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IV/2021

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Geo Politics

Lt Gen Kamal Davar (Retd) cautions on

The US withdrawal from Afghanistan: A strategic blunder in the making

(photo: Reuters)

Notwithstanding being easily the world's most powerful nation since the end of the Second World War, much glory still cannot be ascribed to the US statecraft. In reality, most foreign policy and strategic experts opine that the US has a propensity for strategic blunders. The most pronounced geopolitical lapse, since the end of the Cold War, apart from its futile intervention in Iraq from 2003-2011, is now its decision to exit from the land of the Hindu Kush by 11 September 2021. That past US administrations in the last decade or so have all been wanting to bring a closure to the 'forever wars' is well appreciated, but to exit from a gravely fratricidal, violence-afflicted and impoverished nation, and leaving it in a total mess, hardly brings any credit to the US. On the other hand, such decisions diminish its stature and reputation to address global problems with any cohesive strategy or success.

The newly elected US President, Joe Biden, took some time to enunciate his foreign strategy priorities including the exit from Afghanistan, which is understandable. That a majority of his policies would differ from those adopted by his mercurial predecessor, Donald Trump, was always in the offing. Though Donald Trump in August 2017 had loudly proclaimed that "US presence in Afghanistan would be determined by conditions, not calendars," Trump's administration later had eagerly speeded up the US negotiations with the belligerent Taliban resulting in the February 2020 peace deal with the group. It is regrettable that the US chose to ignore the democratically elected Government of Afghanistan and President Ashraf Ghani's views during the Taliban negotiations. Most analysts strongly felt that the said negotiations were completely one-sided in favour of the Taliban! Despite the Taliban's assurance, at these negotiations, that they would cease violence-ridden acts inside Afghanistan and maintain no contacts with the Al-Qaeda, the converse has been true, much to the dismay of the Kabul government and the common people of Afghanistan.

A failed Global War on Terror?

It is apparent that the 20 years of war in Afghanistan has bled the US far more than it could absorb, leaving it financially weary and militarily fatigued. The US-based Brown University, in its well researched 20 years, nearly 175,000 people in Afghanistan including 51,000 terrorists-cum-opposition fighters had lost their lives while over 2,300 US soldiers had been killed. In addition, the war had cost the US nearly US $2 trillion. Thus, it is not surprising that successive US administrations have been looking for an honourable exit, even if the hapless Afghans are left at the mercy of the medieval, regressive, intolerant and, fundamentalist Taliban. What is incomprehensible is the hurry to exit in the next three months. The US Central Command, under whose operational responsibility lies Afghanistan, in a statement on 9 June 2021, conveyed that nearly 50 percent of US troops withdrawal had taken place. However, many eminent Americans associated with Afghan affairs earlier have expressed their anguish with Joe Biden's decision to pull out without improving the security situation in Afghanistan. Former US Ambassador to Kabul, Ryan Crocker, has expressed that "we are not ending the war, we are leaving [the] battle-space to our adversaries." Former Commander-in-Chief of the United States Central Command (USCENTCOM) and CIA Chief, Gen David Petraeus, has also expressed his anguish at the sudden announcement of the US withdrawal from Afghanistan.

With the impending complete withdrawal of the US and other foreign troops from Afghanistan fully in sight by September 2021, the Taliban, meanwhile, in concert with the Islamic State in Khorasan (ISK), Al-Qaeda and elements of the Haqqani network have stepped up their violent activities inside Afghanistan. They have no compunction in targeting even women and children, funeral processions, schools, and innocent people. In March, this year, the Taliban murdered three female journalists and a few days back also killed many Afghan mine-clearers in the north-east Baghlan province. ISK claimed responsibility for this act citing their aim of targeting Shiite Hazaras. The Taliban, by conservative estimates, dominate and control the bulk of the Afghan countryside with their span now increasing by the day, whilst the ISK's presence is growing in some of the eastern provinces of Afghanistan. Whether Ashraf Ghani's Afghan National Security Forces will be able to withstand the Pakistani-controlled Taliban's onslaughts can easily be gauged.


(photo: Reuters)

Pakistan's ambitions in Afghanistan

In the complete mess existing in Afghanistan currently, the nation which appears to have the maximum gain from the ensuing political and security instability is neighbourly Pakistan. For years, its Inter Services Intelligence (ISI) has trained, equipped and funded the Afghan Taliban and the other terrorist outfits operating inside Afghanistan. Pakistan senses, with the US exit, it will be able to exercise a hold on Afghanistan's internal affairs with a pliant regime in power in Kabul. It also hopes that its traditional strategy of keeping India out of any reckoning in Afghan affairs will bear fruition. The ISI would already be planning for out-of-work terrorists from Afghanistan to be redeployed for terrorist acts inside Jammu and Kashmir.

Pakistan, however, with its myopic mindset forgets the simple fact that a fiercely independent Pashtuni Taliban in Afghanistan, if and when it seizes power in Kabul, can turn the heat on its Pakistani mentors in working for assimilation of Pathan-dominated areas in Pakistan from the Khyber Pakhtunkhwa and Balochistan provinces into Afghanistan. As is commonly known, no Afghan government in the past or any of its leaders or tribes have ever recognised the Durand Line, which was drawn by the erstwhile imperial British power in 1893 as the boundary between Afghanistan and Pakistan. Pakistan, as ever before, will continue to fish in the troubled waters of Afghanistan; this is a foregone conclusion. Reports that the US is once again seeking logistics assistance, especially air-bases inside Pakistan will be repeating a folly!

Change in the Indian foreign policy towards Afghanistan

Amongst the few nations respected, since ages, by the Afghan people is unquestionably India. Following a consistent policy of non-interference in the internal affairs of Afghanistan and having generously provided humanitarian aid, infrastructural development in many fields, educational, medical, and power generation assistance, India's soft-power forays in Afghanistan have been widely appreciated except by Pakistan. The latter has left no stone unturned to marginalise India even in parleys on Afghanistan's future. Within India itself, the contours of India's future Afghan policy is being hotly debated and not spelt out with any great clarity. Since the last decade or so, commencing with Dr Manmohan Singh's prime ministership and continued by the Modi government, India has made it clear that any resolution of Afghanistan must be "Afghan-led, Afghan-ruled, and Afghan-controlled".

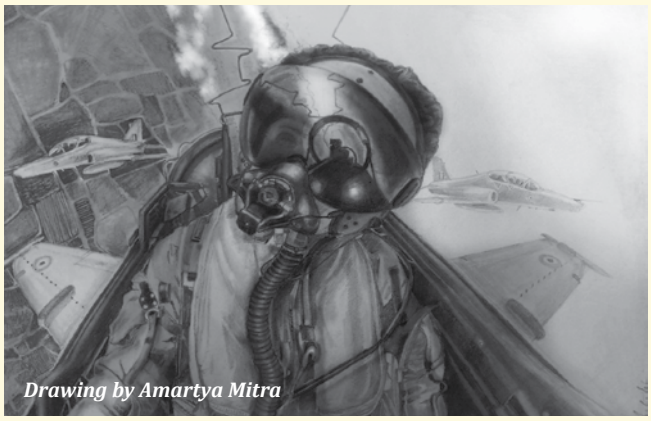
However, with the likely changing power equations in Kabul, there is a strong view amongst some Indian diplomats that India must open up channels of communication with moderate elements in the Taliban. However, are there any moderate or good Taliban elements existing is the moot question. India, as the pre-eminent South Asian power should follow not only a policy which furthers its national interests but must also have moralistic and human overtones to it. Otherwise, what distinguishes it from a country like China or Pakistan? To ensure peace in the region, India should strongly strive for a UN peacekeeping force to be stationed in Afghanistan which ensures the prevention of a civil war from breaking out there. This force should also have some representation from moderate Islamic nations. India must also endeavour to get Russia, Iran, and the US on the same page to conceive and implement a suitable regional policy for the strife-torn Afghanistan. Meanwhile, India must continue with its all-encompassing humanitarian assistance to the Kabul government. India, thus, will have to take some bold decisions to assist the Ashraf Ghani government to stem the approaching Taliban-cum-Pakistani onslaught. It's a pity that the region where the first "Global War on Terrorism" was launched, the principal player, the US, has chosen to abdicate its responsibilities.


(photo: Commons)

OPINION

Air Marshal Brijesh Jayal says

"Can we really afford to relegate air power to a supportive role?"



Drawing by Amartya Mitra

Recent reports on defence reforms towards creation of theatre commands indicate that the government is determined to push ahead with this major change that is expected to contribute to an integrated and cost effective war-fighting machinery and that the decision is likely to be announced on Independence Day. Further that a committee stands appointed to allay reservations of the IAF and resolve matters.

Unlike other areas of national governance, reformers in the field of defence need to be conscious of the impact of their decisions on two very vital aspects of warfare that are inter-related. The first is the fast-changing impact of technological evolution on warfare and its optimal application and the second, the sensitive issue of military 'leader-led' relationship, the combatant's upbringing and training in the parent service and within it, the ethos of the relationship between the enlisted men and their superiors. The integrity of this relationship finally defines the morale of the combatant and potency of the fighting unit.

As example, Air Force culture has been expressed as a combination of rigorous application of advanced technology and individualism where the principal combatants are officers working with small groups of enlisted air warriors. In this environment, formal social and professional distancing between the two is virtually non-existent. This is unlike the sister services more so the army where for good reasons, it is different. It is this relationship through which the larger issue of operational command and control in respective services has evolved.

The inherent strength of air power is both its flexibility and ability to act autonomously and the challenge is to find the optimum overall command and control model that exploits these strengths within the overall context of integrated warfare. This involves far more than 'copying and pasting' models of others.

The principal arguments being projected towards the necessity for this reform are the lack of synergy in planning and jointness towards integrated war- fighting and differently- located seventeen single-service commands covering varying geographical boundaries. While there is every reason to overcome the latter through far simpler and effective administrative means, the former needs acceptance of the fact that with the advent of air power, much needs to change. Recognising this, the IAF has for decades, located an advanced headquarters element, headed by a two star rank, co-located with respective sister service HQs for this purpose. That this is considered a mere formality would explain why in the run- up to Kargil, instead of the IAF's sophisticated tactical reconnaissance resources being exploited, army helicopters were used. In the event, it was shepherds that alerted the army and valuable lessons continue to evade us. That the Kargil Review Committee had no IAF representation, further displays a security mindset yet to come to terms with warfare in three dimensions! The final nail in the coffin to air power comes in a recent TV interview where the CDS labeled IAF as supporting arm to ground forces — likening it to roles of artillery and engineers in Army! The PLAAF must be delighted!

Since history is a provider of lessons, it is worth looking at how air power has evolved in other democracies. Britain's experience during the First World War showed that air power, which was then a component of the other services, had a separate and essential role to play in modern warfare, independent of, but in closest cooperation with the other services. Out of this practical lesson in warfare was born the Royal Air Force. Similarly, after US experience in the Second World War the USAF was established as a separate service under the National Security Act of 1947. Clearly, two democracies with which our armed forces have many linkages, after having fought bitter wars felt the need for air power to have a separate operational identity.

On an inspection visit to the Air Force headquarters in Beijing in 2014, President Jinping whilst stating that the air force played a decisive role in national security as well as military strategy, called for a stronger Air Force to adopt an integrated air and space defence capability. Not surprisingly in the lexicon of Chinese aeronautics, the phrase, 'aeronautical patriotism', is increasingly being heard, as they understand the potential of air power. It is hence ironical that even as our border with China is now live and the latter flexes its muscles, rather than explore avenues to expand the potential of our air and space capability, we should be discussing a retrograde proposal that will effectively limit our air power's exploitation through penny packets limited to theatres on ground!

Reforms as far- reaching as relegating the role of air power to a supportive role within limited theatres must only be studied through scientific and systems- analysis tools and then war -gamed towards arriving at solutions, not by subjective views of some or in committee rooms.

For the sake of maximising national air-power potential and the operational ethos of the IAF, one hopes that this is one major announcement that is missing this Independence Day!

Geo Politics

Lt Gen Kamal Davar (Retd) writes on

India in the contentious US-Russian relationship

The Russian S-400 missile system (photo: Reuters)

The end of the Cold War in 1991 between its principal players, the US and USSR, had triggered optimism the world over that perhaps peace was now on the horizon between the two most powerful nations, and by extension, across the world. The dissolution of the USSR had left only one super-power in the reckoning. Many in the world, subsequently, felt that multipolarity should be the natural and desired outcome of this geopolitical shakeup. Fast forward to the end of the century and by all accounts, China was gradually displaying all the traits of becoming a super-power with its economic resurgence and military growth, propelling global ambitions. However, Russia—the successor of the erstwhile USSR—notwithstanding its serious economic travails retained its military capabilities, its technological advancements and geo-strategic significance in the Eurasian region.

The last two decades, however, also saw the USSR's successor Russia's overall influence diminishing marginally, both at the global and regional levels, primarily owing to its sluggish economic growth and a fluctuating crude oil market. Nevertheless, under its determined head of state, Vladimir Putin, Russia has doggedly meandered its way through a maze of economic challenges. Since the past few years, it has re-emerged as a significant player asserting itself globally and in the region. Though both the US and Russia do not have critical differences amongst each other, which may result in a major military confrontation, yet perceptional divergences between them exist on numerous issues.

Is there a "New Cold War" or "Cold Peace" in the making? India, with its traditional ties with Russia, and equally rapidly developing strategic relations with the US, is perhaps caught in a bind! Not only for its own national interests but India, retaining its strategic autonomy owing to its multi-faceted significance, can play a leading role to bring the two sparring powers closer——a prerequisite for a peaceful global order. On the other hand, it does not require much strategic brilliance to comprehend the simple fact that the emerging global power, China, is the sole major beneficiary of adverse US-Russia relations. That China would be doing its utmost to bring Russia closer to itself and make the US an irrelevant power in the Middle East-South Asia-SE Asian region is clearly evident. Among the major contentious issues plaguing US-Russian rapprochement on strategic matters are differences on nuclear issues, Afghanistan's future, Iran's nuclear impasse, US strategies in the Indo-Pacific and the likely emergence of QUAD as a major grouping.

China's growing intransigence and its scoffing at international rules-based orders, Russia's meddling in Ukraine, Russia's human right violations, trade sanctions by the US on Russia and some other nations, climate change and importantly, cyber security etc are among some other differences.

On some significant issues, indirectly or directly, India too gets affected by US-Russian differences. An analyst succinctly has stated that "US has an India problem and it's all about Russia." The Russians too are distinctly uncomfortable at the growing strategic ties between India and the US especially in the area of hi-tech arms, weapons, platforms import from the US to India. Since the last many decades, Russia has been the largest exporter of warlike

stores to India amounting to over 70 percent of India's arsenal.

Two years back, India despite US opposition had signed over a 5 billion US dollars deal with Russia, for the import of the latest long-range air-defence missile system the S-400 (Triumf). The US, for a similar deal between the Russians and Turkey had imposed sanctions on the latter. Some noises have been emanating from the US to India to cancel the deal with Russians, but India has stood its ground so far. It must be conveyed to all, friends and foes alike, that India is not a recipient of any military aid and procures its defence needs on payment, from wherever it feels appropriate. It will indeed be a retrograde step, if the US imposes the CAATSA (Countering America's Adversaries Through Sanctions Act) on its strategic partner, India.

Another contentious issue between the US and Russia which has implications for India is the future of Afghanistan from where the US has already commenced its troop withdrawal and would exit by 11 Sep 2021. The US forsaking Afghanistan in its currently precarious security and political instability ridden state does not augur well for India's friendly and humanitarian linkages with that fratricidal-violence afflicted nation. Pakistan inspired and funded Afghan Taliban, warlords and terror-driven organizations like the Haqqani network, Al Qaeda elements, the Islamic State in Khorasan which is gaining ground in some eastern provinces of Afghanistan are all waiting in the wings to take over Afghanistan, after the US departure and revert it to the dark ages. Women, school children and the ordinary citizens of Afghanistan are dreading their future with many of them trying to leave Kabul for other countries. India indeed would be marginalised in even assisting Afghanistan in non-kinetic endeavours.

Amazingly, that US and Russia could not agree to the contours of the hapless nation's future does not augur well for regional peace. Somewhere, India should have endeavored far more actively to get US and Russia on the same page on Afghanistan. Mindful of China's growing naval power with its implications on it belittling the maritime rules based international order, the US and many like-minded nations do agree to chastening China's ever growing ambitions in the Indo-Pacific region. China's bullying of its neighbours in the South China and East China seas, like Vietnam, Philippines, Indonesia, Japan, has to be confronted with and thus the QUAD, still in its infancy, has to be suitably strengthened.

Russia, despite its growing warmth with China, though, has maintained a seemingly neutral stance in South China Sea's affairs, remains rather wary of the QUAD's future configuration and mission. The US thus must assuage any apprehension of the Russians regarding the QUAD, and India too can play its part in the same endeavour. Russia does, anyway, comprehends that likely confrontation between the nations on the Indo-Pacific rim and Russia itself is hardly a possibility! However, all these littoral nations will be wary of China's unbridled ambitions in the Indo-Pacific expanse-enough suitable reason for US-India-Russian cooperation in this strategic region.

Prior to assuming the US presidency, Joe Biden was expected to adopt a tougher stance than his mercurial predecessor Donald Trump towards Russia. After the first three months in office where Biden appeared to adopt a harder stance towards Russia, also calling Vladimir Putin uncharacteristically a "killer", Biden appears to have softened considerably as seen in the just concluded summit between him and Putin on 16 June at Geneva, Switzerland, after the G-7 meeting in London. Presidents Biden and Putin both engaged for three hours discussing what Biden termed "in excruciating detail" the many issues which plague US-Russian relations. By all accounts the meeting was useful for both nations and Biden announced that they discussed, among other issues "the next steps our countries should take on arms control measures" to reduce the risk of war. Putin hailed Biden as "very constructive, balanced and extremely experienced." Both leaders agreed to ensure that certain types of critical infrastructure should be kept off limits to cyber attacks including in the energy and water sectors. They agreed to pursue criminals carrying out ransomware attacks. The summit between the two augurs well for global geopolitics for the immediate future.

Overall, as regards US-Russian relations and their likely impact on India, the latter has to forge ahead with clarity bearing its national interests in mind. Ensuring strategic autonomy will be a diplomatic tight-rope for India. However, as India does not have any major problems with either of these nations, ensuring friendly and mutually beneficial relations should not be overly a difficult task. India can play a major role in ensuring both these nations cooperate with each other in resolving global and regional problems and keeping China's machinations at bay. The coming months will thus be a test for Indian diplomacy and statecraft.

The QUAD naval exercises in 2020

VIEWPOINT

Admiral Arun Prakash says

"China has become a maritime power. It's time India caught up"

The lead Chinese Type-075 preparing for sea trials. (Photo via Weibo)

While early signs of China's "maritime awakening" had emerged with its 2004 Defence White Paper (DWP), most China-watchers were sceptical when Hu Jintao declared at the 2012 Party Conference that China aimed to become "a maritime great power". Scepticism gave way to apprehension as it became clear that Hu's announcement was underpinned by a time-bound programme for acquiring the full gamut of maritime capabilities. Today, China has not only overtaken the US Navy in numbers, it is also the world's top ship-producing nation, with the largest merchant navy, coast-guard and fishing fleet/maritime militia in the world.

The competition between China and India in the economic and military spheres, no matter how asymmetric, makes it inevitable that the two will remain rivals in the Asian strategic space. Having weathered the Covid-19 pandemic with limited economic impact, China has reaffirmed its revanchist agenda via its refusal to resume the status quo ante in Eastern Ladakh. An economically strong, expansionist, and militaristic China will use the Maritime Silk Route initiative to expand its sphere of influence and ensure dominance in the Indo-Pacific. The PLA Navy's crucial role in this endeavour, clearly spelt out in China's 2019 DWP, relies on its formidable maritime/industrial capabilities.

In this context, the yawning gap between the maritime capabilities of China and India is shown by this example. China laid down its first indigenous aircraft-carrier in 2015 and commissioned it in 2018 — an astonishing industrial/technological feat. Work on India's first indigenous aircraft-carrier commenced in 2009 and in 2021, the ship awaits completion. The roots of this debility are not far to seek. India launched its first "maritime modernisation" plan, bearing the catchy title of "Sagarmala" in 2003, almost simultaneously with China. But its focus was limited to port development and road/rail connectivity.

Politicians, however, assumed that Sagarmala was a panacea for all of India's maritime shortcomings and sold it to the public as such. The exclusive focus of successive governments on port development has led to gross neglect of other critical components of India's maritime capability. These include merchant shipping, shipbuilding, ship repair, seabed exploration and fisheries etc; all of which have implications for India's maritime security as well as its "blue economy". It is instructive to follow the trajectory of Sagarmala because it is illustrative of India's "sea blindness" as well as political myopia and bureaucratic ineptitude.

Sagarmala, in its first avatar, was announced in August 2003 by the Vajpayee-led NDA government with the stated objective of ensuring that all major ports would be connected to the Golden Highway Quadrilateral through a network of expressways, facilitating country-wide goods traffic to-and-from ports. It was abandoned within months, following the declaration of the general election.

The UPA government, which won office in 2004, replaced Sagarmala with the National Maritime Development Plan (NMDP) in 2005. While the stated aim of the NMDP-2005, much like that of Sagarmala, was to "develop India's maritime sector", it was actually confined to modernisation of port infrastructure and enhancement of rail-road connectivity to these ports. To fulfil these goals, the NMDP included 276 projects at an investment of Rs 1,00,339 crore.

Progress of the plan, however, remained tardy. Seven years after its commencement, the Lok Sabha was informed that only 82 of the 276 projects had been completed, while 30 had been dropped and 66 were still in the planning stage. In 2011, the UPA government decided to abandon the NMDP-2005 and replaced it with a new 10-year plan titled Maritime Agenda 2010-2020 (MA-2020). While the Sagarmala-2003 and NMDP-2005 were focused mainly on port modernisation and enhancing rail-road connectivity, MA-2020, ostensibly, had a

much broader scope. It envisaged an outlay of Rs 5 lakh crore to achieve quantum jumps in shipping tonnage, shipbuilding, and coastal trade, apart from ports, cargo-handling and other capacities.

However, a reading of the MA-2020 document served to seriously undermine its credibility on two counts. Firstly, it had set extremely unrealistic targets; aiming to increase in just 7-8 years shipbuilding capacity by five times and enhancing cargo throughput in Indian ports by four times. Secondly, it showed clear signs of confusion in the ministry, citing itself as "a roadmap to guide this ministry" in one place, while stating elsewhere that it was "more an agenda for consideration, rather than agenda for action". Predictably, MA-2020 failed to achieve anything of substance before it was overtaken by the next plan.

The NDA government that came to power in 2014 followed the earlier practice, and having terminated MA-2020, revived the Sagarmala project. Like all its predecessors, Sagarmala-2015 also focusses on modernising ports and enhancing connectivity. This version of Sagarmala held out greater hope because it had a structured, progress-monitoring framework. However, data from the Ministry of Shipping's Sagarmala Project Tracker, updated until September 2019, shows a project completion rate no better than past trends. Tellingly, while the plan aimed to create 40 lakh direct jobs and 60 lakh indirect jobs, in 2019, the government admitted that only 10,000 jobs had been created.

Initiating programmes with inappropriate aims, choosing unrealistic targets, abandoning/renaming projects and not ensuring faithful implementation are the reasons underlying the dismal state of our maritime capability. It is time India evolved a National Strategy for the maritime sector that charts a 50-year path and receives Parliament's approval to ensure survival through changes of government.

Nations which were lagging behind India a few decades ago have surged ahead because of their vision and dynamism in the vital maritime arena. Today, India's major ports are overloaded and inefficient, our shipbuilding industry is moribund, the merchant fleet is inadequate and growing at a snail's pace, seabed exploitation has yet to take off, the fishing industry is backward, and human resources are lacking everywhere.

All eyes are focused seawards, and naval power is going to play a decisive role in the India-China rivalry. But navies remain hollow without the backing of a strong maritime sector. If "atmanirbharta" has relevance anywhere, it is here.

China's aircraft carrier Liaoning takes part in a military drill in the western Pacific (photo: Reuters)

A PLA Navy carrier battle group sails in formation. (photo: China Daily)

A helicopter and a submarine from a submarine division of the PLA Navy's South Sea Fleet participate in an exercise. (photo: China Daily)

Ships from China moor at a port in Zhanjiang during the ASEAN-China Maritime Exercise-2018. (Asia news photo)

Defence Acquisition Council approves RFP for six submarines

The Defence Acquisition Council (DAC), in its meeting held under the Chairmanship of Raksha Mantri Rajnath Singh on 4 June2021, has approved proposals concerning Capital Acquisitions of various equipment for modernisation and operational needs of the armed forces amounting to approx. Rs 6,000 crore.

In addition, the DAC also approved issue of RFP for construction of six Conventional Submarines under Project P 75(I) under the Strategic Partnership (SP) Model. This project envisages indigenous construction of six conventional submarines equipped with the state-of-the-art Air Independent Propulsion system at an estimated cost of Rs 43,000 crore.

Navantia's S-80 Plus submarine

This is a landmark approval, being the first case processed under the Strategic Partnership model. This would be one of the largest 'Make in India' projects and will serve to facilitate faster and more significant absorption of technology and create a tiered industrial ecosystem for submarine construction in India. From a strategic perspective, this will help reduce current dependence on imports and gradually ensure greater self-reliance and dependability of supplies from indigenous sources.

DAC approves air defence guns and ammunition

"There was a long pending need of the Indian Army for modernisation of its air defence guns. These had been earlier procured only from foreign sources. With the continued thrust of Ministry of Defence towards 'AtmaNirbhar Bharat' and 'Make in India', an enthusiastic response from about a dozen Indian companies was received. All of them have expressed their willingness and commitment to manufacture this complex gun system and associated equipment by ensuring technology assimilation in India". Accordingly, the DAC accorded approval of procurement of air defence guns and ammunition at an approx. cost of Rs 6,000 crore under the Buy & Make (Indian) category.

246-year-old Ordnance Factory Board scrapped

In a major decision of the Union Cabinet, the Ordnance Factory Board (OFB), first set up by the British in 1775, now under the Ministry of Defence will cease to exist. Seven separate companies are planned to be created, each doing a specific manufacturing role. The existing 41 factories under the OFB will be subsumed under one or the other of the seven new companies, all 100 per cent government owned public sector undertakings (PSU).

The seven new – yet to be named—PSU entities will cover a separate sector. One will be the 'Ammunition and Explosives group'. This will engage in production of ammunition of various calibre and explosives, not only for the Make in India initiative but also for exports. The 'Vehicles group' would engage in production of defence mobility and combat vehicles such as Tanks, Trawls, BMP and Mine Protected Vehicles.

'Weapons & Equipment group' would engage in production of small arms, medium and large calibre guns and other weapon systems. The other four companies would be 'Troop Comfort Items group', 'Ancillary group', 'Opto-Electronics group' and 'Parachute group'.

MoD notifies 'Second Positive Indigenisation List' of 108 items

Raksha Mantri Rajnath Singh has approved a proposal of the Department of Military Affairs, Ministry of Defence (MoD) to notify the 'Second Positive Indigenisation List' of 108 items. This will give further boost to indigenisation with active participation of public and private sector for fulfilling the twin objectives of achieving self-reliance and promoting defence exports. All the 108 items will now be procured from indigenous sources as per provisions given in Defence Acquisition Procedure (DAP) 2020.

The 'Second Positive Indigenisation List' comprises complex systems, sensors, simulator, weapons and ammunitions such as helicopters, next generation corvettes, Air Borne Early Warning and Control (AEW&C) systems, tank engines, medium power radar for mountains, MRSAM Weapon Systems and many more such items to fulfil the requirements of Indian Armed Forces. This second list is planned to be implemented progressively with effect from December 2021 to December 2025.

Indian Navy receives its 10th P-8I

Boeing is continuing to expand the Indian Navy's long-range maritime reconnaissance anti-submarine warfare capabilities with the delivery of the country's tenth P-8I. The patrol aircraft is an integral part of the Indian Navy's fleet and has surpassed 30,000 flight hours since it was inducted in 2013. This is the second aircraft to be delivered under an option contract for four additional aircraft that the Indian Ministry of Defence awarded in 2016. The Indian Navy was the first international customer for the P-8 and today operates the largest non-US fleet. The P-8 is also operated by the US Navy, Royal Australian Air Force and the United Kingdom's Royal Air Force.

DRDO successfully flight tests new generation Agni-P Ballistic Missile

Defence Research and Development Organisation (DRDO) successfully flight tested a New Generation Nuclear Capable Ballistic Missile Agni-P (Prime) from Dr APJ Abdul Kalam island off the coast of Odisha, Balasore on 28 June 2021. Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile. The missile followed 'text book trajectory', meeting all mission objectives with high level of accuracy. Agni–P is a new generation advanced variant of Agni class of missiles. It is a canisterised missile with range capability between 1000 and 2000 kms.

Jyotiraditya Scindia is new Minister for Civil Aviation

Hardeep S Puri, former Minister of Civil Aviation and incumbent Minister of Housing & Urban Affairs and Minister of Petroleum and Natural Gas, handed over the charge of office of Minister of Civil Aviation to Jyotiraditya Madhavrao Scindia. General V.K. Singh, Minister of State for Civil Aviation was also present on the occasion. In a tweet, Scindia stated, "Delighted to take the baton of the Ministry of Civil Aviation from Hardeep S Puri. I resolve to discharge my duties with earnestness and continue the good work undertaken by him."

Ajay Bhatt takes over as Raksha Rajya Mantri

Ajay Bhatt took over as Raksha Rajya Mantri on 8 July 2021. After assuming charge, he called on Raksha Mantri Rajnath Singh at his office in South Block. Defence Secretary Dr Ajay Kumar and other senior officials of Ministry of Defence received Ajay Bhatt and welcomed him into his office.

Army Chief reviews security in the Kashmir Valley

In the background are two Army Aviation ALH Dhruvs

General MM Naravane, Chief of Army Staff (COAS) paid a two day visit to Kashmir Valley in order to review the prevailing security situation in the UT.

On arrival at Srinagar, the Army Chief, accompanied by Lt Gen YK Joshi, the Northern Army Commander and Lt Gen DP Pandey, Chinar Corps Commander visited units and formations in the hinterland where he was briefed by the local Commanders on the existing security situation and the measures being taken to identify and target the over ground workers' (OGWs) network involved in radicalisation and recruitment of youth into terrorist ranks. Efforts to prevent local recruitment and facilitate surrender of local terrorists were also discussed.

On the second day of his two-day visit to the Valley, Chief of Army Staff (COAS) interacted with the troops and complimented them for their high morale and the high state of operational preparedness.

Raksha Mantri Rajnath Singh in Ladakh

Raksha Mantri Rajnath Singh interacted with the officers and *jawans* of Indian Army's 14 Corps at Karu Military Station in Ladakh on 28 June 2021. In his address, Rajnath Singh paid rich tributes to the brave jawans who laid down their lives in the service of the nation during the Galwan Valley incident in 2020, stating that the country will never forget their supreme sacrifice. The Defence Minister also commended the 14th Corps for their invaluable contribution during the 1965 Indo-Pak War as well as the 1999 Kargil war.

