trajectory of a drone to neutralise the threat it represents by simulating the GNSS signals ensuring guidance towards its target. Coupled with radar detection and optronic identification, Skyjacker can efficiently defeat isolated drones and drone swarms in land and naval environments.

Safran develops laser optical communications

Safran Electronics & Defense is developing a new solution for transmitting and receiving optical communications by laser. This innovation will enable armed forces to share information at very high speed with no risk of jamming or interception. It is the result of the company's expertise in inertial navigation, optronics and communications.

Laser optical communication technology will be based on terminals that can transmit and receive optical communications: one terminal to send data encoded in a laser beam, the other to receive it and convert it into digital information. Users will be able to share messages, pictures and video at ranges of tens of kilometres, or even further with the aid of relay satellites.

Laser optical links offer several advantages over traditional radio communication, including discretion and resistance to interference. But also throughput, with speeds of 5 Gb/s to 50 Gb/s, which is a major benefit as data volumes continue to increase and data–hungry AI becomes more widely deployed.

Safran and Edge Autonomy present Lanner

Safran Electronics & Defense and Edge Autonomy proudly presented Lanner, a new configuration of the Penguin Vertical Takeoff and Landing (VTOL) Uncrewed Aircraft System (UAS) during the exhibition Eurosatory 2024. The Lanner configuration is based on the field proven Penguin UAS platform and has been specifically modified to meet the requirements of the SDTL (Light Tactical Drone System) programme for the French armed forces.

In this configuration, the Penguin drone can address multiple missions through a simultaneous dual payload capability, including Electro–Optical/Infra–Red systems, electronic warfare (detection of radio signals or jamming for example), radar, and ammunitions. It can thus carry out land and maritime intelligence, surveillance and reconnaissance missions.

Safran and MTU Aero Engines create EURA

Safran Helicopter Engines and MTU Aero Engines signed the cooperation agreement to create the 50/50 joint venture EURA (derived from EUropean Military Rotorcraft Engine Alliance). This newly created company will form the core of a larger programme, which will collaborate with industrial and technological partners from several other European nations. With the creation of EURA, the two companies are taking a further important step towards the joint development of a new 100% European engine for the next generation of European military helicopters. The new entity EURA will be based in Bordes (France), Safran Helicopter Engines headquarters, and its CEO will be selected from within MTU.

This exclusive joint venture will focus on the development of a new heavy helicopter engine to power the next generation of European military helicopters, scheduled to enter into service by 2040. The future engine, which has the ambition of significantly increasing engine efficiency while reducing operating and maintenance costs at the same time, will be particularly well suited to the ENGRT (European Next Generation Rotorcraft Technologies) project. Outstanding engine characteristics will provide the European Next Generation Rotorcraft with enhanced capabilities such as longer range, higher speed, better maneuverability and higher availability.

Safran Launches ACE Embedded AI Solution

At Eurosatory 2024, Safran Electronics & Defense is launching its Advanced Cognitive Engine (ACE) artificial intelligence system. Its purpose is to integrate AI capabilities into all Safran Electronics & Defence products to deliver enhanced situational awareness, decision support and reduced cognitive load for forces in the field.

ACE will improve target detection, classification and identification capabilities by correcting for environmental effects such as atmospheric turbulence and low light conditions. Other functions such as advanced tracking and automatic target detection will help users perform missions by reducing their cognitive burden. Each capability can be adapted to specific environments – flat open landscape, desert, jungle, etc. – for optimum performance.

Thales at Eurosatory 2024, Paris

A view of the Thales stand and display area at Eurosatory 2024.

Thales unveils new tactical wideband HF radios

At Eurosatory 2024, Thales unveiled the first two radios in its new HF XL range of resilient high data rate wideband HF radios for command posts deployed by land forces in the theatre of operations.

They are ideally suited to high–intensity conflict scenarios. High frequency (HF) transmissions, fully secure and with low operating costs, are still essential for armed forces, particularly in areas with poor satellite coverage (polar regions, for example, or in constrained environments) or where there is a high risk of jamming. However, HF is limited in terms of bandwidth, and can no longer meet the growing needs of armed forces for data exchange.

By developing high frequency broadband communication capabilities (HF XL), Thales is offering a 10–fold increase in bandwidth and a significant improvement in quality of service, while still benefiting from HF's advantages of long range and operation in constrained environments.

Brazil acquires Thales GM200 MM/A radars

The Department of Airspace Control (DECEA), through the Airspace Control System Implementation Commission (CISCEA), signed a contract for the acquisition of Ground Master Multi–Mission "All–in–One" radars in order to enhance Brazil's air surveillance capability. To protect airspace, the Ground Master 200 Multi–Mission radar family covers the whole spectrum of threats, from low mini–drones to faster, more agile targets at longer ranges, while retaining a very high tactical mobility and a very short deployment time. More than 250 radars from the GM family have been sold worldwide.

The GM200 MM/A is designed for modern multi–mission air surveillance and GBAD missions, figuring amongst the most flexible radars on the market today – offering radar operators instant superior situational awareness. Featuring new–generation 4DAESA and unique 'dual–axis multi–beam' technology, the radar provides flexibility in elevation and bearing. This software

defined radar is ready for future upgrades and capabilities expansion to manage the ever evolving spectrum of threats and doctrines.

Thales supports Irish Defence Forces with more than 6000 SDRs

Thales has won a major contract to supply all three branches of the Irish Defence Forces with software defined radios systems and related support services. The agreement covers the initial provision of over 3,500 SquadNet tactical radios and around 2,500 radios from the SYNAPS product family. The Framework Agreement positions Thales as a key partner for the Irish Defence Forces.

The SquadNet radio system is compact, lightweight, and easy to use and offers 24 hour autonomy, making it ideal for dismounted soldier. In addition to secure voice communications, location display and a data sharing option, SquadNet offers battery recharging and radio programming capabilities. This solution has been adopted notably by the Austrian armed forces.

Thales unveils OpenDRobotics

With OpenDRobotics, Thales is taking collaborative combat to the next level through the development of a revolutionary integrated system that ties together robotics technologies and different types of drones to provide an automated mission system capability. Recent conflicts have demonstrated the operational value of drones and robotic systems in terms of battlefield transparency and speed of action to enhance mission effectiveness while keeping human operators out of harm's way.

EDGE and Thales in strategic partnership

KATIM, an EDGE Group entity and leader in the development of ultra–secure communication solutions, and Thales, will start discussing the co–development of Software Defined Radio technologies in the United Arab Emirates (UAE). A declaration of intent was signed at the international defence and security show, Eurosatory.

Thales in 1st DVR by EASA

Thales has received the first full DVR ever granted by EASA to operate light UAS in medium risk, SAIL III. This DVR process set in place in April 2021 by the Agency aims at ensuring safe drone operations. Such a premiere strengthens the group's position on emerging civil drone market and represents further progress towards the certification of the Thales UAS100 in the most demanding conditions.

Assorted news from Eurosatory 2024, Paris

French Army's NH90 for SF in flight testing

Airbus Helicopters has launched the flight test campaign for the prototype of the NH90 Standard 2. This standard is one of the latest NH90 configurations and is being developed specifically for the French Army Aviation, to support Special Forces operations. The French Ministry for Armed Forces has ordered a total of 18 NH90s in the Standard 2 configuration. Flight testing will continue until the end of the year in accordance with the schedule agreed with the French Armament General Directorate (Direction Générale de l'Armement). The Standard 2 configuration includes the integration of the Safran Euroflir 410 electro–optical system, a new digital map generator, installation for a third crew member and new enlarged rear sliding windows able to accommodate self–protection guns.

BAE Tridon Mk2 makes debut at Eurosatory

BAE Systems launched its next generation 40mm anti–aircraft system, Tridon Mk2, at Eurosatory 2024, showcasing its unique capability to protect against ever evolving aerial threats. "The Tridon Mk2 is the ideal solution for combat operations, where soldiers need a proven, high–precision and reliable anti–aircraft system to keep the skies clear and protect troops and infrastructure," stated Lena Gillström, President of BAE Systems Bofors. "The adaptability of the system, which can evolve as threats continue to change, is what makes it one of the most effective anti–aircraft systems on the market today."

BAE showcases modularity of armoured multi–purpose vehicle

BAE Systems' fourth Armoured Multi–Purpose Vehicle (AMPV) prototype was showcased at Eurosatory. Configured with a common top plate, also known as the External Mission Equipment Package (ExMEP), the prototype showcases the vehicle's ability to integrate capabilities and equipment packages internationally. This AMPV prototype features Oshkosh Defense's Medium Caliber Weapon System (MCWS), a 30mm weapon system with planned fielding to the US Army's Stryker Brigade Combat Teams. The vehicle's ExMEP can adapt to more than 30 different turret systems and builds on the vehicle's modularity.

FN Herstal's deFNder

The company was present at Eurosatory in a big way with many weapons and systems on display. FN Herstal's deFNder Medium remote weapon station can be fitted with FN machine guns including FN Herstal's exclusive fast firing (1,100 rpm) .50 Cal (12.7x99mm NATO) FN M3R –, or 40mm HV AGL. Thanks to its modular architecture this proven remote gun turret can be adapted for a very wide range of applications such as static positions, manned or unmanned ground vehicles, and naval vessels. It is now possible to order the deFNder Medium configured for a

Northrop Grumman M230LF 30x113mm cannon, or a reversible conversion kit to upgrade existing RWS. The deFNder Medium equipped with the 30mm cannon is exceptionally low profile (< 80cm) and light (300 kg with gun and 50 rounds) compared to other similar systems.

John Cockerill in MoU with France and Belgium

John Cockerill, a major supplier of light tank turrets, firing, and simulation systems, announced that it had signed an exclusive agreement with the Volvo Group to acquire Arquus, France's leading supplier of military vehicles. This prospective acquisition would contribute to strengthening the cooperation between France and Belgium in a strategic sector and aims to reinforce the group's footprint in the worldwide land defence market by expanding its portfolio of solutions to include an extensive range of advanced, high mobility wheeled military vehicles.

Arquus' new robot: the DRAILER

For the first time at Eurosatory, Arquus revealed its robotic platform that support fighters: the DRAILER. Aware of the advantages that new technologies bring to the battlefield and supporting this dynamic, Arquus has decided to combine its expertise in mobility and robotics to create a multifunctional platform, the DRAILER. A teleoperated vehicle, the DRAILER is a 4x4 platform that can be deployed for infantry support missions, as well as various specialised missions such as engineering, electronic warfare, counter–drone operations, and very short range ground–to–air missions. Equipped with a hybrid electric/diesel propulsion system ensuring silent movement, the DRAILER is a high–tech robot with autonomy suited to operational theaters.

HENSOLDT optronic vision systems for PUMA IFV

HENSOLDT said it would be supplying an unspecified number of optical vision systems for the PUMA infantry fighting vehicle. The customers are the system houses KNDS and Rheinmetall, which produce the PUMA infantry fighting vehicle and distribute it through the jointly founded PSM GmbH. The order value is in the double digit million range. In addition to the vision systems for the turrets of the infantry fighting vehicles, the order also includes the equipment for twelve turret trainers for training vehicle crews.

Leonardo showcases its new AW249

The AW249 next generation exploration and escort helicopter had its international public premiere at

Eurosatory (Paris 17–21 June) during an official ceremony attended by representatives from industry, Italian Defence and international delegations. The result of the strong collaboration between the Italian Ministry of Defence and Leonardo, the AW249 (designated AH–249A NEES – Nuovo Elicottero da Esplorazione e Scorta – known as the 'Fenice') is the only Western clean sheet combat helicopter design, in development to meet stringent emerging operational requirements for the next 30+ years. "It leverages capabilities and technologies not available elsewhere today, uniquely and ideally bridging a further gradual evolution of military vertical lift", stated Leonardo officials.

Germany joins CAVS vehicle programme

Germany has proceeded to the research and development agreement phase of the Common Armoured Vehicle System (CAVS) programme. The agreement parties are the CAVS participant nations Finland, Latvia, Sweden and Germany, and Patria. Germany is the fourth country to join the research and development phase of this multinational programme, which was initiated by Finland and Latvia in 2020, and later joined by Sweden in 2022.

Kongsberg turret firepower for USMC

BAE Systems delivered the first production representative test vehicle (PRTV) of the new Amphibious Combat Vehicle 30mm Cannon (ACV–30) to the customer earlier this year. ACV–30 is the third variant in the ACV family of vehicles designed, developed and built since BAE Systems was selected as the prime contractor for the programme in 2018.

British Army's "most lethal ever" tank undertakes live firing

"With advanced survivability and devastating firepower, the Challenger 3 boasts an impressive range of state of the art technology, making it the most lethal and survivable tank ever operated by the British Army," according to the army.

The live firing took place in northern Germany, following Prime Minister Rishi Sunak's visit to Berlin where he announced a joint endeavour to develop Remote Controlled Howitzer 155mm Wheeled Artillery Systems (RCH 155), which will be fitted to Boxer vehicles.

Finland orders heavy Patria 6x6 vehicles

The Finnish Defence Forces will purchase heavy Patria 6x6 armoured vehicles from Patria within the Common Armoured Vehicle System (CAVS) programme. The first phase of the acquisition will include one pre–series vehicle and 20 Kongsberg's remote weapon stations which will be integrated in the vehicles.

The acquisition will also include an option for additional purchases of 18 vehicles as well as provisions for vehicle outfitting, maintenance, spare parts, and training.

CAES to support US Army

CAES is advancing a key US Army modernisation priority with the development of the Precision Strike Sensor Core, a state of the art programmable transceiver. The Precision Strike Sensor Core enables Assured Positioning, Navigation, and Timing (APNT) and supports the Army's Long Range Precision Fires initiative, enabling first strike success. The programmable transceiver was developed to facilitate RF guidance and control as well as in–flight data link communications.


Photo Credit: U.S. Army photo by Spc. Jessica Scott

GDLS delivers 1st M10 Booker to US Army

General Dynamics Land Systems announced that it had delivered the first M10 Booker Combat Vehicles to the US Army. The M10 Booker is a new assault vehicle for the Army's Infantry Brigade Combat Teams (IBCTs). It moves rapidly in a variety of terrain conditions to engage and destroy enemy combatants, bunkers, machine gun positions, fortifications and armoured combat vehicles.

BAE to develop next gen decoys

BAE Systems has been selected by the US Navy to develop Dual Band Decoy (DBD), one of the most advanced radio frequency (RF) countermeasures in the world. DBD is a cutting–edge RF self protection jammer that shields fighter jets from enemy attacks.

Airbus achieves Eurodrone's PDR

The Eurodrone programme has successfully performed the Preliminary Design Review (PDR). Led by Airbus Defence and Space as prime contractor, this major programme milestone has been completed with OCCAR and representatives of the four customer nations (France, Germany, Italy and Spain).

AV's Switchblade 600

AeroVironment's (AV) Switchblade 600 loitering munition system has been selected for Tranche 1 of the first iteration of the US Department of Defence's (DoD) Replicator initiative. AV's Switchblade 600 is a man–portable, extended range loitering munition system equipped with an anti–armour warhead for engaging larger, hardened targets at greater distances.

B–21 Raider continues flight test campaign

Northrop Grumman Corporation's B–21 Raider continues its flight test campaign at Edwards Air Force Base, California, led by a Combined Test Force (CTF) comprised of Northrop Grumman and US Air Force personnel. CTF test pilots indicate the jet is performing as expected with the aircraft flying like the simulator, reflecting the precision of the digital environment on B–21.

Embraer delivers 1800th E–Jet

Embraer has reached a new delivery milestone on the "world's preferred small narrowbody aircraft programme"; delivery of the 1800th E–Jet production aircraft. The new Azorra owned E190–E2 was handed over to Royal Jordanian Airlines at Embraer's facility in São José dos Campos, Brazil.

2nd KC–390 Millennium for FAP

Embraer delivered the second KC–390 multi–mission aircraft to the Portuguese Air Force (FAP). The platform includes standard NATO (North Atlantic Treaty Organisation) equipment already integrated into the aircraft and meets the requirements set by the National Aeronautical Authority (AAN) of Portugal. In 2019, FAP ordered five KC–390, including a comprehensive services and support package and a flight simulator. The first aircraft entered into service in October 2023 at Beja Air Base.

AW609 in ship trial campaign

The AW609 tiltrotor programme set another major industry capability milestone after its first successful ship trial, which was recently conducted with the support of the Italian Navy.

HII delivers SSN 796 to US Navy

HII announced that its Newport News Shipbuilding division had delivered Virginia class fast attack submarine New Jersey (SSN 796) to the US Navy. New Jersey is the 11th Virginia class submarine delivered by NNS, and the 23rd built as part of the teaming agreement with General Dynamics Electric Boat.

Rafale enters service with Croatia

Following the acquisition of 12 Rafale from the French Air and Space Force in November 2021, the first six Rafale of the Croatian Air Force – Hrvatsko ratno zrakoplovstvo i protuzracna obrana (HRZ i PZO) – operated by its pilots trained in France, arrived at the 91 operational base, near Zagreb.

Coming from the Dassault Aviation site in Mérignac, these six Rafale will join the 191 Squadron of the Croatian Air Force. The next Rafale will arrive from the end of 2024, to form a complete squadron by mid–2025.