Defence Minister also dedicated to the nation 63 bridges, built by Border Roads Organisation (BRO), in six States and two Union Territories (UTs), at an event held at Kyungam, 88 kms from Leh in the Union Territory of Ladakh on 28 June 2021.

MoD to procure 11 Airport Surveillance Radars

Ministry of Defence signed a contract with Mahindra Telephonics Integrated Systems Ltd., Mumbai for procurement of 11 Airport Surveillance Radars with Monopulse Secondary Surveillance Radar for Indian Navy and Indian Coast Guard on 3 June 2021.

The procurement, at a cost of Rs 323.47 crore, will be made under the 'Buy & Make' category. The installation of these radars will increase the air domain awareness around airfields and enhance safety & efficiency in flying operations of Indian Navy and Indian Coast Guard.

DRDO's Short Span Bridging System-10 m inducted

The first production lot of 12 Short Span Bridging System (SSBS)-10m, designed and developed by Defence Research and Development Organisation (DRDO) has been inducted into Indian Army by Chief of the Army Staff General MM Naravane during a ceremony held at Cariappa Parade Ground, Delhi Cant. on 2 July 2021.

The SSBS-10m plays a crucial role of bridging the gaps up to 9.5 m as a single span providing a 4 m wide, fully decked roadway, ensuring faster movement of the troops. Research & Development Establishment (Engrs) Pune, an engineering laboratory of DRDO, has designed and developed the system in association with L&T Ltd. The 12 bridges are part of 102 SSBS-10 m from L&T Ltd, which is the production agency. The Project Short Span Bridging System involved the development of two prototypes of 5 m SSBS on Tatra 6x6 chassis and another two prototypes of 10 m SSBS on Tatra 8x8 re-engineered chassis.

Raksha Mantri calls for open & inclusive order

Defence Minister Rajnath Singh called for an open and inclusive order in Indo-Pacific based upon respect for sovereignty and territorial integrity of nations while addressing the 8th ASEAN Defence Ministers Meeting (ADMM) Plus on 16 June 2021. The ADMM Plus is an annual meeting of Defence Ministers of 10 ASEAN (Association of Southeast Asian Nations) countries and eight dialogue partner countries - Australia, China, India, Japan, New Zealand, Republic of Korea, Russia and the United States. Brunei is the Chair of the ADMM Plus forum this year.

BEML records highest ever turnover

BEML Limited recorded its highest ever turnover of Rs. 3557 crs for the FY 2020-21 against the previous year turnover of Rs 3029 crore a growth of 17%.

DRDO successfully test fires Enhanced Pinaka Rocket

Continuing the development of Artillery Rocket Systems, Defence Research and Development Organisation (DRDO) successfully test fired extended range version of indigenously developed Pinaka rocket from a Multi-Barrel Rocket Launcher (MBRL) on 24 and 25 June 2021 at Integrated Test Range (ITR),

Chandipur off the coast of Odisha. Twenty-five Enhanced Pinaka Rockets were launched in quick succession against targets at different ranges. The enhanced range version of Pinaka Rocket System can destroy targets at distances up to 45 kms. All the flight articles were tracked by range instruments including Telemetry, Radar and Electro Optical Tracking System deployed by ITR & Proof and Experimental Establishment (PXE).

Keel laid for second frigate of P11356 Project

Keel of the second frigate for the Indian Navy was ceremoniously laid at Goa Shipyard Ltd on 18 June 2021. The ship under construction at GSL is a part of indigenous shipbuilding programme being executed under IGA with Russian Side for construction of two Advanced Missile Frigates for the Indian Navy. The contract was signed on 25 Jan 2019 between Ministry of Defence and Goa Shipyard Limited.

Indian Coast Guard Offshore Patrol Vessel Sajag commissioned

The National Security Advisor Ajit Doval commissioned Indian Coast Guard (ICG) Offshore Patrol Vessel (OPV) *Sajag* through digital means and dedicated it to the nation for safeguarding

the maritime interests on 29 May 2021. OPV *Sajag* is constructed by Goa Shipyard Limited. Defence Secretary Dr Ajay Kumar, Indian Coast Guard Director General K Natarajan and CMD Goa shipyard Cmde BB Nagpal (Retd) were among those who attended the event.

Indian Navy Killers Squadron annual awards function 2020-21

The ships of the 22nd Missile Vessel Squadron, the current avataar of the Missile Boats that caused havoc in Karachi in December 1971, had their Annual Awards ceremony on 28 May 2021 at the Mumbai Dockyard. Aptly called by the epithet 'Killers', these sleek and swift ships are the first to go into harm's way and are the 'First Strike' elements of the Indian Navy. Vice Admiral R Hari Kumar, Flag Officer Commanding-in-Chief, Western Naval Command gave away the trophies to the deserving ships which are based in Mumbai under Rear Adm Atul Anand, Flag Officer Commanding Maharashtra Naval Area.

Indo-Thai Coordinated Patrol (CORPAT)

The 31st edition of India-Thailand Coordinated Patrol (Indo-Thai CORPAT) between the Indian Navy and the Royal Thai Navy was conducted from 9–11 June 2021. Indian Naval Ship (INS) *Saryu*, an indigenously built Naval Offshore Patrol Vessel and His Majesty's Thailand Ship (HTMS) *Krabi*, an Offshore Patrol Vessel, along with Dornier maritime patrol aircraft from both navies participated in the CORPAT.

INS Tabar deployed to participate in joint exercises

Towards enhancing military cooperation with friendly nations, Indian Naval Ship Tabar commenced her prolonged deployment on 13 June visited a number of ports in Africa and Europe and will continue till the end of September. During the deployment, INS Tabar will transit across the Gulf of Aden, Red Sea, Suez Canal, Mediterranean Sea, North Sea and Baltic Sea while making port calls at Djibouti, Egypt, Italy, France, UK, Russia, Netherlands, Morocco, and Arctic Council countries such as Sweden and Norway. INS Tabar, is a Talwar-class stealth Frigate built for Indian Navy in Russia. The ship is commanded by Captain M Mahesh and has a complement of 300 personnel.

Exercise Maroo Strike

The Indian Army conducted an airborne exercise to validate its Rapid Response Capability. The exercise also validated 72 hours of intense integrated battle drills involving mechanised forces demonstrating clockwise precision and seamless integration between the IAF, airborne and mechanised troops of the Indian Army.

Indian Army celebrates 100th anniversary of AEC

Indian Army celebrated the 100th anniversary of the raising of Army Educational Corps (AEC) on 1 June 2021. On this occasion, Maj Gen Devesh Gaur, Additional Director General Army Education and Colonel Commandant, AEC laid wreath at the National War Memorial on behalf of all ranks of the Army. The Corps is rendering yeoman service in conduct of map reading

training, academic training at Pre-Commission Training Academies, capability development in foreign languages, military music, handling of Right to Information cases and shaping young minds in various Rashtriya Military Schools and Sainik Schools.

Indian Army conducts rail trials on Dedicated Freight Corridor

The recently developed "Dedicated Freight Corridor (DFC)" by the Indian Railways provides faster movement of freight across the country. The Indian Army on 14 June 2021, conducted a successful trial by moving a military train loaded with vehicles and equipment from New Rewari to New Phulera validating the efficacy of the DFC. The intricate and synchronised coordination by the Indian Army with Dedicated Freight Corridor Corporation of India Ltd (DFCCIL) and Indian Railways will significantly enhance the mobilisation capability of the Armed Forces. These trials were part of the "Whole of the Nation Approach" for optimising national resources and achieve seamless synergy among various ministries and departments.

MoD signs contract with GSL

Ministry of Defence signed a contract with Goa Shipyard Ltd (GSL) for construction of two Pollution Control Vessels (PCVs) for Indian Coast Guard (ICG) at a cost of about Rs 583 crore on 22 June 2021. These special role ships will be indigenously designed, developed and built by GSL. The acquisition is under 'Buy Indian - Indigenously Designed Developed & Manufactured (Buy Indian-IDDM)', the highest priority category for defence capital procurements. The acquisition will significantly augment the capability of ICG to respond to Oil spill disasters at sea and also enhance Pollution Response (PR) efficiency. These two vessels are scheduled for delivery by November 2024 and May 2025 respectively.

INS Sandhayak decommissioned

INS Sandhayak, the first of its class indigenously designed and built Hydrographic Survey Ship of Indian Navy, was decommissioned on 4 June 2021 after serving the nation for 40 years. The decommissioning ceremony of INS Sandhayak was held at Naval Dockyard Visakhapatnam.

The ship, during her commissioned service, has undertaken approximately 200 major Hydrographic Surveys and numerous minor surveys in both East and West coasts of the country, the Andaman seas and the neighbouring countries too. Apart from Survey Missions, the ship has been an active participant in many significant operations such as Op Pawan – assisting the Indian Peace Keeping Force in Sri Lanka in 1987, Op Sarong, Op Rainbow - rendering humanitarian assistance post Tsunami of 2004 and participation in maiden joint INDO-US HADR Exercise 'Tiger-Triumph'.

Fleet Awards Function - Eastern Naval Command

Fleet Awards Function 2021 was held on 19 June 2021 to celebrate the operational achievements of the Eastern Fleet during the last year. Fleet Awards Function marks the culmination of the Operational Cycle of the Eastern Fleet and recognises accomplishments of the 'Sword Arm' of the Eastern Naval Command (ENC).

Western Air Command Commanders' Conference

Two day Station Commanders' Conference of Western Air Command was held on 24 and 25 June 2021 at New Delhi. Considering the ongoing pandemic situation, the conference was conducted in a hybrid mode where only few of the commanders attended through video tele conferencing. Air Chief Marshal RKS Bhadauria, Chief of the Air Staff (CAS) was the chief guest and was received by Air Marshal VR Chaudhari, AOC-in-C WAC.

The CAS during his address, emphasised on the need for critical analysis and measures to enhance operation preparedness, further improvement in maintenance practices and ensuring robust physical and cyber security. He directed the commanders to ensure that the operational readiness of all platforms, weapon systems and assets should be kept at the highest level.

SpiceJet unveils the blueprint of Sustainable Aviation Fuel

In line with its ambitious target to fly 100 million domestic passengers on Sustainable Aviation Fuel (SAF) blend by 2030, SpiceJet, under the aegis of World Economic Forum (WEF), is leading WEF's initiative of 'Clean Skies for Tomorrow' (CST); which has now manifested in formulation of a blueprint, 'Deploying Sustainable Aviation Fuels at Scale in India'. This blueprint consists of Indian case study on biofuel, feedstock availability, technology pathways and policy recommendations etc.

Flybig widens its operation in Northeast

Flybig has announced that it has successfully established air connectivity in the Northeast India in three states in 50 days. The airline started its journey from Guwahati to Rupsi, Pasighat and Kolkata in May this year. Continuing with the commitment to enhance air connectivity in the region, the airline started its scheduled flights between Agartala and Dibrugarh from 25 June 2021 under Government of India's Regional Connectivity Scheme (UDAN-RCS). This new flight path will build a stronger network between the states of Assam and Tripura.

Grene Robotics designs and develops "Indrajaal"

Grene Robotics has designed and developed India's first 100% indigenous unified, distributed and wide-area Autonomous Drone Defence Dome called Indrajaal. Indrajaal provides protection to a large area of 1000-2000 sq. km per system against threats such as UAVs, Incoming Weapons, Loitering Munitions, Low-RCS targets autonomously.

Vistara inaugurated services to Tokyo Haneda

Vistara, a joint venture of Tata group and Singapore Airlines, inaugurated its non-stop flights between Delhi and Tokyo Haneda on 7 July 2021. The inaugural flight departed Delhi at 0300 hours (IST) and landed in Tokyo (Haneda) at 1450 hours

(JST). Under the air bubble agreement between India and Japan, Vistara will fly once a week between the two cities using its Boeing 787-9 Dreamliner. The airline has a fleet of 48 aircraft, including 37 Airbus A320, three Airbus A321neo, six Boeing 737-800NG and two Boeing 787-9 Dreamliner aircraft, and has flown more than 25 million customers till now.

Agreement between GIFT and Airbus

On 7 July 2021 the first aircraft purchase order was signed by a GIFT city (Gujarat International Finance Tec) based leasing company under the Atmanirbhar Bharat Abhiyan of the Government of India. Under the Atman Nirbhar Abhiyan, GIFT IFSC, with various incentives from the government of India including a low set up cost, has become very attractive entity for lessors.

IAI donates 100 O2 concentrators to BEL

Israel Aerospace Industries (IAI) has donated 100 Oxygen Concentrators to Bharat Electronics Limited (BEL) as a goodwill gesture during pandemic time, and in view of its long-standing business relationship with BEL. Anandi Ramalingam, Director (Marketing) BEL, stated, "We would like to express our sincere, heartfelt thanks to IAI for its pro-active and timely support in providing a large number of oxygen concentrators to BEL. It is a kind, thoughtful and generous gesture from IAI to have extended a prompt helping hand for our employees and their families who are facing extreme hardship due to the COVID-19 pandemic.

Honeywell partners with DRDO and CSIR-IIP

Honeywell has partnered with Defence Research Development Organisation (DRDO) and the Council of Scientific and Industrial Research–Indian Institute of Petroleum (CSIR–IIP), Government of India, to supply molecular sieve adsorbents (zeolites) to accelerate setting up of Medical Oxygen Plants (MOP) in the country to address the ongoing pandemic.

Blue Dart support in the Covid 2nd wave

Blue Dart, express logistics service provider and part of the Deutsche Post DHL Group (DPDHL) facilitated the transport of Oxygen Concentrators amongst other essential COVID-19 relief medical equipment across the length and breadth of the Indian terrain. The express logistics provider flew charter aircraft internationally to facilitate the transport of oxygen concentrators amongst other COVID-19 related medical and pharmaceutical equipment.

Airbus expands India COVID-19 relief

Airbus has doubled down on its response to the COVID-19 crisis in India, delivering more than 36 tonnes of additional medical equipment to the Indian Red Cross Society (IRCS) and deploying humanitarian flights to move supplies from abroad as well as within the country.

APPOINTMENTS

Air Marshal Vivek Ram Chaudhari assumes charge as VCAS

Air Marshal Vivek Ram Chaudhari took over as the Vice Chief of the Air Staff on 1 July 2021. The Air Marshal was commissioned in the fighter stream of the IAF on 29 December 1982. The Air Officer has a flying experience of more than 3800 hrs on a wide variety of fighter and trainer aircraft, including missions flown during Op-Meghdoot and Op-Safed Sagar.

Air Marshal BR Krishna assumes the command of WAC

Air Marshal BR Krishna took over as Air Officer Commanding-in-Chief (AOC-in-C) of Western Air Command on 1 July 2021. The Air Marshal was commissioned in the IAF in December 1983 as a Fighter Pilot. In a distinguished career spanning nearly 38 years, the Air Officer, being a Qualified Flying Instructor and an Experimental Test Pilot, has flown a wide variety of fighters, transports and helicopters

in the inventory of IAF. He has a flying experience of nearly 5000 hours, including operational, instructional and test flying.

Lt Gen Sanjeev Kumar Sharma is Deputy Chief of Army Staff (Strategy)

Lt Gen Sanjeev Kumar Sharma has been appointed as the Deputy Chief of Army Staff (Strategy) on 1 July 2021. Lt Gen SK Sharma takes over the appointment from Lt Gen Paramjit Singh who superannuated on 30 June 2021 after completing thirty nine years of illustrious career in the Army. The Deputy Chief (Strategy), a third and a new vertical created for overseeing the Indian Army's operations and intelligence directorates, among other important branches, is one of the most crucial appointments within the Indian Army. Lt Gen SK Sharma was the Director General of Military Intelligence prior to assuming this key appointment.

Vice Admiral Rajesh Pendharkar is Director General Naval Operations

Vice Admiral Rajesh Pendharkar assumed charge as Director General Naval Operations on **7 June 2021**. An alumnus of the National Defence Academy, Khadakwasla, Pune, he was commissioned into the Indian Navy in January 1987. He is a graduate of the Defence Services Staff College, Wellington, Naval War College, Karanja, and Naval Command College, Newport, Rhode Island, USA. The Flag Officer is a specialist in Anti-Submarine Warfare (ASW) and has served on frontline warships of the Indian Navy as ASW Officer and later as the Executive Officer and Principal Warfare Officer of Guided Destroyer INS Mysore.

Vice Admiral Dinesh Tripathi assumes charge as Chief of Personnel, Indian Navy

Vice Admiral Dinesh K Tripathi has assumed charge as Chief of Personnel of Indian Navy on 1 June 2021. He is an alumnus of National Defence Academy Khadakwasla and was commissioned in the Navy on 1 July 1985. The Flag Officer is a specialist in Communication and Electronic Warfare and has served on frontline warships of the Indian Navy as Signal Communication Officer and Electronic Warfare Officer and later as the Executive Officer and Principal Warfare Officer of Guided Destroyer INS Mumbai.

Lt Gen Pradeep C Nair takes over as Director General Assam Rifles

Lieutenant General Pradeep Chandran Nair took over as the 21st Director General of the Assam Rifles (popularly known as Sentinels of the North-East) on 1 June 2021. He has rich experience of Assam Rifles and the North East, having earlier been an Inspector General and a Company Commander in Assam Rifles, besides having commanded Assam Rifles battalions as a Brigade Commander. The General Officer was commissioned into the Sikh Regiment in 1985. In his last assignment at the Army Headquarters, he was the Director General Recruiting, responsible for recruiting officers and jawans in the Indian Army.

Lieutenant General Manoj Pande takes over Eastern Command

Lieutenant General Manoj Pande took over the reins of Eastern Command as its General Officer Commanding-in-Chief on 1 June 2021. Prior to this, he was Commander-in-Chief Andaman & Nicobar Command, the only Tri- services Operational Command in India from 1 June 2020 to 31 May 2021. The General was commissioned in the Bombay Sappers in December 1982.

Rear Admiral Kapil M Dhir appointed as the Joint Secretary (Navy & Defence Staff)

Rear Admiral Kapil Mohan Dhir has taken over as the Joint Secretary (Navy

and Defence Staff) in the Department of Military Affairs. He is the first Armed Forces' officer to tenant this assignment. He is an alumnus of National Defence Academy Khadakwasla, Pune and was commissioned into the Indian Navy on 1 January 1985. He is the Senior most Serving Marine Commando (MARCOS) and has served in frontline afloat and ashore assignments including Command of the premier MARCOS establishment, INS Abhimanyu, Indian Naval warships INS Khanjar and INS Rana, and peacekeeping missions both within and outside the country, including 'Op Pawan' and 'Op Jupiter'.

Thales appoints Ashish Saraf as Vice-President and Country Director for India

Thales has appointment of Ashish Saraf as Vice-President and Country Director for India with effect from 1 June 2021. In this role, Ashish will lead the company's India business and will be responsible for the strategic growth of Thales in the country across all of its markets, further strengthening local teams, collaborations and innovation. He succeeds Emmanuel de Roquefeuil who takes up a new role as the VP and head for Thales in the Middle East.

Prior to joining Thales, Ashish served as the President and Head of Region for Airbus Helicopters - India and South Asia where he led Airbus' Helicopters' Sales, Services, Training, Innovation, Industrial Partnerships and Government Relations functions across the Civil, Parapublic and Military markets in the region.

Jetendra S Gavankar appointed MD of Safran Helicopter Engines India Pvt Ltd.

Safran Helicopter Engines has appointed Jetendra S Gavankar as Managing Director of Safran Helicopter Engines India Pvt. Ltd. Jetendra will lead the company's business in India and will be responsible for its strategic partnerships across the market and with Hindustan Aeronautics Limited (HAL) in particular.

Safran Helicopter Engines India is based in Bangalore and is fully dedicated

to supporting the company's Indian customers, notably the Indian Armed Forces and Coast Guard. Its strategy is to build around a long-standing cooperation with HAL and the Ardiden 1H1 engine, co-developed by the two companies and now in production under the 'Shakti' designation. It powers HAL's Dhruv and Light Combat Helicopter and more than 250 units are in service.

Zurich Airport International agreement for Noida International Airport

Progressing further towards the development of Noida International Airport (NIA), the shareholder agreement between Zurich Airport International AG (ZAIA) and Noida International Airport Limited (NIAL) was signed in Lucknow recently. As per the agreement, NIAL will hold one golden share in Yamuna International Airport Pvt Ltd (YIAPL) and the right to nominate two directors to the board. The directors to be added to the board will be Dr. Arun Vir Singh, CEO NIAL, and Mr. Vishak Iyer, Director Civil Aviation, Government of Uttar Pradesh.

US Navy hands over two MH-60R's to Indian Navy

Two MH-60R Seahawks, assigned to the "Seahawks" of Helicopter Maritime Strike Squadron (HSM) 41 participate in a formation flyover during a ceremony in which the Indian Navy inducted its first two MH-60Rs from the US Navy at Naval Air Station North Island. The Indian Navy will receive a total of 24 MH-60Rs in the contract with the US Navy. (photo: MC2(SW/AW) Sara Eshleman)

The United States Navy handed over the first two Sikorsky MH-60R multi-role helicopters to the Indian Navy 16 July 2021 at Naval Air Station, North Island, San Diego.

Hamid Salim, Vice President, Sikorsky Maritime & Mission Systems stated, "The delivery of the first two MH-60R Romeo helicopters to the Indian Navy marks the beginning of a new era of collaboration and partnership between the United States Navy, the Indian Navy and Sikorsky. We are committed to stand shoulder-to-shoulder with the United States Navy to support the Indian Naval Forces in the future through

Vice Adm. Ravneet Singh, Indian Deputy Chief of Naval Staff arrives as a member of the official party during a ceremony in which the Indian Navy inducted its first two MH-60R Seahawks from the US Navy. (photo: MC2(SW/AW) Sara Eshleman)

Ambassador Taranjit Singh Sandhu, Indian Ambassador to the US, delivers remarks during a ceremony in which the Indian Navy inducted its first two MH-60R Seahawks. (photo: MC2(SW/AW) Sara Eshleman)

Vice Adm. Kenneth Whitesell, Commander, US Naval Air Forces, left, presents the Material Inspection and Receiving Report for first aircraft to Vice Adm. Ravneet Singh, Indian Navy Deputy Chief of Naval Staff, during an acceptance ceremony at Naval Air Station North. (photo: MC2(SW/AW) Sara Eshleman)

capability upgrades and sustainment as the aircraft transitions to the Indian Navy. This will enhance our Navy-to-Navy cooperation and strengthen our combined subsurface and surface warfare capability and capacity in the Indo-Pacific region".

William L. Blair, Vice President and Chief Executive, Lockheed Martin India stated. "MH-60R is the most advanced maritime multi-mission helicopter in operation - deployed globally, and its mission performance by far, second to none. We appreciate the tremendous confidence placed in Team Seahawk by the Indian Navy through their selection of the Romeo. We stand committed to making this programme a tremendous success in partnership with the United States Navy and the Indian Navy."

First photos of IN's MH-60R pre-delivery

A photo released by Navair News mid-June titled 'MH-60R International Partnerships Continue' shows Indian Navy students arriving at NAS Pensacola and North Island to commence training with two MH-60R helicopters while strengthening 'global partnerships'.

Vice Admiral G Ashok Kumar, Vice Chief of Naval Staff with Indian Navy's MH-60R helicopter induction crew (prior to delivery), undergoing training at the US Navy Naval Base Coronado, San Diego.

Passing Out Parades

425 Gentlemen Cadets pass out from Indian Military Academy

425 Gentlemen Cadets of 148 Regular Course and 131 Technical Graduate Course, including 84 Gentlemen Cadets from nine friendly foreign countries passed out from the Indian Military Academy in Dehradun on 12 June 2021. The Gentlemen Cadets put up a parade which was reviewed by Lt Gen RP Singh, General Officer Commanding in Chief of Western Command.

The Western Army Commander complimented the Instructors and Gentlemen Cadets for the excellent parade, immaculate turnout as well as the crisp, synergised drill movements indicating high standards of training and discipline imbibed by the young leaders. The 'Pipping Ceremony', which is traditionally done by the parents of the Gentlemen Cadets, was this time carried out by the staff and instructors while observing strict social distancing and personal protection protocols.

89 Gentlemen Cadets pass out from Officers Training Academy Gaya

A total of 89 Gentlemen cadets (20 from the Special Commissioned Officers' (SCO) - 46 Course, 60 Gentlemen Cadets of Technical Entry Scheme (TES) - 43 Course and nine from Assam Rifles) passed out from the Officer Training Academy, Gaya (Bihar) in a Passing Out Parade while observing strict COVID protocols on 12 June 2021. The young officers from the TES Course will now proceed to pursue a degree in Engineering at various Army Cadet

Combined Graduation Parade at Air Force Academy

The Combined Graduation Parade (CGP) was held at Air Force Academy (AFA) Dundigal Hyderabad on 19 June 2021, marking the successful culmination of training for 161 Flight Cadets of Flying and Ground Duty Branches in the Indian Air Force. Chief of the Air Staff, Air Chief Marshal RKS Bhadauria was the Chief Guest and Reviewing Officer of the CGP, where he conferred the President›s Commission upon the graduating flight cadets. On this occasion, 6 officers from the Indian Navy and 5 officers from the Indian Coast Guard were also awarded 'Wings' on successful completion of their flying training.

After the 'Pipping Ceremony', the Reviewing Officer presented awards to the Trainees who had excelled in various disciplines of their training. Flying Officer Prajwal Anil Kulkarni from Flying branch was awarded the President's Plaque as well as the Chief of the Air Staff Sword of Honour for standing first in overall order of merit in the Pilots Course; while Flying Officer Kritika Kulhari was awarded the President's Plaque for being first in overall order of merit in Ground Duty branches.

Flypast by Pilatus PC-7 Mk-II, Hawks, Kirans and Chetaks as well as display by Sarang, Suryakirans and Akash Ganga Sky Diving team added colour and cheer to an impressive graduation parade.

Training Wings of Military College of Electronics and Mechanical Engineering (MCME), Secunderabad, Military College of Telecommunication Engineering (MCTE), Mhow and College of Military Engineering (CME), Pune. Lieutenant General G A V Reddy, Commandant, Officers' Training Academy, Gaya was the Reviewing Officer reviewed the parade.

Passing out Parade held at INA, Ezhimala

In a Passing out Parade held at Indian Naval Academy (INA), Ezhimala, on 29 May 2021, 152 trainees comprising Midshipmen of 100 INAC, cadets of 30A Naval Orientation Course (Extended) and 32 Naval Orientation Course (Regular) passed out with flying colours, marking the culmination of their ab-initio training. The parade was reviewed by Vice Admiral Ajendra Bahadur Singh, Flag Officer Commanding-in-Chief, Eastern Naval Command who awarded medals to meritorious Midshipmen and Cadets on completion of the Ceremonial Review. Vice Admiral M A Hampiholi, Commandant, INA was the Conducting Officer.

Passing Out Parade at INS Chilka

A total of 2142 trainees of Indian Navy and Coast Guard of batch 01/2021 graduated from INS Chilka under Southern Naval Command in a ceremonial Passing Out Parade held on 9 July 2021. The parade was reviewed by Vice Admiral MA Hampiholi, Commandant, Indian Naval Academy. The passing out parade marked the successful culmination of 21 weeks of their basic training. The Chief Guest also awarded medals and trophies to meritorious trainees on the occasion. During his address, the

Admiral urged the passing out trainees to hone their skills further and develop a strong foundation of knowledge, willingness to learn and commitment to excel in their respective careers that lay ahead. He also urged them to uphold Navy's core values 'Duty, Honour and Courage'

Passing out Parade at Happy Valley, Shillong

A Passing-Out Parade of 190th Recruit Batch of 58 Gorkha Trg Centre was held on 10 July 2021 at Harish Parade Ground, Happy Valley, Shillong. The Parade marked culmination of rigorous training where young boys are transformed into physically fit, mentally robust and professional soldiers of the Indian Army.

Maroon Beret ceremonial parade at Garud Regimental Training Centre

A Maroon Beret Ceremonial Parade (MBCP) was held on 17 July 2021 at Garud Regimental Training Centre, Air Force Station Chandinagar to mark the successful completion of training of 69 Air Force Special Forces Operatives (Garud). Air Commodore K Khajuria VSM, Air Commodore Operations (Offensive), reviewed the Passing Out Parade as the Chief Guest of the event.

The Chief Guest awarded the coveted trophies to the meritorious trainees and presented the Maroon Beret, Garud proficiency Badge and Special Forces tabs to successful Garud trainees. During the parade, the Garuds carried out demonstrations to showcase various skills such as Combat Firing Skill, Hostage Rescue Firing Drill, Assault Explosives, Obstacle Crossing Drill, Wall Climbing/ Slithering/ Rappelling Skills & Military Martial Arts.

Passing Out Parade at Bangladesh Air Force Academy (BAFA)

India's Chief of the Air Staff, Air Chief Marshal RKS Bhadauria was invited by his counterpart Chief of Air Staff, Bangladesh Air Force to review the Passing Out Parade and Commissioning Ceremony at Bangladesh Air Force Academy (BAFA) in Jashore on 28 June 2021, on the occasion of 'President Parade 2021'. The two day visit was significant in view of Golden Jubilee of 1971 Liberation War and marked the first instance when any foreign Chief was invited to review the Parade at BAFA. During the visit, CAS held meetings with COAS BAF, CAS, Bangladesh Army, PSO AFD and HC of India in Dhaka.

Review of development work at Karwar Naval Base and IAC

Defence Minister Mr. Rajnath Singh visited the Karwar Naval Base in Karnataka on 24 June to review the progress of ongoing infrastructure development under 'Project Seabird'. Accompanied by Chief of the Naval Staff Admiral Karambir Singh, he undertook an aerial survey of the Project Area and Sites before arriving at the INS Kadamba Heli Pad. The visiting dignitaries were received by Flag Officer Commanding in Chief, Western Naval Command Vice Admiral R Hari Kumar and Flag Officer Commanding Karnataka Naval Area, Rear Admiral Mahesh Singh.

The Raksha Mantri inspected the ongoing works at the Naval Base and received on-site briefings including capability demonstration at the Shiplift Tower. He also undertook a tour of the Naval Harbour and reviewed the marine works/infrastructure being developed as part of Project Seabird Phase II A as also operationalisation of Piers. Mr. Rajnath Singh visited the newly-constructed Sailors Married Accommodation which incorporates advanced features for water efficiency, handling of house-hold waste, energy efficiency and provides environment-friendly houses.

Later, he interacted with Project Seabird Contactors & Engineers and Officers, Sailors & Civilians of Karwar Naval Base. In his address, he expressed satisfaction at the progress of works being carried out under 'Project Seabird'. He hoped that after the completion of the project, the Kawar Naval Base would become Asia's largest Naval base which would further bolster the operational readiness of the Armed Forces and help in augmenting trade, economy & humanitarian aid operations.