Saab delivers 4th GlobalEye to UAE

Saab has delivered another GlobalEye Airborne Early Warning and Control (AEW&C) aircraft to the United Arab Emirates (UAE), marking the delivery of the fourth advanced AEW&C aircraft to the UAE in just four years. The delivery took place on 18 April 2024 and follows Saab's previous deliveries of three GlobalEye to the UAE in 2020 and 2021.

Airbus Helicopters' Racer

Airbus Helicopters' Racer demonstrator, developed in the frame of the European Research Clean Sky 2 project, has performed its first flight, in Marignane. The aircraft flew for about 30 minutes, allowing the flight test team to check the overall behaviour of the aircraft.

Raytheon/Sener in missile production support

Raytheon has awarded Spanish supplier, Sener, a contract to develop and produce the electro–mechanical control section of the Patriot GEM–T missile. Sener will directly contribute to missile production in Europe in support of the recently awarded GEM–T contract by the NATO Support and Procurement Agency (NSPA) for a quantity of up to 1,000 missiles for a coalition of nations, including Germany, the Netherlands, Romania and Spain.

1st MQ–9A ER for USMC's VMUT–2

General Atomics Aeronautical Systems, Inc (GA–ASI) and the US Marine Corps (USMC) celebrated delivery of the first MQ–9A Extended Range (ER) Unmanned Aircraft System (UAS) to Marine Unmanned Aerial Vehicle Training Squadron 2 (VMUT–2).

Brunei orders six H145M's

Airbus Helicopters has signed a contract with the Ministry of Defence of Brunei for the acquisition of six H145M helicopters. Replacing its old BO105 fleet, Brunei's H145Ms will be used to enhance the air force's operational capabilities for missions including close air support and aerial observation.

10 ATR 72–600s for Avation

ATR announced the signature of a firm order for 10 ATR 72–600 with Avation PLC. Deliveries are scheduled between 2025 and 2028, showcasing Avation's "long–term vision and confidence in the relevance of ATR's products to serve the regional aviation market". The agreement is further complemented by 24 purchase rights, extending until 2034.

Manta Ray UUV prototype testing

The Manta Ray prototype uncrewed underwater vehicle (UUV) built by Northrop Grumman completed full–scale, in–water testing off the coast of Southern California in February and March 2024.

Testing demonstrated at–sea hydrodynamic performance, including submerged operations using all the vehicle's modes of propulsion and steering: buoyancy, propellers, and control surfaces. Manta Ray aims to develop and demonstrate a new class of long duration, long range, payload capable UUVs ready for persistent operations in dynamic maritime environments. DARPA is engaging with the US Navy on the next steps for testing and transition of this technology.

Malaysia for Sniper Advanced Targeting Pods

Malaysia has requested to buy ten (10) AN/AAQ–33 Sniper Advanced Targeting Pods. Also included are technical data and publications; personnel training; software and training equipment; US Government and contractor engineering, technical, and logistics support services; and other related elements of logistics and programme support. The estimated total cost is $80 million.

Elbit celebrates 3,000th delivery of F–35 HMDS

On 25 April 2024, Elbit America employees and legislators gathered to celebrate delivery of the 3,000th F–35 Helmet Mounted Display System (HMDS) from the company's site in Merrimack, USA.

Romania for 300 AIM–9X missiles

Romania has requested to buy up to three hundred (300) AIM–9X Sidewinder Block II Tactical Missiles; forty (40) AIM–9X Sidewinder Block II Tactical Missile Guidance Units; forty (40) AIM–9X Sidewinder Block II Captive Air Training Missiles (CATM) and twenty (20) AIM–9X Sidewinder Block II CATM Guidance Units.

NASA's X–59 passes milestone toward safe 1st flight

NASA has taken the next step toward verifying the airworthiness for its quiet supersonic X–59 aircraft with the completion of a milestone review that will allow it to progress toward flight. A Flight Readiness Review board composed of independent experts from across NASA has completed a study of the X–59 project team's approach towards safety for the public and staff during ground and flight testing.

Aurora's latest X–Plane design speeds ahead

Aurora Flight Sciences, a Boeing company, recently completed conceptual design review for a "game changing, high speed, vertical lift X–plane and has been selected to continue development of a preliminary design review". The aircraft is being developed for a Defense Advanced Research Projects Agency (DARPA) programme called Speed and Runway Independent Technologies (SPRINT), which "aims to design, build, and fly an X–plane to demonstrate the key technologies and integrated concepts that enable a transformational combination of aircraft speed and runway independence."

PAC–3 MSE/Aegis defeats target in flight test

In partnership with multiple Department of Defence Services and Components, Lockheed Martin launched a PAC–3 Missile Segment Enhancement (MSE) interceptor from an MK–70 containerised launch platform to engage a cruise missile target in flight. This test marks the first time PAC–3 MSE was launched in this configuration, utilising the Virtualised Aegis Weapon System, to intercept a live target.

US–Japan glide phase interceptor

Northrop Grumman Corporation will support the US–Japan cooperative development agreement to build capabilities defending against hypersonic missiles, strengthening overall missile defence deterrence.

LM in hypersonic weapon system contract

The US Army awarded Lockheed Martin a $756 million contract to deliver additional capability for the nation's ground–based hypersonic weapon system, the Long Range Hypersonic Weapon (LRHW). Under the new contract, Lockheed Martin will provide additional LRHW battery equipment, systems and software engineering support, and logistics solutions to the Army.

Canada for 690 JDAM tail kits

Canada has requested to buy an additional six hundred ninety (690) KMU–572 Joint Direct Attack Munition (JDAM) tail kits; seventy–five (75) KMU–556 JDAM tail kits; and twenty–five (25) KMU–557 JDAM tail kits that will be added to a previously implemented case whose value was under the congressional notification threshold.

Saudia Group orders 105 A320neos

Saudia Group, represented by Saudia, the national flag carrier of the Kingdom of Saudi Arabia, and flyadeal, the group's low–cost carrier, has signed a firm order for an additional 105 A320neo Family aircraft.

The order comprises 12 A320neo and 93 A321neo aircraft. This increases Saudia Group's Airbus aircraft order backlog to 144 A320neo family aircraft.

Sikorsky's 'Rotor Blown Wing' UAS for DARPA Project

Sikorsky is conducting flight tests to mature the control laws and aerodynamics of a novel vertical takeoff and landing uncrewed aerial system (VTOL/UAS). The flight tests are intended to prove the efficiency and scalability of a twin proprotor 'rotor blown wing' configuration that sits on its tail to take–off and land like a helicopter, and transitions easily to horizontal forward flight for long endurance missions, such as intelligence, surveillance, reconnaissance and targeting.

NG's autonomous VTOL X–Plane

Northrop Grumman has been selected by the Defense Advanced Research Projects Agency (DARPA) for the next design phase of its autonomous vertical takeoff and landing aircraft, as part of the AdvaNced airCraft Infrastructure–Less Launch And RecoverY (ANCILLARY) programme.

MBDA news and updates

MBDA's MdCN in simultaneous firing

The French Navy *(Marine nationale)* has successfully fired MBDA's Naval Cruise Missiles (NCM, or *Missile de Croisière Naval* (MdCN) simultaneously from both the multi–mission frigate Aquitaine (FREMM ASM) and a nuclear–powered attack submarine (*Suffren*–class), with the missiles striking the same target at the same time with pinpoint accuracy as part of training exercises on 18 April 2024. This double firing was performed with the technical support of the French Armament General Directorate (DGA).

GRIFO system with CAMM–ER

MBDA has recently performed a successful qualification firing of the GRIFO system, the Italian Army's new generation air defence system, a member of the EMADS (Enhanced Modular Air Defence Solutions) family developed by MBDA, based on the CAMM–ER (Common Anti–Air Modular Missile–Extended Range) missile. The Italian Army will operate GRIFO System for its air defence, giving its short–range air defence (SHORAD) capability an extended range. CAMM–ER is part of the wider air defence family of CAMM (Common Anti–Air Missile) missiles, which are vertically launched to provide 360° air defence coverage.

MBDA signs enhancements for Italy

MBDA has signed a contract amendment with OCCAR (the organisation for joint armament co–operation) to augment the technical capabilities of the Italian air defence systems based on CAMM–ER for the Italian Army and Italian Air Force, namely Grifo and MAADS (Medium Advanced Air Defence System). The contract will also see a new multi–role and multi–purpose Fire Control Unit (FCU), developed and designed by MBDA to significantly

increase the command and control capabilities of the Grifo system. This evolution, implemented to the benefit of the Italian Army, introduces comprehensive evolutions that have been designed over the past 12 months, within the main production contract to strengthen the Italian Armed Forces' operational capabilities.

MBDA, Kongsberg and Diehl Defence to develop supersonic strike missile

The Norwegian government announced this initiative in November 2023 and the industry team essential for the success of this project have now entered their partnership agreement. This partnership, led by Kongsberg, combines the strengths of these companies and brings together decades of missile development experience to create this highly advanced, long distance, maneuverable super sonic strike missile for the Norwegian and German customers as well as Allied customers in the future. The team will work closely with the Norwegian and German Defence Forces as well as their national research organisations to define and develop "the world's most advanced long range strike capability designed to meet future surface threats".

MBDA to launch HYDIS² concept phase

MBDA has signed with the Organisation for Joint Armament Cooperation (OCCAR – *Organisation Conjointe de Cooperation en Matière d'Armement*), a European Defence Fund grant agreement on behalf of the partners of the HYpersonic Defence Interceptor Study (HYDIS2) Consortium and a Linked Procurement Contract (member states co–funding), on 15 May, launching the HYDIS2 concept phase. The European Commission selected the HYDIS² project for funding in July 2023 and the governments of France, Germany, Italy and the Netherlands decided to co–fund.

MBDA's Marte ER success in Romania

MBDA has signed a contract with IAR Brasov to support the integration of the Marte ER onto a maritime helicopter platform for the Romanian Naval Forces, based on the Airbus H215M platform. "Thanks to its excellent performance, Marte ER will provide a state of the art capability to carry out anti–surface warfare missions, allowing the Romanian Navy to protect Romania sovereign interests in the most efficient way" stated officials. This contract marks a major step of co–operation between MBDA and the Romanian Armed Forces.

Lockheed Martin delivers 2,700th C-130 Hercules

Lockheed Martin recently delivered the 2,700th Hercules multi-mission tactical airlifter, increasing the size, reach and strength of the worldwide C–130 fleet. This landmark aircraft was a KC–130J Super Hercules tanker operated by the US Marine Corps Aerial Refueler Transport Squadron 252 at Marine Corps Air Station at Cherry Point, North Carolina.

Defined by its proven performance and unmatched versatility, operators in 70 nations around the world fly C–130 airlifters to support any mission–anywhere, any time. The current C–130 production model is the C–130J Super Hercules, which includes the KC–130J tactical tanker. To date, the C–130J is certified to support 18 different mission requirements.

"The Lockheed Martin team is honoured to deliver this milestone Super Hercules to the US Marine Corps, where it will be part of the largest KC–130J fleet in the world and provide true force amplification across the globe," stated Rod McLean, vice president and general manager of Lockheed Martin's Air Mobility & Maritime Missions line of business. "Not only does this Hercules represent the 2,700th C–130 delivered, but it also reflects the inherent mission and performance adaptability that fuels the C–130's ongoing relevance."

The KC–130J is the global standard for tactical tankers, refueling a majority of rotary wing aircraft in operation today and multiple fixed wing aircraft including the Lockheed Martin F–35B/C Lightning II fighter aircraft. With its truly tactical design, the KC–130J has the ability to fly at the slow speeds and low altitudes that are ideal when refueling helicopters.

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 — including humanitarian operations around the world. The global C–130J fleet spans 26 operators in 22 nations with 20+ air worthiness certifications. With nearly 3 million flight hours logged across the global fleet of 540+ C–130Js, invaluable insights gained from missions in every scenario equip the C–130J for what's next.

Text: Lockheed Martin
Photos: IAF C–130J taken by the Vayu Team

Rosoboronexport to help equip airborne forces

BMD–4M

BTR–MDM

SPRUT–SPTP

JSC Rosoboronexport (part of Rostec State Corporation) is offering its foreign customers its services in organising and fully equipping airborne units as part of the national armed forces.

The Company is ready to assist in forming an organisational structure of airborne units, establishing the necessary ground infrastructure, equipping the units with all types of military equipment and weapons and training military personnel. Rosoboronexport's efforts will result in the emergence of a fully operational branch of the foreign customer's armed forces.

"The experience of modern military, counter–terror and peacekeeping operations suggests that airborne units are the most trained tactical formations capable to rapidly achieve the goals behind enemy lines and on the forward edge of the battle area (FEBA). They can successfully conduct raids to defeat the enemy, capture and hold territories and critical facilities", stated Alexander Mikheev, Director General of Rosoboronexport. "Today Rosoboronexport offers friendly countries to implement projects for building, equipping and training airborne units, given rich traditions and combat experience of the Russian Airborne Forces. The company sees a great potential for its offer in the Asia–Pacific region, the Middle East and Africa."

In the framework of organising airborne units in the partner armies, Rosoboronexport proposes to equip them with all the necessary state of the art military equipment for performing combat missions. In recent years, Russian defence companies have developed new models of military equipment, as well as heavily modernised weapons tested in real conditions, equipping them with regard to relevant and advanced warfighting concepts.

The BMD–4M airborne assault vehicle from Rostec's High–Precision Systems is an air–droppable tracked amphibious fighting vehicle armed with a 100mm gun, a 30mm cannon and a 7.62mm machine gun. It has a three–man crew and accommodates seven equipped paratroopers. Its airborne platform is fitted with an adjustable hydro–pneumatic suspension that provides a ground clearance from 100 to 500 mm, thus reducing the profile of the vehicle when it is used in defence.

High–Precision Systems' upgraded 2S25 125mm self–propelled anti–tank gun (Sprut light amphibious tank) is the only light amphibious combat vehicle in its class that is similar in firepower to the T–90MS tank and compatible with munitions for Russian main battle tanks. It is equipped with a lethal weapon system, including a 125mm gun with a 7.62mm coaxial machine gun and a 7.62mm remote–controlled machine gun mount. The vehicle is fitted with a guided missile system designed to defeat armoured targets, including those equipped with ERA, at ranges up to 5 km.

The BTR–MDM armoured personnel carrier, manufactured by High–Precision Systems, is designed to transport up to 13 troops, ammunition, spare parts, fuels as part of assault units in all conditions of combat employment. Command post vehicles, mobile signal centers, medical vehicles and technical support vehicles can also be equipped on the BTR–MDM chassis.

AMRAP vehicle of the Typhoon–K family manufactured by Remdiesel (part of Rostec State Corporation), which is armed with a 30mm remote–controlled weapon station, is also designed to support combat operations by airborne units, transport personnel and cargo.

Remdiesel's MTR technical reconnaissance vehicle is designed to carry a crew of 5 people and special equipment. It is fitted with surveillance and technical reconnaissance devices.

Depending on the missions assigned, an airborne unit can be armed with a 120mm 2S42 Lotos self–propelled howitzer, a 2S41 Drok self–propelled mortar and a Kornet–EM ATGM system. The 83t501 Zavet–D system based on the BTR–MDM is designed to provide automated artillery fire control.

All military equipment of the airborne forces can be air landed or air dropped at a specified point.

Personnel, military equipment and cargo are air dropped at the mission location using parachute systems developed and manufactured by Rostec companies.

Rosoboronexport offers foreign partners a wide range of air drop systems for a variety of missions. Among them are the Dalnolet, Tandem–400, Arbalet–2, Berkut–2 and Stayer–2 dedicated systems, as well as the D–6 and D–10 mass dropping systems.

The Dalnolet special purpose system enables paratroopers to jump from an altitude of 8,000 meters, including as part of a group, at up to 60 km away from the aircraft. At the same time a paratrooper can carry enough weapons, ammunition and special equipment, since the total flight weight is 190 kg. With the Tandem–400 two–seat special purpose parachute system, it is possible to be air dropped with a passenger or place a container weighing up to 50 kg on a harness system (the total flight weight is 225 kg). To equip paratroopers with a payload, Russia has developed various cargo restraint systems and cargo containers that meet modern ergonomics requirements, as well as protective helmets, night vision devices and oxygen equipment for paratrooper breathing during air drops at altitudes from 4000 to 8000 meters.

Airborne assault vehicles weighing up to 20 tons are air dropped using the MKS–350–12/12M cargo multi–canopy parachute system and a PBS platformless parachute system.

Rosoboronexport proposes to use modern Russian–made parachute cargo systems for airdropping weapons, ammunition, military and humanitarian supplies.

In addition, Rostec State Corporation has proactively developed the APSDG–250 automated parachute system which makes it possible to drop loads up to 250 kg from altitudes up to 8,000 meters with a touchdown error of up to 100 meters.

To ensure high mobility of airborne units, Rosoboronexport offers the latest Ilyushin Il–76MD–90A(E) military transport aircraft developed and built by Rostec's UAC, which has more than 70% of upgraded systems and units compared to the Il–76.