The Raksha Mantri also highlighted some of the reforms undertaken by the Government to further strengthen the operational preparedness of the Armed Forces, including appointment of Chief of Defence Staff and setting up of Department of Military Affairs in Ministry of Defence. He also listed out a number of initiatives

taken by the Government to promote self reliance in defence manufacturing. The initiatives include allocation of 64 per cent of modernisation funds under capital acquisition budget for 2021-22 for domestic procurement; changes in Defence Acquisition Procedure 2020 and increase in FDI limit in the defence sector to 74 per cent.

Raksha Mantri also reviewed the progress of construction of first Indigenous Aircraft Carrier (IAC) built by Cochin Shipyard Ltd., at Kochi and was accompanied by Chief of the Naval Staff Admiral Karambir Singh and Flag Officer Commanding-in-Chief, Southern Naval Command Vice Admiral AK Chawla. The Raksha Mantri visited the construction site and was briefed about the successful Basin Trials completed during November 2020. He was also appraised of the progress achieved on integration of a number of other navigational, communication and operational systems since then, as it prepares for its maiden Contractor Sea Trials (CST) which is expected in the forthcoming months.

The IAC would be commissioned as INS Vikrant in the first half of 2022, which would be the most potent sea-based asset. The ship shall operate MiG-29K fighter aircraft, Kamov-31 Air Early Warning Helicopters, the soon to be inducted MH-60R multi-role helicopter and the indigenously manufactured Advanced Light Helicopters. It would offer an incomparable military instrument with its ability to project air power over long distances, including air interdiction, anti-surface warfare, offensive and defensive counter-air, airborne anti-submarine warfare and airborne early warning.

The Raksha Mantri expressed satisfaction at the progress of construction of

Indigenous Aircraft Carrier, describing it as a shining example of 'AatmaNirbhar Bharat' envisioned by Prime Minister Mr. Narendra Modi. He stated that IAC had nearly 75 per cent indigenous content - from design to steel used in construction to key weapons and sensors. He recalled a recent approval accorded by the Defence Acquisition Council for RFP of Project 75-I under the Strategic Partnership model, which will give further fillip to indigenous development of niche manufacturing technologies.

He further highlighted the combat capability, reach and versatility of the aircraft carrier, saying that it would add formidable capabilities in the defence of the country and help secure India›s interests in maritime domain. Appreciating the fact that significant progress was made on the construction of IAC despite COVID-19, he said the commissioning of IAC will be a befitting tribute to 75 years of India›s independence.

Policy approval on archiving, declassification and compilation of war/operations histories

India's defence Minister Mr. Rajnath Singh has approved the policy on archiving, declassification and compilation/publication of war/operations histories by the Ministry of Defence. The policy envisages that each organisation under the Ministry of Defence such as Services, Integrated Defence Staff, Assam Rifles and Indian Coast Guard, will transfer the records, including war diaries, letters of proceedings and operational record books, etc., to the History Division of Ministry of Defence (MoD) for proper upkeep, archival and writing the histories.

The responsibility for declassification of records rests with the respective organisations as specified in the Public Record Act 1993 and Public Record Rules 1997, as amended from time to time. According to the policy, records should ordinarily be declassified in 25 years. Records older than 25 years should be appraised by archival experts and transferred to the National Archives of India once the war/operations histories have been compiled.

The History Division will be responsible for coordination with various departments while compiling, seeking approval and publishing of war/operations histories. The policy mandates constitution of a committee headed by Joint Secretary, MoD and comprising of representatives of the Services, MEA, MHA and other organisations and prominent military historians (if required), for compilation of war/operations histories.

The policy also set clear timelines with regard to compilation and publication of war/operations histories. The above-mentioned Committee should be formed within two years of completion of war/operations. Thereafter, collection of records and compilation should be completed in three years and disseminated to all concerned.

The requirement of having war histories written with clear cut policy on declassification of war records was recommended by Kargil Review Committee headed by K Subrahmanyam as well as N N Vohra Committee in order to analyse lessons learnt and prevent future mistakes. Post Kargil War, GoM recommendations on national security also mentioned the desirability of authoritative war history.

Timely publication of war histories would give people accurate account of the events, provide authentic material for academic research and counter the unfounded rumours.


Drawing by Amartya Mitra

VAYU Interview with

Mr. MV Rajasekhar, CMD, BEML


Aircraft Towing Tractor

VAYU : Over the last five and a half decades, BEML has been supplying quality products and services to sectors such as Mining and Construction, Rail and Metro, Defence and Aerospace. How successful has the company been in achieving its missions and goals? What are the major accomplishments in recent times?

CMD: Yes. We were able to achieve our short-term goals. However, some of the long-term plans are yet to be achieved and we are on the trajectory for achieving the same. During recent times ample numbers of accomplishments has been achieved by the Company. Some of them are:

BEML received prestigious orders from VSSC, ISRO for manufacture of eight types of Light alloy structures for GSLV. This is first of its kind for BEML to venture into space domain to manufacture critical launch vehicle structures thereby supporting ISRO for their upcoming launch mission including "Mission Gaganyan". Required facilities including an assembly hangar have been set up at Bangalore Complex.

BEML received orders for supply of more than 800 HMV vehicles and 1512 mine ploughs for the T-90 tank.

Overhauling of two Armoured Recovery Vehicles (ARV) has been taken up at KGF Division which is yet again first of its kind in BEML. Required facilities have already been established in the division.

So far, more than 8200 High Mobility Vehicles, 350 Armoured Recovery Vehicles, 3200 Trailers/Wagons, 6 sets (330) of Pontoon Bridge Systems, 7 sets of Sarvatra Bridge systems, etc have been supplied.

VAYU : What are the capabilities of the newly-launched Aerospace Assembly Hangar, situated within BEML's Bangalore Complex and the new Industrial Design Centre?

CMD: New Aerospace Assembly hangar has been set up at Bangalore Complex to take up the manufacture of the Light Alloy Structures for GSLV Mk III structures. Required infrastructures have been established to meet the stringent quality requirements of ISRO. The Industrial Design Centre will focus on implementing Industrial Design & Human Factors in all Products plus global benchmarking for Industrial Design and Ergonomics and integration with R&D and manufacturing.

VAYU : How healthy is BEML's order book?

CMD: At present we have an orderbook position of over Rs. 12,200 crore which will be executed by 2023-24. With respect to Defence vertical, it has seen a rising trend in performance over the last five years. BEML has around Rs.4660 Crores order book as on date and around Rs .850 Crores orders is in pipeline. With this order book position, BEML is poised to grow reasonably well in the defence business in the forthcoming years.

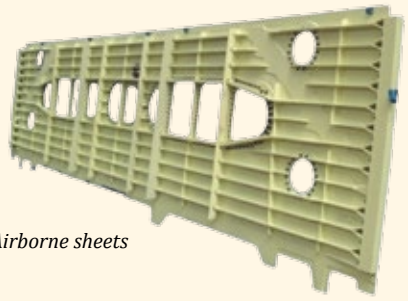
VAYU : How does the company support the Atmanirbhar Bharat initiative?

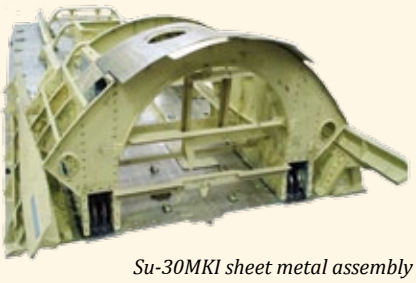
CMD: Atmanirbharta is in our DNA. Over the years indigenisation has been a big plank of our strategy. Under the government's guidance, we have issued an expression of interest on every product for seeking manufacturing and technology partnerships from reputed OEMs looking to establish and/or expand their supply chains/manufacturing base in India for the manufacture of various goods and/or service business that is being imported as we want to go towards zero import on whatever item is being imported. BEML has also signed a ToT with Tatra Trucks for indigenisation of cabins for military trucks.

Under Atmanirbhar initiative, BEML is associated with IIT, Kanpur to establish a potential Industry – Research Institute relationship for joint development of 25 kg class Tactical UAV for surveillance application. Furthermore, BEML is entering into an MOU with NAL to associate in the areas of Advanced Composites & Autoclaves, Mini UAV, Design & Analysis of Aircraft Structures & Systems. Efforts are also being made with global OEMs to associate for indigenous design and development of Unmanned Aerial Systems through technology transfer.

VAYU : The products of BEML are exported to more than 67 countries. Which are the main customers and what are the main export products?

CMD: BEML is exploring opportunities for exporting defence products to friendly neighboring countries like Bangladesh, Thailand etc. Apart from this, BEML has exported more than 1100 pieces of equipment to various countries across the globe. Our main customers are Syria, Tunisia, Saudi Arabia, Abu Dhabi, Nepal and the main export products are HMV 8x8, HMV 6x6, Sarvatra Bridge System, Recovery Vehicles, Dozers, Excavators etc.


Airborne sheets


Su-30MKI sheet metal assembly

Royal Navy's mixed task group heads East

Final preparations were completed at Portsmouth, UK, in early May prior to the departure of Carrier Strike Group 21 (CSG21) which will see the largest UK naval deployment to Asia Pacific waters for a generation. The flotilla of ships is getting deployed for 28 weeks, through the Mediterranean, Indian Ocean and South China Sea into the Pacific and will represent the most ambitious Royal Navy overseas projection of sea power since the Falklands Task Force in 1982. A very wide selection of vessels will be involved, apart from the flagship, the aircraft carrier HMS Queen Elizabeth, and will include Type 45 destroyers, HMS Defender and HMS Diamond, Type 23 frigates, HMS Richmond and HMS Kent, the new offshore patrol vessel, HMS Tamar, an Astute Class nuclear submarine and fleet

support ships, RFA Fort Victoria and RFA Tidespring. Apart from these, US Navy Destroyer, the USS Sullivans, and a Dutch frigate, HNLMS Evertse will add international flavour to it.

Besides promoting defence exports along the way and underlining the UK's renewed commitment to a more global outreach, this opportunity will be fully exploited to exercise sea and air assets with other friendly nations, gaining experience through operating diverse equipment and capabilities, including co-ordinated command and control and tactical operations. A major sea and air exercise has been planned in the Eastern Mediterranean on the way to the Middle East, but this might be changed if the military situation in Gaza extends into a wider local conflict involving Israel. Beyond the Suez Canal and Red Sea, there will be exercises in the Indian Ocean, but it looks bit dicey owing to the current Covid-19 emergency that might affect the planned activities involving Indian forces. All aspects involved in maritime air and sea operations are expected to be included in joint activity during this deployment, from air, surface and sub-surface surveillance and detection to defensive and simulated attack air operations and continuing fleet support.

The carrier group will be visiting a total of 40 nations during the deployment. Speaking during a work-up exercise, Commander Steve Harman, HMS Queen Elizabeth Commander Logistics, stated, "One of the things which makes our carrier strike capability so special is our ability to operate anywhere in the world and to sustain those operations at sea for as long as it is necessary. While the new carrier is enormously self-sufficient by design, our ability to replenish supplies of fuel, food, general stores, and, if necessary, ammunition from our Royal Fleet Auxiliary ships, massively increases our capacity in this area."

The carrier air group will see the intensive use of new aircraft types working together on a long-distance deployment for the first time. The 18 F-35B combat aircraft will see crews from the Royal Navy, RAF and US Marines working together as a group, following intensive training and working up on the new aircraft in the USA and UK. For the Royal Navy, the step up in combat capability is considerable moving to a stealthy, supersonic, fifth-generation fighter/attack platform, aboard a highly automated 65,000 ton carrier. The RN has suffered a serious capability gap in recent years following the withdrawal of three Invincible Class 22,000 ton carriers and their Sea Harrier and Harrier GR9 aircraft. However, the deliveries of UK F-35Bs to date have been relatively slow and are being spread three ways- between development and training units in the USA and UK and just a single operational squadron, No 617, a joint RAF/RN unit. The second operational squadron, No 809 Naval Air Squadron, will become operational in 2023. Some 37 F-35Bs should then be deployable. On CSG21, the inclusion of a USMC squadron within the air group is a bonus for both the UK and USMC and the huge four acre deck and vast hangar of the new carrier has been designed to accommodate 40 aircraft, so operating and maintenance space is not a problem. Several Asia Pacific nations will be taking a particular interest in seeing up close how the F-35Bs can work closely with helicopters as many already have, or are planning, new compact aircraft carriers and since the demise of Harrier production, there is currently no other combat jet apart from the F-35B that can use flat decks lacking catapults and arrestor wires. The USMC may be the largest user of F-35Bs but is still operating Harriers on its own helicopter landing platform ships as it transitions to the new aircraft.

HMS Tamar with new dazzle paint scheme in the water

New helicopter platforms

Another new UK aircraft that will be operationally deployed for the first time is an essential component in the carrier air group - the Merlin Crowsnest Airborne Surveillance and Control helicopter. The carrier has embarked seven Merlin Mk2 anti-submarine helicopters from No 820 Naval Air Squadron and is now also providing airborne early warning, aircraft control and air-sea integration of communications with three of the latest Merlin ASaC helicopters which have replaced the former Sea King Mk 7s. The Merlin Crowsnest, as the name implies, will provide a beyond the horizon radar capability offering advanced warning of air and surface movements over a very wide area, along with essential air movement management and general surveillance for the ships. These helicopters, already nicknamed "baggers" as their distinctive search radars are externally carried in an inflatable side mounting, have just been released for operations with a sophisticated radar and associated on-board systems developed by Thales UK. The anti-submarine system aboard the Mk 2 Merlins has been enhanced significantly by Lockheed Martin UK.

In addition to that, the carrier will be carrying ramp-equipped Merlin Mk4 helicopters that will be used for exercises with the Royal Marines and for general communications and medium lift support. Four Wildcat helicopters will also be carried for ship-to-ship and ship-to shore communications and also have an attack capability against small vessels, armed with guns and missiles. All the surface ships in the group are equipped with helicopter landing decks. The ships will conduct extensive sea exercises, expected to include working with ships and aircraft from India, South Korea, Singapore, Taiwan, Japan and Australia. The passage to Japan is expected to be controversial and will involve a balance between avoiding what might be regarded by China as provocation in their back-yard, and the opportunity to display a robust show of resolve in support of regional maritime forces committed to the protection of internationally recognised free shipping routes across the South China Sea.

Dazzling spectacle

One of the new Royal Navy ships will be reviving a tradition that has not been witnessed at sea on a Royal Navy ship since the end of the Second World War. The OPV HMS Tamar is heading to the region carrying a "dazzle" camouflage paint scheme incorporating various shades of black, white and grey in unusual shapes. This was designed to make it most distinctive but the purpose of this scheme is the use the different shapes, angles and colours to make the ship harder to identify and to confuse those seeking to calculate its speed and direction, especially when looking through a submarine periscope. Commander David Louis, Commander of the Overseas Patrol Squadron stated that the RN had decided to give the River Class ships a distinct identity to recognise their extended missions, which includes a forward presence in the Asia-Pacific region. He said, "Dazzle has much less military value in the 21st Century although there is still value in littoral environments when viewed against the background of land." He added, "We're really proud of our new paint schema and the historical significance that comes with it. Different styles of dazzle were used by RN ships in various stations around the world and we are pleased to have been given an iconic new look before we deploy." The Royal Navy's ships will once again become more familiar in Asia Pacific waters after CSG21 returns to the UK, and will be followed by further deployments of frigates and larger ships next year.

Richard Gardner, London

Update

UK Carrier Strike Group reaches Indian Ocean Region

The United Kingdom Carrier Strike Group (CSG) 2021, led by HMS Queen Elizabeth, has sailed into the Indian Ocean Region mid-July having recently transited the Suez Canal. Following a series of successful engagements and operations in the Mediterranean it is now sailing East across the Indian Ocean towards India. It will then meet with ships from the Indian Navy to conduct routine maritime exercises.

The deployment represents the UK's commitment to deepening diplomatic, economic and security ties with India and in the Indo-Pacific region. It demonstrates both the UK's support for the freedom of passage through vital trading routes and for a free, open and inclusive order in the Indo-Pacific.

Defence Secretary Ben Wallace stated. "The UK Carrier Strike Group deployment

is a major moment for UK defence as we develop this cutting edge capability across the globe. The group is sailing the Indian Ocean and will shortly conduct exercises with the Indian Navy, building on our already strong partnership with an important ally and friend. The deployment illustrates the UK›s enduring commitment to global defence and security, strengthening our existing alliances and forging new partnerships with like-minded countries as we face up to the challenges of the 21st century."

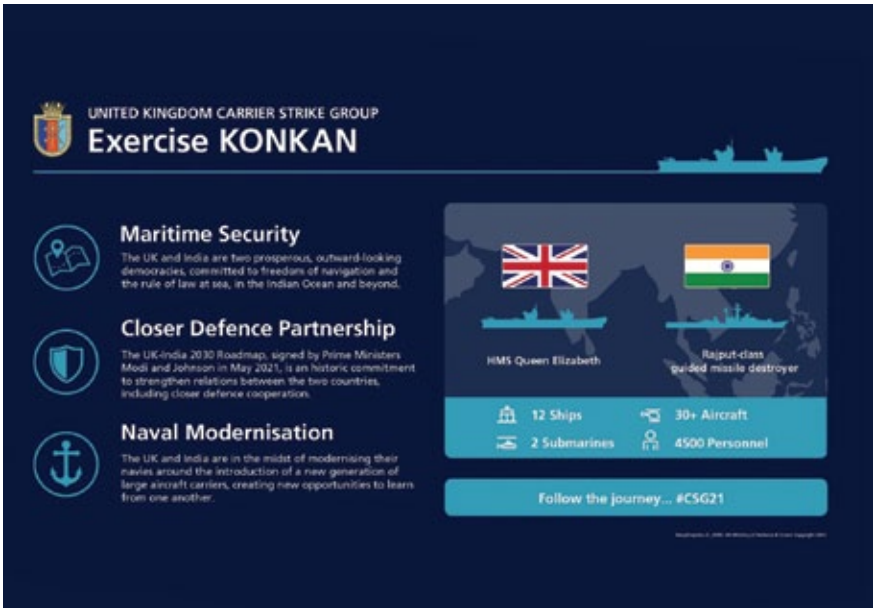
Foreign Secretary Dominic Raab stated, "The Carrier Strike Group deployment marks the start of a new era of defence cooperation with allies in India and the Indo-Pacific. By visiting 40 countries and working alongside our partners, the UK is standing up for democratic values, seizing new trading opportunities and tackling the shared threats we face together. The deployment will interact with India, strengthening our already deep ties for the benefit of both our peoples' security and prosperity."

British High Commissioner to India, Alex Ellis stated, "The Carrier Strike Group is a powerful demonstration of our commitment to the security of India and the Indo-Pacific. Its arrival follows the UK's first International Liaison Officer joining the Indian Navy's Information Fusion Centre-Indian Ocean Region in Gurugram. Today marks another step towards delivering the ambition set out jointly by our Prime Ministers in the 2030 Roadmap, bringing our countries, economies and people closer together."

Indian Navy exercises with Royal Navy Carrier Strike Group

With the presence of the CSG-21 in the Indian Ocean, the ongoing exercise has afforded "excellent opportunity" to engage over the entire spectrum of maritime operations including ASW, Anti-Air and Anti-Surface warfare. The exercise also witnessed the maiden participation of the F 35 B Lightning which operate from the deck of HMS Queen Elizabeth. Regular IN-RN interactions over the years have augmented their professional content, interoperability and adaptability in the ever-changing security scenarios. The inter- operability achieved over the years has ensured a quantum jump in the complexity and scale of professional exchanges which is being further enhanced by the presence of the Royal Navy's Carrier Strike Group in the Indian Ocean.

The Indian Navy participated in a two-day bilateral Passage Exercise (PASSEX) with Royal Navy Carrier Strike Group (CSG)-21 led by HMS Queen Elizabeth in the Bay of Bengal from 21 to 22 Jul 21. The bilateral Maritime Exercise was designed to hone the ability of the two navies to operate together in the maritime domain. The maiden exercise between Indian Navy and the Royal Navy's latest aircraft carrier, HMS Queen Elizabeth included participation of CSG-21 comprising Type 23 Frigates and an Astute-class submarine in addition to the other surface combatants. Indian Navy was represented by IN Ships Satpura, Ranvir, Jyoti, Kavaratti, Kulish and a submarine. Anti-submarine warfare capable long range maritime reconnaissance aircraft P8I also participated in the exercise.



Indian Navy and European Union Naval Force (EUNAVFOR) Exercise

On 18-19 June 2021, the EU and India conducted a joint naval exercise in the Gulf of Aden. The exercise involved Indian Navy frigate INS Trikand, EU NAVFOR Somalia - Operation Atalanta assets, including Italian frigate Carabiniere (Atalanta's flagship) and Spanish frigate Navarra, French frigate Surcouf and French amphibious assault helicopter carrier Tonnerre. The exercise was based on the scenario of an anti-piracy operation. It included cross-deck helicopter landings, complex tactical evolutions at sea, live firing, a night-time joint patrol and a naval parade in the high seas off the coast of Somalia.

According to the charter, the EU and India are committed to a free, open, inclusive and rules-based order in the Indo-Pacific region, underpinned by respect for territorial integrity and sovereignty, democracy, rule of law, transparency, freedom of navigation and overflight, unimpeded lawful commerce, and peaceful resolution of disputes. They reaffirm the primacy of international law, including the United Nations Convention on Law of the Sea (UNCLOS).

In January 2021, the EU and India launched a dialogue on maritime security and agreed to deepen their dialogue and cooperation in this domain. The Indian Navy has been providing escort to World Food Programme chartered vessels, coordinated by EU NAVFOR Somalia - Operation Atalanta. The Indian Navy has previously participated in the Shared Awareness and Deconfliction (SHADE) conference, co-hosted by Operation Atalanta, whose assets conducted several joint exercises with Indian vessels in the past.

The EU and India intend to strengthen their operational cooperation at sea, including joint naval exercises and port calls, and to protect the sea-lanes of communication. They also intend to boost maritime domain awareness in the Indo-Pacific through mutual coordination and exchanges.

Integrated bilateral exercise of Indian Navy and IAF with the US Navy

The two-day integrated bilateral exercise between Indian and US Forces in the Indian Ocean Region concluded on 24 June 2021; the Indian Navy along with the Indian Air Force participated with US Navy Carrier Strike Group in the exercise. The exercise has been a key enabler in building interoperability and strengthening the defence coordination between the two nations and witnessed high tempo-naval operations at sea. These included intense air dominance exercises, advanced air defence exercises, anti-submarine exercises, tactical manoeuvres and cross deck helicopter operations.

Participation of Indian Navy in the exercise included Guided Missile Stealth Destroyer Kochi, Guided Missile Frigates Teg, maritime air dominance fighter MiG 29K, Long Range Maritime Patrol Aircraft P8I, Sea King 42B and Kamov AEW helicopters.

The IAF hardware included Jaguars and Su-30MKI fighters, AWACS, AEW&C, and air to air refueller aircraft. The US side was represented by the Nimitz class aircraft carrier Ronald Reagan with her integral maritime air element comprising F18 fighters, E2D AEW&C aircraft and MH60R ASW helicopters, Arleigh Burke class guided missile destroyer USS Halsey and Ticonderoga class guided missile cruiser USS Shiloh.

The exercise has been another milestone in strengthening cooperation between the two countries and "reinforcing the shared values as partner militaries, in ensuring freedom of seas and commitment to an open, inclusive Indo-Pacific and a rules-based international order".

VAYU on-the-spot report

International Maritime Defence Show 2021, Russia

As a fellow Vayu subscriber, if I were to bring up Russia, I can confidently say at this very moment you are conjuring up thoughts of freezing temperatures, vodka and the Cold War. As such it's only logical that I address these three thoughts, and my perception of the same, through the course of this article.

St Petersburg in all its Tsarist splendour

First, a little bit of context. Earlier this year, amidst all the pandemic-related doom and gloom, I was asked to represent Vayu at IMDS (International Maritime Defence Show) 2021 at St Petersburg, Russia. The show, held in cooperation with the Russian Ministry of Defence, Rosoboronexport JSC and Federal Service for Military-Technical Cooperation, is an exposition held every two years at St Petersburg. Akin to what Aero India and Defexpo are to us, IMDS showcases naval armament, maritime assets and technology. Of particular note, and something I found personally amusing was the interest garnered by the Brahmos Stand in this edition of the show.

Temperature

Landing up armed with the best cold weather gear the average Bangalorian can muster, I was subject to scorching temperatures that would make the average Delhiite look back fondly upon the scorching North Indian summer, so much for thoughts of emulating a frozen Napoleon.

Vodka

As any of the thousands of other engineers floating aimlessly throughout India can attest, I too have my fair share of drinking stories. Maybe it was the environment, or perhaps the relief of finally being out of the house after a year of lockdowns, but Russian vodka truly is worth its weight in gold!

The Cold War

This thought is something I want to handle differently. Having had grown up on a steady diet of Tom Clancy novels and videos games like Jane's 688i Hunter/Killer, my perception of the Cold War and of Russian/Soviet submarines are musings that I think are worth delving into.

As one of the companies bidding for the Indian Navy's Project 75I tender, Russia's United Shipbuilding Corporation (USC) and the Rubin Design Bureau, were keen to show me, and by extension Vayu, what sets them apart. With a portfolio boasting of designs like the Foxtrot (Independent India's first submarine), Delta series of SSBN's and the INS Vikramditya dwarfing Typhoon class, the Rubin Design Bureau hardly needs some random correspondent from India singing their praises.

What is Project 75I? It is a project, cleared by the Nirmala Sitharaman-headed Defence Acquisition Council in June 2021, to build 6 conventional submarines under the Make in India scheme. These submarines, with advanced sensors and Air Independent Propulsion (AIP) are intended

Meeting to discuss Project 75I with Mr Andrei I. Baranov (Deputy Director General on Foreign Activities, right) and Chief Designer Igor Molchanov (responsible for conventional submarine design, left)

Mr Dmitry Semyonov (Designer of the Vityaz UUV, Rubin Design Bureau) showing us the key features of the UUV on a scale model of the same at IMDS 2021

Whilst this article chooses to concentrate on Rubin and the Project 75I bid, as guests of USC (United Shipbuilding Corporation) we got the opportunity to interview and visit a number of partner shipyards. From visiting Sredne-Nevsky Shipyard and climbing all over their proposed replacement to the Indian Navy's Pondicherry class (modified Natya class minesweepers), to interviewing the head of the Severnaya Shipyard to learn more about their proposed bid to upgrade the first batch of Talwar class frigates. Each of these visits are deserving of their own separate articles and will thus be dealt with as such in future editions of Vayu.

Before I delve into the world of UUV's on display at the USC stand at IMDS 2021, I wish to first provide you with a little more context. St Petersburg is a city of rivers and canals, a city uniquely in touch with both its maritime past and its present. Far from the Cold War references I expected to find around every corner I instead found myself treated to Tsarist Russia at its finest. As if to drive the point of the city's seafaring past home the museum ship Aurora, rumoured to have had fired the first shots of the Russian Revolution in 1917, is moored near the heart of the city with the

to keep the Indian Submarine arm at the forefront of underwater warfare and as such serve the nation for the foreseeable future. At the time of writing, four foreign firms have responded to the Indian government's request for proposal: the French firm Naval Group, Germany's ThyssenKrupp Marine systems, Sweden's Saab and Russia's Rubin Design Bureau.

A quick Google search will reveal all that there is to know about the Amur class of submarine, its merits, demerits, etc. All written by people with far more experience in the field of defence journalism. Keen to showcase their improved Kilo class/ Lada class/Amur class of submarines, my attention was instead (rather frustrating for all parties involved) drawn to the selection of Autonomous Unmanned Underwater Vehicles (UUV) on offer. So instead I pose, to you the reader, the question, what next? What comes after P75I?

The cruiser Aurora moored in the Neva river, St Petersburg.

A short walk from the Aurora, Admiralty Shipayrds (left) and Baltic Shipyards (right) with the C-189 Submarine Museum in the foreground (613 class diesel-electric submarine launched 1954)

opulent Admiralty Building serving as a backdrop. A mere 10-minute walk along the riverbank leads one to Admiralty and Baltic Shipyards, complete with under refit Kilo class submarines and a Soviet WW2 submarine bobbing in the river. Amidst all of this Imperial Russian splendour is located the Rubin Design Bureau. Each of these sights was soundtracked with apocryphal stories of James Bondesque espionage (narrated to us by our USC representative Alice Gritskova) which helped draw a stark mental contrast with what I see as the potential future of underwater combat.

Posing many a question to Mr Dimitri Semyonov, chief designer of the Vityaz UUV, I managed to, at the very least, figure out how little I know. Still largely in a proof of concept stage in the design life-cycle of any major weapons programme, like with UAV's (Unmanned Aerial Vehicles), UUV's are improving with leaps and bounds and will soon prove to be (in my opinion) the next disruptive technology. Not without their own challenges, Rubin and Mr Semyonov patiently explained the engineering obstacles associated with the Vityaz's record making dive to the bottom of the Mariana's trench (10,925 mtr), where they succeeded and where their Chinese rivals failed. As with all ground breaking tech, this dive pioneered new technologies such as sound-guided communications

Rubin: *Sentry* shows who's the BOSS!

Rubin is offering the first version of a submersible patrol ship combining the benefits of a submarine and a surface patrol vessel. The concept named the *Sentry* (Border and Offshore Submersible *Sentry*, BOSS) is intended for foreign customers.

Offshore patrol vessels are relatively inexpensive, which makes them affordable for countries with constrained budgets. Their operation is profitable because they can be used to prevent illegal trade, poaching and other law infringements. Ships of this type are multi-functional and can be used as patrol ships, and as rescue or research vessels as well. Equipment for the new ship comes mostly from surface ships and aircraft and is commercially available.

The ability to dive provides the ship with two advantages at a time: to discreetly observe inflictors (and to catch them red-handed) and evade harsh weather conditions without aborting the mission. A submersible ship can be used as a classical submarine, for intelligence, surveillance and reconnaissance (ISR), as well as other missions. Seabed research capability of the submersible patrol ship would be wider than those of a surface ship. It can also serve as an inexpensive training vessel to give crews seagoing experience and prepare the infrastructure before purchasing classical submarines at a later stage.

In its architecture and outline, the ship resembles Whiskey-class submarines (Project 613) - the most numerous series of the Soviet submarines, very popular with foreign customers. Basic parameters are also much the same, with the surface displacement around 1000 tons, overall length 60 to 70 metres depending on the configuration, and the crew up to 42 people including the boarding team. Large pressure-proof containers can be used to store RHIBs for boarding teams or an UAV with up to 3 hours endurance, its launch sequence will be automated and will not require the presence of people on the open deck. At the customer's choice, the ship can be fitted with torpedoes, small guided missiles and autocannon.

(which as of 2021 has no foreign analogues), automatically directing communication bursts along a selected acoustic-ray path. Involving both ultrasonic and sonic channels, this new system demonstrated an ability to transmit and receive text, low quality images as well as command and control instructions from great depth.