The Il–76MD–90A(E) can carry and airdrop weapons and military equipment used by airborne forces. It

Parachute System

accommodates up to three BMD–4M assault vehicles, up to three BTR–MDM APCs and up to two upgraded 125mm 2S25 self–propelled anti–tank guns (Sprut light amphibious tanks). The aircraft provides airdropping of up to 126 fully equipped paratroopers. Its range is 4,000 km with a 60 ton load and 5,000 km with a 52–ton load.

The aircraft can be equipped with the President–S defensive aids system, which automatically protects the Il–76MD–90A(E) from enemy guided missiles across the entire envelope of their engagement ranges and aspect angles.

An important competitive advantage of the Il–76MD–90A(E) is its capability to take off and land on unprepared and unpaved airfields.

Effective training of the airborne personnel is carried out using modern equipment. Rosoboronexport is ready to provide partners wishing to have trained and efficient airborne units with dynamic crew simulators, gunnery trainers, driving simulators, as well as crew training classrooms. The initial paratrooper training with parachute landing fall drill in various conditions is carried out at the UTK–VDP airborne training facility.

As part of personnel training, the Russian Ministry of Defence's experienced instructors will train future paratroopers in the basics of airborne warfare tactics, actions in combat situations, equipment and weapon operation features, taking into account the realities of modern military conflicts, including the use of unmanned reconnaissance and strike systems.

IL-76MD-90AE

Article and photos: Rosoboronexport

Rosoboronexport at National Security, Belarus–2024

National Level Cybersecurity Platforms

Rosoboronexport JSC (part of Rostec State Corporation) presented the latest Russian solutions to ensure public and national security at the National Security. Belarus 2024 Exhibition from June 19 to 21 in Minsk, Belarus. The company held presentations on a wide range of weapons, gear and equipment for counter–terrorism and police units, special operations forces (SOF), ground troops, as well as security and surveillance equipment for protecting borders, high–value assets and critical infrastructure.

"The brotherly nations of Russia and Belarus are facing similar security challenges today. International terrorism, threats to state borders and critical facilities, cyber attacks on information systems and digital infrastructure are factors that are seriously affecting sovereignty and economic development. At the exhibition in Minsk Rosoboronexport presented modern equipment and solutions capable to effectively counter these threats. In addition, we count on strengthening technology linkages between developers and manufacturers from our countries, who have repeatedly shown their abilities to make products unique for the world market in close industrial partnership," stated Alexander Mikheev, Director General of Rosoboronexport.

The company exhibited small arms, including a wide range of Kalashnikov assault rifles – the AK–200 series, AK–12, AK–15 and AK–308 assault rifles – to equip SOF and Land Forces' soldiers. The company also demonstrated the Chukavin sniper rifle, 9mm Lebedev pistols and the PPK–20 submachine gun.

PLK

AK-15

Leading Russian manufacturers have developed new uniforms that take into account the realities of modern fighting and special operations. Rosoboronexport also showcased in Minsk the VKPO 3.0 all–season field uniform and the Strelok modular load carrying system. Among the exhibit items at the company's booth were also communication equipment, electroshock devices, thermal attachments and sights, and UAV countermeasures.

PPK–20

VKPO 3.0 + Strelok

Updates from Boeing

T–7A Red Hawk triples progress

The Boeing T–7A Red Hawk recently achieved three recent milestones, propelling the advanced pilot trainer for the US Air Force forward.

T–7A aircraft APT–3, one of five engineering and manufacturing development aircraft, underwent rigorous testing at Eglin Air Force Base, enduring temperatures ranging from –25°F to 110°F. This test evaluated the aircraft system's performance, including propulsion, hydraulic, fuel, electrical, secondary power, environmental control, and overall operations in extreme environmental conditions. The aircraft has since returned to St. Louis for testing.

Boeing and the Air Force conducted a dynamic sled test in February at Holloman Air Force Base in New Mexico.

The test focused on design enhancements in the Collins Aerospace, an RTX business, ACES 5 ejection seat and Pacific Scientific EMC's canopy fracturing system to reduce the risk of injury. During the test, the team implemented variable timing to slow down the ejection seat, using the drogue chute and investigated canopy fracturing system patterns. The team is now preparing to move forward with the next round of development testing.

Boeing completed development of a new software flight control law in February and since then, has flown the aircraft more than 10 times, reaching 25–degree angle of attack. Additionally, three of those flights demonstrated the aircraft's ability to achieve fine tracking while in high angle of attack, a key capability for pilot training. Incorporation of control law 17.5 clears the path for the Air Force to start high angle of attack and departure resistance testing at Edwards Air Force Base.

While the T–7A Red Hawk continues to progress in testing and flight completions, Boeing is also building a new production line for low–rate initial production (LRIP) of the T–7A. The company is slated to load the first forward and aft fuselages for LRIP midyear as suppliers are already underway developing parts for production.

Contract for 7 more MH–139As

The US Air Force has awarded Boeing a $178M contract to produce seven MH–139A aircraft and provide sustainment and training support. This order brings the total number of aircraft under contract to 26.

Boeing's ecoDemonstrator

Boeing is testing three dozen technologies on its ecoDemonstrator programme focused on strengthening operational efficiency and sustainability in cabin interiors, one of the most challenging parts of recycling an airplane. The company will begin testing using a 777–200ER (Extended Range).

The Boeing ecoDemonstrator projects includes 1) Airport operations: Testing to enable single–engine taxi and digital taxi clearances to reduce fuel use and enhance safety by reducing pilot workload. 2) Airport noise: Quantifying the benefits of flight operation procedures, like steeper glide slope and continuous descent approach, to reduce community noise, fuel use and emissions. 3) Waste–reducing materials: Lighter, recyclable and more durable floor coverings and recycled carbon fiber ceiling panels – both made with 25% bio–based resin. 4) Noise and weight reduction: Cabin insulation to better reduce noise and regulate humidity and temperature, and fabric–covered acoustic panels for the bulkhead and galley. 5) Future cabin concepts: Economy and business class seats with sensors that detect if someone is seated during taxi, takeoff and landing which can improve safety, and reduce crew workload and downtime for maintenance; a touchless water conservation lavatory; and galley technologies to make cabin service more efficient and reduce food waste.

"The Boeing ecoDemonstrator programme helps us make tangible improvements to our products – allowing us to reduce the environmental impacts of flying, improve the in–flight experience and strengthen the safety of our airplanes," stated Stephanie Pope, president and CEO of Boeing Commercial Airplanes. "We're grateful for the many partnerships within aviation and beyond who help us turn the seemingly impossible into reality."

Since its initial flights in 2012, almost every platform of the Boeing ecoDemonstrator programme has flown on sustainable aviation fuel (SAF), and this year, the flagship airplane will fly on a 30/70 blend of SAF and conventional jet fuel.

Boeing completes F/A–18 Super Hornet upgrade

Boeing has completed the upgrade and life extension of the first two service life modification (SLM) F/A–18 Block III Super Hornets, delivering them to the US Navy one month ahead of schedule from St. Louis and two months ahead of schedule from San Antonio. The upgraded jets have the same capabilities as Super Hornets being delivered from Boeing's new–build production line.

"Our success in meeting the accelerated timeline is proof our service life modification game plan is working," stated Faye Dixon, Boeing SLM director. "Thanks to our years of learning on the programme and our partnership with the Navy, the F/A–18 Super Hornet remains at the forefront of defence technology with renewed years of service to support the fleet."

In partnership with the Navy, Boeing has improved productivity and is completing Block III upgrades ahead of the 15 month contract requirement. This was made possible by establishing a baseline for the condition of Block II F/A–18s received at Boeing, and the Navy's work to prepare the jets in advance plus sharing information and best practices across multiple SLM sites to improve efficiency, manage workload distribution and optimise resource allocations.

"Great measures were taken by the Boeing and Navy teams to ensure these are the safest and most capable Block III F/A–18s we can give our warfighters," stated Mark Sears, Boeing Fighters vice president. "These are just the first of many deliveries, with around 15 years of SLM deliveries to go. Our warfighters are counting on us to get this right every time."

Block III upgrades include a large area display and more powerful computing through Tactical Targeting Network Technology and a Distributed Targeting Processor Networked open mission systems processor. The work is being done at Boeing sites in St. Louis and San Antonio, and at the Navy's Fleet Readiness Centre Southwest in San Diego.

Boeing and the Fleet Readiness Centre Southwest signed a Public–Private Partnership agreement in March to expand the work scope at the command, paving the way for the readiness centre to now perform the same Block III SLM work done in St. Louis and San Antonio.

"These first deliveries of Block III SLM jets are a major milestone in our continued efforts to ensure capability, reliability, availability and maintainability of the Super Hornet aircraft," stated Capt. Michael Burks, programme manager for the F/A–18 and EA–18G Programme Office. "We look forward to our continued partnership with Boeing to deliver this critical warfighting capability to the fleet."

Text courtesy: Boeing

Photos: The Vayu Team at Aero India 2023

VAYU on–the–spot report

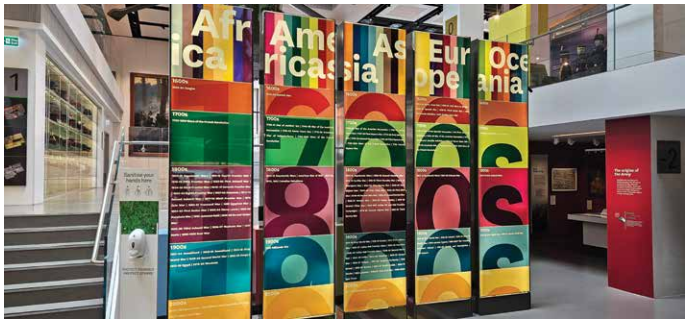
The National Army Museum, London (Part 1)

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

Iniochos 2024

Introduction

Exercise Iniochos 2024 was carried out in the clear blue Hellenic sky from 8–18 April. Also, this year again, three new members were welcomed to the continually expanding international Iniochos family: Montenegro, Qatar and Romania. The number of Air Forces participating in Iniochos 2024, has been so far the largest one in the history of the exercise since its establishment as an INVITEX–exercise. The number of air assets was 106, based in Andravida AB plus more air assets flying from other airbases. These air assets completed in total 1,027 sorties, more than 100 per day.

Exercise

In general, exercise Iniochos offers realistic combined air operations where crews operate in a complex and congested air environment. These challenging scenarios with multiple modern threats and real–time live injects are specially designed to maximise combat effectiveness and boost the interoperability of participating allied forces, operating in a demanding and dynamic training environment. The combined presence of dangerous air and surface threats provides an opportunity to interact, cooperate and exchange ideas with the aim of producing an effective tactical action plan. Following the flights, mission reconstruction and debriefing is helping identifying lessons regarding the use of multinational forces and strengthens individual and team skills. In order to achieve this, the Hellenic Air Force Fighter Weapons School (SOT) of the Air Tactics Center (KEAT) supervises the missions

from scenario planning to debriefing, confirming that the full range of missions to be covered was conducted by the participants.

Iniochos 2024 was structured around nine major missions, each focused on a particular theme: Air Power Contribution to Land Operations (APCLO) & Air Power Contribution to Maritime Operations (APCMO); Combat Search & Rescue; Defensive Counter–Air; Ground Asset Attack; High Value Airborne Attack; Offensive Counter–Air Operations against Integrated Air Defence Systems; Strategic Air Operations; Time Sensitive / Dynamic Targeting and finally Traditional Reconnaissance.

A main mission theme is defined each year in cooperation with the participating countries. Last year it was "Maritime Strike". This year special emphasis was given to Air Superiority and Long Range Escort as well as to Night missions. In addition, new missions based on observation of the current global conflicts have been included in the detailed training programme.

Participants

In addition to the Hellenic Armed Forces, the following countries took part with personnel and equipment at INIOCHOS 2024:

COUNTRY	NUMBER & TYPE(S)	UNIT(S)	REMARKS
Austrian Air Force	–	–	Reconnaissance & Special Forces Team
Cyprus Air Command	1x AW139	460 MED	
French Air Force	E–3F	–	Operating from Home Base
French Navy	7x Rafale M	Flottille 12F	
Montenegrin Air Force	1x Bell 412EPi	HE	
Portuguese Air Force	–	–	Reconnaissance & Special Forces Team
Qatar Emiri Air Force	1x Rafale DQ 4x Rafale EQ	62 Sq	
Romanian Air Force	3x F–16AM	Esc 53	
Royal Air Force	Typhoon FGR.4	–	Operating from RAF Akrotiri
Royal Saudi Air Force	4x Typhoon F.2 2x Typhoon T.3	3 & 10 & 80 Sq	
Spanish Air Force	4x F/A–18A+	462 Esc	
USAFE	F–16C/D MQ–9A	510th FS 31st EOG	Operating from Home Base's

Fig. 1: INIOCHOS 2024 Participating Countries

Observers from Germany were also present. Due to the ongoing Gaza–War, the Royal Jordanian Air Force and the Israeli Air Force cancelled their participation in the exercise.

The Hellenic Air Force (HAF) participated with all types of its combat aircraft (fighters and EriEye Command & Control platform) as well as helicopters, transport and training aircraft. Forces of the Army, the Navy and the Special Warfare Command also participated, which contribute decisively to creating complex and realistic scenarios throughout the entire exercise area. Keeping up with the technological evolution and learning from the latest developments in the various current battlefields, the HAF further utilised the Operational Synthetic Training Squadron with its 11 simulators. At the same time, the increasing number of operational F–16CV/DV, equipped with the AN/APG–83 AESA radar, combined with the large number of foreign participants with fighters also equipped with AESA radar, raised this year's Iniochos to the absolute pinnacle of modern air exercises on an international scale.

Due to the recent discussions in Hellas and abroad, it was interesting to see the HAF F–16 Block 30 and Block 50 Fighting Falcons from 330 and 347 Squadrons, 111 Fighter Wing, Nea Anchialos AB in action and in direct comparison against a multitude of modern fighters equipped with AESA radar. The latest information from Athens indicates the intention of implementation of an upgrade programme to the F–16 Block 50 with the scope to bring them to F–16CV/DV standard with, among other, the APG/AN–83 AESA radar. The future of the F–16 Block 30 is nebulous. There are rumours that they will be offered to the Ukraine or to the European F–16 Training Center (EFTC) in Romania. So far, the Hellenic government has denied this. Another plan is to bring them up to a similar standard like the US Air National Guard Fighting Falcons. Nevertheless, and apart from these plans, these "old" F–16 have many more flight hours available and in the hands of experienced pilots together with the support of highly trained and experienced technicians, they are still a real "troublemaker" and the reason of headaches for pilots in

much more modern fighters! It must not be forgotten that the pilots and technicians of 330, 341 and 347 Squadrons of 111 FW are among the most experienced Fighting Falcon personnel worldwide.

The Air Command of the Cypriot National Guard has sent again, as in the previous exercises Iniochos, an AW139 multirole helicopter from 460 MED, Paphos AB. The Cypriot contingent's primary duties were insertion/extraction of JTAC and Special Forces teams behind enemy lines, day and night, troop transport, and combat search and rescue operations.

France took part in a dual way. The Navy (Aeronavale) deployed Rafale M from Flottille 12F, BAN Landivisiau to Andravida with 18 pilots and 90 technicians. This was the second French Navy deployment after 2021. This time, the naval Rafale mainly participated in Long Range Escort missions, Air Superiority missions and Reconnaissance missions. They were reinforced by several E–3F AWACS flights by the French Air Force (Armee de l'Air) for general command & control tasks, operating from BA702 Avord.

With the participation of Montenegro for the first time in an exercise Iniochos, a new cycle has opened in the long–term cooperation between the armed forces of Montenegro and Hellas. After 112 years and the 1st Balkan war, the armed forces of the two countries and in particular the Air Forces cooperated again for a common purpose. The military relations between Podgorica and Athens are particularly close as shown by the large number of Montenegrin students at Hellenic higher military schools, e.g. at the Hellenic Air Force Academy. This year's participation with a Bell 412EPi helicopter to Iniochos is the seal of this close cooperation.

After the dissolution of the Federal Republic of Yugoslavia, the subsequent union of Serbia–Montenegro and the renewed independence of Montenegro, the newly established Air Force had and still has to deal with significant problems of manning, material renewal and financing, although in recent years the country has managed to gradually and successfully overcome the problems with small, cautious and gentle steps. A major step forward in terms of fleet renewal was made in 2018 with the delivery of two new–build Bell 412EPi and one fully upgraded Bell 412EP. These helicopters are primarily used for SAR and MedEvac duties, as well as for transport and reconnaissance roles.

The Montenegrin Air Force's participation in this year's Iniochos is due to the Hellenic Air Force's desire to further expand the exercise's range of missions and give greater importance to the role of helicopters on the modern battlefield. The Montenegrins, together with their Cypriot colleagues, contributed to combat search and rescue missions and troop air transport missions and also carried out day and night insertion and extraction missions of JTAC and Special Forces teams behind enemy lines. HAF AS.332C1 also took part in these missions. AH–64A/D of

the Hellenic Army Aviation participated either as friendly forces or as "enemy" forces.

The overall performance of the Montenegrin contingent in Andravida was more than excellent and the other participants had only the best to say about their performance in these extremely demanding missions. From the Hellenic side, there is a clear desire for a re–participation in Iniochos 2025, which is almost sure that will happen, barring exceptional circumstances.

The State of Qatar participated in exercise Iniochos for the first time. However, it was not the first time that Qatari fighters operated from Hellenic territory. Despite the contrary rumours circulated by so–called experts mainly on the internet, general relations and especially defence relations between Qatar and Hellas are at a very good level. Let's not forget that Qatar turned to the Hellenic Air Force for joint training of the Qatari Mirage 2000–5DDA/EDA with the Hellenic Mirage 2000–5/B Mk. 2 over the past decade.

The Qatari detachment consisted of a total of five Rafale, four single–seat EQ and one two–seat DQ from 62nd Squadron, Tamim AB. During the exercise, the Qataris participated in all kinds of missions, air to air and air to ground, day and night. During these missions, the Qatari detachment was characterised by high professionalism, total dedication in carrying out each mission and by team spirit. All other participants had nothing but the best to say about their Qatari colleagues,

who were always characterised by exceptional friendliness and great modesty.

The aim of participation was, among other things to increase general combat readiness and to exchange modern tactical combat experiences. An important aim was also the mutual exchange of tactical, operational and technical knowledge with the two others participating Rafale users, the Hellenic Air Force and the French Navy. From the Hellenic side, the annual participation of Qatar in future Iniochos exercises is highly desired. It is certain that both the Qatari Emiri Air Force and the other participants will only benefit from such a possible development.

The third new participant in Iniochos 2024 was the Romanian Air Force. The Fortele Aeriene Romane had sent to Andravida three F–16AM of Escadrila 53 Vanatoare based at Baza 86 Aeriana in Fetesti. The Romanian Air Force acquired its first ex–Portuguese Fighting Falcons in 2016 with the last delivery in 2021. In November 2023, the receiving of ex–Norwegian F–16AM/BM to equip a second Fighter Squadron began.

Iniochos 2024 was the first participation of the Romanian Fighting Falcons in an international exercise outside Romania, if we exclude the Baltic Air Policing 2023/2 campaign. Although the Romanian Air Force is of course still in the phase of gaining valuable experience in the use of F–16, the other participants in the exercise were impressed by the high professionalism of the Romanian contingent, which distinguished itself through innovations on several occasions. Their ideas contributed significantly to the successful execution of the missions in which they took part.

Due to its proximity to Hellas and the given intention to assume greater responsibility in the Balkans, the participation of the Romanian Air Force in the next exercise Iniochos is considered a given, which is highly welcomed by the Hellenic side.

The Kingdom of Saudi Arabia participated in exercise Iniochos for the second consecutive year. As it is usual with the Royal Saudi Air Force, this time new squadrons had the opportunity to compete with some of the best air forces in the world. The Saudi contingent consisted of a mix of Typhoon (Eurofighter) drawn from 3 different squadrons (3, 10 and 80), all based in King Fahd AB at Taif.

Like last year, the Spanish Air Force had sent again real veterans to Hellas, McDonnell–Douglas F/A–18A+ from 462 Escuadron in Gran Canaria. This Hornets were bought used from the US Marine Corps and are scheduled to be replaced by new Typhoon (Eurofighter) Tranche 4 in accordance with the Halcon–program from 2026 on. Their main task is Air Defence and this was also their main task during the exercise. On the other hand, the exercise represents also a great challenge in terms of the expeditionary capacity of the Spanish Air Force, given the need to deploy and withdraw forces from Gran Canaria to Hellas.

Both Austria and Portugal sent JTAC and Special Forces teams to Andravida. They worked together with the Cypriot and Montenegrin contingent as well as with Hellenic Special Forces and air assets. The Austrians in particular have been participants for many years in exercise Iniochos and are always welcomed with open arms due to their extensive experience in this area.

The Royal Air Force participated for only the second time in exercise Iniochos but was not physically present at Andravida, instead flying with Typhoon FGR.4 from RAF Akrotiri in Cyprus. Like last year, the USAF participated with F–16C/D and MQ–9A UCAV flying from their respective home bases at Aviano AB in Italy and Larissa AB in Hellas, but only during the second week of the exercise.

They were supported by USAF KC–135 operating from Athens International Airport and NATO E–3A AWACS operating from Preveza AB. The somewhat hesitant participation of the USAF in particular in recent years, but also the RAF's unwillingness to participate in joint exercises with the HAF, is seen by many international analysts as a result of London and Washington's desire to maintain a certain balance in their respective defence relationships with Hellas and Turkey respectively. Of course, one cannot help but notice that the scale is clearly tilted in favour of Turkey and everything is being done for the sake of pretence.

Resume and Future

In his speech, the Chief of the Hellenic Air Force General Staff, Lieutenant General Dimosthenis Grigoriadis, mentioned among other "… it is widely acknowledged that we are facing an increasingly unstable global environment, characterised by evolving security threats and geopolitical complexities. As we navigate through such environment, the challenges faced by Air Forces continue to grow, emphasising the urgent need for robust defence cooperation and interoperability. In this context, Iniochos, a Multinational Joint Air Exercise among allies and partners, stands as a lighthouse of collaboration and preparedness, providing a crucial platform to enhance our fighting capabilities, joint readiness, interoperability, and foster regional partnerships. Iniochos serves as a platform where participating countries come together to extend their skills, exchange expertise and enhance their collective capabilities in addressing diverse security challenges. This year's exercise introduces innovative training procedures, such as Synthetic Training, and leverages new technologies to provide participants with dynamic and highly realistic environments to refine their skills in aerial warfare. Focusing on multinational cooperation and integration, Iniochos 2024 exposes participants to diverse operational concepts and cutting–edge technologies, preparing them for the complexities of modern air combat environments. From air combat tactics to air–to–ground

missions, participants benefit from exposure to a wide range of scenarios, ensuring readiness to meet future challenges. Our objective is to brace ourselves and be ready to collaborate, fight together and act as a wingman to each other, in order to face any emerging security threat…".

The Chief of the Hellenic National Defence General Staff, General Dimitrios Choupis, mentioned "… it was with great satisfaction and joy that we watched the Iniochos exercise, with which we give the possibility to our Air Force and also to the Air Forces of our allies, to cooperate in an interdisciplinary environment, but also in a clearly difficult terrain of our country. The environment of air, land and sea, as it is shaped in Hellas, gives different unique experiences for pilots. But also, in the training of older types of aircraft with the most modern aircraft, the pilots are given the opportunity to discover new possibilities but also the disadvantages of each aircraft, so that he can make better use of it …".

Exercise Iniochos is rapidly becoming the premier mid–sized air exercise in Europe and the Near/Middle East, covering the full spectrum of modern air operations, from air to air to air to ground to maritime operations. Proof of this is the growing number of participating countries and the return of former participating countries. Rising costs are one of the biggest challenges for all air forces worldwide and are the number 1 problem for most European air forces after the current/future introduction of the F–35. In times of financial austerity, Iniochos has a big advantage compared to other similar exercises such as Red Flag or Maple Flag: It is much more cost–effective! You don't have to fly across the Atlantic and any outages or bottlenecks can be resolved in a few hours. Aside from that, the geographical environment in Hellas offers great terrain either for terrain masking flights in mountainous areas or for unlimited dogfights over a deep blue sea environment, giving each participant a unique experience. Also, in these times when large international exercises are becoming increasingly rare due to rising costs and loosing training days due to bad weather is simply not an option anymore, the predominantly good weather in Hellas was praised by all participants. No missions were cancelled due to poor weather conditions.

According to the Hellenic Air Force, exercise Iniochos will continue to be a LIVE INVITEX exercise, but of course there will be increasing emphasis on the use of the Operational Synthetic Training Squadron with its fully operational simulators. Work is currently underway to bridge the HAF simulators at Andravida, Araxos and Souda AB's to create a unified synthetic simulation network. After a thorough comprehensive analysis of the current global conflicts, especially Ukraine, next year's Iniochos will see a greater contribution and participation of UCAV in the overall missions, with hopefully the first Hellenic–made next–generation UAV and inclusion of maritime UAV. As for participating countries, it is expected that the Indian Air Force (IAF) will take part again, this time most likely with Rafale. The plan is to alternately conduct HAF–IAF exercises in Hellas and India every two years. According to the Hellenic Air Force General Staff and following the IAF participation in Iniochos 2023, the HAF will participate in exercise Tarang Shakti 2024 in August this year with Rafale DG/EG of 332 Squadron. There were also rumours doing the rounds of setting up an annual or biennial exercise just for Rafale users, similar to the Lion Effort exercise for Gripen users.

The authors would like to warmly thank all personnel of the French, Hellenic, Montenegrin, Qatari and Romanian Air Force (in alphabetical order). Without their active support, this article would not have been possible. Thank you so much!

Text by Marcus Vallianos
Pictures by Philipp Vallianos

Pharewell Phantom

One of the final F–4's received this jungle camouflage scheme, referring to the initial ROKAF Phantoms when they entered service back in 1969.

South Korea bid farewell to the McDonnell Douglas F–4 Phantom II on 7 June 2024. After 55 years of service two Phantoms made their last flight from Suwon Air Base. Upon their return an emotional decommissioning ceremony saw the Republic of Korea Air Force (ROKAF) provide an "honourable discharge" for these aircraft that have played such a vital role over the past decades. The F–4 has been vital in the defence of the nation and seen as a game changer after its introduction. The proper send off for the type was attended by South Korea's Minister of National Defense Shin Won–sik. The ceremony saw many other military leaders, past and present, as well as former pilots and maintenance crew associated with the ROKAF F–4 join the ceremony. With South Korea being only one of four operators of the Phantom in the world, this iconic plane will slowly disappear from the skies in the world.

Having operated the type since 1969, the ROKAF was one of the F–4's earliest operators, after the United States, United Kingdom and Iran. As part of a deal between the US to participate in the Vietnam War, South Korea became the fourth country to fly the F–4. In total, South Korea operated 187 Phantoms in three versions. The ROKAF initially received 18 F–4D's, paid for with $64 million in special military aid provided by the United States government, part of the Peace Spectator programme. Training for aircrew and maintainers began at Davis–Monthan Air Force Base, Arizona, in 1968. The first six of these F–4Ds arrived at Daegu Air Base on 29 August the following year. With the ROKAF's main fighter being the budget friendly F–5 beforehand, the Phantom helped form South Korea's aerial superiority in the 70s. The first ROKAF Phantom squadron, the 151st Fighter Squadron, was formally established at Daegu on 23 September 1969. The 152nd, 153rd, and 159th Fighter Squadrons followed,

An F–4E and RF–4C watch over the retirement ceremony.

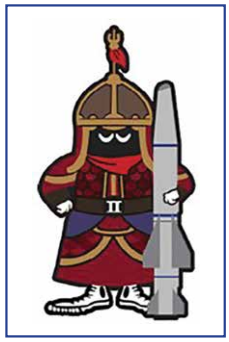
making Daegu the Korean Phantom's primary home base. Among the pilots involved in bringing the first ROKAF Phantoms to Korea was retired Maj. Gen. Lee Jae–woo: "My heart still races when I think of the moment I flew the then state of the art Phantom, received mid–air refuelling, and landed at the Daegu base. Fifty–five years have passed since then, and witnessing the Phantom's final flight is deeply moving."

The introduction of the Phantom was a turning point for South Korea when it came to the relationship with the North. With the Korean People's Air Force (KPAF), which at the time was roughly twice the size of the ROKAF, operating the capable MiG–21, the introduction of the Phantom brought a change in the proportions. It wasn't long before the Phantom was involved in skirmishes with North Korea. On 1 June 1971, a North Korean spy ship appeared off the coast of Soeguksan Island. The ROKAF and the Republic of Korea Navy conducted a joint counter–espionage operation against the ship. While the North Korean vessel put up anti–aircraft fire, it was eventually destroyed by F–4Ds. In 1972, South Korea acquired another 18 F–4Ds from the United States as a free loan, in a reciprocal arrangement that saw Seoul send 30 F–5A/Bs to South Vietnam. 1975 saw the arrival of more Phantoms, amid changes in the regional security situation. This included the visit of North Korean leader Kim Il–sung to China and the communist takeover of Vietnam. Under the National Defence Fund, South Korean citizens funded the purchase of five more F–4Ds at a cost of around 7 billion won ($6.7 million). President Park Chung–hee inaugurated the resulting 'Pilseung Squadron' at Suwon Air Base on 12 December 1975. Several more F–4Ds were delivered in the following years, with the last batch delivered in 1987–88. These were equipped with Pave Tack laser designators, an important feature that allowed the use of laser guided bombs.

A total of 92 F–4Ds were delivered, making the ROKAF the main export customer for the "D" model. The F–4Ds were joined by 37 new–build F–4Es, ordered in the 1970s. The last of these was the 5,068th F–4 built in St. Louis. Under Operation Peace Pheasant these were delivered to the ROKAF 152 and 153 TFS (Tactical Fighter Squadron), 17th TFW (Tactical Fighter Wing) at Cheongju. This was only the beginning of South Korean F–4 acquisitions, as more ex–USAF F–4Es were delivered in the next few years, giving a total of 103 F–4Es. This meant a major boost in operations, offering enhanced air–to–air and air–to–ground capabilities. It was an F–4E that was at the centre of another significant incident involving North Korea, on 25 February 1983. When KPAF Capt. Lee Ung Pyeong defected to the South in a MiG–19, a Phantom was scrambled and intercepted the North Korean pilot over

From the hands of the people, to the hearts of the people was written on one of the F–4Es during its final flight.

Phantom II Spook



ROKAF AGM–142 Spook

ROKAF RF–4 Spook

ROKAF Samurai Spook

ROKAF Spook

ROKAF Phantom

Yeonpyeong Island, before guiding him safely to land at Suwon Air Base. The same MiG–19 is still preserved at Suwon Air Base today.

The Phantoms were furthermore involved in different intercepts of Russian assets. Notable interceptions involved various Soviet military assets that were closely monitored by ROKAF Phantoms, including Tu–16s (in 1983), and Tu–95's as well as nuclear submarines (in 1984). Over the Sea of Japan, on 17 February 1998, F–4D's were responsible for shadowing a Russian Il–20 Coot electronic intelligence aircraft. ROKAF Chief of Staff Lee Young–su stated, "The level and frequency of enemy provocations, including ballistic missile launches, GPS jamming, and dirty balloons, have increased in recent years, and we must be ready and able to respond immediately, forcefully, and to the end, to any provocation. The F–4E Phantom that served as a virtual representative today, but our airmen will forever carry the security will and wishes of the people that were embodied in the Phantom. The Phantom, introduced with fervent desire and active support from people longing for strong national security, has steadfastly defended the skies of the Republic of Korea for over 50 years, repaying the citizens' support. This year's final journey of the Phantom will be recorded as the most magnificent retirement of a fighter jet in the history of the Air Force."

The South Koreans also received RF–4Cs. There were 12 ex–USAF 460 TRG (Tactical Reconnaissance Group) that were sent to the South Korean 131st TRS (Tactical Reconnaissance Squadron), at Suwon Air Base, along with another 11 sent later. Included in the package were ALQ–131 electronic countermeasures pods. In South Korean service, the F–4 was nicknamed Dokkaebi, after a kind of goblin from Korean mythology and folklore. However, the Spook motif was also widely used. To mark the retirement, new versions of the Spook were created, one of them wearing a traditional Korean red scarf and a flag, and another with the helmet of a Joseon Dynasty warrior, holding an AGM–142 Popeye missile. While the KF–16 has replaced the F–4s role as the nation's main fighter in 1994, it still offered unique capabilities that no other subsequent platform could. The remaining Phantoms have been kept in service into the 2020s due to its unique ability to carry larger payloads that no other aircraft in the ROKAF arsenal can't.

Taxiing back to receive the goodbye it deserves. The Phantom has had a long career with the ROKAF. 55 years of great service.

Most notably, the AGM–142 "Popeye" missile has been used exclusively by the Phantom on air–to–surface roles. The AGM–142 was first introduced to the Republic of Korea Air Force in 2002. It is an air–to–ground missile that can precisely hit targets with an error range of less than 1m. From a distance of five kilometres to the target, the pilot can directly control the direction of the missile and adjust it where needed to improve the accuracy.

With the Phantom getting older, South Korea disposed of its F–4Ds in 2010, while the RF–4C reconnaissance aircraft was retired in 2014. Since the introduction of more modern fighters such as the KF–16C/D, F–15K and more recently the F–35A, the F–4E has been focusing on attack roles. These include being used as a launching platform for air–to–ground missiles

The final landing of the last F–4E in South Korea. The Phantom will be missed, but not forgotten.

and guided bombs like the AGM–65 Maverick and Korean GPS–Guided Bomb (KGGB). With the maintenance, repair and overhaul (MRO) contract with Korean Air ending on 26 May 2022, any Phantoms that reached its maintenance cycle have been retired one at a time. Along with the F–5E/F's, the F–4E's in service have seen an extension of their service life due to the delay of the KF–21 programme. Speaking at the decommissioning ceremony was South Korea's Minister of National Defence Shin Won–sik. He stated, "The past 55 years with the Phantom have marked a history of victory for South Korea. With the introduction of the Phantom, the guardian of the free world, the Republic of Korea swiftly overwhelmed North Korea's air power, and since then, North Korea's air force has been no match. The Phantom never dies; it just fades away. The noble spirit of the Phantom, dedicated to protecting the skies of our nation, will return to us alongside the world's most advanced sixth–generation fighter jets."