The editors of GlobalSecurity.org do a far better job of putting my thoughts to paper when they say: "Once UAVs came to be regarded as reusable aircraft rather than expendable aerial munitions, there was a quantum leap in the size of vehicles and the purposes to which they were put. Now such a revolutionary phase transition is underway underwater. In both cases, the foundation was the inexorable unfolding of the gift that keeps on giving, the miracle of Moore's law" (Moore's law when simplified basically states that we can expect the speed and capability of our computers to double every couple of years whilst having to pay ever less).

More of the C-189 Submarine Museum with an under refit Kilo class submarine in the background

Perhaps in the not so distant future a school kid will spend less time daydreaming of Soviet Akulas chasing American missile boats, and instead dream of unmanned submarines stalking the world's oceans. One thing is for certain, the Terminator series of movies must now be included in the CBSE school curriculum.

Angad J. Maolankar

INS Tabar arrives at St. Petersburg on a goodwill visit

Indian Naval Ship Tabar arrived at St Petersburg 22 July 21 as part of a five-day goodwill visit to Russia and to participate in the 325th Navy Day celebrations of the Russian Navy. India and Russia share special bilateral relations that span several decades. These include close military ties and strong cooperation between the two navies.

INS Tabar is a Talwar-class stealth frigate and forms part of the Indian Navy›s Western Fleet which is based at Mumbai under the Western Naval Command. Incidentally, the ship was built for the Indian Navy in Russia and was commissioned at St. Petersburg in April 2004. The ship is presently commanded by Capt Mahesh Mangipudi and has a complement of over 300 personnel. The ship is equipped with a versatile range of weapons and sensors and is among the earliest stealth frigates of the Indian Navy.

During the Russian Navy Day Parade on 25 July 2021, INS Tabar joined the column of ships that were reviewed by the President of Russian Federation. The Indian Naval Band embarked on Tabar also participated in the City Parade during the celebrations. In addition, during her stay at St Petersburg, the crew of Tabar participated in various bilateral professional interactions with the Russian Navy. This was followed by naval exercises at sea between the two navies. This was part of the established series of naval exercises between the Indian Navy and the Russian Navy titled exercise INDRA. These interactions also offered an opportunity for both sides to observe and imbibe the ‹Best Practices› followed in each other›s Navy.

Federal Service for Military Technical Cooperation (FSMTC)

India-Russia Defence Cooperation

Indian Navy MiG-29K (photo: Vayu)

Defence cooperation is an important pillar of the India-Russia strategic partnership. It is guided by the Programme for Military Technical Cooperation signed between the two countries which is valid, at present till 2020. It enshrines the interest of the two governments to further develop and strengthen the military and technical cooperation in the sphere of research and development, production and after sales support of armament systems and various military equipment. The two sides also have periodic exchanges of armed forces personnel and military exercises.

India and Russia have an institutionalised structure to oversee the complete range of issues of military technical cooperation. The India-Russia Inter-Governmental Commission on Military Technical Cooperation (IRIGC-MTC), set up in 2000, is at the apex of this structure. The two Defence Ministers meet annually, alternately in Russia and India, to discuss and review the status of ongoing projects and other issues of military technical cooperation. There are two Working Groups and seven Sub-Groups under the IRIGC-MTC, which review and discuss an array of military technical issues. In 2008, a high level committee called the High Level Monitoring Committee (HLMC) was set up with Defence Secretary from the Ministry of Defence in India and Director of Federal Service for Military Technical Cooperation (FSMTC) from the Russian Federation as its co-chairs.

Bilateral projects currently underway include indigenous production of T-90 tanks and Su-30-MKI aircraft, supply of MiG-29-K aircraft and Kamov-31 and Mi-17 helicopters, upgrade of MiG-29 aircraft and supply of Multi-Barrel Rocket Launcher Smerch.

Over the years, cooperation in the military technical sphere has evolved from a purely buyer-seller relationship to joint research, design development and production of state of the art military platforms. Production of the Brahmos cruise missile is an example of this trend. The two countries are also engaged in joint design and development of the Fifth Generation Fighter Aircraft and Multi-Role Transport Aircraft. Joint exercises between the two Armed Forces are held under the title "INDRA".

Indian Navy Ka-31AEW (photo: Vayu)

Rosoboronexport presents Russian shipbuilding technology at IMDS 2021

Rosoboronexport JSC (part of the Rostec State Corporation) presented the latest models of Russian naval equipment and coastal surveillance and defence systems to foreign customers during the tenth anniversary of International Maritime Defence Show (IMDS 2021).

"Rosoboronexport is a long-standing exhibitor and sponsor at the International Maritime Defense Show. Therefore, as one of the pioneers, we are very pleased to note that the show has grown qualitatively and ranked well amongt the world's leading exhibitions," stated Alexander Mikheev, Director General of Rosoboronexport. "Rosoboronexport has invited delegations from more than 70 countries to IMDS 2021 and we expect a strong incentive to develop military-technical cooperation with partners in the naval segment. Today, the company's order portfolio in this segment stands at about $5.5 billion. It includes contracts for the supply and joint construction of ships and submarines, the supply of various weapons for them and coastal support equipment, as well as infrastructure projects."

Rosoboronexport's exhibits at IMDS reflected the main needs of the present-day market, guiding potential customers towards the purchase the most in-demand products. Scale models of the Project 636 large diesel-electric submarine, Project 20382 Tigr class corvette, Project 677E Amur 1650 diesel-electric submarine, Project 22800E Karakurt-E corvette and the Rubezh-ME coastal defence missile system were on display at the company's stand.

The latest Russian naval equipment, whose export versions Rosoboronexport is offering to its partners in the world market, were also showcased at the Passenger Port of St. Petersburg within the Show.

Project 12700 Alexandrit coastal minesweeper

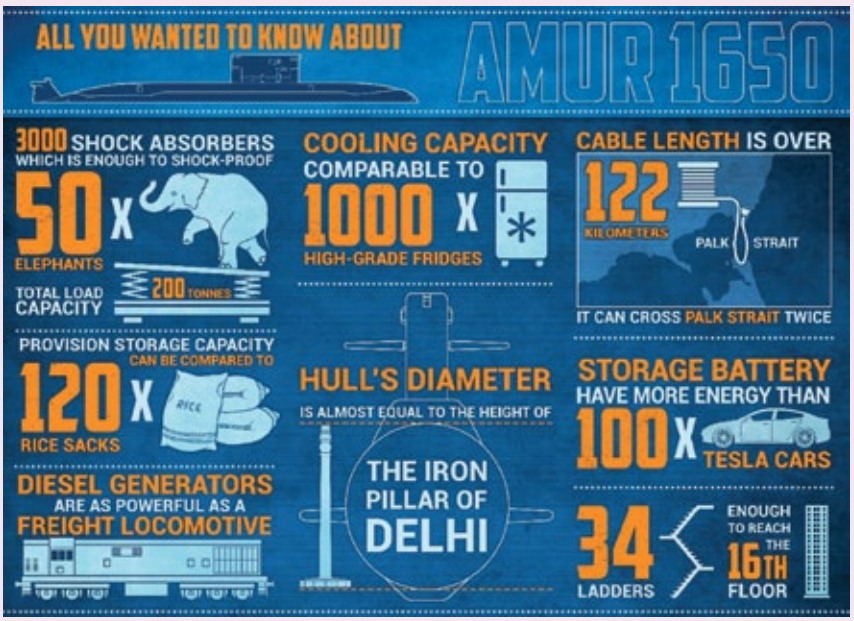
Project 22800 corvette (export version–Project 22800E Karakurt-E) is comparable in firepower to a frigate and equipped with the Club-N integrated missile system and the Pantsir-ME multi-channel anti-aircraft gun/missile system.

Rubezh-ME coastal defence missile system enables a single launcher vehicle to search and engage a target by integrating weapon and target designation subsystems into a single platform. A strike group consisting of up to eight launcher vehicles can also be formed.

Project 677 diesel-electric submarine (export version–Project 677E Amur-1650) belongs to the latest generation of submarines and incorporates the most advanced technologies and materials. Its ammunition load includes Club-S missiles capable of engaging enemy ships and land targets, as well as torpedoes with a firing range of up to 50 kilometers.

Project 22350 multi-purpose frigate (export version–Project 22356) is a high-tech warship of the latest generation, perfectly adapted for operations in the far sea and ocean zone. Its armament suite includes a Club-N integrated missile system and a 130-mm A-192M gun system with a range of 22 km. Air defence is provided by a Rif-M multi-channel SAM system firing two types of medium-and short-range missiles, as well as by two Palma close-in weapon systems (CIWS).

Project 12700 Alexandrit coastal minesweeper (export version–Project 12701) is equipped with a state-of-the-art mine countermeasures system to search and neutralise mines.



Project 677E Amur-1650: It has been offered to India as part of the Indian Navy's new P-75I plans.

Rubin Design Bureau's Project Amur 1650

Kilo class submarines are well-known in the export market. More than 70 ships of the basic and upgraded design have been already constructed and inducted into the Russian Navy and those of friendly countries. Now comes the *Amur 1650*-the next generation submarine. She is more compact with similar weapons pack (six torpedo tubes with ammunition comprising 18 torpedoes and missiles), the surface displacement has been reduced and the displacement of Pr. 636 submarines is about 2400 tons, the same of Pr. *Amur 1650* is about 1800 tons. Due to automation, the complement has been reduced from 52 to 35.

Special features include a powerful torpedo-missile complex, capable of striking both underwater and surface targets, as well as land targets. Torpedo or missile salvos can be launched from all six tubes.

Stealth is ensured by hull lines, a carefully designed propulsor (propeller), slow-speed low-noise permanent magnets propulsion motor, specially developed low noise equipment and advanced acoustic protection means. Anechoing coating

reduces the probability of detection by surface ships and anti-submarine aircraft. A forward sonar array, with area comparable to that of nuclear submarines, availability of towed array sonar, as well as advanced processing techniques enable detection of very low-noise targets at considerable distances.

As for the Ergonomic Combat Information Centre (CIC), operators' consoles are of modern design and have user-friendly interface. Consoles arrangement ensures swift and accurate joint work in standard combat and emergency scenarios.

(Text courtesy Rubin. All photos: Oleg Kuleshov)

AIP developed by Rubin Design Bureau

Rubin Design Bureau proposes an AIP system based on diesel fuel reforming. Diesel fuel reforming is attractive from operational point of view:

- hydrogen is not stored on board, instead it is produced and instantly used (absence of "hazardous stock");
- only in case of diesel fuel reforming, the submarine gets the opportunity to store one type of fuel only and use it for diesel-generators, as well as for AIP system. Hence, the submarine operational cost reduces;
- use and storage of diesel fuel onboard submarines has been mastered long ago;
- all naval bases of the world have adequate infrastructure for diesel fuel storage. Hence, additional infrastructure cost inputs are not required;
- it is possible to develop a range of plants: from low to high power;
- AIP system is designed to be maintenance-free between submarine's overhauls.

The HAL Rotary Wing 'Lightweights'

An excellent example of Made in India initiative, HAL Dhruv (Pole Star) Advanced Light Helicopter (ALH) has been developed indigenously by the Helicopter Division of the government-owned Hindustan Aeronautics Limited (HAL). It is a light (5.5 tonne) multirole and multi-mission helicopter for army, air force, navy, coast guard and civil operations, for both utility and all weather attack roles. The helicopter, which is built to FAR 29 specifications, entered series production in 2000. Its prime variants are classified as Dhruv Mk I, Mk II, Mk III and Weapon System Integrated (WSI) Mk IV known as Rudra. HAL has produced more than 300 Dhruv helicopters till October 2020, for Indian Armed Forces and exports. Also the fleet of the Indian Air Force (IAF) Display Team, Sarang (Peacock) includes the Dhruv helicopters.

The helicopter has a twin-engine configuration allowing continued flight virtually throughout the flight envelope. The prototype helicopter is fitted with two Turbomeca TM 333-2C or 2B2 engines rated at 740 kW take-off power.

A more powerful engine for the Dhruv, the Shakti (Ardiden 1H) rated at 900 kW was developed under a cooperative agreement between HAL and Turbomeca and manufactured at Bangalore. Avio was selected to supply Integrated Dynamic Systems (IDS) for the Shakti engine. The first flight of the Dhruv Advanced Light Helicopter with the new engine took place in August 2007 and it was certified in 2008. The maximum fuel capacity is 1,400 litres and the fuel system includes cross feeding and fuel dumping.

The Dhruv ALH helicopter is of conventional design and about two-thirds by weight of composite construction. The high tail boom allows easy access to the rear clamshell loading doors. The four-bladed hinge less main rotor can be manually folded. The blades are mounted between cruciform-shaped carbon-fibre-reinforced plastic plates on a fibre elastomer constructed rotor head. The tail section features bearing less tail rotor. The helicopter is equipped with an active vibration control system developed by Lord Corporation of North Carolina that uses sensors to monitor on-board conditions and outputs signals to actuators to cancel fuselage floor vibrations.

The cockpit section of the fuselage is of Kevlar and carbon-fibre construction and is fitted with crashworthy seats. The navigation suite includes a Global Positioning System (GPS), a Doppler navigation system, distance measuring equipment, a true air speed indicator, automatic direction finder,

Lineup of Rudra's

HAL Dhruv in green Army Aviation livery

a heading reference system, radio altimeter, Very High Frequency Omnidirectional Ranger and Instrument Landing System (VOR/ILS) and marker beacons. The aircraft is equipped with a SFIM Inc. four-axis automatic flight control system. The communications suite includes High Frequency (HF), Ultra High Frequency (UHF), and Very High Frequency (VHF) radio communications. Israel Aerospace Industries (IAI) developed an integrated helicopter avionics suite for the Dhruv, including daylight and thermal imaging cameras, electronic warfare suite, and observation and targeting devices. As already stated, the ALH is also outfitted with anti-resonance vibration isolation system, Full Authority Digital Electronic Control (FADEC), and an automatic flight control system.

In December 2006, Nexter Systems (formerly Giat) was awarded a contract for the installation of the THL 20 20 mm gun turret on Rudra helicopters. The turret is armed with the M621 low-recoil cannon and is combined with a helmet-mounted sight. Rudra has stub wings fitted to carry up to eight anti-armour missiles, four air-to-air missiles or four rocket pods for 70 mm and 68 mm rockets. The Rudra WSI variant also has FLIR Forward-Looking Infra- Red (FLIR), Charge Coupled Device (CCD) camera and a target acquisition system with thermal sight and laser rangefinder.

Busy times at the HAL Flight Hangar

The countermeasures suite includes radar and missile detectors, infrared jammer, chaff and flare dispensers. Saab Avitronics was awarded a serial production contract in December 2008 for the Integrated Defensive Aids Suite (IDAS) self-protection systems.

Designed and developed with seamless airborne operations in support of ground troops at high altitudes and holding the distinction of the first attack helicopter to land on Siachen, the maiden flight of Hindustan Aeronautics Limited Light Combat Helicopter (LCH) took place on 29 March 2010 marking successful culmination of three years of design and development efforts by Rotary Wing Research & Design Centre (RWRDC) of the Helicopter Complex and appropriately named 'Tiger Bird' perhaps inspired from exceptional high agility and the design painted on the prototype. Projected to meet the requirements of the Indian Air Force and the Indian Army (they are likely to order 65 and 114 units respectively) plus significant export potential, the LCH is being developed as a dedicated attack helicopter derived from the Advanced Light Helicopter (ALH) Dhruv and to be fitted with weapons and special mission systems and having a crashworthy wheel landing gear. In addition to the primary anti-armour role the rotary-wing platform will play the critical roles of escort to special heliborne

A well armed Rudra

Fitting out

Manufacture in progress

ALH Rudra


LCH during an air display


LCH hovers


LUH is the latest entrant from the stables of HAL

operations (SHBO), support of Combat Search & Rescue (CSAR) operations, and armed aerial scouting duties. The LCH was declared ready for production in February 2020 with a LCH Production Hangar established at HAL's Helicopter Division in Bengaluru. The new hanger will "augment capacity to reach the peak production of 30 helicopters per year", stated HAL Chairman and Managing Director R. Madhavan in an Indian defence ministry statement.

The LCH inherits many technical features of the Dhruv including its rotor system transmission, power plant, hydraulics, IADS, and avionics. The features that are unique to LCH are its sleek and narrow fuselage, exterior covered by canted flat panels to minimise Radar Cross Section (RCS), an integrated dynamic system, including a hinge less main rotor and bearing less tail rotor, which works in conjunction with an anti-resonance isolation system to dampen vibrations, tri-cycle crashworthy landing gear, tandem cockpit, self-sealing fuel tanks, and aerofoil shaped stub wings for weapons, armour protection, Nuclear, Biological, Chemical (NBC) protection and low visibility features which make the LCH "lethal, agile and survivable."

Notably the flight controls and hydraulics of Dhruv have been redesigned for the LCH. An indigenous Automatic Flight Control System (AFCS) have been designed by HAL. The helicopter is powered by two HAL/Turbomeca Shakti-1H1 turboshaft engines fitted with Infra-Red (IR) suppressors, each of which can generate up to 871 kW and can run for up to 3,000 hours without maintenance. It features a Full Authority Digital Electronic Control (FADEC) system, which decreases the work of the pilot by automatically counting engine cycles. The LCH has a cruise speed of 260 km/h, a maximum speed of 275 km/h and a climb rate of 12 m/s to a service ceiling of 6,500 m. LCH has an operational range of 550 km and a ferry range of 700 km.

Fitted with a chin-mounted, twin-barrel M621 20 mm cannon on a Nexter THL-20 turret integrated to a Helmet Mounted Sight (HMS), LCH armament will include Belgian 70-mm rockets and air-to-air/air-to-ground missiles and Laser Guided Bombs (LGB) on the weapon stations. MBDA PARS3 and indigenous Helina with a range up to 7 km are favoured anti-armour weapons. MBDA Mistral-2 Air-to-

Air Missiles (AAM) are carried to ensure self-protection during scouting operations and to decimate hostile helicopters and Unmanned Aerial Vehicles (UAV). The helicopter would have day/night targeting systems for the crew including the helmet mounted sight and an Elbit Compact Multi-Purpose Advance Stabilisation System (CoMPASS) electro-optic/infrared turret (being license built in India by Bharat Electronics Limited) consisting of CCD camera/ third generation 3-5 µm Forward-Looking Infra-Red (FLIR)/Laser Range Finder (LRF)/Laser Designator (LD). The LRF and LD facilitate measurement of range to the target and guidance to the laser guided missiles respectively. The Digital Video Recorder would enable recording of the vital mission for debriefing purposes.

The turret gun skewing is controlled by the Helmet Mounted Sight (HMS) of the gunner, who along with the pilot receives adequate inputs from Multi-Function Displays (MFD). The digitally camouflaged LCH is also fitted with a Saab Self-Protection Suite consisting of Radar/Laser warning receivers and Missile Approach Warning Systems (MAWS) and Countermeasures dispensing system. It is planned to integrate IR/Laser missile jammers on the helicopter. Another addition is a Data Link for Network-Centric Warfare (NCW) operations facilitating transfer of the mission data to the other airborne platforms and ground stations operating in the network, thus facilitating force multiplication. The LCH is designed for low detection (visual, aural, radar and infrared) and includes armour protection of critical areas.

A 30 minute dry running capability of the gear box is a built in-feature to survive after any ballistic hit to the transmission system. Crashworthiness features are built into the wheel landing gear and main structure while dual redundant systems also enhance effectiveness of helicopters in the battlefield environment. The performance features of the LCH including rate of climb, cruise speed, service ceiling are comparable with those of contemporary helicopter types such as the Agusta A129 'Mangusta' and Tiger. Development costs of the LCH have been "relatively low" compared to that of other helicopter types in its class, ensuring lower unit costs. "LCH design is optimised to ensure ease of maintenance with improved reliability of all the onboard systems to keep the life cycle operating costs low as well," stated a HAL designer.

LUH seen here at Defexpo 2020

HAL Light Utility Helicopter (LUH) is a new-generation rotorcraft being designed and developed by Hindustan Aeronautics Limited for the Indian Armed Forces to replace the combat-proven Cheetah and Chetak helicopters in service with the Indian Air Force and the Indian Army. It is capable of performing multiple missions such as surveillance, reconnaissance, rescue, medical evacuations, and cargo and troop transport. The helicopter's cabin and airframe are made of composite material. It features two access doors and windows on port, as well as starboard sides of the hull for the entry and exit of passengers. The next-generation helicopter is also fitted with high-capacity skid-type landing gear.

The LUH is powered by an Ardiden 1U (Shakti) engine designed by Safran. The two-stage turbine engine develops a maximum power of 1,058 kW enabling the rotorcraft to perform search-and-rescue missions, long-range flights, and hover operations. The maximum continuous power output of the engine is 912 kW. The Ardiden 1U engine integrates a two-stage centrifugal compressor along with a single-stage gas generator turbine equipped with single crystal blades. It also features a reverse flow combustion chamber, an integral oil system, and a dual-channel FADEC system. The engine can be operated in Auxiliary Power Unit (APU) mode, which enables power supply for all the lighting, electronic and communications systems aboard the helicopter.

The LUH integrates a glass cockpit equipped with Multi-Function Displays (MFD). The smart cockpit display system presents key flight data on LCD screens. The new-generation helicopter also features auto-pilot and helmet-mounted display system.

Additional equipment includes a rescue hoist for search-and-rescue operations, cargo sling and stretchers. The helicopter also features an emergency floatation system to remain afloat in the event of crash landing on water. The maximum take-off weight of the helicopter is 3,150 kg.

The helicopter is capable of performing in high-altitude areas such as the Himalayas. It has a service ceiling of 6,500 m and can perform manoeuvres with ease due to the sufficient power generated by the engine. It is capable of carrying payloads weighing up to 500 kg. The LUH can attain a maximum speed of 235km/h during a level flight at the sea level. It can endure up to a range of 350 km, which can be extended to 500 km with the integration of internal fuel tanks.

Sayan Majumdar

Why India's indigenous attack helicopters matter

HAL Rudra

Recently a Nigerian defence source created a sensation claiming procurement of Light Combat Helicopters by the Nigerian Government from India. Though there was no confirmation of this rumour but for obvious reasons it created a lot of buzz on social media particularly amongst Indians.

The Light Combat Helicopter is designed and developed indigenously by India's state owned Hindustan Aeronautics Limited. If the news is confirmed, obviously it would be the biggest success story of India's attempt to cement its position as a major weapon exporting nation. Though for several years India has been selling a lot of cutting edge platforms to a large number of nations, Philippines will perhaps be the first to purchase the Brahmos- world's fastest supersonic cruise missile. LCH being fully indigenous would not be concerned with the Russian factor as in case of BrahMos. HAL instead on 5 July gave the following official statement: "Based on the contract between HAL and Nigerian Army for imparting phase-I flying training, six Nigerian Army Aviation officers were formally inducted into HAL's Rotary Wing Academy today". What should be noted here is that the pilots in question are from their Army Aviation

HAL Light Combat Helicopter or LCH

HAL LCH

which is the latest establishment in the Nigerian Armed Forces. Till now it was the air force in charge of sensitive and complex heliborne operations; they are procuring the Mi-35 attack helicopter as well as the AW-109 utility platforms. According to latest reports, their Army Aviation is interested into a new platform separately for counter terrorism operations. Recently they have gone in full swing against their main concern, Boko Haram, against whom the nation has been fighting a bloody war for a long time.

LCH is derived from the Advanced Light Helicopter Dhruv which is a utility platform which too is designed and developed indigenously. It was developed along with Rudra, another attack platform finding the same origin as LCH. Whereas Rudra with limited troop transporting capability can be deployed for special force operations (like the Mi-35 fleet in service with Indian Air Force), LCH is much like AH-64E but with much lighter payload. Boeing's AH-64E Apache is the latest acquisition by the Indian Air Force to replace their aging Mi-35E Hind platforms. Twenty two have been ordered by the Indian Air Force while the Indian Army has contracted for six. Without any doubt, the Apache is unique but the real game changer will be the indigenous platforms which can be deployed for any desired role and in larger numbers. India, braving multi-front threats must have platforms capable of performing multi-domain operations whenever required. Keeping this in mind, the LCH and Rudra have been developed to meet the requirements fully. From the scorching summer in deserts to blistering cold at high altitudes of the Himalayas, these platforms can be deployed anywhere thus gaining huge advantage over potential adversaries lacking such.

LCH can check the Chinese movement at Himalayan region and thwart any misadventure. Both Rudra and LCH can be equipped with a wide range of weapons according to need of their customers, anti-tank guided missiles to destroy enemy armoured columns as well as air to air missiles to deny air space. While AH-64E can do all of these in much larger scales, is too costly to be procured in great numbers. Currently, as mentioned earlier, there are only 28 orders for these platforms from the Indian Armed Forces. But obviously, this is a number too small to support India's ever growing requirements.

According to reports, more than 90 Rudra helicopters are being procured by the IAF and Indian Army where as LCH orders might be around 180 by the two services together. This will make a fleet of 300 various attack helicopters, one of the largest in the world.

China has already inducted more than 300 Z-10 and Z-19 attack platforms. On the other hand Pakistan is also looking to replace their ageing AH-1F's with 12 AH-1Z's and 30 A-129B's. But sanctions by the US has forced Pakistan to hold its plans. It is obvious they will either go for Chinese origin Z-10ME or Turkish T-129B's but with non-American origin engines.

To establish itself as a reliable partner in the weapon export programmes, India must show faith in its weapon systems as well. Turkey recently unveiled a heavier attack helicopter programme known as the T-929 ATAK 2. It will first be powered by Ukrainian engines but later Turkey will develop an indigenous one. India can't rule out the possibility of this platform as a future threat. The much ambitious indigenous Indian Multi-role Helicopter programme envisages various variants including an armed one as well. However, it is yet unknown if there will be a heavier version of the LCH which will complement the AH-64E fleet. But it is necessary and there should be no doubt about that.

Sankalan Chattopadhyay (Twitter @Vinoddx9)
(all photos: Vayu)

HAL's ALH successes!

Advanced Light Helicopters inducted at INS Dega

The induction ceremony of '322 Dega Flight' was held in the presence of Vice Adm Ajendra Bahadur Singh, Flag Officer Commanding-in-Chief, Eastern Naval Command (ENC) with three indigenously built Advanced Light Helicopters (ALH) MK III helicopters flying into Naval Air Station, INS Dega on 7 June 2021. With the induction of these Maritime Reconnaissance and Coastal Security (MRCS) helicopters, the ENC has got a major boost towards enhancing the capabilities of the force, in pursuit of the maritime interests of the nation.

ALH MK III helicopters feature an array of systems previously seen only on heavier, multi-role helicopters of the Indian Navy. These helicopters are fitted with modern surveillance radar and electro-optical equipment, which enable them to undertake the role of maritime reconnaissance in addition to providing long-range Search and Rescue, both by day and night. In addition to special operations capabilities, ALH MK III is also fitted with a heavy machine gun to undertake constabulary missions.

ALH MK III of the Indian Navy in Medevac role

A Medical Intensive Care Unit (MICU) has been installed onboard ALH Mk III from INAS 323 at INS Hansa by Hindustan Aeronautics Limited (HAL). With ALH Mk III, an all-weather aircraft, being equipped with MICU, the Indian Navy can now undertake medical evacuation of critical patients by air even in unfavourable weather conditions. The MICU has two sets of defibrillators, multipara monitors, ventilator, oxygen support as well as infusion and syringe pumps. It also has a suction system to clear secretions in the mouth or airway of the patient. The system can be operated on aircraft power supply and also has a battery backup of four hours. The equipment can be installed in two-three hours to convert the aircraft into an air ambulance. This is the first of eight MICU sets to be delivered by HAL to Indian Navy.

ALH Mk-IIIs inducted into the Indian Coast Guard

Three Advanced Light Helicopters (ALH Mk.III) manufactured by HAL were inducted into the Indian Coast Guard on 12 June 2021 and will be positioned in Bhubaneswar, Porbandar, Chennai and Kochi and will be part of different Coast Guard Aviation Squadrons.

Speaking on the occasion Dr Ajay Kumar stated, «The state of the art helicopters with advanced sensors will enable ICG to take up challenging tasks. This is for the first time Performance Based Logistics is being introduced in Indian aviation sector which is a modern management practice and will increase operational and maintenance efficiency. The sophisticated helicopters being handed over will be a game changer for the operational capability of ICG in the times to come».

Speaking on the occasion, Mr R Madhavan (CMD HAL) said with this contract, HAL was embarking on a new journey of Performance Based Logistics (PBL). The PBL will assure desired levels of availability of ALH MKIII fleet of ICG for six and half years, a unique feature of this contract and a first of its kind in HAL.

These helicopters are equipped with state of the art equipment like surveillance radar, electro optic pod, medical intensive care unit, high intensity search light, SAR homer, loud hailer, machine gun and can perform other key roles. HAL Helicopter MRO Division is the nodal agency for execution of PBL contract along with HAL Engine Division and other Sister Divisions of HAL.

The PBL will provide a one stop solution for maintenance of complete helicopter, engine and components which encompasses Helicopter/Engine Servicing Task, Rotable Repair Task (RRT), Repair & Maintenance Spares Order (RMSO) etc. As part of PBL, Helicopter MRO Division of HAL will be extending the support from four bases, ie, Bhubaneswar, Porbandar, Chennai and Kochi. All necessary infrastructure, repair facility etc are set up at Bhubaneswar and Porbandar, dedicated LRU/rotable floats are stocked and on-site support team is identified towards ensuring the availability of helicopters.

Malaysia to acquire new fighters

The Malaysian government issued an international tender on 22 June 2021, for the Royal Malaysian Air Force (RMAF) Light Combat Aircraft/Fighter Lead-In-Trainer (LCA/FLIT) programme. The Ministry of Defence intends to acquire 18 FLIT/LCA aircraft and the tender will close on 22 September 2021. The light fighters will replace several aging aircraft, such as the BAe Hawk Mk 108 and Mk 208, and support the Boeing F/A-18D Hornet and Sukhoi Su-30MKM in service with the RMAF. As for the trainers, they will replace the Aermacchi MB-339CM trainer jets that are currently grounded.

US State Department clears F-16 sale to Philippines

The Government of Philippines has requested to buy 10 Lockheed Martin F-16C and 2 F-16D aircraft in Block 70/72 ("Viper") configuration, along with engines, radars, avionics and other equipment for them. The request also included an assortment of weapons, from medium-range AMRAAM air-to-air missiles and unguided bombs to targeting pods and electronic warfare suites.

USAF releases new B-21 Raider artist rendering

The US Air Force has released a new B-21 Raider artist rendering graphic with an accompanying fact sheet. As with past renderings, this rendering is an artist's interpretation of the B-21 design. The new rendering highlights the future stealth bomber with Edwards Air Force Base, California, as the backdrop. The 420th Flight Test Squadron based at Edwards AFB will plan, test, analyse and report on all flight and ground testing of the B-21 Raider.