Two pilots walk away from their Phantom one last time as they return to Suwon AB.

Text and photos: Erik Bruijns

75th Anniversary of the Berlin Airlift

1949 2024

BERLIN AIRLIFT

SEVENTY-FIFTH ANNIVERSARY

Preamble on Wiesbaden

Wiesbaden Army Airfield (ICAO: ETOU) is located in Germany, southwest of Frankfurt. It is also known as the Lucius D. Clay Kaserne, or US Army Garrison Wiesbaden. The airfield is named after General Lucius Clay (1898–1978), he was the highest ranking officer of the US Army in western Germany after the Second World War. When the Berlin blockade was started by the Soviet forces in 1948, he initiated the Berlin Airlift.

General Lucius D. Clay's statement in April 1948 was clear: *"Why are we in Europe? We have lost Czechoslovakia. We have lost Finland. Norway is threatened. After Berlin, will come Western Germany. If we mean that we are to hold Europe against communism, we must not budge."*

The US Army currently has several helicopter and aircraft units based at Wiesbaden: 12th Combat Aviation Brigade with Boeing UH–60 helicopters and 1st General Support Aviation Battalion plus 214th Aviation Regiment with C–12 (Beechcraft Huron) and UC–35 (Cessna Citation V) aircraft.

Berlin Airlift 1948/1949

In June 1948, the Soviet forces blocked all railways, roads and waterways in the western zones of Berlin. In response, the Allied powers in Berlin (United Kingdom, France, United States) began transporting supplies through an airlifting campaign that lasted until September 1949.

A complete city of 2 million inhabitants, needed to be supplied with food and coal via this airbridge.

The US aircraft flew to Tempelhof airport, while the British aircraft flew to Gatow airport and the French flew to Tegel airport in Berlin. The British forces also used Short Sunderland flying boats to land on the Havel river

in Berlin. During the Berlin Airlift, every few minutes an airplane landed at these Berlin airports; with a plane landing every 30 to 45 seconds during peak moments. The schedules were so tight that if a pilot missed the landing, the plane had to be flown back fully loaded, in order not to interrupt the very busy landing and take–off schedules.

The US involvement in this campaign was known as Operation Vittles, with a combined airlift task force established at Wiesbaden Army Airfield in Wiesbaden, West Germany. Using twin–engined C–47s and four enginged C–54 transport airplanes flying from Wiesbaden and Frankfurt via a dedicated direct corridor to Berlin. On the way back, the empty aircraft flew a different route to keep the intense inbound and outbound traffic separated. During the Berlin Airlift, 77 people lost their lives due to aircraft crashes: 41 British, 31 Americans and 5 Germans perished.

Present capacity comparison

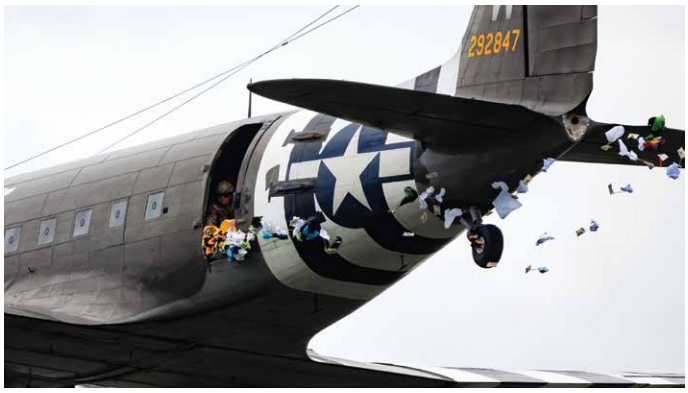
Between 26 June 1948 and 6 October 1949, with almost 278,000 flights, more than 2.3 million US tons of freight was transported to Berlin. With 1 US ton approximating 2205 pounds, the total amount flown in was 5,070,632,030 pounds, using hundreds of aircraft flying 278,000 flights. If that would have been done these days, the amount of flights would be different:

Aircraft	Max payload (pounds)	5070632030/payload
C–17	170900	~30,000 flights
C–130	41790	~125,000 flights

Source Wikipedia:
Maximum payload capacity of the C–17 is 170900 pounds (77,519 kg)
Maximum payload capacity of the C–130 is 41790 pounds (18,955 kg)

Rosinenbomber/Candybomber

During the Berlin Airlift, 1st Lieutenant Gail Halvorsen was one of the C–54 pilots flying to and from Berlin. One day he gave some candies to the local children at the Tempelhof airport. When he saw how happy they were with the candies, he promised them to drop some candies via a handkerchief/parachute during his next landing at Tempelhof. When this was noticed by other pilots, they started to drop candies via handkerchieves as well during their landings.



These were called 'Rosinenbomber' in the German language or 'Candybomber'/'Raisinbomber' in English.

Interviews/Press Conferences

The Wiesbaden Garrison commander colonel David W. Mayfield, welcomed the German neighbours and friends on the Lucius Clay Kaserne and invited them to visit the historic aircraft, the airshow and military band. He also mentioned that the new airport control tower was named after Colonel Halvorsen, the inventor of the 'Candybomber'/'Raisinbomber' gifts for the children in Berlin in 1948.

Denise Halvorsen Williams is the daughter of Candybomber Colonel Gail Halvorsen and she was very proud that the new control tower was named after her father. She said that her father was always very happy to hear the voices on the control towers when he flew his triple daily roundtrip missions into Berlin. These missions were not without danger and after every landing German women repaired the runway with oil and tar, during one

of the intervals her father gave some candies to the local children. As they were very excited, he told the children he would be there the next day and he would wiggle his wings for them. And they had to look out for small parachutes (made by handkerchiefs) with more candy that he would drop for them. He made the same wing wiggles during training flights over his parents farm in Utah, while in flight training.

He received the candies from the rations of his flight buddies and attached these to the handkerchieves. And he dropped these while flying overhead Berlin. Unfortunately this was detected and he was courtmarshalled for this. Fortunately for him, a photographer saw the parachutes and a photo appeared in a newspaper. After that publication, the higher ranks decided that this as a perfect publicity campaign and he was free to go.

Lucius D. Clay, III, is the grandson of General Lucius Clay and he did not follow his grandfather but found an occupation in medicine. He knew his grandfather for 30 years. The grandson thinks that General Clay always felt that his crowning achievement was the Berlin Airlift and he was a real advocate for Berlin and Germany. And he convinced President Truman that Berlin was an important political symbol of freedom and that standing fast in Berlin led to a waterfall or cascade of events ultimately resulting in unification Germany followed by freedom for Eastern Europe and the Baltic states as well.

An eyewitness of the Berlin airlift, was a young girl in 1948. I'm sorry

I'm so happy that I can stay here and my big Thank You for Lt. Halvorsen as we as children were very happy to see the handkerchiefs floating down with gum and chocolate. And we are so happy that he came to us and I will never forget this and I'm so proud of him for giving us hope. He took care of us and I will never forget thank you so much God, bless you all thank you.

The Show

The Wiesbaden 75th Commemoration Berlin Airlift show was held on 15 June and 16 June 2024, whereby the show on the 15th was a family day while the show on the 16th was open for the general public.

Static show

On the large platform, the visitors could see some current military aircraft and helicopters, like the US Army UH–60 Blackhawk, the AH–64 Apache helicopters and the German Army Airbus Tigre helicopters. Also the locally based US Army C–12 and UC–35 were present at the static display. The US Air Force was present with a Lockheed MC–130 Hercules and a Boeing C–17 Globemaster III.

Dynamic show

The dynamic show was flown by three Douglas C–47 'Dakota' aircraft and one North American Aviation T–6 'Texan'. During the first flight, these aircraft flew some circuits in formation. And during the second flight, the formation was extended with a US Air Force Lockheed C–130J 'Hercules' from nearby Ramstein air base. After a formation flight, paratroopers were released from the C–47s and the C–130, whereby the paratroopers landed in front of the crowd.

After releasing all paratroopers, the C–47s flew around for the grand finale of the day. During three high speed runs, parachutes with candies were dropped onto the field in front of the crowd. And after the last 'Rosinenbomber'/'Candybomber' drop, all the children (accompanied by their parents) ran into the field to collect the candies. As a very kind gesture, many officials had received upfront some candies, to give to the children that could not find ant candies on the field.

Text by: Joris van Boven and Alex van Noije
All photos by: Joris van Boven and Alex van Noije

Puglia Pilots
Fast jet and rotor flights from Gioia del Colle

Italy, from the Alps in the North stretched down South deep into the Mediterranean, has organised its air defence mainly around its Eurofighter force. Therefore it is no surprise that the air defence bases of the Aeronautica Militara Italiana (AMI), or Italian Air Force, can be found in 4 different areas which together cover the country ideally.

Up in the north you have 51 Stormo (wing) at Istrana air base and further centrally you can find four Stormo at Grosseto air base. The south–west is taken care of by 37 Stormo with its Eurofighters of 18 Gruppo (squadron) which are operating out of Trapani, located at the west coast of Sicily. Italians south–east air defence is the domain of the Eurofighters of 36 Stormo, which are based at Gioia del Colle, a smaller town in the country side between the harbor cities of Bari and Taranto. Grosseto and Gioia del Colle are the more large Eurofighter operating bases, as their wings have each two squadrons, where Istrana and Trapani have only one Gruppo.

When adding up the 2 fighter gruppo's at Gioia del Colle with an extra based helicopter unit flying the HH–139, one can consider it as the largest base over the other three and reason to have a look at their operations out of the province of Puglia.

Gioia del Colle

Directly connected with the south side outskirts of Gioia del Colle town, you can find the military air base, with its

north–west to south–east oriented runway referred to as ICAO LIBV. The base is named after Antonio Ramirez, a former Italian aviator who crashed and died in 1930, at the earlier premises of what later became the current air base of Gioia del Colle. The 36 Stormo is named after Helmut Seidl, the former Colonel pilot and decorated 36 Stormo commander who died during one of his missions in World War II. The history of 36 Stormo goes back to 1938, when erected as a bomber wing at Bologna air base. In 1955 the unit was disbanded but, due to the Cold War developments, re–erected as rocket unit at Gioia del Colle in 1960. By 1966, fighter aircraft were introduced again to the unit which saw aircraft like F–86, F–84, F–104 and the Tornado until the entry of the Eurofighter in 2007.

Gruppo

Nowadays 36 Stormo has 2 squadrons, namely 10 and 12 "Gruppo Caccia", Fighter Interceptor Squadron. 10 Gruppo was earlier based at Trapani, but re–positioned to 36 Stormo in 2010. 12 Gruppo has been within 36 Stormo at Gioia del Colle ever since the unit started flying fighter aircraft in the sixties. 12 Gruppo has also been for more than 20 years a "NATO tiger–squadron" and an active member to the periodical Tiger–meets held throughout Europe. Last October, 12 Gruppo and Gioia del Colle were hosting the tiger event of 2023 for the first time.

Eurofighter community

Although the various Eurofighter units fulfill individually their own regional roles from their different air bases, they join forces during trainings operations and (international) exercises or missions.

When the Italian Air Force command decides to participate with their Eurofighter in a specific international mission, each of the units contributes with aircraft, personal and equipment. A sample can be the regular NATO Enhanced Air Policing missions to the Baltic or Black Sea regions. For such missions, several Italian Eurofighters from 4, 36, 37 and 51 Stormo will be detached like in Poland at Marlbork air base or at Mihail Kogalniceanu in Romania. They conducted Quick Reaction Alert (QRA) missions when tasked by NATO's Combined Air Operations Centre (CAOC) Uedem, Germany, to intercept, identify and escort Russian aircraft flying without authorisation nearby NATO country borders.

The basic missions of the Eurofighters of 10 and 12 Gruppo are flown out of Gioia del Colle and also conduct regional QRA duties from here, for which they are tasked by the second Combined Air Operations Centre, namely CAOC Torrejon, Spain. This CAOC is in charge over the European NATO airspace south of the Alps, where CAOC Uedem is in control over the north. Regularly the Eurofighters of 36 Stormo contribute out of their home base to NATO Air Policing missions over Slovenia, Albania and Montenegro, as these countries have no adequate means themselves.

Rotory CSAR

The 3rd flying unit based at Gioia del Colle and under command of 4 Stormo, is the 84th Centro Combat Search And Rescue (CCSAR) squadron mainly flying the Leonardo HH–139A. Formal hierarchy places all Italian CSAR squadron detachments under command of 15 Stormo which has its home base at Cervia. 15th wing is the major Italian air force helicopter unit, solely focusing at rotary operations with, besides the HH–139, types like the HH–101A, HH–212 and the smaller TH–500B. The wing also takes care of the more complex maintenance of the detached CSAR HH–139's offering size of scale and logistic benefits, which includes replacement or additional helicopter capacity. Other CSAR squadrons include 80th CCSAR at Decimomannu air base, 82nd CCSAR at Trapani, 83rd CCSAR at Cervia and 85th CCSAR at Pratica di Mare and all together they provide a national CSAR coverage.

The strong bond between all the CSAR squadrons is underlined by the use of Warner Brothers cartoon figures in all their individual unit badges, like "Daffy Duck" for 84th CCSAR. The main tasks of the squadron includes SAR and Personal Recovery (PR) but also taking care of casualty and medical evacuation (MedeEvac), slow mover protection and fire protection. In the recent past 15 Stormo has also received a number of new HH–139B's for CSAR operations which are equipped with a double winch, a more powerful Trakkabeam search light instead of the Nightsun device and the FLIR has changed to a new Wescam system integrated in a new cabin console with improved characteristics. The new Bravo models will fly alongside the earlier Alpha models within the CSAR units.

Slow move intercept

Over the years, some CSAR units performed dedicated training to make them even more specialised in niche assignments. The CSAR squadrons at Trapani and Decimomannu have been focusing at firefighting, knowing that the Sicilian and Sardinian region sees regular outbreaks of forest fires in the summer season. 84th CCSAR at Gioia de Colle had been ordered to take a lead in slow mover protection, were also Cervia and Pratica di Mare play a role in this field. The slow mover protection is no longer limited only to escorting slow moving assets, like vehicle convoys or vessels, but is now also looking at slow moving aerial assets which may be a potential threat. The Eurofighters which are normally on QRA duty to intercept unidentified aircraft, can also encounter slow moving aircraft which may be hard to escort due to the difference in speed. For that reason, the HH–139 can step in as these are better suited to take over intercepts with speeds below 160 knots. When an HH–139 is ordered for a slow mover intercept a sniper joins the cabin, where a slide door can be armed with a sniper gun to neutralise the slow mover if it is needed to escalate to that level. With the additional slow mover interceptor task the HH–139 have become part of the Italian national defence system.

Walk around

To know the Leonardo built helicopter better we do a walk around with Daniele, on of the units pilots. In base the HH–139 helicopter has modular equipment which makes it easy to switch quickly to another configuration, or just take it out to become lighter, depending on what type of mission is required. The modular base of the helicopters makes it also easy to swap systems with other HH–139's. The helicopter is powered by 2 engines and is installed with a full glass cockpit, flying with a Honeywell management system. The pilot is more an operator and programmer of the system, trying to reach the best performance of the rotorcraft. Although the computers of the flight management system executes the pilot's programme, the pilot must know all available options and alternatives to adjust the plan or take over when needed. The nose of the HH–139 houses the radar which has a very good performance with ground mapping as well as with ship finding and tracking and provides weather info of the flight area. "Our radar is able to scan a radius of 360 nautical miles, however we hardly reach this as we normally fly below 500ft" as pilot Daniele describes. "In our daily missions we scan approximately 100 NM, which is more than sufficient for our common activities. The bulb under the nose is the Forward Looking Infra–Red (FLIR) and in combination with the digital Wescam camera, supported by a laser ranger finder and a laser illuminator we can zoom–in pretty well over the sea", as pilot Daniele continues. The heli doesn't have a data–link (e.g. link16) and not integrated in a tactical scenario. However with available GPS coordinates, a more precise search can be done and when adding available marine–tracking info the task can be very effective. "Certainly when I use the Head Up Display (HUD), I consider it as a pretty effective tool," pilot Daniele continues, "and when we are looking for an ejected pilot, we scan for any transmissions of the pilots beacon which is very accurate."

The winch has a cable length of about 100m and a payload of 270kg. Next to the cabin door there is a hoist

pendant unit for the hoist operator. If needed, a pilot can also manage the hoist out of the cockpit with the support of a camera view on the display to see what's below the belly of the HH–139. The computer calculates the best height to perform a hoist operation, under the condition it can always execute a "fly–away" maneuver, e.g. in a sudden situation of losing power of one of the two engines. "A fly–away manoeuver allows us, when in hoover operations, to safely fly away without any consequences for the crew and helicopter", as pilot Daniele explains. He recalls a recent mission with a winch operation at 135ft which he described as already pretty high: "Although you want to be as high for the fly–away maneuver, you don't want to be too high, as these operations are becoming more difficult and take longer." Under the belly of the HH–139, you can find a fuselage mounted cargo hook for external loads.