Designed to perform long range conventional and nuclear missions and to operate in tomorrow's high end threat environment, the B-21 will be a visible and flexible component of the nuclear triad. The Air Force plans to incrementally replace the B-1 Lancer and the B-2 Spirit bombers to form a two-bomber fleet of B-21s and modified B-52s. The B-21 programme is on track to deliver B-21s to the first operational base, Ellsworth AFB, South Dakota, in the mid-2020s.

Silent Sentinel Jaegar 225 thermal cameras for Pakistan?

British threat detection specialist Silent Sentinel has signed a contract with a 'South Asian customer' to provide their Jaegar Ranger 225 Long-Range Uncooled (LWIR) thermal cameras for security along a mountainous border. The Jaegar's unique through-shaft allows a radar to sit above the PTU enabling uninterrupted 360° continuous rotation ideal for detection and tracking applications.

Indra to equip 38 German Eurofighters

Indra has concluded contracts totaling €100 million to equip the 38 Eurofighters that the German Ministry of Defence has acquired as part of the Quadriga programme with next-generation systems to guarantee the air superiority of the aircraft in the coming decades. In consortium with German sensor solutions provider Hensoldt, Indra will develop and produce the novel ECRS Mk1 electronic scanning

radar. This radar will provide multi-function capabilities for tracking several close-range targets while simultaneously scanning the airspace hundreds of kilometers away for potential threats. ECRS Mk1 will become the key sensor that will provide the aircraft with air-to-air and air-to-ground combat dominance.

Bell H-1 surpass 400,000 flight hours

The H-1 mixed fleet of AH-1Z Viper and UH-1Y Venom attack and utility helicopters have accumulated more than 400,000 joint-flight hours. The USMC programme of record is for 349 H-1 aircraft split between the AH-1Z Viper and UH-1Y Venom, with production continuing through 2022 for the USMC and then beyond that for foreign military partners. The aircraft are expected to be in service for the USMC through the 2040's and Bell supports operations with continuous upgrades to maintain reliability, survivability and lethality on an evolving battlefield.

United Airlines to buy aircraft from Boom Supersonic

United Airlines has announced a commercial agreement with Denver-based aerospace company Boom Supersonic to add aircraft to its global fleet as well as a cooperative sustainability initiative – a move that facilitates a leap forward in returning supersonic speeds to aviation. Under the terms of the agreement, United will purchase 15 of Boom's 'Overture' airliners, once Overture meets United's demanding safety, operating and sustainability requirements, with an option for an additional 35 aircraft.

USMC completes 1st AH-1Z flight with Link-16

The United States Marine Corps (USMC) has successfully demonstrated in flight testing a two-way connection between the AH-1Z Viper helicopter and a ground station using new Link-16 hardware and software. Link-16 is part of a defined road map of planned improvements designed to ensure the H-1 platform maintains its technological edge and combat capability throughout its service life.

Bangladesh for 24 Grob G 120TP trainers

The Bangladesh Air Force will get 24 Grob G 120TPs, a two-seat turboprop training and aerobatic low-wing aircraft with a composite airframe, built by Grob Aircraft. It is based on the Grob G 120A training aircraft and has been developed for military and civil pilots training.

Pakistan's defence budget 2021-22

Pakistan's defence allocation for 2021-22 has gone up by 6.2% to $8.74 billion. A consolidated allocation of $3.06 billion is for pensions of which 75% of this is for military pensions. According to The Dawn, the proposed increase in the defence budget is less than what the armed forces have been getting in recent years except for FY 2019-20 in which a raise of 4.74% was given. But by the end of that fiscal year, the defence services had overshot the allocated

budget by 6.33%. The army as always has the biggest share of the pie at 47.55%, PAF at 21.26%, Pakistan Navy at 10.85% and inter-services organisations being 20.32%.

Meanwhile, last year's figures for defence budget have been revised. The original allocation for FY2020-21 was Rs1.29 trillion, which has been increased to Rs1.33tr, meaning the armed forces overspent by about three per cent.

HENSOLDT to modernise COBRA artillery location radars

Sensor specialist HENSOLDT will modernise the test equipment of the artillery location radar COBRA which is in service with several NATO armies. Under a contract awarded by the multinational procurement organization Organisation Conjointe de Cooperation en matière d'Armement (OCCAR) on behalf of Germany and France, HENSOLDT will replace the COBRA Radar Environment Simulator (CRES), indispensable for determining optimum deployment and testing system performance.

MD Helicopters secures army contracts

MD Helicopters (MDHI) has announced two independent contract awards worth $43.9 million from Army Contracting Command-Redstone supporting the Afghan Air Force's MD 530F Cayuse Warrior light attack helicopters.

The first contract, a six-month extension worth $14.5 million, continues MDHI's longstanding efforts to provide programme management, and contractor logistics support (CLS) services, material, and remote operations to support the Afghan fleet. The second contract, worth $29.4 million, modifies MDHI's original maintenance capabilities support contract. Under this six-month contract, MD Helicopters will provide continued maintenance, repairs, updates, and overhauls of the Afghan Air Force's MD 530F Cayuse Warrior helicopters in Mesa, Kabul, and Al-Ain.

NGC launches Pegasus XL rocket for the US Space Force

Northrop Grumman Corporation successfully launched the Tactically Responsive Launch-2 (TacRL-2) payload into orbit for the US Space Force (USSF), using the company's Pegasus XL rocket. TacRL-2 was launched from Vandenberg Space Force Base. The USSF's tactically responsive launch concept seeks to introduce speed, agility, and flexibility into the launch enterprise in order to respond to dynamic changes in the space domain or an operational theatre and insert or replace assets on orbit much faster than standard timelines to meet emerging combatant command requirements.

SAF orders three H145s for EMS missions

SAF Group will be operating three more five-bladed H145s for emergency medical services (EMS) in France. These three aircraft will be based in Grenoble, Valence, and Montpellier. They will complement the three H145s already ordered by SAF in 2018 and 2020, the first of which was delivered recently and will be deployed for EMS missions in Belgium.

Rheinmetall introduces its Mission Master XT A-UGV

Rheinmetall has unveiled the Mission Master XT, the latest member of its successful Mission Master family of Autonomous Unmanned Ground Vehicles (A-UGVs). Unlike the Mission Master SP platform, which is already introduced to the market, the Mission Master XT has a diesel-powered engine

Thailand for an additional Airbus C295

The Ministry of Defence of Thailand has placed a firm order for an additional Airbus C295 airlifter. This repeat order for a new aircraft, to be operated by the Royal Thai Army, will increase the country's C295 fleet to a total of three aircraft. The aircraft will be delivered in 2023, in utility transport configuration. The C295 plays a key role for the Royal Thai Army with missions ranging from cargo transport to medical evacuation and paratrooping deployment.

GKN Aerospace to build D328eco empennage

Deutsche Aircraft has selected GKN Aerospace for D328eco's Empennage production; the D328eco is a new 40-seat turbo prop aircraft being developed by Deutsche Aircraft. Based on the proven D328 platform, the D328eco not only inherits the aerodynamic advanced D328 performance, but also will focus on sustainability for both product and production.

GDMS to support LCS fleet

General Dynamics Mission Systems has been awarded two contracts by the US Navy worth $30.5 million in support of various maintenance and upgrade initiatives for the Navy's Independence-variant Littoral Combat Ship (LCS) fleet.

US Army special-missions Beechcraft King Air 300 surpasses 50,000 FH

Textron Aviation has announced that a Beechcraft King Air 300, delivered in 1987 and in service in the US Army fleet of aircraft since 2009, has surpassed a significant 50,000 flight hours milestone. The milestone King Air 300 is one of a larger fleet of Medium Altitude Reconnaissance and Surveillance System (MARSS) aircraft. MARSS aircraft are quick reaction capability assets supporting the US Army's requirement for aerial intelligence, surveillance and reconnaissance.

NGC completes 1st flight of Japan's 2nd RQ-4B Global Hawk

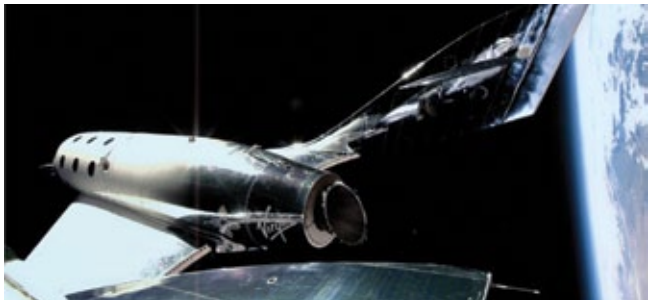
On the heels of the successful first flight of Japan's RQ-4B Global Hawk in early April, Northrop Grumman has recently completed additional successful flights for the second unmanned air vehicle (UAV) for Japan.

Bell V-280 Valor programme focuses on FLRAA

Bell Textron is advancing Bell's V-280 Valor programme to meet requirements for the Future Long-Range Assault Aircraft (FLRAA) Programme of Record. The competition is expected to begin with the Army releasing a Request for Proposals this summer. The optimised design for a fleet of next-generation tiltrotors builds on the 'exemplary' flight-test results and programmatic execution during the Joint Multi-Role Technology Demonstrator (JMR TD) programme and Competitive Demonstration and Risk Reduction (CD&RR) efforts.

Bell and Team Valor are transitioning focus to the critical next phase of the competition supporting army modernisation. The V-280 Valor marked the completion of its three-year flight-test programme with a series of demonstrations to highlight its performance during more than 214 hours of flight.

Virgin Galactic receives approval from FAA



Virgin Galactic announced that the Federal Aviation Administration (FAA) has updated the Company's existing commercial space transportation operator license to allow the spaceline to fly customers to space. The Company also announced that it has completed an extensive review of data gathered from its 22 May test flight and confirmed that the flight performed well against all flight objectives.

Bundeswehr upgrading Puma IFVs

Rheinmetall has won a major order from the German Bundeswehr in the armoured vehicle domain, representing sales volume of well over half a billion euros. The contract for modernising Germany's fleet of Puma IFVs was signed on 28 June 2021 at the Federal Office for Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) in Koblenz. In awarding this contract, the Bundeswehr remains on track toward an operationally ready, fully digitised fleet of infantry fighting vehicles. Work is slated to begin immediately in July 2021 and is expected to be complete in 2029.

United Airlines orders 70 Airbus A321neo's

United Airlines has placed an order for 70 Airbus A321neo aircraft, positioning the airline to grow its presence in the single-aisle market in alignment with its "United Next" initiative. The new order complements existing orders from United for 50 A321XLR aircraft, bringing the total commitment from the airline to 120 A321 aircraft.

Scoot becomes new operator of A321neo

Scoot, the low cost subsidiary of Singapore Airlines, has become a new operator of the A321neo, following the arrival in Singapore of its first three aircraft. All three aircraft are leased from BOC Aviation. Scoot's A321neo aircraft are powered by Pratt & Whitney PW1100G engines and seat 236 passengers in a single class layout. The aircraft cabin is based on the Airbus Cabin Flex option which enables optimal use of space. Scoot will operate the A321neo on routes of up to six hours from Singapore.

Collins Aerospace Advances the Airlander 10

Collins Aerospace has announced it has completed critical design review and started fabrication of a 500 kilowatt electric motor for the Airlander 10 aircraft under a partnership with Hybrid Air Vehicles and the University of Nottingham. Flight qualification testing of the motor is expected to occur in 2023, followed by hybrid-electric operation of Airlander 10 by 2025 and all-electric, zero-emission operation by 2030. To achieve these improvements, the aircraft's four fuel-burning engines will be replaced by Collins' 500 kilowatt electric motors—beginning with the two forward engines in 2025 and the two rear engines in 2030.

Sikorsky contracted for 9 more CH-53K's

Sikorsky will build nine more CH-53K heavy lift helicopters under a new contract for the US Navy. This production award also includes an agreement for the next production contract at an even lower unit price which will decrease further if additional quantity options are exercised, resulting in significant savings for the US government and taxpayers. The nine helicopters are part of a 200 aircraft Programme of Record for the US Marine Corps for a total of 33 production aircraft under contract with 3 of the 33 already delivered to the US Marine Corps. Sikorsky will begin deliveries of the nine additional aircraft in 2024.

ZeroAvia expands to 19-seat aircraft

To continue the company's trajectory toward zero-emission flight, ZeroAvia is ramping up its 19-seat aircraft programme to decarbonise and revolutionise regional air travel. The company will utilise two twin-engine 19-seat Dornier 228 aircraft - one in the UK and one in the US, provided respectively by Aurigny and AMC Aviation. Both aircraft were previously in service for regional flights in the US and UK, demonstrating the opportunity for carbon reduction on existing routes.

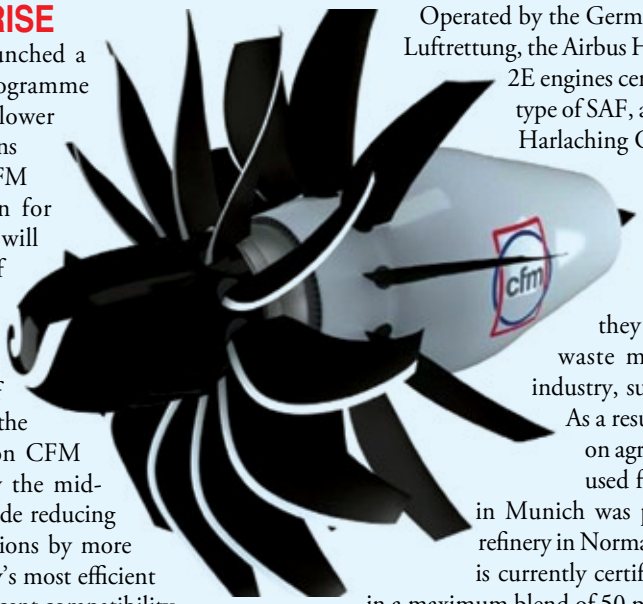
ZeroAvia's 19-seat R&D is part of HyFlyer II, the second ZeroAvia-led project backed by the UK Government to target the development of a hydrogen fuel cell powertrain. As part of HyFlyer I, ZeroAvia successfully demonstrated a 250kW powerplant in a 6-seat aircraft across three flight test campaigns, achieving all the project's technical goals, including fuel-cell only cruise flight. All the learnings of HyFlyer I will be fully utilised in the development of a 600kW 19-seater powerplant in HyFlyer II.

Kuwait for 517 heavy tactical vehicles

The US State Department has made a determination approving a possible Foreign Military Sale to the Government of Kuwait of Heavy Tactical Vehicles with support and related equipment for an estimated cost of $445 million. The Government of Kuwait has requested to buy five hundred seventeen (517) total Heavy Tactical Vehicles consisting of Heavy Expanded Mobility Tactical Trucks (HEMTT) and Heavy Equipment Transporters (HET).

Updates from Safran

Safran and GE launch RISE



Safran and GE Aviation have launched a bold technology development programme targeting more than 20 percent lower fuel consumption and CO2 emissions compared to today's engines. The CFM RISE (Revolutionary Innovation for Sustainable Engines) programme will demonstrate and mature a range of new, disruptive technologies for future engines that could enter service by the mid-2030s.

Technologies matured as part of the RISE Programme will serve as the foundation for the next-generation CFM engine that could be available by the mid-2030s. The programme goals include reducing fuel consumption and CO2 emissions by more than 20 percent compared to today's most efficient engines, as well as ensuring 100 percent compatibility with alternative energy sources such as Sustainable Aviation Fuels and hydrogen.

The programme is being led by a joint GE/Safran engineering team that has laid out a comprehensive technology roadmap including composite fan blades, heat resistant metal alloys, ceramic matrix composites (CMCs), hybrid electric capability and additive manufacturing. The RISE programme includes more than 300 separate component, module and full engine builds. A demonstrator engine is scheduled to begin testing at GE and Safran facilities around the middle of this decade and flight test soon thereafter.

Safran's Arriel 2E on H145 flies on sustainable aviation fuel

A rescue helicopter has flown on sustainable aviation fuel (SAF) for the first time, achieving a new milestone in international aviation. Operated by the German non-profit organisation ADAC Luftrettung, the Airbus H145 rescue helicopter has its Arriel 2E engines ceremonially refuelled with biofuel, a type of SAF, at the air rescue station at Munich's Harlaching Clinic.

The biofuel fueling the H145 is a second-generation biofuel - the SAF of choice of the aviation industry - which significantly reduces CO2 emissions because they are produced from residual and waste materials, usually from the food industry, such as used vegetable oils and fats. As a result, the fuel has no negative impact on agricultural food production. The fuel used for the first rescue helicopter flight in Munich was produced by TotalEnergies at its refinery in Normandy from used cooking oil. Biofuel is currently certified and approved for aviation use in a maximum blend of 50 percent with conventional kerosene of the JET-A1 type. The ADAC rescue helicopter was flown on a 40 percent blend.

SIA selects Safran wheels and carbon brakes for its Boeing 777-9 fleet

Singapore Airlines (SIA) has chosen Safran Landing Systems to provide wheels and carbon brakes for its entire fleet of Boeing 777-9 through a tailored brake landing Service contract. 31 aircraft are currently on order. Under this contract, all heat-sink exchanges will be performed by Safran Landing Systems' facility in Sendayan, Malaysia. Safran Landing Systems currently supports wheels and carbon brakes for 126 Airbus and Boeing aircraft at SIA and Scoot, the low-cost airline of the Singapore Airlines Group, including A320, A350, 737-800 NG, 737-8 MAX and 787.

Developments at Saab

Order for future development support of Gripen

Saab has received an order from the Swedish Defence Materiel Administration, FMV, to provide future development support for Gripen. The total order value is SEK 998 million. The order is an extension of an existing contract and enables the future development of Gripen for the Swedish Air Force and other Gripen users around the world. The contract includes the operating and support of test aircraft and advanced tools such as testing rigs and simulators. Test aircraft together with these advanced tools are used in the verification and validation of Gripen C/D and Gripen E fighter systems as Saab develops future new capabilities or enhancements.

Saab trials 3D-printed part on Gripen for battlefield damage repairs

Saab has successfully conducted the trial which marked the first time an exterior 3D-printed part has been flown on a Gripen, rather than internal 3D-printed components. The purpose of the trial was to test how additive manufacturing could be used in battlefield damage repair. The test flight took place in the skies above Saab's facilities in Linköping, Sweden. Gripen was fitted with a replacement hatch that had been 3D-printed using additive manufacturing, using a nylon polymer called PA2200. This work is a step towards 3D-printed spares being used for rapid repairs to fighter aircraft that have sustained damage while deployed on remote operations, thereby gaining a vital time-saving advantage.

This milestone is the latest step in Saab's embrace of additive manufacturing. In 2017 Saab co-founded the AMEXCI consortium for the specific purpose of furthering the technology, and Saab has been working with AMEXCI's experts ever since to find new applications and ways to produce parts and equipment using additive manufacturing.

US Navy advances Saab radar to LRIP Phase Two

The US Navy's Shipboard Air Traffic Radar programme in Low Rate Initial Production (LRIP) has awarded an LRIP option for three of Saab's AN/SPN-50(V)1 radar systems. The order value for the LRIP phase two contract is USD 37.1 million, with the first delivery scheduled for 2022. The AN/SPN-50(V)1 radar system, which is one of the US versions of Saab's Sea Giraffe Agile Multi Beam radar, will function as the primary air traffic control surveillance radar for manned and unmanned aviation aboard the Navy's nuclear-powered aircraft carriers and amphibious large decks.

Order for Carl-Gustaf M4 and ammunition

Saab has received an order for deliveries of Carl-Gustaf M4 weapons and ammunition to the Estonian Armed Forces. The order value is approximitly 100 MSEK and deliveries will take place in 2021-2022. The order was placed within a joint-framework agreement

signed with Estonia, together with the Swedish Defence Materiel Administration (FMV) and Latvia. The framework agreement allows the Estonian customer to place orders for Carl-Gustaf M4 weapons and ammunition during a ten year period. The Estonian Armed Forces has been a user of the Carl-Gustaf weapon system for more than two decades.

Saab Technology digitising ATC at Stockholm Arlanda airport

On 1 June, the new control centre for remote air traffic control started operations at Stockholm Arlanda Airport. Saab Digital Air Traffic Solutions (SDATS) will equip three more Swedavia airports with the second generation of digital air traffic control towers by the end of 2022. With the new digital air traffic control centre in Stockholm (RTC Stockholm), Saab is introducing the second generation of Digital Tower. R-TWR, an air traffic control system that significantly enhances the capability of air traffic controllers to make quick decisions to improve safety and operational efficiency. RTC Stockholm, operated by LFV, is an operational centre that can manage more than 20 airports and will enable complete air traffic control for a larger number of airports 24 hours a day, all year round.

Saab unveils and demos new guided multipurpose munition

Saab, in cooperation with the US Army and Raytheon Missiles & Defense, has successfully demonstrated the new Guided Multipurpose Munition (GMM). The GMM System Capability Demonstration was a joint activity between Saab and Raytheon Missiles & Defense, funded under a US Government Rapid Innovation Funding (RIF) effort awarded by the US Army. This three-year contract effort culminated in a live firing demonstration in November 2020. RIF efforts are intended to support the development of promising technologies that address military capability to fulfill an operational or national need.

GMM was fired from both the Carl-Gustaf recoilless rifle and an adaption of an AT4 disposable launcher. The munitions were guided to their target using a semi-active laser guidance system and designator.

Saab and FMV sign helicopter support agreement

Saab has signed an agreement with FMV regarding full support for Helikopter 15. Helikopter 15 has been in operation in the Swedish Armed Forces for around 18 years and since 2012, Saab has had an exclusive agreement to ensure the operational availability of the helicopters. The agreement confirms the Swedish Armed Forces' continued trust in Saab as a long-term support partner.

Saab combat training solutions to the Netherlands

Saab has signed a contract for the delivery of live training systems and services to the Dutch armed forces. The order comprises the supply of new equipment and functionality at 727 MSEK, with a 10-year support contract with an annual value of 66.9 MSEK. The total order over the ten year period is valued approximately 1.4 billion SEK. The contract also has an option for five years additional support following the initial 10-year period.

The order includes delivery of an upgraded Mobile Combat Training Centre (MCTC) and reflects Saab's latest market offer with enhanced functionality and new capabilities. These include examples such as the "Mortar and Forward Observer" capability, which introduces a mix between live and virtual training, also known as blended training.

F-35 Lightning in the news

RAAF F-35A makes history in Exercise Arnhem Thunder

For the first time, the Australian Air Force F-35A Lightning II aircraft have taken to the skies with a full complement of weapons. The two fully laden F-35As took off from RAAF Base Darwin as part of Exercise Arnhem Thunder 21. Commanding Officer No. 35 Squadron Wing Commander Matthew Harper said the F-35A was the only Western fighter jet that could carry both internal and external ordnance. In addition to their internal payload, the pair departed with inert GBU-12 bombs attached to their under-wing pylons.

1st F-35B Lightning landing on HMS Prince of Wales

An F-35B Lightning aircraft has landed onboard the Royal Navy's latest aircraft carrier, HMS Prince of Wales, for the first time. Taking place off the south coast of England, the milestone marks a significant step towards the 65,000-tonne vessel reaching full operational capability. Operating together as part of Sea Acceptance Trials, it is the first time a fixed wing aircraft has landed onboard HMS Prince of Wales. The trials test the ship's capability to receive and launch aircraft whilst maintaining continuous air operations.

F-35A's 1st working display

Australia's newest strike aircraft has successfully conducted its first public working display, in the skies over the NSW Central Coast. The F-35A Lightning II took to the skies for a 20-minute display of power and precision at the Central Coast Airshow, which showcased ADF elements in the air and on the ground.

BAE Systems ramps F-35 electronic warfare system production

BAE Systems is providing Lockheed Martin with additional electronic warfare (EW) systems, retrofit kits, and spares for the F-35 Lightning II aircraft. The contract builds on BAE Systems› on-time delivery of more than 800 state-of-the-art AN/ASQ-239 electronic warfare/countermeasure systems to date, providing F-35 jets with critical situational awareness and survivability capabilities.

News and updates from Boeing

MQ-25 refuels another aircraft

For the first time in history, the US Navy and Boeing have demonstrated air-to-air refueling using an unmanned aircraft– the Boeing-owned MQ-25 T1 test asset– to refuel another aircraft. During a test flight the MQ-25 T1 successfully extended the hose and drogue from its US Navy-issued aerial refueling store (ARS) and safely transferred jet fuel to a US Navy F/A-18 Super Hornet, demonstrating the MQ-25 Stingray's ability to carry out its primary aerial refueling mission.

During the initial part of the flight, the F/A-18 test pilot flew in close formation behind MQ-25 to ensure performance and stability prior to refueling – a maneuver that required as little as 20 feet of separation between the MQ-25 T1 air vehicle and the F/A-18 refueling probe. Both aircraft were flying at operationally relevant speeds and altitudes. With the evaluation safely completed, the MQ-25 drogue was extended, and the F/A-18 pilot moved in to "plug" with the unmanned aircraft and receive the scheduled fuel offload.

The milestone comes after 25 T1 flights, testing both aircraft and ARS aerodynamics across the flight envelope, as well as extensive simulations of aerial refueling using MQ-25 digital models. MQ-25 T1 will continue flight testing prior to being shipped to Norfolk, Virginia, for deck handling trials aboard a US Navy carrier later this year.

The Boeing-owned T1 test asset is a predecessor to the seven test aircraft Boeing is manufacturing under a 2018 contract award. The MQ-25 will assume the tanking role currently performed by F/A-18s, allowing for better use of the combat strike fighters and helping extend the range of the carrier air wing.

Australia for AH-64E Apache helicopters

The State Department has made a determination approving a possible Foreign Military Sale to the Government of Australia of AH-64E Apache Helicopters and related equipment for an estimated cost of $3.5 billion. The Government of Australia has requested to buy twenty-nine (29) AH-64E Apache attack helicopters; sixty-four (64) T700-GE 701D engines (58 installed, 6 spares); twenty-nine (29) AN/ASQ-170 Modernised Target Acquisition and Designation Sight/AN/AAR-11 Modernised Pilot Night Vision Sensors (M-TADS/PNVS); sixteen (16) AN/APG-78 Fire Control Radars (FCR) with Radar Electronic Units; twenty-nine (29) AN/APR-48B Modernised Radar Frequency Interferometers (MRFI); seventy (70) Embedded Global Positioning Systems with Inertial Navigation Systems plus Multi-Mode Receiver (EGI+MMR) (58 installed, 12 spares); thirty-five (35) AAR-57 Common Missile Warning Systems (CMWS) (29 installed, 6 spares); seventy (70) AN/ARC-231A Very High Frequency/Ultra High Frequency (VHF/UHF) radios (58 installed, 12 spares); eighty-five (85) AGM-114R Hellfire missiles; twenty-nine (29) M36E8 Hellfire Captive Air Training Missiles (CATM); and two thousand (2,000) Advanced Precision Kill Weapon System Guidance Sections (APKWS-GS).

Boeing completes successful 737-10 first flight

Boeing›s 737-10, the largest airplane in the 737 MAX family, has completed a successful first flight. This flight was the start of a comprehensive test programme for the 737-10. Boeing will work closely with regulators to certify the airplane prior to its scheduled entry into service in 2023. The 737-10 can carry up to

230 passengers. It also incorporates environmental improvements, cutting carbon emissions by 14 percent and reducing noise by 50 percent compared to today›s Next-Generation 737s.

Germany signs for 5 P-8A Poseidon's

The German Ministry of Defence has signed a letter of offer and acceptance for five Boeing P-8A Poseidon aircraft under the US Government's Foreign Military Sales (FMS) process. With this order, Germany becomes the eighth customer of the multimission maritime surveillance aircraft, joining the United States, Australia, India, the United Kingdom, Norway, Korea and New Zealand. The P-8A Poseidon offers unique multimission capability and is the 'only aircraft in service and in production that meets the full range of maritime challenges' faced by European nations. Deployed around the world with more than 130 aircraft in service, and over 300,000 collective flight hours, "the P-8A is vital for global anti-submarine warfare, intelligence, surveillance and reconnaissance and search-and-rescue operations'.

Boeing, ESG and LT partner for P-8A fleet support

Boeing has signed agreements with ESG Elektroniksystem- und Logistik-GmbH and Lufthansa Technik that outline joint efforts to explore potential areas of collaboration in systems integration, training, support and sustainment work.

Boeing to boost Royal Air Force Chinook fleet

US Special Operations Command awarded Boeing a $578 million Foreign Military Sales contract approved by the US Department of State to deliver 14 extended-range Chinook helicopters to the UK Royal Air Force (RAF). The extended range Chinook gives the RAF fleet more versatility to execute the domestic and international heavy-lift missions that only the Chinook can facilitate.

Boeing and the RAF recently celebrated the 40th anniversary of the first Chinook delivery to the UK. Boeing will also celebrate the 60th anniversary of the Chinook's first flight later this year. The United Kingdom will be the first international operator of a Block II Chinook. Deliveries are scheduled to start in 2026.

Philippines to purchase AGM-84L-1 Harpoons

The US State Department has made a determination approving a possible Foreign Military Sale to the Government of the Philippines of AGM-84L-1 Harpoon Air Launched Block II Missiles and related equipment for an estimated cost of $120 million. The Government of the Philippines has requested to buy twelve AGM-84L-1 Harpoon Block II air launched missiles; and two ATM-84L-1 Harpoon Block II Exercise missiles.

United Airlines orders 200 more MAX jets

Boeing and United Airlines announced that the carrier will expand its 737 order book by purchasing an additional 200 737 MAX jets, including 150 for the largest member of the family, the 737-10, and 50 for the airplane that serves the heart of the single-aisle market, the 737-8.

Dassault successes

Egypt acquires 30 additional Rafale fighters

Egypt has decided to purchase an additional 30 Rafales to equip its air force. This new order complements the first acquisition of 24 Rafales signed on February 2015 and will bring the number of Rafales flying under Egyptian colours to 54, making the Egyptian Air Force the second in the world after the French Air Force, to operate such a fleet of Rafales. It reflects the strategic relation between Egypt and France. It emphasises also the confidence of the highest Egyptian authorities in Dassault Aviation and their satisfaction with the effective execution of the first contract. "This new order is proof of the unfailing bond that unites Egypt, the first foreign user of the Rafale, as it was for the Mirage 2000, with Dassault Aviation for nearly 50 years. It is also a tribute to the Rafale's operational quality, as this is the second time an export customer has chosen to order additional aircraft. Dassault Aviation and its partners would like to thank the Egyptian authorities for this new mark of trust and assure them of their total commitment to meeting their expectations once again", stated Eric Trappier, Chairman and CEO of Dassault Aviation.

Croatia selects the Rafale

Croatia has selected the Rafale for its Air Force, following an international call for tenders as part of its Multi Role Fighter Aircraft (MRFA) programme. The contract between the French and Croatian authorities will cover the acquisition of 12 Rafale previously in service with the French Air Force, as well as fleet support and training.

"Dassault Aviation and its partners are delighted with the choice of Croatia as a first-time user of a 'Dassault aircraft' and the fifth Rafale export customer, and thank the Croatian authorities for their confidence. They commend the work done by the 'France' team in the frame of the call for tenders and actively support the French authorities in finalising the signature of this contract", stated company officials.

Dassault Aviation launches Falcon 10X

Dassault Aviation today announced an all-new Falcon jet that will deliver a level of comfort, versatility and technology unmatched by any purpose-built business jet. Featuring a range of 7,500 nautical miles, the Falcon 10X will fly nonstop from New York to Shanghai, Los Angeles to Sydney, Hong Kong to New York or Paris to Santiago. Top speed will be Mach 0.925. "Today we are introducing a new benchmark in business aviation," said Dassault Chairman and CEO Eric Trappier. "The Falcon 10X will offer an unrivalled passenger experience over both short-and long-duration flights, along with breakthrough safety features from Dassault's frontline fighter technology. We have optimized every aspect of the aircraft with the passenger in mind and established a new level of capability for ultra-long-range aircraft." The Falcon 10X will enter service at the end of 2025.

Third Falcon 6X joins test programme

A third Falcon 6X recently took flight and joined Dassault Aviation's flight test campaign, moving the new long-range extra widebody twin a step closer to anticipated certification in 2022. Falcon 6X s/n 003 is fitted with a full interior and will be used for cabin design validation. The aircraft completed a two-hour maiden flight from Dassault's Bordeaux-Mérignac final assembly plant to its Istres flight test facility on 24 June, climbing to Flight Level 400 and accelerating to a cruise speed of Mach 0.85.

The first 6X flew on March 10 and the second on April 30. The two test aircraft have accumulated more than 130 flight test hours, at a rate of two to three flights a week, and envelope expansion is now nearly complete. "This latest flight is yet another sign of the smooth progress we have been making with the 6X test programme," stated Eric Trappier, Chairman and CEO of Dassault Aviation. "We have been consistently impressed with the flight performance and handling of the 6X and the reliability of aircraft systems."

Aircraft no. 3 is outfitted with the Falcon 6X's award winning interior, including in-flight entertainment and communications systems. In addition to testing this equipment, the aircraft will be used to evaluate environmental features and temperature control and validate cabin acoustics systems, which alongside those on the ultra long-range Falcon 8X trijet are expected to be the industry reference.

A fourth aircraft will also be equipped with a full cabin interior, currently being installed in Mérignac. It will conduct a two-month global endurance flight campaign intended to ensure that all 6X systems are fully mature upon entry into service. Production of additional units is in full swing, with aircraft no. 10 scheduled to be on the final assembly line by beginning of July.

MBDA in 2020: Resilience and innovation for growth

MBDA showed strong resilience in 2020 despite the global pandemic. Revenues were at €3.6 billion in 2020, with a 50:50 split across domestic and export customers. Order intake during 2020 was €3.3 billion, with MBDA's order backlog now standing at €16.6 billion. Major new business won during 2020 included; a production order for the SPEAR missile for the Royal Air Force and an upgrade for the Brimstone 3 missile; Aster mid-life refurbishment for France and the commissioning of the development of the new MHT combat missile for the Tiger helicopter; Italy winning a contract for the new Teseo MK2/E anti-ship missile; and the contract (with Rheinmetall as co-contractor) for a new high-energy laser demonstrator for German Navy. Major export orders included a naval weapons package for a foreign undisclosed customer and a naval weapons package for Senegal.

To answer the future needs of its customers' armed forces, MBDA is extensively investing in new types of innovative effects (Directed Energy Weapons, Counter-measures, etc.), technologies (Artificial Intelligence, target identification, hypersonic, etc.), and associated techniques (combination of effects, collaboration, swarming, packs, fast targeting, complex mission planning, navigation in a contested environment, etc.), to develop a new generation of offensive and deceptive weapons and effectors.

2021 will be a decisive year for several key future defence capabilities in Europe. The SAMP/T NG contract awarded by OCCAR on 19 March will give France and Italy an enhanced capability to guarantee their airspace sovereignty, and protect their population, territory and troops-on-operations against new emerging threats. France and the United Kingdom shall take further steps in their cooperation under the Lancaster House Treaty framework by launching the assessment phase for the FC/ASW programme, and will continue to strengthen their technological base for generation-after-next missile systems by renewing their commitment to the Complex Weapon Innovation & Technological Partnership (CW-ITP). MBDA will continue to invest in cooperation for the endo-atmospheric interceptor that could be the backbone of the wider TWISTER (Timely Warning Interceptor with Space-based TheatER surveillance) programme launched under the EU PESCO framework, to provide a European contribution to NATO Ballistic-Missile Defence (BMD). As member of two partnerships producing next generation Future Combat Air Systems (Tempest/SCAF), MBDA will continue to mature capable, affordable, upgradeable, connected and cooperative effectors for future air dominance.

Sea Ceptor ordered for Canadian surface combatant

MBDA has been awarded a contract by Lockheed Martin Canada to equip the Royal Canadian Navy's new Canadian Surface Combatant (CSC) with the Sea Ceptor air defence weapon system. Utilising the Common Anti-air Modular Missile (CAMM) as its effector, Sea Ceptor will undertake the Close-In Air Defence System (CIADS) role on-board the new CSC frigates.

Sea Ceptor provides self-defence performance, with a rapid response time and a high rate of fire to defeat multiple threats simultaneously. Its state-of-the-art Soft Vertical Launch (SVL) technology enables full 360° coverage with close range performance normally only associated with trainable launcher systems. Sea Ceptor will be integrated with Lockheed Martin Canada's Combat Management System 330 (CMS 330) as part of a multi-tier air defence capability. The CAMM missiles will be quad packed in Lockheed Martin's Extensible Launcher System (ExLS), which is part of the Mk41 family of vertical launcher systems.

CAMM-ER successfully completes major milestone

MBDA has successfully completed a firing of the CAMM-ER air defence missile against a manoeuvring target, confirming the excellent capability of the CAMM family system. The trial took place at an Italian firing range. CAMM-ER is the extended range member of the new-generation CAMM air defence family of systems. All members of the CAMM family share the same cutting-edge active radar seeker and soft-launch system, with CAMM-ER featuring a larger rocket motor designed by AVIO to provide extended range out beyond 40 km.

CAMM-ER was designed to replace the Aspide munition in the Medium Advanced Air Defence System (MAADS) of the Italian Air Force and the GRIFO air defence system of the Italian Army. CAMM-ER is the missile that will be used in the Albatros NG system, which provides an optimised naval based air defence (NBAD) solution to enhance the defence capabilities of naval fleets.

Sea Ceptor ordered by the Brazilian Navy

MBDA has been awarded a contract to equip the Brazilian Navy's new Tamandaré-class frigates with the Sea Ceptor air defence missile system. Sea Ceptor is a smart weapon control system (WCS) that together with the fully-active Common Anti-air Modular Missile (CAMM) provides comprehensive self-defence and local area air defence (LAAD). This will enable Brazil's Tamandaré-class frigates to protect themselves, consorts and fixed infrastructure against the full range of threat types at sea or in harbour, and in the most stressing operational scenarios.

CAMM air defence capability for RN Type 45 destroyers

MBDA has been awarded a number of contracts to significantly upgrade the air and missile defence capabilities of the Royal Navy's six Type 45 destroyers. The work will see CAMM (Common Anti-air Modular Missile) paired with an upgraded Sea Viper command and control (C2) system for the first time. CAMM offers both close-in and local-area air defence, and will complement Aster 30, strengthening the anti-air defence capability of the Royal Navy.

Fitting CAMM onto the Type 45s will give the destroyers a 50% increase in the number of its air defence missiles. Installation will be via 24 additional launcher cells, and the Sea Viper C2 will get a technology upgrade, giving it a major increase in processing power. The existing 48 Sylver cells on the Type 45 will now be solely for the longer-range Aster 30 missile, which is also subject to a recently announced mid-life refresh. This will see the missile remain in service throughout the life of the Type 45s.

In service on upgraded Royal Navy Type 23 frigates, CAMM will also be fitted to Type 26 and Type 31 in the future. The CAMM family has proven a rapid success with international customers, with Canada and Brazil among the new users ordering the missile this year.

Israel defence industry updates

IAI to upgrade SLAF Kfir's

Israel Aerospace Industries (IAI) recently signed a contract, worth USD $50 million with Sri Lanka's Ministry of Defence to upgrade Kfir aircraft for the Sri Lankan Air Force. The deal includes replacing the aircraft's basic avionics with the advanced 4+ generation fighter aircraft avionics in order to one day integrate advanced radar, sensors, communication systems, and new helmets. The upgrade process will also include transfer of knowledge and skills for refurbishment to Sri Lankan Air Force personnel. The upgrades will be completed in cooperation with Sri Lanka's Air Force and in their local facilities.

IAI sells dozens of Drone Guard Systems

Israel Aerospace Industries (IAI) though its ELTA Systems group is delivering dozens of Drone Guard (CUAS) systems to a country in South Asia in a deal, worth tens of millions of dollars (USD). The unique multi-sensor multi-layer ELI-4030 Drone Guard system is one of the most capable battlefield proven systems in the world, providing the ability to detect, classify, identify and defeat drone attacks.

The Drone Guard system handles hundreds of targets simultaneously and provides a solution to multiple evolving threats worldwide. The system›s advantage derives from the multi-layer implementation concept using a high-resolution 3D X-Band radar a key for drone-detection, an integrated COMIN ESM, multi-channel jamming and high resolution EO/IR with integrated AI capabilities.

IAI naval combat suite on Sa'ar 6 Corvettes

Israel Aerospace Industries (IAI) is integrating offensive and defensive systems, to enhance the 'Sa'ar 6' corvette's capabilities and usher the Israeli Navy into a new technological era, under the guidance of Israel's Ministry of Defense (IMoD) and the IDF.

IAI, together with the Administration for the Development of Weapons and Technological Infrastructure (part of IMoD) and the Israeli Navy, completed the first phase of installing the MF-STAR (Magen Adir) radars on the Israeli Navy's 'Sa'ar 6' corvettes

and will continue to integrate the Barak MX Air Defence System (Ra'am Adir) on the vessels. The radars will serve to locate and classify air and surface targets and help to build an advanced and detailed maritime picture of the surveillance area. The MF-STAR radar system, one of the world's most advanced radar systems, will serve as the "brain," integrated with all surveillance sensors on every one of the Israeli Navy's new warships. The radar system is also an important component of the Barak MX Air Defense System (Ra'am Adir), and provides a layer of defence against advanced aerial and naval threats.

IAI in UAS services contract

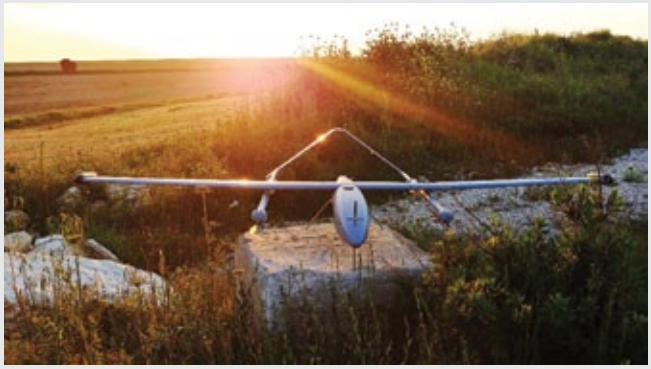
Israel Aerospace Industries (IAI) recently signed a US$ 200 million contract to provide unmanned aerial systems (UAS) services to a country in Asia, relating to IAI›s Heron unmanned aerial vehicle (UAV). This is the fourth major UAS transaction that IAI has announced this year. The Heron family leads IAI's range of UAVs. The various Heron models are used regularly for operational missions by over 20 customers worldwide. Controlled remotely from sea frigates or the seashore, the Heron supports ground and maritime missions against submarines and coastal guards. It transmits information while at sea, including between all the weapon systems participating in a mission. The Heron UAS may be fitted with LOS or SATCOM communication, and features "long runner" operational flexibility with automated remote takeoff, landing, and control with no need for deploying a control post near the runway.

IAI to establish 1st PF conversion site in Europe

Israel Aerospace Industries' (IAI) Aviation Group has agreed to establish a passenger to freighter conversion site to convert the Boeing 737-700/800 with Atitech company, at Atitech's leading MRO centre in Naples, Italy; this, following the rise in demand for cargo aircraft of this model. The cargo conversion site in Italy will join two existing cargo conversion sites in China. The MRO center will supply solutions in maintenance and aircraft renovation, converting passenger aircraft to cargo configuration. In addition, it will provide training and support in licensing and registration.

BlueBird Aero Systems delivers 100 VTOLs

BlueBird Aero Systems, partially owned (50% of shares) by Israel Aerospace Industries (IAI), completed the delivery of 100 WanderB-VTOL UAVs to a European customer. The Vertical Takeoff and Landing (VTOL) UAVs are part of a transaction involving over 150 WanderB-VTOL and ThunderB-VTOL UAVs worth tens of millions of dollars (USD). This is the world's largest number of VTOL UAVs delivered to any customer at one time, and was completed within the agreed timetable despite COVID-19 conditions.



Elbit to supply XACT to UK Armed Forces

Elbit has announced that its UK subsidiary, Elbit Systems UK Ltd. has been awarded an approximately $16 million initial contract by the UK Ministry of Defence to provide the UK Armed Forces with XACT Night Vision Goggles (NVG). The initial contract will be performed over an 18-month period with the potential for additional follow-on orders over a period of five years. Under the contract, Elbit Systems UK will supply the lightweight micro binocular XACT *nv33* NVGs in a helmet-mounted configuration. XACT *nv33* NVG improves mission efficiency during dark conditions and enables safe, off-road vehicle driving without headlights. Systems from the XACT family have been selected by a number of NATO countries including Germany and the Netherlands, as well as by Israel, and are operationally proven.

Elbit's E-LynX multi-channels radios for Sweden

Elbit's German subsidiary, Elbit Systems Deutschland GmbH & Co. KG, has been awarded an approximately $23 million follow-on contract by the Swedish Defence Material Administration (FMV) for the supply of additional Software Defined Radios ("SDR") for the Swedish Armed Forces. The contract will be performed over a period of 30 months.

Elbit to upgrade US Army pilots night vision systems

Elbit was recently awarded two orders with an aggregate value of approximately $29 million by the US Army›s Programme Executive Office (PEO) Soldier under an Indefinite Delivery/Indefinite-Quantity (ID/IQ) contract issued in 2020. The orders will be executed from the Elbit Systems of America facility in Roanoke, Virginia with deliveries through September 2021.

RAFAEL's BNET SDR communication selected

Rafael Advanced Defense Systems has been selected by an Asian air force to equip its fleet of aircraft with the BNET-AR communication solution. The BNET Family of SDR provides a robust voice and data-link solution and supports simultaneous services of data, voice and video services with multiple auto relays. The BNET is operational and combat-proven with a number of air forces around the world, featuring a unique, patented software-defined radio and network architecture, delivering wideband communications with low delay and reliable connectivity.

The variant that will be supplied is the BNET-AR, a modular multiband SDR for airborne platforms, integrated onboard fighters and helicopters as well as Ground Control Stations equipped with the same BNET-AR, enabling net-centric operations and real-time situation awareness.

Trophy integration on UK Challenger 3 MBTs

Rafael Advanced Defense Systems Ltd. announced that its Trophy Active Protection System (APS) for armoured vehicles has been selected for the next phase of detailed assessment and integration by the UK Ministry of Defence for the Army's Challenger 3 MBT. The selection is a result of a study conducted by the UK MOD as part of an upgrade programme led by prime contractor Rheinmetall BAE Systems Land (RBSL), which will entail detailed integration and system trials of this lighter Trophy variant (Trophy MV), to fit the particular requirements of this vehicle. Trophy has also been supplied to four US Army Abrams MBT brigades, and will soon be supplied to Germany for its Leopard MBT's.

Rafael unveils the Sea Breaker

Rafael Advanced Defense Systems Ltd. unveiled its Sea Breaker, a 5th generation long range, autonomous, precision-guided missile system, enabling significant attack performance against a variety of high-value maritime and land targets. Sea Breaker is a naval and artillery unit force-multiplier, designed to overcome the modern warfare arena challenges.

Sea Breaker provides surgical, pin-point precision strikes from stand-off ranges of up to 300 km. It features an advanced IIR (Imaging Infra-Red) seeker, ideal for engagement of maritime and land targets, stationary or moving, in advanced Anti Access/Area Denial (A2/AD) arenas, and in littoral or brown water, including archipelago, as well as for engagements in which previous generation RF-seeker-based missiles are not effective.

Sea Breaker can be launched from naval platforms, varying in size, from fast attack missile boats, to corvettes and frigates. The land version is a central part of the shore defence, based on Rafael›s highly-mobile SPYDER launchers. The battery architecture supports standalone launchers, or operation as an integrated solution, with a command and control Unit (CCU) and various sensors, based on customer requirements.

UVision's HERO-120 for US Marine Corps

UVision has been awarded through its Business Development partner, Mistral Inc. to supply the Hero-120 for the US Marine Corps Organic Precision Fire Mounted (OPF-M) System. The system will be integrated with LAV-M, JLTV, and LRUSV.

The Hero-120 is a mid-range, anti-armour weapon system which meets the complex requirements of the modern battlefield. Hero-120 is a high precision smart loitering munition system with a unique aerodynamic structure that carries out pinpoint strikes against anti-armour, anti-material and anti-personnel targets including tanks, vehicles, concrete fortifications, and other soft targets in populated urban areas.

Israel MoD in 1st-ever tests with an airborne, high-power laser system

The Directorate of Defence R&D in the Ministry of Defense (MoD), together with Elbit Systems and the IAF, has successfully intercepted several UAVs using an airborne High-Power Laser Weapon System (HPL-WS). The UAVs were intercepted at various ranges and flight altitudes.

The test series was conducted under the leadership of the Directorate of Defence R&D in the Israel Ministry of Defence. During this series, a high-power laser system was installed on an aircraft and was tested in a number of scenarios. It successfully intercepted and destroyed all of the UAVs that were launched throughout the test. "The ability to intercept and destroy airborne threats in the air is groundbreaking and offers a strategic change in the air defence capabilities of the State of Israel. This game-changing series was conducted in a testing field in the centre of Israel, in close cooperation with the IAF and the "Yanat" unit", stated company officials.

Israel Shipyards to supply SHALDAG MK V's to the Israeli Navy

Israel Shipyards has announced the signing of an agreement to supply its SHALDAG MK V vessels to the Israeli Navy. The company will provide four vessels which have been adapted to the Navy's unique configuration requirements. Over the years, the Israeli Navy has used a variety of Israel Shipyards' vessels for ongoing security missions – including the SHALDAG MK III and the Saar 4 and Saar 4.5 fast attack missile vessels – protecting the maritime borders of the State of Israel. Recently, it was decided to equip the Navy with advanced vessels that will enable an upgrade of the force's capabilities for its routine security missions.

The largest member of the SHALDAG Class, the SHALDAG MK V, is a combat-proven, all-aluminum, light and fast vessel driven by powerful waterjets, with a high payload capacity, providing maneuverability and seakeeping. The vessel has a speed of above 40 knots, can accelerate from zero to 40 knots in less than one minute, has a turning diameter of 150m and a minimal draft – enabling operation in shallow waters.

Derby Mk3- The Israeli BVRAAM Solution

The Indian Air Force (IAF) is all set to arm its Sukhoi Su-30MKI multi-role air superiority fighters with Rafael Advanced Defense Systems Derby Mk3 Beyond Visual Range Air-to-Air Missile (BVRAAM). Rafael Advanced Defense System, the Israeli missiles & munitions giant, at Paris Air Show 2015 unveiled the missile, then known as I-Derby ER, the extended range (100-km+) version of its Derby Active Radar Homing (ARH) Beyond Visual Range Air-to-Air Missile (BVRAAM). It is an evolutionary version of the I-Derby BVRAAM unveiled earlier at Aero India 2015. The Derby entered service in the mid-1990s and is fielded with multiple customers worldwide.

The Israeli Defence Force-Air Force (IDF-AF) realised the value and operational flexibility of BVRAAM long ago as it was repeatedly frustrated by high-altitude over flights by the MiG-25 Foxbat-B reconnaissance models of the Soviet Expeditionary Force between October 1971 and March 1972. Soviet MiG-25Rs based at Cairo covered the Israeli-held coastline Haifa to Port Said and flew the length of Sinai Peninsula involving 500 km penetration of the Israeli airspace. With a speed of Mach 2.5 to 2.8 at a cruising altitude of 80,000 ft they successfully evaded the formidable Israeli defences including F-4 Phantoms thus gathering valuable "real time" intelligence and transmitting them to ground-stations through secure data-links for further analysis. Appropriate IDF-AF BVR tactics underwent development and during June 1982 two Syrian MiG-25 Foxbat-A were destroyed by the IDF-AF with carefully planned and executed "snap up" attack by F-15 fighter/AIM-7 Sparrow BVRAAM combination emphasising the growing maturity of the BVR tactics and procedures of the IDF-AF pilots. For the first time the formidable high-altitude MiG-25 interceptor, hitherto regarded as "untouchable" was shot down. United States Raytheon AIM-120 AMRAAM succeeded AIM-7 'Sparrow' in IDF-AF inventory in course of time and holds the distinction of being the first operational ARH "fire-and-forget" BVRAAM.

However Derby BVRAAM, developed by Rafael Missile Division, was born from an Israeli desire to retain full control of the BVRAAM technology especially in relation to Electronic Counter Counter Measures (ECCM) modes. The 3.62 metre long 118 kg weight active-radar homing BVRAAM shares design commonality with Python 4 (including warhead and proximity fuse and even sharing same launcher); with the addition of mid-body wings while its own ‹no escape zone› overlaps that of the Python 4. The Derby is fitted with an ARH seeker with a compact gimballed antenna, developed by Israeli Aerospace Industries› (IAI) MBT Division. Derby has Look-Down/Shoot-Down capability and advanced programmable and adaptable ECCM to operate under dense electronic warfare environments while reconfigurable upon the emergence of new threats. For BVR engagements a LOAL mode is adopted in which the missile initially fired using cues from the launch aircraft›s fire control radar, or perhaps an Infra-Red Search & Track (IRST) system employing inertial guidance immediately after launch until the ARH seeker is activated at appropriate distance to home in on the target with substantial kinematics performance allowing ‹end game› manoeuvrability thanks to slightly enhanced rocket motor.

Derby Mk.III on the left

For greater accuracy over extended ranges, the ‹Derby Uplink› capability allows targeting data to be transmitted from the launch aircraft to provide accurate mid-course guidance while dealing with fast-moving or manoeuvring targets. The missile also has the ability to receive data-link updates from other platforms besides the launch aircraft thereby permitting ‹stealthy› engagements. According to Rafael even 'baseline' "multi-shot capable" Derby has a launch-range in excess of 63 km if launched at Mach 0.9 at 25,000 ft against a head-on target, although its maximum range, or its effective seeker range, remain highly classified. During Aero India 2007 on being suggested so by this Vayu correspondent on aspects of

Derby's maximum range, top Rafael officials along with their aides burst into laughter and intended to retain the veil of secrecy by reaffirming it as "mystery". Now very much apparent, Rafael was contemplating an extended ranged version for over a decade. Derby also has a very low minimum range and an option for Lock-On Before Launch (LOBL) mode thus also capable of being employed for short-range engagements with Derby's seeker slaved to the aircraft›s radar or the pilot›s helmet mounted cueing system. During short range engagements Derby's capabilities are regarded similar to Python 3 close-combat missile trapping enemy aircraft in "killing fields" 60 km inwards.

In the present Derby Mk3 evolution, the BVRAAM appears to have reached its inherent optimum potential. The latest variant is equipped with a new seeker that employs an advanced solid-state Software Defined Radar (SDR) technology, based on combat proven technology derived from the Tamir interceptor used in Rafael's Iron Dome system. The new lighter and more compact seeker has cleared valuable space which has been used by the missile designers to augment the propulsion system by adding a dual pulse rocket motor for "second kick" mode, thereby increasing the range of the Derby Mk3 beyond 100 km against "straight line" targets, and more importantly specifically to accelerate the missile at the critical terminal phase of the flight prior intercept of manoeuvring targets by increasing the BVRAAM kinematic envelope, and trapping the target in "no escape zone".

The "second kick" operates independently of the primary rocket propulsion and can be activated at any time during the fight, by the BVRAAM Flight Control System (FCS). The use of SDR technology means the missile seeker can be reprogrammed with software upgrades including new waveforms, duty cycles and processing techniques, addressing new threats, countermeasures and techniques that may evolve in foreseeable future. Smooth integration is a plus point as Derby Mk3 BVRAAM will be compatible with aircraft currently cleared to carry Derby. The missile is already cleared on F-16I (Block50/52), F-5E and Kfir. I-Derby ER integration tests are currently under way on the IAF Tejas Light Combat Aircraft.

Sayan Majumdar

Inauguration of Arquus Heritage Conservatory

Created a year ago, the ARQUUS Fund for Heritage inaugurated the ARQUUS Conservatory on 17 June in Garchizy (Nièvre). The aim of this Conservatory is to inventory, list, contextualise, highlight and present the objects, documents and vehicles that make up the history of Arquus or the historic brands that are part of the company's heritage. This Conservatory already brings together more than 70 military vehicles from the ARQUUS collections, but also from donations and very promising partnerships.

The challenge is to gather post-World War II vehicles, in service or not in the French and foreign armed forces, such as the EBR, the AML, the VAB or the GBC 8KT truck. In a second phase, the Conservatoire set itself the objective of searching for older vehicles, wheeled or tracked, belonging to its historical heritage. Some of these vehicles, belonging to the Musée des Blindés, were presented on 17 June in front of the

Conservatoire's premises, such as the FT, the 1918 Victory tank, the Somua tank, the Renault UE35 caterpillar or the B1Bis tank.

An ARQUUS Heritage Endowment Fund has been created in order to collect funds, legacies or donations under the law on patronage (1983) in order to support the ARQUUS approach to the benefit of heritage. It is in this capacity that the Conservatory was able to carry out fitting-out work for the exhibition on 17 June, and to receive donations and loans of vehicles which were lacking in its collection. The Conservatoire already houses a dozen vehicles from the Musée des Blindés (Saumur) made available by the French Army, the Paul Legueu collection, donated by the family of the founder of ACMAT, and a VLRA made available by Mr. Fortin, a private collector. Two turrets, the Mistral turret donated by MBDA and the 25 mm turret donated by John Cockerill have joined the collection on a LAV and the CRAB respectively.

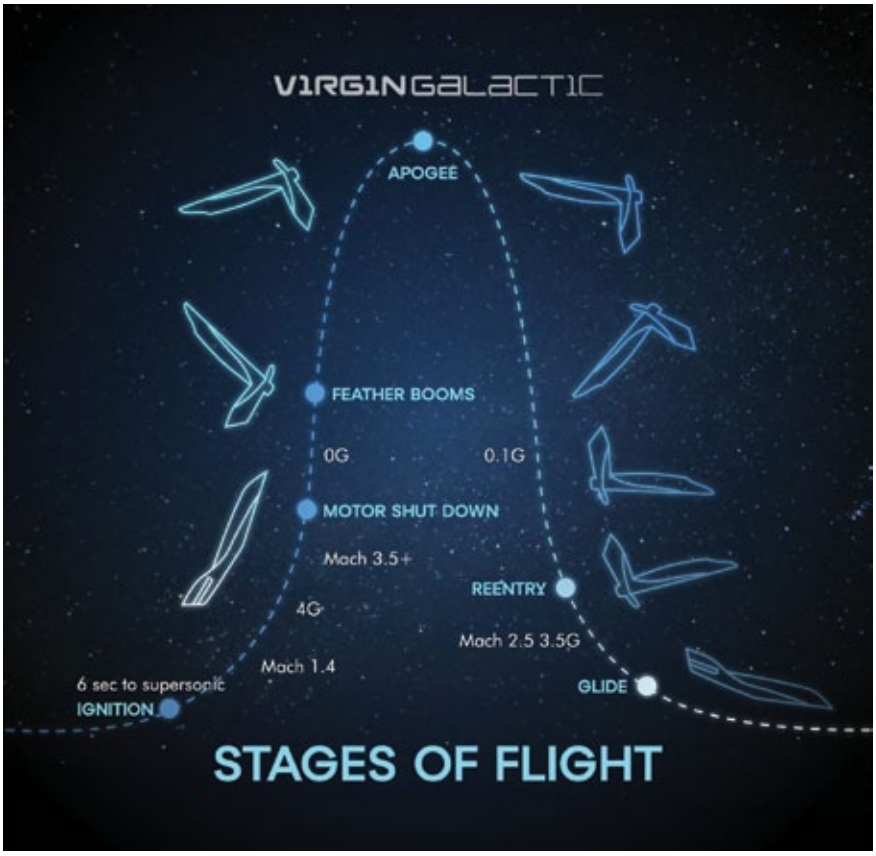
The oldest vehicle in the exhibition is a 1916 Berliet CBA, donated by the Berliet Foundation, as well as a GBC 8KT from its Conservatoire in Montellier. This inauguration was an opportunity to present an exhibition by the Association Renault-Histoire, who devoted to the life of the Renault factories in Boulogne Billancourt during the First World War.

Virgin Galactic successfully completes first fully crewed spaceflight

Virgin Galactic on 11 July 2021 announced that VSS Unity successfully reached space, completing the Company's fourth rocket-powered spaceflight.

This flight was the 22nd test flight of VSS Unity and the first test flight with a full crew in the cabin, including the Company's founder, Sir Richard Branson. The crew fulfilled a number of test objectives related to the cabin and customer experience, including evaluating the commercial customer cabin, the views of Earth from space, the conditions for conducting research and the effectiveness of the five-day pre-flight training programme at Spaceport America.

Michael Colglazier, Chief Executive Officer of Virgin Galactic, stated, "Today is a landmark achievement for the Company and a historic moment for the new commercial space industry. With each successful mission we are paving the way for the next generation of astronauts. I want to thank our talented team, including our pilots and crew, whose dedication and commitment made today possible. They are helping open the door for greater access to



space – so it can be for the many and not just for the few."

VSS Unity achieved a speed of Mach 3 after being released from the mothership, VMS Eve. The vehicle reached space, at an altitude of 53.5 miles, before gliding smoothly to a runway landing at Spaceport America.

This seminal moment for Virgin Galactic and Sir Richard Branson was witnessed by audiences around the world. It gave a glimpse of the journey Virgin Galactic's Future Astronauts can expect when the Company launches commercial service following the completion of its test flight programme.

Sir Richard Branson stated, "I have dreamt about this moment since I was a child, but nothing could have prepared me for the view of Earth from space. We are at the vanguard of a new space age. As Virgin's founder, I was honoured to test the incredible customer experience as part of this remarkable crew of mission specialists and now astronauts. I can't wait to share this experience with aspiring astronauts around the world."

Branson continued, "Our mission is to make space more accessible to all. In that spirit, and with today's successful flight of VSS Unity, I'm thrilled to announce a partnership with Omaze and Space for Humanity to inspire the next generation of dreamers. For so long, we have looked back in wonder at the space pioneers of yesterday. Now, I want the astronauts of tomorrow to look forward and make their own dreams come true."