"Here at Gioia del Colle we don't use that hook, but our colleagues at Trapani and Decimomannu use it to attach a bambi water bucket when in fire fighting operations", pilot Daniele explains. Our helicopters are also equipped with inflatable floats, making us able, when in an emergency, to ditch at sea and giving us at least 30 minutes of float time in conditions up to sea state 6.

In this time we should be able to leave our helicopter, enter life rafts and await further help. Additionally the HH–139s are equipped with a Crash Position Locater (CPL) which automatically starts transmitting an emergency signal at various frequencies.

Aerosoccorritore

Meanwhile an "aerosoccorritore", an air rescue man, joined us in the helicopter hangar, who also listens to the name Daniele and starts explaining what range of wear and equipment the rescuers normally use. "Most of the time we wear a dry suit which makes our operations safe when in the water during the winter and on the ground, with a temperature ranging from 0 to maximum 30 degrees Celsius. In the water we wear flippers, a snorkeling mask and carry floating means. Additionally, for under water rescue, we have air cylinders etc to support operations at a maximum depth of 40 m" as air rescue man Daneile

describes. On the scene, the rescuer jumps out of the helicopter into the water from several metres high, depending on what types of additional equipment they are carrying, or are lowered by the winch. Rescue operations can also be land based and training includes mountain recoveries and rescues from holes and caves. In such operations the air rescue man are often helped by local mountaineers with knowledge of the area. At night the aerosoccorritore also wears Night Vission Goggles (NVG), however not in the water. When in hostile environments during combat missions, the air rescue men are armed and additional protection to the rescuers can be provided from the helicopter with the door mounted guns. When an emergency call comes in, a staff member of the CSAR unit informs the crew about the helicopter configuration, equipment and tools required for the mission. Together with the pilot a fuel load plan is made for the mission, which depends on flight distance, expected time on station and number of persons to be recovered, which influences the weight of the helicopter.

Mission

Piloted by 84 CCSAR commander major Flavio, we join a HH–139 training flight in which the crew will work down a list with a variety of to be trained elements. The crew consists out of four, with two pilots in the cockpit and 2 men in the cabin with exchanging roles of hoist operator and rescue man. While hovering over the Adriatic Sea near the coastline of the old town of Monopoli, commander Flavio demonstrates the powerful zoom function of the onboard digital Wescam camera making it easy to give a clear sight on a cargo ships' details, although separated by several miles of distance. The flight continues with a sea–patrol routine while scanning the area. After testing the cabin and cockpit installed monitors and included systems, commander Flavio flies back to land. While overflying the town of Alberobello, well known for its houses in typical "Trulli" style, the helicopter sets further course to a remote area where numerous landings as well as hoist operations are executed.

These trainings are essential to keep the crew's skills at a high and adequate level to remain qualified for their

special CSAR missions. After half an hour of training, the HH–139 finally lifts off from a steep canyon to set course to a dedicated and military reserved airspace somewhere in the vicinity of Matera and Altamura, central Puglia. Here we will have a planned rendezvous with a pair of Eurofighters of 36 Stormo. Piloted by 10 Gruppo major Davide, with combat name "Ikea" acting as the Eurofighter formation lead and 12 Gruppo major Gennaro, the jet pilots have reserved the last 20 minutes of their local training mission to finish with some slow moving interception maneuvers together with the HH–139 of commander Flavio and his crew. The helicopter's average top speed of about 140 knots, with a maximum up to 160 knots, makes it possible to interact with the Eurofighters and execute several aerial maneuvers together with the jets at 3000ft. For the helicopter crew it means they have to perform operations close to the maximum speed, while the jet aircraft operate close to their minimum speed. Clear standard procedures, continues radio contact between the helicopter and the jets is essential to obtain situational awareness for all, remain in control of the situation and stay within safety limits. After the flight the Eurofighter pilots major Davide and major Gennaro explain more about the slow mover intercept.

"If a HH–139 is already airborne and nearby the "bogey" it will be the primary asset to perform the visual identification (VID). In all other situations our Eurofighters will be scrambled instantly. During a slow mover intercept we are always in contact with our tactical controller in order to follow his instructions. Once we have reached the bogey, we set a pattern over him which is called the "wheel" in order to keep him in sight. As soon as we have received the green light for the VID we approach the bogey from 6 O'clock and if speed allows we remain on his wing in order to communicate with him visually, otherwise we perform some flyby at low speed in order to get every possible information. It is up to the Eurofighter formation leader to assess the tactical situation and to decide to ask for HH–139 support. Once we are together on scene we first determine a deconfliction plan between all assets and then hand over the command to the HH–139 crew.

Then the HH–139 usually will approach the non–identified slow mover while the Eurofighter set a visual pattern over them in order to keep both visual and be ready to support the HH–139 when asked for" as major Davide and Gennaro finally declare about their in–flight cooperation with the helicopters of 84 CCSAR during slow mover intercepts.

Text and photos by Peter ten Berg

36 Stormo badge

X Gruppo badge

XII Gruppo badge

15 Stormo badge

84 Gruppo CCSAR badge

Additional 84 CCSAR badge

Tiger Meet debut of the F-35 Lightning II

This year the next edition of the traditional NATO Tiger Meet took place at the German Air Base Schleswig–Jagel in the Northern part of Germany. From 3–13 June 2024, Allied aircraft participated in the annual meeting. The NATO Tiger Meet offers a unique opportunity for Allied and Partner Tiger squadrons to train to NATO standards increasing flying skills and interoperability. The meeting at Schleswig–Jagel is hosted by the German squadron TLG–51 'Immelmann' which is based here in the far north. The Tiger Meet in 2024 was also the debut of the F–35A Lightning II at the exercise. The Royal Netherlands Air Force is the first Tiger unit which participated with this fighter jet.

Background

With the main goals of sharing experiences, increasing interoperability, exemplary values and team spirit as a guiding principle, the NATO Tiger Meet has developed into an important exercise within NATO in almost 60 years. The tradition teaches that the participating squadrons, whether they are flying with airplanes or helicopters, are always present in the well known tiger colours. The squadron emblem of all these participants is the tiger. This predator is a formidable and proud predator and an excellent hunter, this character fits exactly with the operational units of the NATO countries. The motto of the tiger units in Europe is "Hard to be Humble". The NATO Tiger Association is a collection of military units from NATO member states. The organisation allows all units with helicopters or aircraft with a tiger or a feline as an emblem. Since 1961, the organisation has been organising the NATO Tiger Meet every year. This meeting

gives the units and their crew the opportunity to gather and participate in various exercises. The story of the Tiger Meet began on 19 July 1961, when three Tiger squadrons met at the British airbase RAF Woodbridge which was in use at that time by the US Air Force. The units that participated in the meeting from the first hour are the Royal Air Force 74 Squadron with the Lightning, EC 1/12 "Cambresis" with the Super Mystère B2 and the 79th Tactical Fighter Squadron with the F–100 Super Saber. During the Cold War in a context of international tensions, the French Minister of Defence Pierre Messmer created the meeting to promote solidarity between the NATO units and to improve the quality of operational deployment.

International Training

The NATO Tiger Meet (NTM) is not only about the team spirit and the traditions which are being propagated. In addition to these social activities, it is also about training the tough reality of modern scenarios during various conflicts. Different scenarios are practiced daily in which two training waves a day are launched. The purpose of this exercise is to intensify cooperation with the other participating nations. The exchange of experience between the armed forces relates to aviation and technical aspects. In the former, the debriefing, the joint follow–up to the mission, proves to be particularly valuable. The exchange of knowledge, technologies and cultural values promotes innovation and understanding. In this way, all participating nations benefit from the shared experiences and progress. This concept enhances interoperability. This is often the central objective of the majority of the meeting participants. Different scenarios are made up during the preparation that are suitable for both the younger pilots and the very experienced pilots. Depending on the scenario, participants will take turns taking part in both the Allied Air Force (Blue Air) and the Aggressor (Red Air). During the missions, the combat aircraft are equipped with chaff and flare pods and interference equipment to simulate air operations as real as possible. In this way, the scenarios come very close to actual operations in a crisis area. The intensity of air missions requires a high level of expertise and highly qualified crews. The NTM largely took place this year within a very large training area over the North Sea on the West Coast of Germany and Denmark. This meeting allowed all parties involved to train in international efforts. Common operational procedures are used for this and training with up–to–date threats makes

the exercise feel like an operational reality. By using the tactics of each country in an ambitious environment, the exercise is lifted to a higher level.

A typical flight day during the NATO Tiger Meet is made up of two large flights. A large combined flight is often planned in the morning. This flight is the so called COMAO wave (COMposite Air Operations). During this flight several smaller missions were flown during the scenario.

Every participant had its own mission and role within the whole scenario. This year, the theme of the COMAO scenarios was emphatically on the planning of a large scale international Air Defence Force of more than thirty to forty combat aircraft.

During the NTM 2024 there was training on the planning of these types of missions and especially on leading these missions. After the missions, extensive analyses were released on the results of that day. They jointly learned from what happened during the various sub missions.

The second flight of the day consisted of the basic and advanced flights. During this shadow wave, the participants of the Tiger Meet scenarios flew missions that matched their own level or the level of their own team. The main objective was to fly missions with or against aircraft of other types. These missions often consisted of In Visual Range battles against other types of combat aircraft than their own types. Also, often with the helicopter units, air support missions were flown (Close Air Support) or missions were flown around Electronic warfare and jamming.

Due to the great importance of the exercise, which is reflected not least in the large number of participants, it is important that the Air Forces are committed as a reliable partner in the alliance of European air forces and make their contribution to joint air defense. The NTM is regularly one of the largest exercises for combined air warfare operations in Europe and therefore offers particularly valuable experience for the participating aircraft crews.

Participants NTM24

In Germany, there are two so called Tiger squadrons that are full members of the NATO Tiger Association. The "51 Tigers" of the Tactical Air Force Wing 51 "Immelmann" (TLG–51) have been full members of the NATO Tiger Association since 1994. The Bavarian Tigers from Neuburg took over the so–called Tiger Spirit in 2013 from the "321 Lechfeld Tigers" of the disbanded Fighter Bomber Wing 32 (JBG–32). The Tactical Air Force Squadron 51 "Immelmann" is the only flying unit of the German Air Force that has the capabilities for manned and unmanned imaging and signal capturing air based reconnaissance. On 1 April 2013, the squadron took over the ability to suppress enemy ground based air defences from the disbanded Fighter Bomber Squadron 32 from Lechfeld. Equipped with all weather Tornado ECR fighter aircraft, modern reconnaissance sensors and a deployable evaluation system, the squadron is part of the Bundeswehr's operational forces. Since 1 January 2005, the squadron has also been tasked with the role of naval warfare from the air. TLG–51 is the host unit for this year's Tiger Meet.

The majority of the participants operated daily from Schleswig–Jagel Air Base. Both the French Air Force and the French Navy participated with their Dassault Rafale. The Greek, Polish and Turkish Air Force were in Germany with their F–16C Fighting Falcons. The Germans from Bavaria and the Italian Air Force participated with the EF2000 Eurofighter Typhoon. The Swiss Air Force was the only non NATO member who joined the meeting annually and they flew along with the F/A–18C Hornet. Finally the Czech Air Force participated with the JAS–39C/D Gripen. The Belgian Air Force flew with their F–16s from their home base in Kleine–Brogel during the missions. The same was for the Dutch flying the F–35As from Volkel Air Base in the Netherlands. The NATO unit from Geilenkirchen operated also from their home base with the E–3A Sentry to guide the Tiger Meet missions. Next to the fighter aircraft there are also helicopters present at the Tiger Meet. The French Army (ALAT) operated in Germany with Gazelle, NH90 and Tigre helicopters. One additional unit that took

part was MFG–5 from the German Navy. This unit is not a member of the Tiger Association, but operated with one Lynx helicopter during the missions.

Debut F–35A Lightning II

One of the most remarkable participants in this year's Tiger Meet was the participation of the Dutch 313 Squadron from the Netherlands. This unit is based at Volkel Air Base and operated during the meeting from their home base. The 313 Squadron is the first unit in the history of the Tiger Meet which participated with the Lockheed–Martin F–35A Lightning II. Despite the fact that they flew from their home base it was still the debut of the F–35A Lightning II on this famous stage. The 313 Squadron flew along in the missions twice a day with three to four aircraft. Four aircraft came over to Schleswig–Jagel during the weekend to participate in the Tiger games which took place in during weekend. On Friday, the four aircraft arrived at the German Airbase after the morning sortie. Showing up with the F–35A Lightning II was a huge milestone for the Dutch 3313 squadron. It was their first appearance with this new aircraft since they left the stage five years ago. The last participation of the 313 Squadron was during the Tiger Meet in 2019 at the French Landivisiau. The unit showed up with a few F–16AM Fighting Falcon aircraft during that Tiger Meet as an observer. At the end of December 2020, the 313 Squadron at Volkel Air Base ceased its activities with the F–16 Fighting Falcon. The 313 Squadron was released from operational duty to begin its conversion to the F–35A Lightning II. After a period of 32 years, the 313 Squadron stopped flying the legendary F–16 Fighting Falcon. The unit received its first F–16s in 1988, when the unit was

still based at Twenthe Air Base. From December 2005, the first F–16s from 313 Squadron were moved to Volkel. Since then, the airbase in Brabant has been home to the 313 Squadron, which is known for its emblem depicting the tiger.

The 313 Squadron is the second operational unit after the 322 Squadron to fly the F–35A. The 313 Squadron is already for a long time a member of the NATO Tiger Association. The unit became a member in 1990 and will continue in the future with the F–35A.

The conversion of the 313 Squadron to the F–35A Lightning II started in early 2021. The pilots of the unit left for the United States to Luke Air Force Base in the state of Arizona. At this American airbase, the Royal Netherlands Air Force currently has eight F–35As that are used for the training of the pilots. The pilots were trained in the course of the following year. The ex F–16 pilots had no longer to go through the entire programme, because they are, after all, already qualified fighter pilots. This was therefore only a conversion training on the Lockheed Martin F–35A Lightning II. The fact that the pilots already have experience on the F–16 is a plus, but that does not mean that the conversion training is immediately an easy training, because the F–35A is an advanced aircraft and cannot be compared with the F–16.

Once the first 313 Squadron pilots had completed their conversion training in America, the unit moved temporarily to Leeuwarden Air Base. This happened in the second half of 2021. Here, the main goal was that the pilots of the 313 Squadron would learn from their experienced colleagues from the 322 Squadron as they fly the types already for two more years. At Leeuwarden, the 313 Squadron started its road to initial operational status as a squadron. Eventually the 313 Squadron was relocated to Volkel Air Base halfway 2022. On 30 June 2022 the first F–35A Lightning II for the 313 Squadron landed at Volkel Air Base, and the squadron started the next phase on their road map to Initial Operational Capable (IOC) on this 5th generation fighter. The unit is nowadays already IOC and is on its way to reach Full Operational Capability in 2024. The F–16AM Fighting Falcon which is currently still in use at the 312 Squadron at Volkel will stop its activities in late September this year. The F–35 will take over the full role of the good old Viper from that moment on. In early 2024 the F–35 already took over the Quick Reaction Role of the F–16 and since 1 June 2024 also the nuclear role belongs to the F–35's. This is a huge step for the Dutch F–35 fleet. Showing up in a large–scale international exercise like the Tiger Meet was therefore for the 313 Squadron a huge achievement. The unit is back on the 'Tiger' stage and is here to perform many years with the Lightning II. After finishing the road to the point where they are now, the 313 Squadron is the first unit in the Tiger Meet history operating a fifth generation fighter in the exercise. Therefore the Dutch tiger spirit will live on!

Trophies and Awards

Traditionally, trophies are awarded every year to the participating units in different categories. The main prize that can be won is the Silver Tiger, which was taken home this year by the Polish 6elt from Poznan Air Base. This prize means that the Polish Air Force had the best overall performance during all the aspects of the Tiger Meet. Also the Tiger games were won by the Polish unit. During these games the teams of all the countries play simple funny games against each other to socialise next to the hard working during the missions on the flying days. The Tiger

games are traditionally held in the weekend between the two mission weeks. The best skit award is given to the participant who has the best performance and best show during the Tiger Meet. The intention is to give a small show with much humour and self spotting involved. The winner of this award this year was the French unit EC3/30 'Lorraine' from the French base Mont–de–Marsan. The trophy for the best performing unit during the exercises is a very important trophy as it says something about the performance of the unit in their core job. This year the prize was won by the French 11 Flotille of the French Navy. This unit is from BAN Landivisiau and operates the Dassault Rafale Marine. The unit had the best overall performance during the exercise missions during the NTM. One of the most important prizes in the area of aesthetics is the trophy for the best looking tiger print. It is a tradition that all units bring one special paint aircraft to the NATO Tiger Meet. Mostly the tails and sometimes complete aircraft are painted in the wildest versions of tiger prints. The trophy for the best print was this year for the host unit TLG–51 of the German Luftwaffe. The unit showed a Tornado which was fully painted. The back of the aircraft had a big tiger emblem visible when the aircraft would make a pass with swept wings.