The mission specialists in the cabin were Beth Moses, Chief Astronaut Instructor; Colin Bennett, Lead Flight Operations Engineer; Sirisha Bandla, Vice President of Government Affairs and Research Operations; and the Company's founder, Sir Richard Branson. The VSS Unity pilots were Dave Mackay and Michael Masucci, while Kelly Latimer and CJ Sturckow piloted VMS Eve.

Courtesy: Virgin Galactic

14 Juillet meeting point Evreux

During the French national festivities on 14 July, celebrating the turning point in the revolution of 1789 and the foundation of its current republic, all eyes were focussed at the skies over Paris. Traditionally, the French armoured forces execute a major parade in and over the countries capital commemorating "14 Juillet" or Bastille Day. The large flight display over Paris' main street 'The Champs Elysees' in front of the French President, takes some precise planning to organise all aircraft and helicopters in various formations at the right time in a perfect orchestrated flyby.

One of the main centres for the execution of the flight parade is at Evreux "Base Aérienne" (BA) Air Force Base, located some 100 km west of Paris. At Evreux, also marked as BA 105, the majority of fighter aircraft of L'Armée de l'Air (French Air Force) gather some days ahead and repeatedly conduct various rehearsals for all the formations. Not all participants use Evreux, as the navy flies straight from their home bases, also like tanker and transport aircraft do. The performing helicopters are using Villacoublay BA 107 near Versailles in the outskirts of Paris as their gather point.

The more than 30 jets at Evreux, including Mirage 2000s from Luxeuil (M2000-5F), Nancy (M2000D), Orange (M2000B and C), and Dassault Rafale B and Cs from Mont-de-Marsan and Saint Dizier, were lined up in a row at the taxi track parallel to the runway. Viewed by L'Armée de l'Air employee family

members, the aircraft took off in groups to join formations with various tankers and transport aircraft already in airborne in the direct vicinity of the base to await further clearance to head for Paris. Soon they were joined by a large formation of Navy's Rafales along with a Hawkeye E-2C.

In previous editions of the 14 Juillet Air Parade, the French invited other countries' aircraft to join the flyby, underlining strong bonds of friend- and partnerships. Due to the Covid-19 situation, 2021's edition witnessed only French aircraft participating. In that perspective, it was interesting to see a first appearance of a Beech 350ER/ASLR which was recently delivered to special intelligence unit EEA01.054 "Dunkerque" at Evreux. The unit, which will phase out its C-160 "Gabriel" aircraft, will reach a total of three Beech 350s "Vador" (Vecteur aéroporté de désignation, d'observation et de reconnaissance/airborne vector for designation, observation and reconnaissance) by 2023. The Vador aircraft are initially delivered by manufacturer Beech to the French Direction Générale de l'Armement (DGA)/general armament department, to receive its special intel and reconnaissance gathering equipment from Sabena Technics and Thalès. After experimental testing of its equipment by Centre d'Expertise Aérienne Militaire (CEAM)/Military Air Expertise Centre, the Beech 350s will be inducted to its operational support.

Another interesting highlight was the participation of aircraft from the DGA Essais en Vol (DGA-EV)/DGA Flight Test unit based at Cazaux BA 120, close to Bordeaux. The unit was delegated at Evreux by 3 Alpha Jets and 2 types of Mirage 2000s, of which 2 Alpha Jets and 1 Mirage participated in the parade, while the others were kept as air spares. These DGA-EV aircraft are used as test bed for new equipment, armament and update projects, or act as chase plane to observe other aircraft in their test flights. The aircraft of the unit, which also has a branch at air base Istres-Le Tubé BA 125, are due to their test flight programmes normally very rarely seen outside their home base. Therefore, their public display in the Paris parade was a unique event.

To stress their test function in the air force, the appearance of the aircraft differs from the operational aircraft in their front line units. For example, the DGA Alpha

Jets had day glow coloured wing tanks and the DGA-EV Mirage 2000s had a dull grey colour scheme applied which is not common for the others. The Mirage which joint the parade, a B model, is known as a testbed for the Rafale radar, including additional sensors above and beneath the nose cone and some extra antennas. The aircraft flies with a centreline pod variant. The other Mirage, a 2000C model, had its main fuselage colour in glossy blue and was furthermore attached with 60 years DGA-EV anniversary marks, a 2021 milestone for the unit. For the anniversary, all aircraft received a 60 year celebration badge on their tail. The current DGA-EV unit was previously known as Centre Essais en Vol (CEV)/Flight Test Centre and was based at air base Bretigny BA 217, until closure in 2009.

After the air parade over in Paris, most aircraft flew straight and returned to their home bases throughout the country. A few days later, on 16 July, Evreux air base received the first C-130J Hercules aircraft for the newly joined German-French transport squadron.

Text and photos by Peter ten Berg

Hot Blade 2021

The Hot Blade 2021 (HB2021) is the 15th helicopter exercise organised under the umbrella of the European Defence Agency's Helicopter Exercise Programme (HEP) and its 5th edition was conducted by the Portuguese Air Force Air Command. This exercise was held between 16 to 30 June 2021.

The participating forces were deployed at Air Base No. 11, Beja and the missions were planned for the central and south of Portugal, with the concern of reducing their impact on the environment and population.

Participats flew diverse day and night COMAO (Composite Air Operations) missions such as Air Assault, Special Operations Aviation (e.g. fast rope techniques; insertion/extraction and air-to-surface firing), Combat Service Support, Close Air Support, Convoy/helicopter escorts, Reconnaissance and Surveillance, Combat Search and Rescue, Personnel Recovery and Medical Evacuation and Casualty Evacuation.

The HB2021 allowed aircrews to practice operations in a variety of environments by reproducing challenging conditions that participating forces could encounter in real theaters of operation.

The HB2021 exercise was consisted of one daily common COMAO flight in afternoon or in the evening. Before or after these common flights, the participating countries flew their own local missions in the various target areas over Portugal.

Participating aircraft and helicopters

Country	Type	Unit
Portugal	AW119 Koala	Squadron 552 "Zangões
Portugal	EH-101 Merlin	Squadron 751 "Pumas"
Portugal	F-16M	Squadron 201 "Falcões" Squadron 301 "Jaguares"
Portugal	P-3C CUP+	Squadron 601 "Lobos"
Netherlands	CH-47 Chinook	Squadron 298
Netherlands	AS-532U2 Cougar	Squadron 300
Austria	PC7	Airplane Training Squadron
Austria	OH-58 Kiowa	Light Utility Helicopter Squadron
Slovenia	AS-532	15 Helicopter Battalion

The exercise also provided opportunities to practice multinational and national formation and training with the Special Operations Forces (SOF) and units (infiltration and exfiltration). These missions enhanced crews' skills in using the HEP Standard Operating Procedures (SOP) and COMAO planning procedures in the conduct of flight planning and operations.

Background

The Helicopter Exercise Programme (HEP) is part of EDA's wider helicopter portfolio and aimed at providing Member States with a joint European framework to develop, consolidate and share best practices to meet the current and future challenges of flying helicopters in a modern operational environment. Other components of this portfolio are the Helicopter Tactics Course (HTC) programme, the Helicopter Tactics Instructor Course (HTIC) programme and the future Multinational Helicopter Training Centre (MHTC).

Dutch helicopter detachment

Capt. "SIMBA", a CH-47 Pilot Flight Commander (298 squadron), was given the role of 'Chief Air Operations' during the exercise. The aims and expectations of this exercise were Safe execution of multinational collaboration during Composite Air Operations (COMAO) and successfully complete the Qualification Training (QT) and Degraded Visual Environment (DVE) landings for the Dutch Cougar and Chinook crews. The most special demand for this exercise was the fact that they required hot-refueling on Beja AB and on FOB Tancos. Therefore, extra Portuguese and Dutch POL and fire rescue support were deployed on these bases. The Dutch S3 Air detachment consisted of approximately 66 participants and of them, there were 30 pilots, 25 loadmasters and 11 mission support persons. Depending on the lead, tasks were given to the pilots during the COMAO. In total, the Dutch helicopters participated 46 times with Cougars and Chinooks in the COMAO and flew 45 DVE training missions. Capt. "SIMBA" described the support of the Portuguese Air force as incredible.

Text and photos: Joris van Boven and Alex van Noije

Leeuwarden air force base terminates F-16 operations

At the Dutch airbase Leeuwarden, the Royal Netherlands Air Force will say goodbye to the F-16 Fighting Falcon, also nicknamed "Viper", in 2021. The fly-out was scheduled for 1 July but was delayed due to a crash at Leeuwarden of a Belgian Air Force F-16 during the Weapon Instructor Course (WIC). The Dutch F-16s finally left Leeuwarden Air Base on 5 July after a period of 42 years at this Frisian air base.

Leeuwarden was the first airbase of the Royal Netherlands Air Force to receive the F-16 Fighting Falcon in 1979. The 322 Squadron of the the Royal Netherlands Air Force was the first unit to use the type and is now the first unit in the Air Force to replace the type with the F-35A Lightning II. This is a huge milestone for the Air Force, as the F-16s have been the backbone of the Royal Netherlands Air Force for many years. The fighters took part in many operations of the Dutch Air Force conducted in regions such as Kosovo, Iraq, Afghanistan, Syria etc. as a part of an international coalition.

For the "F-16 Fly-Out" or "Viper Farewell", the unit painted few aircraft in the original colours of the Frisian airbase of 1980s. A total of four aircraft were painted, three of which had the original Frisian markings of the based squadrons. These planes were; the J-509 bears the full colour badges of 322 Squadron nicknamed "Polly", the J-144 bears the full colour badge of 323 Squadron nicknamed "Diana" and finally the J-201 bears the full colour badge of the Transition and Conversion Department (TCA). The fourth aircraft, the J-871, carried the dragon on the tail, which is the symbol of Leeuwarden Air Base.

These aircraft left Leeuwarden for the last time after 42 years and landed at their new home base Volkel Air Base in the south of the Netherlands. Before this landing took place, the four F-16s circuled around all Dutch military airfields to say goodbye to the Leeuwarden F-16s. The last F-16 flights are planned for 2024 when Volkel will also have its "Viper Farewell" and the F-16 at the Royal Netherlands Air Force will come to a definitive end.

Photos and text: Joris van Boven and Alex van Noije


J-871


J-509


J-144

Dutch squadron ends F-16 operations

322 squadron of the Royal Netherlands Air Force based at Leeuwarden air force base has terminated its operations on the F-16 "Fighting Falcon" early July (2021). With the gradual ongoing new deliveries of its successor, the Lockheed Boeing F-35A "Lightning II", it was time for the squadron to focus only on embedding the new jet in the unit.

After 42 years of F-16 operations from the northern located air base, the command and crews of the base had mixed emotions to say goodbye to the jet, which is planned to leave the Dutch air force somewhere in 2024. To commemorate the event at Leeuwarden, several aircraft received full colour markings after they have flown for many years in toned down, general liveries. The decision to have the aircraft in a simple and standard presence was originated by the fact of being tasked for a number of international (NATO) missions throughout the years in which the aircraft rotated regularly between the different squadrons to secure the agreed obligations of available aircraft. For this reason, during the farewell event, marked aircraft included badges of 322 "Polly" squadron as well as 323 "Diana" squadron and the TCA

unit ("Transitie en Conversie Afdeling" / Transition and Conversion Unit) all having historical roots at Leeuwarden air force base. The event was attended by former air force pilot Wim Sneek, who flew the first F-16 to Leeuwarden in 1979.

The farewell event, which included some formal ceremonies and a fly-out of the last F-16's, was originally planned for 1 July. But it was cancelled owing to a shocking accident with Belgian F-16 that caused some major injuries to its pilot. During engine start up, the Belgian F-16, which was temporary based at Leeuwarden for the running international "Weapon Instructors Course 2021", suddenly accelerated in uncontrolled manner hence forcing the pilot to use his ejection seat at the flight line.

On 5 July, the event was re-scheduled, however without any ceremonial aspects. In presence of a small group of squadron members and the media, the last 4 Leeuwarden F-16's were brought together on the flight line close to the air traffic control tower. After the pilots "walk-around", pre-flight checks were conducted and then four aircraft made a taxi tour over the base to say goodbye to all the units. After take-off, the F-16s joined in formation over the nearby North Sea for their final farewell pass over Leeuwarden air base. The aircraft continued a low level flight over The Netherlands towards Volkel air force base, their new home until the F-16 will exit the Dutch air force in 2024.

The Netherlands acquired a total of 212 F-16s as a replacement for the F-104 Starfighter and later on the NF-5 Freedom Fighter. Forced by several governmental cost cutting initiatives, the F-16 force was reduced considerably down to around 68 serviceable aircraft. Surplus aircraft had found new careers in the air forces of Chile and Jordan.

A recent initiative will take care that the F-16 will not be forgotten at

Leeuwarden for the years to come. The F-16 aircraft of the Dutch air force had a serial number"J-259", which landed at Leeuwarden on 7 June 1979 and it was piloted by Wim Sneek. This aircraft now serves in non-flying status, as an instructional airframe at the depot centre at Woensdrecht air base. The aircraft will be brought back in to its colour scheme and markings of the early years and is expected to be displayed at Leeuwarden in ceremonial events.

With the move of the last four F-16s from Leeuwarden, all remaining Dutch F-16s are centralised at the southern located Volkel air force base and will remain there till the end of their career in the Dutch Air Force. The aircraft will become part of local unit 312 squadron. In the final years of Dutch F-16 operations, the 10 aircraft which are based for pilot training at Tucson, Arizona, USA, will also return to Volkel. In the course of 2022, Volkel is expected to receive its first F-35s.

With the ongoing new F-35 deliveries, the number of F-16 operations will reduce and consequently also the number of F-16 aircraft. With that knowledge, it was no

surprise that the Royal Netherlands Air Force recently announced to have agreed with Draken International based in the USA, to take over 12 F-16s. Draken is a specialised contractor, who offers aggressor "Red Air" training services. The contract further contains an option to take over another 28 F-16s, which will come available around 2024. The agreement with Draken is part of the "F-16 End Life of Type (ELOT) programme".

The Netherlands Air Force will plan a final F-16 farewell event in 2024 to say goodbye to the aircraft which will then have 45 years of service over the Dutch skies and international presence.

Text and photos by Peter ten Berg

Technical training 'Down Under'

One of the CT/4's that is used for taxiing

RAAF base Wagga, located next to the town of Wagga Wagga in New South Wales, Australia, is the place where most technicians in the Australian armed forces start their career. The base itself was found just before World War II to house a flying training school, but already before the war ended, the flying units left and the base was turned into a maintenance depot. In 1946, the role of the airbase changed again when the Ground Training School was established. This unit was renamed School of Technical Training (RAAFSTT) in 1952 and still recognised by that name. Many buildings that were built during WWII, including some of the hangars, are still in daily use today.

Some 200 to 400 trainees apply for Initial Employment Training (IET) every year, of which some 25% are female. The age range is 17–45 years and the ethnic backgrounds and educational levels are very diverse. When asked about the experience, Wing Commander Dean Collins (recently succeeded by Wing Commander Sheena Stapleton) answers, "This varies significantly: some have worked in similar technical environment before joining the Defence Force, others have transferred within the ADF to train for a new mustering, and some have never used basic tools before, like a hammer or a spanner." New trainees will first spend 10 weeks with 1 RTU (Recruit Training Unit) which is also based at RAAF Wagga, before they go to RAAFSTT. Then they start with another and spend 10 weeks with seven basic aviation trades skills: avionics technician, aircraft technician, aircraft structural fitter, surface finisher, life support fitter, armament technician, and aviation support technician. This last trade includes flightline support and marshalling. After this phase, the following route for the trainees depends on the specialisation that

One of many MB.326 that are used in various roles

is assigned, and this part could last between 6 and 18 months.

Although established as an RAAF school, the Army has been sending its cadets here since 1969 and with the inclusion of the Navy in 1992 the school became a tri-service installation. Since 2013, the facilities are licensed to British Aerospace who provides a 'turnkey solution' which is called the Defence Aero skills Training Academy (DATA). Though all facilities and infrastructure are still owned by the RAAF, only the aircraft that are used are owned by BAe, apart from two UH-1 Iroquois helicopters which are still owned by the army. These comprise no less than 18 MB.326, 8 CT/4A, 6 more modern CT/4B and 3 SA.226 Metro. Recently 6 PC-9 arrived to supplement the fleet. About

MB.326s used for refuelling training and flightline servicing


Integrated Avionics Maintenance Trainers (IAMT) simulator

half of the staff members on site are serving military, the rest are contractors. To make things realistic, most still wear a uniform.

Next to the real aircraft, simulators are used for different purposes. There are two Generic Flying Controls Trainers or Genfly simulators. They are operated by Pennant and are used to teach troubleshooting. Every button and every pedal is logged, so after a session everything can be played back. This way students can "learn without getting hurt" as SQNLDR Ron Batcheldor explains. Virtual Reality (VR) is not used yet, but will most certainly become a future asset as well.

Also operated by Pennant since 2015 are two Integrated Avionics Maintenance Trainers (IAMT). These are full size cockpits which are currently equipped with a Hawk

127 layout, including a Head Up Display (HUD) and multiple Multi Functional Displays (MFD). All controls can be operated and the system responds to all input. These are used to simulate ground runs and compass swings, including all kinds of checks, with ground power and other support equipment. Next to these are two main types of simulators, numerous smaller training rigs are in use for teaching electronics, cabling, etc.

One of the few larger instructional aircraft, the SA.226 Metro

From day one, tool control is considered very important. Students get their own toolbox and are responsible for the accompanying paperwork as well. Also health and safety is an important subject obviously. Collins explains, "Trainees are placed in a Simulated Work Environment (SWE) phase in different segments of their training. The SWE is run as a typical squadron work area where the trainees are expected to comply with all normal maintenance policies and procedures. So from day one students are in an environment as close to the real world as possibly can. Apart from that, trainees are also required to use maintenance publications and apply correct technical administration during their SWE components of training."

Not only mechanics are taught at Wagga, also subjects such as parachute folding and marshalling aircraft are also a part of the training programme. For the latter six live CT/4B aircraft are used outside on the platform, but the facility also has a state of the art simulator. That makes it possible to teach how to handle unexpected events like an unauthorised crossing by a car, hot brakes or an engine fire in a safe way. Also weather scenarios and fuel leaks can be simulated. When trainees pass this phase, they go outside for the real deal, with the CT/4s.

Two MB.326 are parked outside and are used for refuelling training and flightline servicing. These aircraft are only towed, they don't taxi themselves. The students act fully as a maintenance crew, the staff members are more in a mode of supervising students than teaching them.

When students leave, they receive a 'statement of attainment' from BAe and a 'completion statement' of the RAAF. The next phase will be training on the job, as only operational units can do the certification assessments that are needed to get the formal aircraft type certificates. And with these type of certificates, the former trainees are ready for the operational part of their career.

At RAAF Wagga, they say 'God created aircraft technicians so that aircrew could have heroes too'. And it clearly is their mission to make sure Australian aircrews do get their heroes!

Text and photos: Patrick Dirksen and Frank Mink

Female trainees in front of newly arrived PC-9 during International Women's Day (Photo by Australian Government, Department of Defence)

Crossing of Madhumati, Capture of Kamarkhali and Surrender of Pak 9 Inf Div

Back to Madhumati

My Squadron less two troops were placed under command 62 Mountain Brigade and ordered to move back to Madhumati, where 5 Maratha Light Infantry was holding western bank of Madhumati. We covered approximately 100 kms in about 8 hours or so. In the meantime to make up the tank losses suffered at Kushtia, my regiment sent two troops from B Squadron under Maj Chakraverty (Chuks) a brave and a very fine officer. B Squadron had already taken part in few battles under 9 Infantry Division and acquitted themselves with honour. These two troops were placed under command 7 Mountain Brigade. The Eastern bank of Madhumati was held by two battalions of Pak Army, with elements of recce and support battalion and artillery. On arrival, we were welcomed by heavy shelling. The boys had got so used to shelling that by listening to piercing whistle sound of shell through the air, they could guess likely location where the shell is likely to land. If the shell was coming close to their location, their reaction was, "Oh Sxxt" and they would hit the ground. I had just got back from recce of Madhumati looking for crossing places to watch this fun.

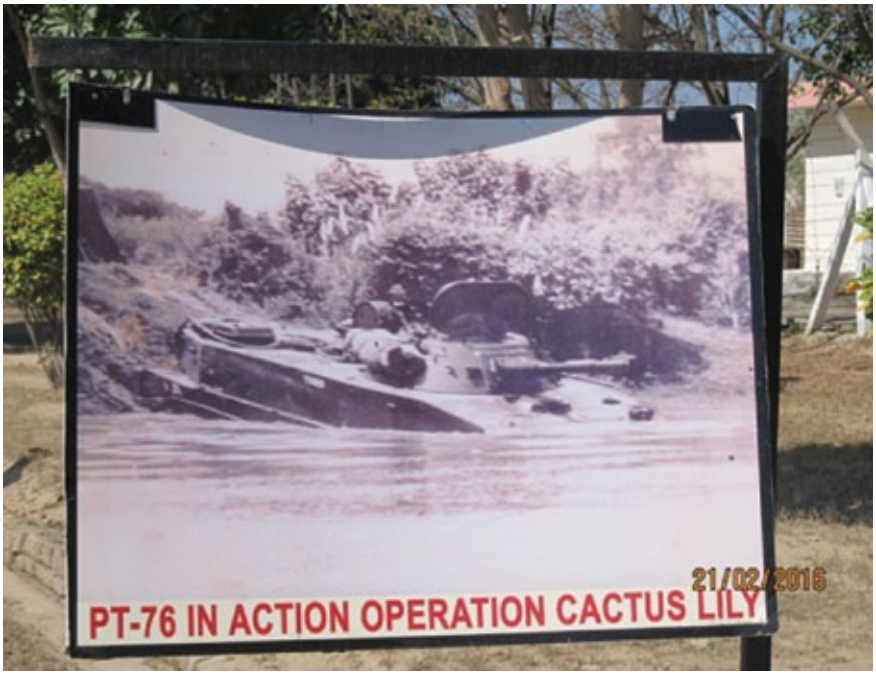
I was very tired and sat on ground leaning on to sprocket of my tank and dozed off. After a little while, my tank driver woke me up with a hot cup of tea. This tea is very distinct from normal tea. It has a bit of kerosene oil, diesel "flavour" with plenty of sugar and it is served hot. One is tempted to ask for another round. It is at this time that a man carrying dead body of a young woman around 20 years or so came and laid it near the tank. He went away and returned after ten minutes carrying the dead body of a newly born baby. He was crying and trying to convey something which we could not understand. My boys gave him some water and he became calm. My Mukti Bahini fighter narrated his sad story. "The previous night three Pak soldiers

had come to his cottage, tied him and his wife and raped this young lady who had just delivered this baby. Next morning, villagers came and untie both of them but till then, both mother and child were dead. A week back, his son and son-in-law had been taken away by Pak soldiers for labour work and not returned. It is believed some were shot dead. This harrowing and sad incident upset us. We could do nothing.

I was summoned to headquarter 62 Mountain Brigade where plans for crossing of Madhumati and capture of Kamarkhali were discussed. I got back after the discussion and ordered my boys to carry out all the 18 pre- floatation checks. Madhumati was a formidable choppy river which was 500 yards wide, with depth of 15-20 feet, water current of 4 to 5 knots and steep banks. Engineers had done a good job in providing this data.

The plan was 7 Mountain Brigade to hold Western Bank of Madhumati with one battalion, establish firm base on the far bank of the river by morning 15 December and assist 62 Mountain Brigade in the capture of Kamarkhali.

62 Mountain Brigade to affect crossing in the North during Night 14/15 December and clear enemy opposition upto road Magura-Faridpur and resume advance on axis Kamarkhali - Goalundo Ghat sooner but not later than first light 17 December. It was a pincer move, with 62 Mountain Brigade in the North and 7 Mountain Brigade in the South. Two troops of B Squadron tanks were allotted to 7 Mountain Brigade and A Squadron 45 Cavalry less two troops were placed under command 62 Mountain Brigade for battle of Madhumati/ Kamarkhali.



7 Mountain Brigade with one Battalion and a troop of tanks crossed Madhumati River from the south and established behind Kamarkhali. Remaining tanks of B Squadron gave fire support from the west bank.

Commander 62 Mountain Brigade responsible for the northern pincer rightly appreciated that any delay in crossing of Madhumati will give enemy chance to consolidate his defences further on this very formidable water obstacle. The plan to cross over had been discussed with me earlier. His plan envisaged to capture Arpara/ Kamarkhali with 2/9 GR with tanks giving fire support.

At mid night, on 14/15 December he decided to cross over Madhumati river. According to Commander, the mother of all battles was crossing of Madhumati and capture of Kamarkhali. Two Battalions of the Pakistan 9 division had taken up positions on the far bank at Kamarkhali/ Arpara. It was a difficult decision to take as any delay could bring international pressure on India for a cease fire. There were indications of American 7th fleet heading for Indian Ocean. I quote from "History of the 9th Gorkha Rifles, Indo-Pak War: 1971 page 201". Brig (Dr) SK Sinha writes the description of how the tanks crossed River Madhumati deserves to be told. In the words of Brig Rajendra Nath (Later Maj Gen), the Squadron had already carried out pre floatation checks and boys were in high spirits. The brave squadron commander (Maj PK Batra) sat in the driver's seat leading by example with me on the deck of leading tank. With prayers on our lips, the leading tank plunged into the river. With great skill and dexterity, the squadron commander moved through the choppy river guided by recce troop. The gradient on the far bank was steep but luck favours the brave. The tanks were across the river with the brave Gorkhas (2/9 Gorkha Rifles) following up in country boats. It was a harrowing experience. "This was the first instance of amphibious tanks swimming across a river obstacle under battle conditions and water current of 5 knots. It was a major achievement in the employment of PT-76 tanks to cross a formidable water obstacle under battle conditions. The presence of tanks on the far bank had a tremendous effect on the morale of the troops", according to historian Brig (Dr) SK Sinha (retd).

Personally for me, it was a great challenge as there was to be no failure, the success of the whole operation depended on tanks getting across and supporting the attacks by brave infantry soldiers.

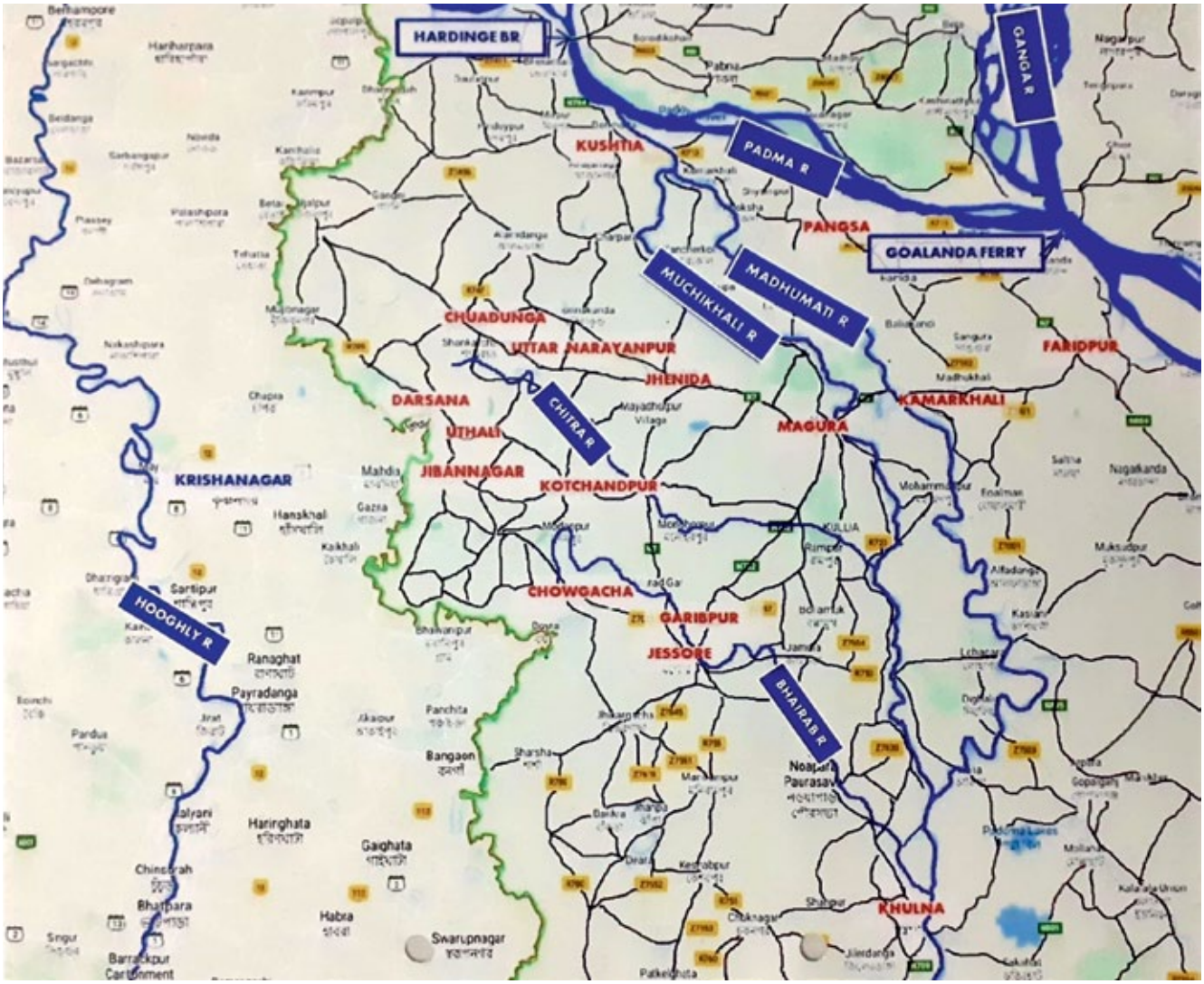
The tanks and infantry battalions in both pincers were across Madhumati river. 22 Rajputs with two troops of tanks established a road block behind the enemy by 1100 hrs 15 December. The brave Gorkhas of 2/9 Gorkha Rifles supported by Maj Chakraverty (Chucks) tanks attacked ARPARA on the morning of 15 December. The enemy offered stiff resistance but could not hold on against the Gurkhas and with some accurate shooting by tanks. Chucks supporting the attacks handled his tanks like a maestro as a series of attacks were launched in succession with support of tanks and all were successful. However, destiny had something different for this brave soldier. One of his tanks got bogged down during a lull in the battle. With total disregard to his personal safety, he got off his tank to supervise the recovery and to tell 2/9 Gorkha Rifles boys to move away from tanks as tanks would draw enemy's fire. Suddenly a mortar bomb landed behind him and he was grievously wounded. His loss was

another big blow to me, as I had not yet recovered from Kushtia shock. Chucks was a brave compassionate and gentleman officer loved and respected by all in the Regiment. For us he is "Hero" of Kamarkhali. He was evacuated and finally boarded out as he had fractured his spinal cord. A great loss to 45 Cavalry and army.

ARPARA was captured by 1400 hrs on 15 December, with my boys supporting a hard fought battle.

We received reports that enemy was escaping by using a track north of 22 Rajput road block. Commander 62 Mountain Brigade ordered me to move with Company of 5 Maratha Light Infantry to establish another road block to trap the enemy. I took one tank from one of my tank troops and we established the road block by 1600 hrs. We saw approximately 50 Pak soldiers approaching our road block. I could feel strong sense of revenge amongst our boys for Kushtia massacre. The tanks (I too sat on gunners seat to kill these Ba xxxxxs) and 5 Maratha Light Infantry boys opened fire and more than 30 Pak soldiers lay dead. I called it a "Savage Revenge". After last light, the Pakistanis launched yet another attack and it was repulsed with heavy casualties to them. They made yet another attempt on 16 December morning to dislodge us but failed miserably. Finally, they gave up and surrendered to 62 Mountain Brigade. It was a great experience to withstand four counter attacks at night, launched with fury and fire. PT76 has limited night capability, yet we acquitted with honour. At this surrender event, Gen Ansari, GOC Pakistan 9 Infantry Division admitted to Commander 62 Mountain Brigade that they could not believe that tanks will get across the formidable Madumati river and that too at night. One of the Pakistan officers complimented the A Squadron by calling us, "Tank Commandos" as narrated by Commander 62 Mountain Brigade. The credit goes to B Squadron boys too. I was ordered to advance on road Kamarkhali-Faridpur with 5 Maratha Light Infantry.

We resumed our advance on road Kamarkhali-Faridpur. The Squadron including one troop of B Squadron was advancing with two troops up, one troop each astride the axis. The leading troop leader came on radio to inform me that a Pakistani jeep with a white flag was approaching towards our location. The Squadron halted the advance and deployed tactically with instructions to carry out speculative fire if need arises. I came on to the road to meet the occupants of this jeep which halted a few yards from my tank. I met the GSO 1, Lt. Col. Mansoor-Ul-Haq of Pakistan 9 Infantry Division, who had come to work out surrender formalities with the Indian Army. He was a very smart, soft



spoken gentleman. We disarmed him and the soldiers accompanying him. My boys searched the jeep and handed over a book wrapped in green silken cloth to me. As a soldier I felt sorry for him as the worst form of humiliation for a soldier is to surrender. The colonel requested if he could keep the book as it was the holy Quran. I touched the book to my forehead as a sign of reverence and handed over the holy Quran without hesitation. This little gesture was much appreciated by him and he said, "We really appreciate the Indian Armed Forces for their respect for all religions and being so secular ". I felt very proud of our culture, our country and our armed forces. We chatted for quite some time about futility of wars between our two nations with same habits, culture, we were one country, blamed the politicians for this mess etc etc. We offered them a cup of tea which was politely declined. In the meantime, a message had been passed to higher headquarters about the surrender and staff from division and brigade headquarters had landed up. It was a great moment for my regiment, squadron and me but sadly it turned out to be a "Tamasha" for some as they did not appreciate the sanctity of this great moment.

By this time, some Pakistani officers had also come. As I stood alone watching, an elderly Pakistani officer walked upto me, introduced himself and said, "Maj Batra, your armoured corps officers on both sides have strong spirit-do-corps and affinity, I've a son who is in 4 Cavalry of Pakistan and I've had no news about him for over a month. We have no news about war in the Western side. Would you be kind enough to find out about 4 Cavalry. I've been having sleepless nights worrying about safety and well-being of my only child". I promised to do my best and find out about this regiment. My GOC was a happy man and invited me to accompany him. He drove the open jeep and I sat in front seat with him. As we crossed the Sikh Light Infantry boys who were coming from the opposite direction, GOC told them that the Pakistanis have surrendered. One of the boys mistaking me to be a Pakistani officer almost hit me when the GOC let fly some choicest of abuses in Punjabi to tell him," *Yeh to mera Squadron Commander hai*". Unfortunately, I was wearing a Khaki overall as worn by Pakistanis instead of our black overalls. We laughed it off! On reaching the division headquarter, I rang up a friend in command

headquater at Calcutta and requested him to find out whereabouts of 4 Cavalry. He was very kind and appreciated the concern of a father. Next day early morning, I got a message informing me that 4 Cavalry had not come to battle. I immediately went and met this officer and gave him the good news. He was so touched and moved and hugged me and kissed my hands with tears of joy rolling down both his cheeks and kept blessing me. This was a moment difficult to describe by both of us.

I felt good as I was instrumental in bringing a cheer in some one's life. I was summoned to division headquater and on reaching there I was informed that my Squadron had to move immediately to Suratgarh. I looked up to the skies and wondered on the irony---from marshy graves of Bangladesh to scorpion/snake infested sand dunes of Rajasthan. Since, I was at heaquarters, I decided to pay final respects to GOC as courtesy demanded. He thanked me profusely with parting words," I'll be recommending you and your boys for gallantry/awards". As I was driving back, I wondered why we 'tank' men are treated like step children. After a dozen of actions/ battles at Div/Brigade level including two road blocks facing five counter attacks to dislodge us, crossing Madumati under enemy's nose on a pitch dark night covering 700 kms without a single breakdown in 20 days of war and only thing you carry is false promises. We moved to Suratgarh and got busy to understand our next operational role and carry out recce. I sent my boys on spot of leave. Finally, in February 72, I went on short leave to Ramgarh where our families were staying. A prisoner-of-war camp had also been established there. One evening as I went for a walk, I stopped at the camp and met the Pakistani subedar major and enquired about their welfare. He said," *Hazoor Sab theek hai, koi gila yah shikait nahin, ek chhoti urz hai*", I said *"farmaiye"*, "*Hazoor har subah hamain is gane ke saath uthaya jata hai "maar dia jaye ya chhor diya jai bol tere saath kya salook Kia jaye*" (translated, should we leave you or kill you. Tell us what kind of treatment you want.) I assured him that we follow Geneva conventions unlike their army and they will go back to their country and requested the adjutant of the camp to not to play this number.

Major (later Maj Gen.) Pramod K Batra commanded 'A' Squadron 45 Cavalry during the 1971 War

Air Marshal Harish Masand (R) says...

I learnt more than flying from them

Preface

In this series, I intend to narrate stories about my early experiences in the life of aviation and the Air Force to express my gratitude to all those who taught me not just flying but about life itself. I have been meaning to do this for some time but, somehow, in the hustle and bustle of daily life and other commitments, I never got to put pen to paper in this area. So, before it gets too late and before more of those folks leave us, let me start the series.

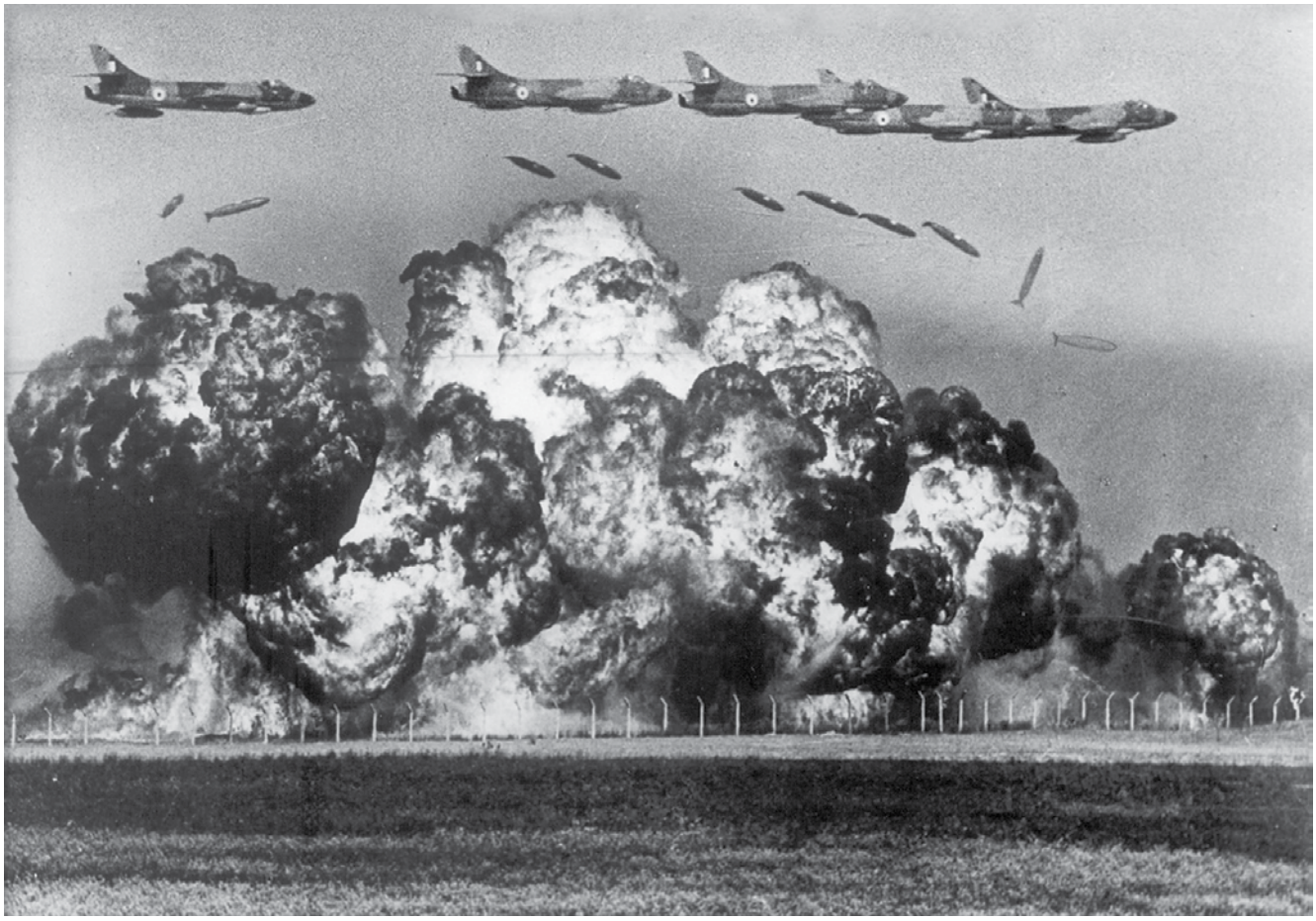
I feel that without such seniors, and even some juniors, and the lessons they taught me, I would not have survived in the Air Force this long, much less reach where I finally did. Obviously, all my instructors and seniors taught me something; most on what to do but even others who, at least, showed me what not to do when I become senior. Though I should actually start this series with my first flying instructor in life, Captain Homi Mistry of Indore Flying Club, I want to move a little randomly to those stories that come to my mind readily.

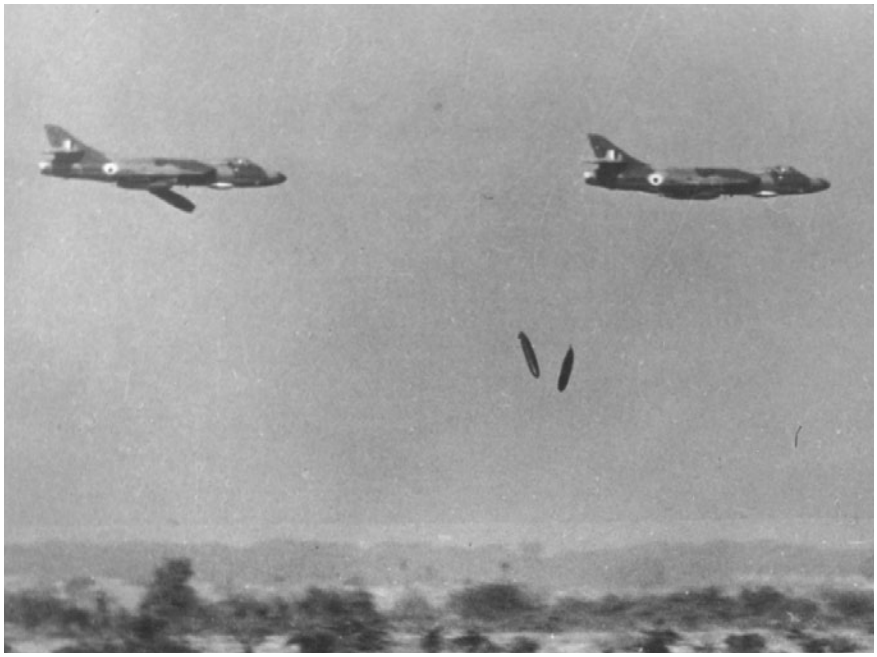
Cecil V Parker

Let me start with my tribute to Air Vice Marshal Cecil Parker, who, as a Wing Commander, was commanding the Operational Training Unit (OTU) on Hunters in Jamnagar in July 1968 when our course moved on from 20 hours on Vampires in Poona over six months to convert on to Hunters in OTU. In the unit, we had senior instructors like "Mumee" Bharadwaj, "Kammo" Vohra, "Herbie" David as Squadron Leaders and some Flight Lieutenants like "Kaka" Sawhney. All of them, under the guidance of the CO, were always ready to help us in their efforts to make us good officers. As a matter of fact, Herbie and some others would take me regularly for their outings. I was taken particularly since I could drive heavy vehicles including the 3-tonner, which was the only vehicle available those days for such activities. Being the regular MTD on unpaved surfaces for these trips, I even earned the nickname of Corporal Masand.

Wing Commander Parker used to take just one pupil from every course and I was the one chosen by him from my course. As the CO, we naturally tried to keep a little distance from him but both Wing Commander Cecil and Mrs Shirley Parker were so nice and warm to us that, soon, we were bouncing them at one in the morning on weekends along with the staff pilots of OTU. The Parkers always opened the door and welcomed us with a drink or two with Mrs Parker making sure that none of us went back without something to eat regardless of how late it was.

In such an environment, we naturally flourished and did our best at the theory and





ground subjects including the technical notes on the Hunter till late September before we started flying. I did my first dual check with WingCo Parker on October 04, 1968. In the very first trip, watching him handle the aircraft to perfection with smooth and gentle movements of the controls, I coined the slogan, with a little help from my course mate, Bala Menon, that "these fingers are meant to caress the power controls of the Hunter at 40,000 feet".

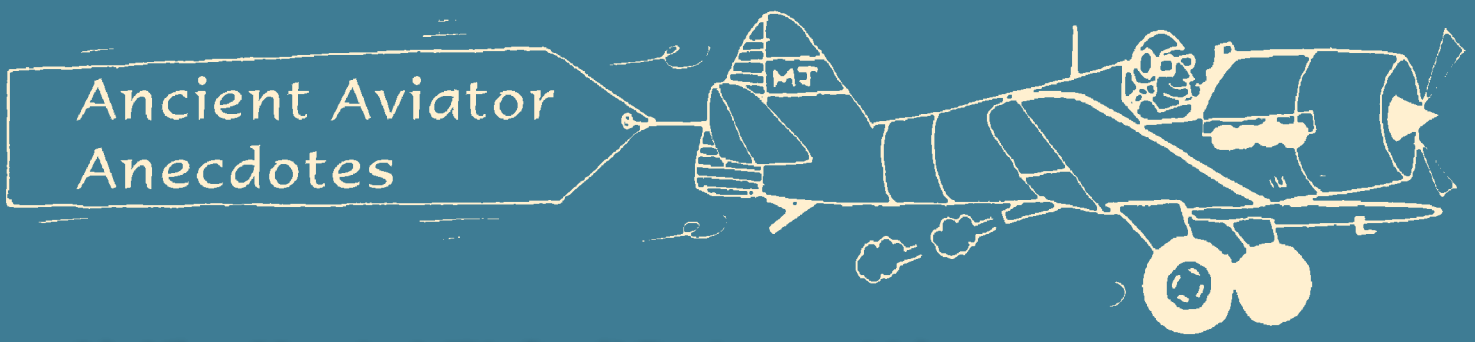
Apart from teaching me to fly the Hunter well, WingCo Parker had this habit of calling me from the aircrew room where we would be going over the pilots' notes of the aircraft to his office upstairs in the other building every Saturday just before pack-up around 1.30 pm. Those days, we worked six days a week. The first time, the seniors in the crew room told me to change into uniform before going to the CO's office but I decided not make him wait, while I changed, and rushed to his office in my French g-suit that we used on the Hunter. He didn't seem to mind that I was in my g-suit and, if he did, he didn't show it. In his office, he would throw me a tough question, either on aerodynamics or the aircraft system, and, then ask me to bring the answer first thing Monday morning with an impish smile and the line, "Have a nice weekend, Mister Masand".

As a consequence, I would rush to the Squadron or the Station library thereafter to get the requisite books/manuals and pore over these the entire weekend to somehow find the answer, many times missing out on the evenings or Sunday visit to town. This carried on for about eight or nine weekends in a row. One Monday, when I gave him the answer, he smiled and said, "Not correct, Mister Masand". We, then, had a discussion wherein I pulled out the AP-129 and showed him the paragraph supporting my reasoning. I must say, WingCo Parker gave me a patient hearing and accepted my reasoning and the answer without taking any offence, expected from most seniors when given a different response from what they believed or expected from a junior. Instead, he graciously put out his hand with "Have a great week ahead, Mister Masand".

While he spared my weekends after that, he had already inculcated in me an inquisitive attitude to everything. The habit of picking up a book on my own every night before going to bed, and even some weekends, remained with me and helped me tremendously in all my future assignments and aircraft that I flew. I also got into the habit of reading every aircraft manual from cover to cover so that none could tell me "Have a nice weekend, Mister Masand" with a smile thereafter.

Tail piece: Unfortunately, due to the bulge of the mid-1960s, our syllabus on the Hunters was curtailed from 50 hours to just what we had done or basic conversion of 11 sorties by end-November 1968 by Air HQ and we were all posted out of OTU to make room for the next course. I got out with just 16 sorties and missed learning a lot more about flying and life itself from this great man, Cecil Parker, as also Mrs Shirley Parker. Fortunately, I served under them again for a short while when he came as AOC Adampur ten years later and in Staff College in 1982 when he was the CI and did learn some more.

(Hunter photos for representational purposes only)



Air Vice Marshal (R) Cecil Parker and his.....

A REVIEW OF INTERVIEWS

In one of his recent calls, our younger grandson informed us that he had successfully cleared the written entrance exam to a prestigious course of training, and now faced his first ever formal interview and asked me for any advice. I had no professional guidance to offer but suggested that he listen carefully to any question, think clearly and answer truthfully. He assured me he would and I thought back to my own first formal interview, 71 years ago!

In 1950, as a teenager still in college, I was at the AFSB (Air Force Selection Board) in Dehra Dun where the final event was an interview with the President of the Board. After the expected question as to why I wanted to join the air force, ('I want to fly Sir') it was mostly helpful advice on working hard through the 18 month Basic and Advanced stages of pilot training. In all my years in the air force, I never met this very thoughtful and likable officer again.

My next interview was 22 years later. After the 1971 Indo Pak war, a well known broadcaster from AIR (All India Radio) toured air, naval and army bases on our western front to interview and (tape) record the experience of actual participants. Among others, I was interviewed by Mr Melville DeMellow in an informal and friendly meeting in Pathankot. We had actually met earlier in 1964 in Delhi when I had been the IAF representative in a tri–service Ceremonial Guard in our Prime Minister's Funeral Cortege where Mr. DeMellow was in the adjacent vehicle relaying the event. His 1971 interviews were later broadcast and subsequently published as 'Remembered Glory' by the Ministry of Information and Broadcasting in October 1972; I still have a copy he sent to me.

The years course at the RCDS (Royal College of Defence Studies) London in 1980 terminated with a personal interview with the Commandant. He was an Air Marshal of the RAF who was keen on receiving a feedback from each member of the course. I had my own feedback typed and offered it to him when asked about it. He read it immediately and thanked me profusely. The rest of the interview was mostly a read – out of the College's Report on my demonstrated performance as a member of my Service and as a representative of my country.

The Swarnim Vijay Varsh, which celebrates fifty years after the 1971 Indo Pak war, appears to have set off several requests for interviews with surviving participants. The interviewers are now media savvy professionals from my son's generation who create a podcast to be relayed on the internet. The first such interview last month was both video and audio which required me to don jacket and tie; after 35 years in kurtha/pyjama I found I had almost forgotten how to tie one!

After premature retirement from the air force in 1986 I attended just one interview with the CMD of the company I joined. Ironically one of my duties thereafter was to interview senior candidates aspiring to join our company thus giving me a different view on an interview! Incidentally we have since received news that our grandson has had a successful interview and is to join his new institution shortly

STAFF DUTIES

Military aviators fly actively for 20 to 30 years. The skills, knowledge and experience acquired, along with other attributes, also make them eligible to be employed on staff duties for another five to ten years. Staff duties refer to the occupation of officers employed on non-operational/support functions at controlling HQ. As many of these assignments include vital matters of policy, procedures and procurement, most armed forces have specialist staff colleges where selected officers are trained in a higher branch of professional knowledge. We have our own DSSC (Defence Services Staff College) at Wellington in TN where a years' course is conducted for officers of all three services. The training has a special emphasis on 'jointmanship' currently a primary *raison de'etre* for the establishment of theatre commands. At a more senior (one

star) level, we have the NDC (National Defence College) in New Delhi.

In January 1959, our air force held its very first DSCC entrance exam. I was then a young flight lieutenant with less than seven years of service but decided to prepare and appear for it. I was successful and attended the 1960-61 air staff course at DSSC which I found to be both interesting and educational. 12 years later I was posted as a Directing Staff (Air) in 1973-74 and returned for a third term as the Chief Instructor (Air) in 1981-83. All three tenures were professionally rewarding and the many

contacts/friendships made were useful in more than one future assignment. My employment in staff duties at HQ were restricted to a year at Air HQ (1961-62) and five months at HQ TC in 1975. A year at RCDS UK in 1980 made a total of seven years on non-flying duties.

There is one connection with staff duties I have never hitherto written about and that was my 'underground' role as a paper-setter/examiner for the DSSC entrance exam. In mid-1975 I received a confidential personal letter from a PSO in Air HQ informing me that I had been appointed (read 'detailed') to set the question paper, submit ideal answers ('greens' in staffco language), evaluate the answer books (turned out to be 185 in number) and render a consolidated report on the results for the next staff college entrance exam. At that point of time, I had 84 aircraft on my air base (50 Iskra + 24 Kiran + 10 Chetak) and my hands were full with the induction of a new aircraft type into our air force and overseeing the advanced stage of flying training on both fixed and rotary wing platforms. On the other hand it was a new challenge and learning opportunity so I took on the new assignment working outside office hours with only my PA in the know! The next year I was requested to repeat the exercise.

A look back at my 35 years in the air force (1951-86) reminds me that 80% was spent on air bases and the balance indoors. In my time however, officers of the flying branch employed on staff duties were permitted to periodically visit air bases for flying practice. I was most fortunate as the time-gap/distance from classroom to cockpit was always a short one for me!

HOME ALONE

(A Business Opportunity?)

My generation, as represented by my pilots course of 30 young pilot officers commissioned in 1952 and whose last member retired in 1988, today has nine survivors aged 88 to 91. We ancient aviators are a part of a growing number of senior veterans who live alone as their children are settled abroad or are still in harness elsewhere. This group includes couples, widows and widowers some of whom reside in independent houses, others in apartment complexes and a few in retirement homes in urban, sub-urban and rural areas. From time to time we old pensioners need help and, in the absence of any family members locally, turn to friends, neighbours or (in the case of air veterans) to the local branch of the AFA (Air Force Association). Covid -19s requirement for physical isolation has however severely restricted assistance from these sources.

The normal process of aging imposes its own limitations, e.g. most of us have a hearing disability (ie, no voice communication), suffer a temporary loss of short term memory and a gradual reduction in the effectiveness of human systems/sub-systems which necessitates regular medication. By and large we are also strangers in the digital world who need information and help while negotiating life online or handling laptops or smart phones to communicate our needs. Essential movements for medical reasons require a reliable driver or a hired vehicle with perhaps need for an escort for visits to canteens, banks, food stalls or shopping areas. And when the final take-off comes, the surviving spouse/family still need help with last rites, death certificates, family pensions, execution of wills, property mutations and so on. Can we not think of organising professional support systems which meet these needs, are commercially viable and not dependant entirely on buddy help or volunteers?

One source of such help is the recently retired service officer (with the necessary personal attributes) who may like to run an independent business or agency that provides a senior support system. It can charge a retainer fee from willing customers and who then pay separately for services requested, eg information, transportation, escort, home maintenance, medical assistance, food delivery and any other personal needs of senior veterans isolated at home. Investment would be minimal as such a service can be run from one's own home with normal communication and perhaps an assistant/driver. It would also provide gainful employment to recent retirees to use their service experience.

It could be a continuing win-win situation for both; today's single-point service provider might well be tomorrows home-alone customer!

25 Years Back

From Vayu Aerospace Review Issue IV/1996

IAF Renews Quest For Jet Trainers

It is learnt from authoritative sources in New Delhi that the Indian Air Force's senior air staff have once again urged the Centre for an early approval of their long pending demand for an Advanced Jet Trainer (AJT). The IAF's anxiety was made known to Prime Minister HD Deve Gowda during a high-level briefing in July 1996. The proposal to acquire AJTs has been awaiting acceptance and implementation since 1984 with the successive governments in power vacillating on the issue despite continuous warnings by the Air Force about the serious problems in training fighter pilots sans a lead-in fighter trainer.

OK On Tata-SIA Airline Imminent?

Civil aviation sources have indicated that there is a thaw in the government's policy and the present Civil Aviation Minister, Mr CM Ibrahim, is inclined to favourably review the proposal to establish Tata-Singapore Airlines (TSA). Already subjected to a long deferment, the proposal is likely to be cleared by October 1996. The proposal is to set up a viable airline company with 60 per cent Indian and 40 per cent foreign participation in the equity "as per the prescribed norms". This development is in consonance with the reported Civil Aviation Ministry proposal to formulate a new policy on civil aviation "which may result in the review of the earlier policy".

Defence allocation in budget 1996-97

The marginal hike in defence allocation has surprised the Indian defence establishment which was hoping for a significant increase in its outlays. The hope for a major defence hike in defence expenditure was raised as the Defence Minister had been speaking of getting more resource for acquisition of weapon systems and equipment, which has not taken place during the last five years.

Defence Outlay 'Peanuts' – BJP

According to reports, the United Front government's refusal to hike the allocation for defence has evoked strong criticism from the Bharatiya Janata Party while leaving the defence and security analysts concerned. While the independent analysts appeared perplexed over what they describe as the failure of the Deve Gowda government to break from the by-now familiar pattern of neglect of the defence sector despite a rapidly deteriorating security atmosphere, the BJP has described the defence outlay as 'peanuts'.

New Civil Aviation Policy on Anvil

The Ministry of Civil Aviation has expressed its intention to decide the future of foreign airlines operating on domestic routes and overhaul the local aviation industry. Civil aviation and tourism minister CM Ibrahim wants to give a verdict soon on the previous administration's liberalisation policies in the aviation sector. Mr Ibrahim has stated that the government would try to inject new life into state run Air India and Indian Airlines and turn them into profit-making carriers.

Indian Airlines to Train Chinese Pilots

According to IA sources at Hyderabad, the Central Training Establishment (CTE) of Indian Airlines plans to train pilots from China's regional airlines on its modern flight simulators at Hyderabad. Pilots from Singapore, Oman, Vietnam and Sri Lanka are already being trained at this Hyderabad-based establishment. At present, CTE has four simulators for the Airbus A300 the Boeing 737 and the Airbus A320 and has a plan to install another simulator for the Boeing 737-300, 400 and 500 series.

Acquisition of MCLR Aircraft

If Air India has to expand its market position and profitability in the face of growing competition, it must acquire medium-capacity long-range aircraft without delay. According to Adam Brown, Vice President of Airbus Industrie, Air India ought to opt for direct non-stop flights between New Delhi and Los Angeles as well as Mumbai and Los Angeles, to be able to increase its international market share and operating margins. Airbus Industrie of India President Kiran Rao has hopes that the French aviation major's fierce competition with Boeing for making sales to Air India would not come in the way of introducing direct regular flights between India and the USA.

Pawan Hans Helicopters for Customs

Pawan Hans Helicopters Ltd has inducted two new helicopters dedicated to the Department of Revenue for anti-smuggling surveillance operations. The two Bell 206L4 helicopters, acquired at a cost of Rs 9.5 crore are fitted with requisite equipment such as infra-red cameras, video recorders, powerful search lights and loud-speakers. The induction for the helicopters is the result of proposal floated three years ago. Mr MR Shivaraman, former Secretary, Department of Revenue, who received the aircraft at Bombay was of the view that the helicopters will greatly empower the customs earlier dependent upon sea vessels to tackle smuggling activities in the coastal region.

Controversy Over Pak Mirage 2000s

Pakistan's President Farooq Leghari may ask for a review of the intentions of the government to purchase 32 Mirage 2000-5 fighter aircraft at a cost of $4 billion. However, a review, which is strongly backed by the Army, is also being strongly resisted by several key players in the government, including members of the Prime Minister's office, the Defence Secretary and the Joint Chiefs of Staff. A decision on this controversial issue, which continues to divide the military and the political establishment will have to await the next meeting of the Defence Committee of the Cabinet next month.

Tale Spin

SpiceJet and their smart witty one-liners! But the way air travel is coming along, soon you will have to get shot twice to board an aircraft or travel overseas!

PoWR!!
Polar bear early-warning system!

Sensor solutions company Hensoldt is making its technology skills available for the protection of threatened species. The company has signed an agreement with the charitable organisation Polar Bears International to initiate a pilot project aiming at the sensor-based early warning of polar bears entering human settlements, thus giving communities notice and time to mitigate negative interactions. The pilot project "Polar Bear Warning Radar" (PoWR) will be operated in Canada.

Can we initiate them for a monkey EW system in our area here at New Delhi?

Who says there's no fun tracking aircraft transponders?

Aircraft trackers had some fun recently when a cute callsign combo of a KC-135 & KC-46 were spotted together: JOHN41 is KC-135R 63-8873 and LENON62 is KC-46A 16-46020!!

Will YOKO1 and ONO2 follow soon? Just Imagine!! Or Instant Karma?

India's Ministry of Education ads on Twitter for Covid prevention

Didn't realise Batman was ahead of the curve with his version of a PPE outfit! Seems Robin will have to mask up in today's era.

Afterburner

VAYU

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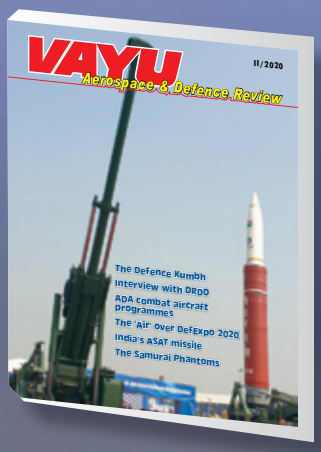
47th year of Vayu



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