Unfortunately this pass was not made during one of the spotter days of the meeting. But all in all this was the best looking fighter in the whole event. The most beautiful uniform was worn by the crew members of the Fliegerstaffel 11 from Switzerland. The members of this unit had according to their colleagues the best looking uniform during the exercise whit a good focus on the tiger spirit. The unit is based at the Swiss Airbase in Meiringen and is one of the few non–NATO members of the Tiger Association. After two weeks of intense training and two fantastic spotter days for the fans the Tiger Meet 2024 ended with the flag ceremony. Next year the Tiger Spirit will show its skill on Beja Air Base when the Portuguese 301 'jaguar' Squadron will host the NATO Tiger Meet.

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

Another Airbus A330 MRTT at Eindhoven AB

On 19 June 2024, another Airbus A330 MRTT aerial refueler was delivered from the Airbus factory at Getafe (Spain) to Eindhoven AirBase (ICAO: EHEH) in the Netherlands; with serial T–061. Eindhoven AB, is the homebase of the Multinational MRTT Unit (MMU), which flies and maintains 9 Airbus A330 MRTT aircraft for the six European partners in this consortium. Later a 10th A330 MRTT will be delivered, to complete the current set of tankers. On Forward Operating Base Cologne AB, four tankers will be based; while five tankers will be located at Eindhoven AB.

The Multinational MRTT Unit partners are the Netherlands, Belgium, Luxembourg, Germany, Norway and Czechia. The Eindhoven based European Air Transport Command (EATC) will take care of the planning and scheduling of the A330 MRTT flights.

Photos: Joris van Boven

Text: Joris van Boven and Alex van Noije

Dutch Coast Guard LIVEX24

On 1 June 2024, the Dutch Coast Guard held a major evacuation exercise (LIVEX24), one of the major Coast Guard exercises that are held every five years. Various aid organisations prepared for an emergency at sea with the LIVEX. The goal was to bring a large group of people from a cruise ship at sea to safety on land. In addition to training one's own skills, attention was paid to cooperation between all services. Are the checklists still correct? Did everyone follow the same processes? Did everyone know his or her role in a real emergency? Did all means of communication work properly?

Ferry in distress

In 2024, training took place with a ferry in distress. A regular IJmuiden–Newcastle ferry from DFDS Seaways ('Princess Seaways') was used for this exercise. This ferry encountered 'problems' approximately 10 kilometres offshore from the port of Ijmuiden, after which a distress signal was sent. This distress signal was picked up by the Coast Guard and this was followed by impressive cooperation between various rescue services. The Coast Guard led the rescue operation on the water. The Kennemerland Safety Region set up a large location to accommodate the evacuees. Several ships, rescue boats from the KNRM, two Search And Rescue (SAR) Leonardo AW189 helicopters from the Dutch Coast

Guard, 2 NH90 helicopters from the Royal Dutch Navy, the Dash–8 Coast Guard aircraft, ambulances, emergency vehicles, control rooms and crisis teams were deployed.

Golf stroke

Due to the strong northern wind and the high waves offshore (a wave height of 1.5–2 meters), part of the exercise was carried out in the harbour to guarantee the safety of the volunteers in the life rafts. These volunteers floated in the life rafts for some time within the shelter of the harbour, after which they were 'rescued' by the various ships. In addition to professional and volunteer care providers, 500 extras also participated in this exercise. These extras were recruited through local advertisements.

The first helicopters to fly to the ferry brought emergency workers and firefighters to the ship. The first passengers were then taken to the coast by helicopter. 'Heliport Ijmuiden' was used for the helicopters, on a headland near the locks of Ijmuiden.

Organisations that participated in the LIVEX included: the Dutch Coast Guard, Kennemerland Safety Region, Royal Dutch Rescue Company (KNRM), Port of Amsterdam, the Red Cross, the Royal Dutch Navy and the Department of Waterways and Public Works.

During the exercise, a real emergency call was received, after which several helicopters were withdrawn from the exercise for a real Search And Rescue mission. No announcement has been made about the outcome of this search.

Coast Guard exercise leader Joost Volkers looked back on a successful day: "It was a challenging exercise. Both the scenario, but also with the actual circumstances. For example, our helicopters left the exercise for real incidents. That means switching gears. Despite that, I am satisfied with how everything went today. It was of course impressive when you see which emergency services were present. Both at sea, in the air and on land. Now we're going to evaluate. And then it becomes clear to what extent everything fell together and the processes connected. Of course I am curious about those results."

Text and photos: Joris van Boven and Alex van Noije

AIRVG 2024–Aviation Day in Croatia

Franjo Tuđman International Airport Zagreb (ICAO: LDZA) is the main airport of Croatia's capital Zagreb, located to the southeast of Zagreb, near the city of Velika Gorica (VG).

The military part of the airport in the south–east, is called Pleso Air Base (Baza 91) of the Croatian Air Force (*Hrvatsko Ratno Zrakoplovstvo*).

Under the auspices of the Government of the Republic of Croatia, on 11 May 2024, the City of Velika Gorica organised the event AIRVG 2024 – Aviation Day in Velika Gorica, an aviation event that was held at the International Dr. Franjo Tuđman airport in the area of the so–called of the old terminal.

The aim of this event was to promote aviation in Croatia and Velika Gorica as the "Aviation City", and the emphasis of this year's edition was on the modernisation of aviation and the promotion of calls for military pilots, aviation technicians and other professions in air traffic.

With this organisation, the City of Velika Gorica continues the "Aviation City" project, as part of which a "Charter of Friendship" was signed between the City of Velika Gorica and representatives from the aviation industry operating in the area of Velika Gorica. The signatories are the Croatian Air Force, Zagreb International Airport, Croatian Air Navigation Control, Aviation Technical Center Velika Gorica, Croatia Airlines, Trade Air, Aviation Technical School *Rudolf Perešin*, Polytechnic Velika Gorica and Aeroclub Velika Gorica.

According to Colonel Stanko Hrzenjak, an operations officer in the Croatian Air Force's Flight Safety Department and the coordinator of AIRVG2024 activities (a MiG pilot): "AIRVG provides an opportunity to see first–hand the power and resilience of the Croatian Air Force, as well as its strong partnership and cooperation with international counterparts. AIRVG honours this fighter aircraft, which had a significant influence on the establishment of the

Croatian Air Force, with a flypast of the MiG–21. Apart from the flying programme, I believe that visitors to AIRVG will benefit from the chance to learn about the ways to become a pilot in the Croatian Air Force and find out what a typical day in our lives entails. In addition to Rudi's MiG–21, the legendary Dicey (Kockica), there are also: Pilatus PC–9M, Zlin 242L, the OH–58D Kiowa Warrior, the UH–60M Black Hawk, Bell 206B JetRanger, Mi 171Sh, the AS532 Cougar helicopter of the Republic of Slovenia and the Orbiter 3 Unmanned Aerial System. During the flying portion of the programme, the acrobatic group Wings of the Storm, the Zlin 242L aircraft, and the Bell 206B Jet Ranger helicopter will perform a demonstration flight. The MiG–21 and Rafale aircraft will perform a formation fly and an individual overflight, while the Mi–171Sh and OH–58D helicopters will display their joint action capabilities in rescuing pilots from a dangerous situation as part of the Pilot Rescue demonstration".

Colonel Damir Barisic, an experienced pilot and head of the CAF Project Team for the VBA Rafale and HRZ Capability Development Department stated: "Croatia has been waiting for three decades for the arrival of fourth generation multi–role combat aircraft. As we've already stated, we've had this as our dream and desire for the past thirty years, and we are thrilled that the day has come when we can finally switch to Western technology. As previously mentioned, AIRVG is a chance for everyone to witness first–hand the strength of the new guardians of the Croatian sky. The Rafale is one of the best fighter jets today. It is equipped with advanced attack navigation systems, a new generation electronic radar with high integration of sensors and self protection systems, as well as the ability to use a wide range of air to air and air to surface weapons. Although the actual training in France was demanding and challenging, our pilots demonstrated their high level of knowledge and expertise to the whole world.

While this fighter is undoubtedly more complex than the MiG–21, maintenance should be simpler because it can independently analyse data and offer aircraft diagnostics".

The Show

On 11 May 2024, a small airshow was held on the terrain of the old terminal of Zagreb Airport. That old terminal was available because the new terminal on the northern side of the airport became operational in 2017. Only 10,000 visitors were allowed on this location. A static show with nearly all aircraft types of the Croatian Air Force was setup on the tarmac before the old terminal, with access from 11:00 onwards. As the Zagreb civil traffic would not be hampered, the dynamic show was scheduled during gaps in the civil traffic. The dynamic airshow started at 15:00 with a show of the Krila Oluje

(Wings of Storm) demoteam with 6 PC–9Ms, followed by a demo of the Zlin 242L basic trainer of the Croatian Air Force.

Next in the programme was a CSAR (Combat Search and Rescue) demo of a Mi–171SH picking up a downed pilot while two OH–58D Kiowas flew alongside protecting the CSAR mission.

Then the highlight of the show started, the aim for all the visitors: the demo of the old MiG–21 and the new Rafale. Both jets took off and the MiG–21 made some fast passes along the crowd. Then the two jets joined up for a formation pass and the MiG–21 came in for landing, while the Rafale made another pass before landing. The two Croatian jets taxied together along the crowd line, showing the past and the future of Croatian Military aviation.

Next in line was a demo of the Bell 206 helicopter, while the Krila Oluje (Wings of Storm) demoteam gave another presentation to finish the AIRVG 2024 airshow.

The static show

Aircraft/helicopter	Country	Serial	Remark
MiG–21UM	Croatia	165	Red/White
MiG–21R	Yugoslavia (former)	26112	Defected from the Yugoslavian Air Force in 1991 (see below)
MiG–21bisD	Croatia	133	
Rafale C F3–R	Croatia	153	
Bell 206B–3	Croatia	604	
OH–58D 'Kiowa'	Croatia	329	
UH–60M 'Blackhawk'	Croatia	231	
Mi–171SH	Croatia	222	KFOR markings
2x Aeronautics Orbiter 3B	Croatia	–	Unmanned Aerial System
AS532 Cougar	Slovenia	72	

The dynamic show

Aircraft/helicopter	Country	Serial	Remark
MiG–21bisD	Croatia	116	
Dassault Rafale C F3–R	Croatia	150	
Mi–171SH 2x Sikorsky OH–58D 'Kiowa'	Croatia Croatia	220 322, 332	CSAR demo
Bell 206B–3	Croatia	603	
6x Pilatus PC–9M	Croatia	051, 055, 059, 061, 062, 064	Krila Oluje demoteam (Wings of Storm)
Zlin 242L	Croatia	402	

MiG–21

The Mikoyan–Gurevich MiG–21 is an iconic fighter/interceptor aircraft designed in the mid 1950s by the soviet Mikoyan–Gurevich design bureau. More than 11000 MiG–21s in various configurations were produced throughout the 70 years of its existence. After the creation of the Croatian Air Force (*Hrvatsko Ratno Zrakoplovstvo*) in December 1991, the main Croatian fighter was the Mikoyan–Gurevich MiG–21, some aircraft were obtained via defectors from the former Yugoslavian Air Force inventory and some were obtained in 1993. After upgrades in cooperation with Romania and its LanceR upgrade programme for the Romanian MiG–21s, the lifespan of the remaining MiG–21s was over and a successor was needed to replace this iconic plane designed in the 1950s.

Rafale

On 25 November 2021, a contract was signed between the Croatian government, the French Air Force and the French Dassault aircraft manufacturer. 12 existing Dassault Rafale aircraft (ten single–seat C F3–R and 2 two–seat Rafale B F3R) were taken from the French inventory and these aircraft were prepared for delivery to Croatia. During the following years, the pilots and the mechanics were trained to operate the Rafale aircraft. And on 25 April 2024, the first six Rafales were flown from Bordeaux (France) to Zagreb airport, where the Rafales were welcomed by a water shower from the local fire department.

During 2024/2025, the remaining 6 aircraft will be transferred to Croatia. After the arrival of the Rafales, they took over the air defence mission from the MiG–21s,

Defected MiG–21

Rudolf Perešin (25 March 1958 – 2 May 1995) was a Croatian fighter pilot serving in the Yugoslav Air Force (JRZ) during the 1991–95 Croatian War of Independence who defected to the Croatian side in October 1991, by flying his MiG–21 fighter jet from Željava Air Base to Klagenfurt, Austria, on a reconnaissance flight for the JRZ. He was the first pilot to desert from the Yugoslav Air Force. Following his defection he continued to fly missions for the Croatian Air Force and was shot down in May 1995 by Serb Krajina military forces, resulting in his death.

The MiG–21 aircraft number 26112 Perešin used to defect was moved to the Heeresgeschichtliches Museum (military history museum) in Vienna and briefly shown to the public there. It was publicly displayed at Zeltweg Air Base during the AirPower11 national air show in 2011. After a protracted international ownership dispute, with competing claims from Croatia and Serbia the aircraft was handed over to Croatia in 2019. (source Wikipedia)

Photos: Joris van Boven

Text: Joris van Boven and Alex van Noije

Airbus H145M, First deployment in the Netherlands

Helicopters of the type Airbus H145M of the German Luftwaffe operated for the first time on Dutch soil with the Dutch Commando's (KCT, Korps Commando Troepen). The helicopters came over from Laupheim and operated from Gilze–Rijen Air Base during their deployment. The German and Dutch Special Operations Forces work closely together nowadays. The German Division Schnelle Krafte and the Dutch Air Mobile Forces are doing this already for years. For the training, the helicopters were used for car blocking scenarios on several Dutch non–standard terrains. The German helicopters flew together with Dutch AS532U2 Cougar helicopters from the 300 Squadron from Gilze–Rijen. This helicopter unit is the Dutch counterpart of the German HSG–64 which operates the Airbus H145M and is specialised in SOF operations as well.

The Airbus H145M is a Light Utility Helicopter Special Operations Forces (LUH SOF). The helicopter is tailored to their needs. Each Airbus H145M is able to carry four fully equipped special forces soldiers, for example the KSK Special Forces Commander or the KSM Naval Special Forces Command, to their place of deployment. In the future, the helicopter will also be able to provide fire support and reconnaissance from the air. In addition, it will soon be possible to evacuate wounded people with this helicopter. When purchasing the helicopter, the

German Army deliberately chose a commercially available helicopter. The EC145 was after purchase adapted to the needs of the soldiers. With its special technologies, the H145M is equipped for special land and sea operations. During the flight, the pilots are supported by a 4–axis autopilot. Thanks to the two powerful gas turbines, the H145M is able to reach a top speed of 268 kilometers per hour. It can operate during the day and at night during SOF missions.

The helicopter allows the Special Forces to be brought to their destination in a well camouflaged and particularly quiet manner. Its colour makes the helicopter difficult to see

crew to fly reconnaissance missions at day and night. This makes the H145M LUH SOF extremely flexible in use. This is a particularly important feature for the changing requirements of special operations. A total of 15 helicopters of this type were purchased for the German Armed Forces. The helicopters are based at Laupheim in the south of Germany.

The Airbus H145M is sometimes also called 'The New Bolkow' referring to the MBB Bo–105 Bolkow which served in Germany in the past.

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

in poor visibility conditions. The H145M's shrouded tail rotor, the Fenestron, makes it one of the quietest helicopters in its class. The soldiers can use the release systems to fast rope down from the sides of the hovering helicopter. The helicopter is also performing very well in an urban environment due to its small rotor diameter. The helicopter can be equipped with various equipment; electronic self–protection systems, ballistic protection or additional equipment for use at sea. The helicopter also has powerful reconnaissance sensors. They enable the

11 Air Mobile Brigade

Airmobile Special Vehicle put on the ground at Deelen Air Base.

11 Air Mobile Brigade (11 AMB) is one of the three Royal Netherlands Army brigades. All three brigades consist of about 2,000 personnel. The three infantry battalions provide the combat mission, each with its own speciality. 11 Infantry Battalion's main task is paratrooper action. 12 infantry battalion has been a ranger battalion since 19 December 2023. This includes Non–Combatant Evacuation Operation. Therefore, one of its companies is tasked as Rapid Reaction Company. Since January the 130 member company is on standby for rapid deployment. 13 Infantry Battalion specialises in Air Assault operations. The other units specialise in supporting the combat units. These are: 11 Brigade Reconnaissance Squadron, 11 Engineer Company, 11 Recovery Company, 11 Supply Company, 11 Medical Company. All battalions/companies listed above are under the command of 11 Staff Company. Headed by a brigadier–general (from December 2023 BG Frank Grandia) and his staff. 11 AMB is headquartered in the Schaarsbergen (Oranje kazerne). 13 infantry battalion is based in Assen (Johan Willem Friso Kazerne). 11 medical company operates from both barracks. Reserve air base Deelen is used by the 11 AMB staff company.

Before earning the coveted red beret all soldiers have to go through a physically and mentally demanding training programme named AMOL for soldiers and corporals and VAKOL for Non Commissioned and Commissioned

The Cougar arrives first to avoid the downwash caused by the Chinook.

A Chinook approaches her landing zone while transporting two Airmobile Special Vehicle.

Chinook on the ground after dropping its cargo.

officers. The red beret distinguishes airborne troops from other units.

All RNLA brigades are reporting to a German Army division. 11 AMB became part of the Division Schnelle Kräfte (DSK – Rapid Reaction Division) on 12 June 2014.

11 AMB is too large to cover all its battalions/companies. From the support units, 11 Brigade Reconnaissance Squadron and 11 Supply Company are the ones that work the most closely with the Royal Netherlands Air Force. 336 squadron (C–130H Hercules) based at Eindhoven perform air drop and SOF missions. 298 squadron (CH–47F Chinook) air assault and 300 squadron (AS532U2 Cougar) air assault and SOF. Both are based at Gilze–Rijen. 300 squadron will transition to a special operations squadron and will receive the H225M (formerly EC725 Caracal).

AMOL / VAKOL

As stated, to earn the red beret all personnel joining 11 AMB must complete the AMOL/ VAKOL. It's a cluster 6 training which is the level required for all special force operators (air mobile, commandos and marines). "First you do the AMO part (mandatory for every soldier in the army). That's followed by the airmobile part. There is a certain mentality that is woven into it from day one. It not only focusses on physical fitness but also mentally. Dealing with difficult conditions and challenges. That make people who join this brigade proud of their beret. You had to work hard for it."

AMOL takes 23 weeks to complete. "The VAKOL, 8 weeks, has basically same requirements but in shorter time frame. You need to demonstrate leadership skills. VAKOL is really rated as extremely tough. The physical aspects come into it, the mental aspects. Show that you can assess situations, for both yourself and the group you are in charge of. It is a very tough course. A small injury can put you out. If you have not shown enough leadership qualities, you may be told to try again just before the final exercise. This applies to the non–commissioned officers and officer ranks."

When you have passed AMOL/VAKOL you are not done. Every person is responsible for keeping themself fit and strong. That is in addition to the weekly sports classes overseen by the sports instructors. All other training is organised by 11 AMB or the respective RNLA education and training centres. For instance, the Education and Training Centre Driving (OTC Driving) for personnel or the Defense Para School.

11 Supply Company

Sergeant–Major Dennis is currently in charge of the Airtransport group (Bewaargroep). The organisational structure of 11 Supply Company consists of the staff led by a major with a captain as second. Each platoon is led by a lieutenant. Each platoon has the same structure: a class 1 group (Bewaargroep) for food management, class 3 group for fuel and a class 5 group for ammunition. The latter are para–trained and can jump along with the infantrymen. The class 3 and Rigger–marshaller group are trained for rotary action. Each company can support an infantry battalion. Additionally, we have the Airtransport group (Bewaargroep). "We are the ones who have the most contact with the Royal Netherlands Air Force squadrons. The group is divided into two elements. The airdrop and rotary groups. The airdrop group works together with 336 squadron and prepares the Container Delivery System (CDS), the loads dropped by parachutes. The rotary group works together with 298 and 300 squadrons. Their main tasks is Pick Up Zone (PUZ) coordinator. In other words, they manage the PUZ brigade and battalion–led operations. From the brigade staff a G3 (Plans and Operations), a commander, determines where the priorities are. The G3 also has the contacts with the infantry battalions. I am the one who ultimately conducts the operations in the field by deploying the PUZ".

"Looking into the exercises or operations you see that the first wave consists of mainly personnel as the battalion first flies its infantrymen to the target. From second wave transport of vehicles etc. is done so the infantrymen also have freedom movement there. When a larger area is secured and controlled and it's safe for the helicopter to fly the supplies arrive. At the PUZ a Combat Battle Train (CBT) is created. Here the infantry companies will pick up their goods. Using the air mobile special vehicles they move

Chinooks (298 squadron) approaching the landing zone with their underslung loads.

these items forward. Personnel of 11 Supply Company keep records of the supplies at the CBT. What has arrived here, what do the companies need and then the distribution is started. The infantry companies use delta pints in the field where their ammunition, food, water etc. will arrive".

"What is new within 11 AMB is they have a group of civilians on duty. These people, called the Personnel and Equipment Preparation and Handling Area (PEPHA) group, are specialised in logistics. They take care of the preparations of exercises and large missions abroad. In the past this duty was assigned to the platoons, but it laid a burden on these units. The current four people working in the PEPHA group ensure the platoons are now more engaged with their operations. "It's a win–win. They have a nice job and the platoons are relieved".

Cougar at its landing spot on the runway of Deelen air base while 11 Supply Company personnel conducts checks on the LSV.

Air Drop, Air Assault

Material must be rigged to be either dropped by transport aircraft or flown in by transport helicopters. Personnel must be trained and certified. And whereas an air drop might look simple handling multiple or large packages of helicopters require a totally different skill set.

The airdrop mission started about 10 years ago. It was triggered by the demand of the Ministry of Foreign Affairs.

Members of 11 Supply Company on their way to unhook the load.

Mercedes-Benz G280 CDI off-road vehicle with trailer arriving by Chinook at the landing zone.

They wanted to drop water and food for the Yezidis in Syria and had bought 20 CDS from the Belgians for dropping by 336 squadron. However, it turned out that they no longer possessed this skill and as a result the operation did not go ahead. The squadron then revived the airdrop domain and through their connections with the 46 Brigata Aerea of the Italian Air Force at Pisa, we were able to join them and took care this task could be performed by 11 AMB too. Currently the Defence Para School (DPS) is responsible for training on the rigging material for air drops.

The CDS are built on pallets. These have standard dimensions. Last year during USAR led exercise Swift Response we found out, during the analysis trajectory, that the paratroopers could not jump with their backpacks. Then they have a problem, how do you keep yourself deployable. They asked us can you make air drop loads. We got the backpacks, different sizes, from an entire company. We rigged that into a pallet sized CDS. That was a nice moment, the infantry guys jumped out and then their equipment was parachuted down. The air drop mission develops quite quickly.

We have now been asked to join a US unit in that exercise. We will then take air mobile special vehicle to see how we would do that. We first look at fellow countries. How do they do it. Then in combination with the DPS we will work on this. Next questions are the budget and the approval.

Rigging material

Material used for an air drop is rigged at the departure Air Field (DAF). Currently A22 containers are used. This is a CDS. It's approximately equal to the size of a pallet (length and width). These are prepared by the air drop group. The biggest load in terms of vehicles is the Suzuki King Quad. For our engineering company we dropped a runway repair vehicle. The limitation is always the parachute, the maximum weight it can carry. The usual air drop consists mainly of spare parts, food etc. In the future, we will drop live ammunition and fuels. That's now being worked on as we do need to receive clearance to drop hazardous materials. We are ready for that as soon as all the paperwork is signed off.

Rigging material for helicopter underslung loads requires another approach. The Materiel and IT Command (Commit. Previously Defense Materiel Organisation) produces a manual for underslung operations. The manual describes all vehicles used by 11 AMB and how to rig those. Our own helicopter office performs all testing and prepares those manuals. Related to underslung loads there are two–ways, one is the use of the cables (which vary in length) and use of a net. Of the later we have a 5.000–pound (about 2,270 kilogram) and a 5.600–kilo (about 12.345 pounds) net. With a net we can transport a vehicle. That is then called an authorised load. For items which can't be slinged the net is always an option. But take in mind that due to the pressure on the cargo thing can bend.

In case we need to sling vehicles/equipment which is not listed in the manual then we have to find another solution. As example, slinging in Poland (Falcon Autumn). If we must sling, let's say, a vehicle from the Americans, then we need to have permission from a higher chain of command because it is foreign material and it is also from a foreign unit. The only option left is the net. But only when we received permission from the higher level.

Rigger/marshaller and landing point commander

We currently have rigger/marshaller (a position) in the PUZ. We give this training ourselves. Our Landing Point Commander (LPC) can give the rigger/marshaller training. Riggers prepare the cargo, either a vehicle or a pallet/net with supplies to be transported as underslung load by the helicopter. The rigger may also do the actual hooking, but only under the direction of an LPC. Riggers are taught to use marshalling signals so that, assuming there is no radio communication, he can communicate with the helicopter crew using hand signals.

At the PUZ for each helicopter a landing zone (LZ) landing spot is set up. This is a box of 100 by 100 meters (when working with loads). A LPC is responsible for the landing spot and is often assigned one or two rigger/marshallers. The LPC together with his teammates place the loads in the right place(s) and checks the load to make

Sling removal in progress.

sure there are no mistakes. That's for 1 landing spot. The we have the Heli Handling Instructor (HHI). As soon as we work with multiple helicopters one more HHI is on scene. When we two helicopters we already need a HHI to handle operations as an LPC is responsible for one LP and cannot work for two. The work of a HHI is also described in procedures. The maximum number of landing spots for helicopters with loads and/or personnel controlled by a HHI are three. When there are no underslung loads, so either internal loads or personnel, this number of landing spots under HHI control is maxed at six.

Another, but an oddball is the role of Commander Landing Point (CLPT). It's a role created by 11 LMB. In the past corporals, working within the different companies of the brigade, could become an LPC. That was stopped as it was ruled that the responsibility of LPC was too high for the rank of corporal. As an exception the corporals of the Airtransport group (bewaargroep) as well as those assigned to our pathfinder company may be trained as HHI. All other corporals assigned to the other 11 AMB companies are not allowed to be trained as CLPT. This exception was only approved because we are short of LPCs within the brigade when we operate on a PUZ with many helicopters. With the CPLT we can do that work on the LZs. However, there must always be supervision by either a LPC or HHI who have the responsibility during the operation. So, the CLPT does almost the same job as an LPC except for a few points for which an LPC/HHI is nearby.

Sling lanes

At a PUZ when dealing with multiple transport helicopters (light, medium, heavy) the landing spots are made using so–called sling lanes. That means that helicopters of the same category, like Blackhawk/Cougar, use the light lane and types like the Chinook use the heavy lane.

When there are a few helicopters in play it is possible to use one lane. In December 2024 there was a slingery exercise with one Cougar and two Chinooks. Here we put the Cougar on the first landing spot with its heavier colleagues on spot two and three, so the Cougar was not hampered by the downwash of the Chinook. We use markers for the helicopters indicating where they should land. One hundred meters further the next marker is placed etc. All loads are placed on the right side of the landing point and or dropped to the left of it. There is a maximum of three loads per landing spot. So in all cases we have more loads to be transported we have to make a plan how we will set up the entire LZ. At the LZ we do have a quad or motorcycles. These are used by our HHIs to bring information around the landing spots.

The author would like to thank SGM Dennis, Airtransport group (Bewaargroep), 11 Supply Company for his time to provide an insight into the work of the company and his group.

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British Aviation Anniversaries connecting the World

Britain has played a pivotal role in global aviation, marked by many notable achievements and innovations as celebrated throughout this set of stamps. Researched and created alongside Brian Riddle, former Chief Librarian of the Royal Aeronautical Society, this collection comprises six retro style posters and advertisements harking back to the golden age of aviation, capturing the historical significance of each milestone.

100th Anniversary of Imperial Airways: As a pioneer in commercial aviation worldwide, Imperial Airways laid the foundation for modern air travel, connecting distant corners of the globe and India and ushering in a new era of transportation.

100th Anniversary of the Fleet Air Arm: The Fleet Air Arm has served as an integral part of the Royal Navy, providing aerial support and defence capabilities that have safeguarded maritime interests and national security.

75th Anniversary of the English Electric Canberra: A pioneering aircraft renowned for its versatility and innovation, the English Electric Canberra played a crucial role in military operations and reconnaissance missions.

75th Anniversary of the De Havilland Comet: The world's first commercial jetliner revolutionised air travel with its ground breaking design and technological advancements, marking a major milestone in the history of aviation.

75th Anniversary of the Avro Shackleton: A stalwart of maritime patrol and reconnaissance, the Avro Shackleton served with distinction in various roles, demonstrating its reliability and endurance over the decades.

60 Seasons of the Red Arrows: Recognised globally as a symbol of precision and excellence, the Red Arrows aerobatic display team has captivated audiences for six decades with their breath–taking performances.

Brian Riddle, Former Chief Librarian, Royal Aeronautical Society, states "Anniversaries offer the opportunity not only to celebrate but also to reflect on the changes, developments and progress that have occurred during that time. During 2024 there are a number of major British aviation anniversaries and the challenge has been to select those which are the most historically significant today.

The anniversaries featured in this set of six stamps celebrate and capture the progress of British aviation over the decades". Isle of Man Post Office Celebrates Six Historical Aviation Milestones highlighting six landmark British aviation anniversaries and milestones celebrated down the ages. This collection features six stamps priced at 85p, £1.60 x 2, £2.31 x 2, £2.72, released to the public on 28 May 2024.

By Vijay Seth
Aerospace Heritage Trust
Images courtesy: IOM Post

25 Years Back

From Vayu Aerospace Review
Issue IV/1999

Five ATR 72–500s

On June 13, at a well–attended press conference held by ATR, Jet Airways and the TAT Group (France), the formal contract for five ATR 72–500s was announced.

LCA First Flight Delayed Again

According to reports from Bangalore, "many engineers involved in the LCA's development had to temporarily slow down on work to contribute to the war effort in Kargil."

Further Ten Su–30s For IAF

An IAF order for a further 10 Sukhoi Su–30 two–seat advanced multi–role fighters to supplement its $1.6 billion contract with India, signed in November 1996, for delivery of 40 Su–30MKI fighters by 2003, has been confirmed by Russia's IAPO President Alexei Fyodorov.

Russia Steps Up Defence Supplies

The current conflict in Kargil has given a new momentum to the emerging strategic partnership between India and Russia", according to Prof. Grigory Bondarevsky, a leading Russian expert on Asia.

IA–AI Aircraft Acquisition Plan "In Cold Storage"

Civil aviation analysts have pointed out that the aircraft acquisition plans of Air India and Indian Airlines would not take off now as the Civil Aviation Ministry feels that key decisions on fleet acquisition and renewal should be left to the 'strategic partners' that the Government proposes to induct while privatising the two carriers.

Saras "Go–Ahead"

Saras, the multi–role light transport aircraft (LTA) project being undertaken by the National Aerospace Laboratories (NAL) has received the approval of the cabinet committee on economic affairs (CCEA).

'Sahara Connect' Launched

According to sources, the Sahara group has floated a new company called Sahara Connect to launch airline operations in regional routes. It has also concluded a deal with SR Aerospace, a US based firm, for dry leasing a dozen 30–seater Embraer 120 aircraft for the new regional airline.

No Takers of AI Equity

Sources in New Delhi have indicated that no major foreign airline operating out of India has shown serious interest in taking equity stake in Air India while the Civil Aviation ministry is keen to reduce Government shareholding in the company to 40 per cent.

ISRO Spy Satellite in a Year

A report from Bangalore suggests that India could have, perhaps, detected the intrusions in Kargil if it had a spy satellite in place. The Indian Space Research Organisation (ISRO) says it can fly one as soon as user agencies place a demand.

Falcon 2000 for Tatas

According to a report from Le Bourget, Tata Industries is acquiring a Falcon 2000 transcontinental–range business jet. It will be the first new generation business aircraft to fly the Indian skies. The eight seater aircraft costing about $23 million, is expected to be delivered to the Tata group in September.

Fare Wars in Indian Skies

To the utter delight of air travellers on the Delhi–Bombay sector, Indian Airlines, Sahara Airlines and Jet Airways are passing through a phase of grim competition, cutting one another in reducing the return fares.

Namibian MoU with HAL

His excellency Dr Sam S Nujoma, President of the Republic of Namibia, accompanied by Erikki Nghimtina, Ministry of Defence and Hidipo Hamutenya, Minister of Trade & Industry, Government of Namibia visited the HAL facilities at Bangalore on 24 July.

Tale Spin

Something to be proud of!

The above image says it all. We've truly come a long way! A thumbs up to humanity.

You help me, I'll help you

A combination not seen before! US Marines flying a CH–53K King Stallion heavy–lift helicopter transported an F–35C Lightning II airframe from the F–35 Integrated Test Force at Patuxent River (Pax ITF) to a Navy unit located at Joint Base McGuire–Dix–Lakehurst, New Jersey, 24 April 2024. During the transport, the CH–53K aerial refueled with a KC–130T Hercules multi–mission medium lift tactical tanker/transport aircraft.

Indian Army of the future?

Not a scene from a science fiction movie! Indian Army regiments getting accustomed to robotics and future warfare. In the photo can be seen a robotic mule, logistic drone, UGV with ATGM launcher and tactical load hauler at Agra military station, Central command.

Excuse me—this is my parking spot!

Just a normal day at the Tank Museum at Wool, England. Old and new tanks parked randomly in the car park. What a great idea! The museum is worth the visit with over 300 tanks and armoured vehicles from the days gone by till today displayed wonderfully.

Afterburner

FLY NAVY, FLY

A HISTORY OF INDIAN NAVAL AVIATION

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U.S. Marine Corps photo by Sgt. Luke Kuennen

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