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*Wed, 30 Aug 2023*

## **Parting Shot: Nag Anti-tank Guided Missile**

India's Defence Research and Development Organisation (DRDO) recently confirmed to Janes that the Nag anti-tank guided missile (ATGM), the development of which was started in the 1980s, has cleared all the flight and user trials required for induction into the Indian Army. The DRDO is currently awaiting an order from the Indian Army for the missile, a DRDO official said.

The Nag ATGM was developed by Bharat Dynamics Limited (BDL) and the DRDO's Defence Research and Development Laboratory (DRDL) to meet an Indian Army requirement for a vehicle- and air-launched ATGM with a maximum range of 4 km.

The Nag is a tripod-mounted ATGM that can also be mounted on helicopters and the Nag Missile Carrier (NAMICA) armoured vehicle, a variant of the Russian BMP-2 Sarath developed by the DRDO.

For targeting, the Nag missile employs a passive mercury cadmium telluride (MCT) focal plane-array imaging infrared (IIR)/longwave IR (LWIR) seeker. The missile uses a lock-on before launch (LOBL) mode; however, it is designed with stretch potential for lock-on after launch (LOAL) capability, according to the DRDO.

Following launch, the roll, pitch, and yaw of the missile are controlled by rotating the rear fins with an all-electric actuation mechanism powered by thermal batteries.

The combined thrust of the booster and sustainer propulsion systems ejects the Nag from its launch tube, following which the fins unfold. It uses a high-energy nitramine-based, extruded double-band, smokeless sustainer propellant.

The missile uses an 8 kg tandem high-explosive anti-tank (HEAT) warhead. The warhead is capable of penetrating 800 mm of rolled homogeneous armour equivalent (RHAe) behind explosive reactive armour (ERA). The Nag has a length, diameter, and weight of 1.83 m, 0.15 m, and 42 kg respectively.

<https://www.janes.com/defence-news/news-detail/parting-shot-nag-anti-tank-guided-missile>



**Press Information Bureau**  
Government of India

**Ministry of Defence**

*Wed, 30 Aug 2023*

## **Curtain Raiser: Launch of Y - 12654 (MAHENDRAGIRI)**

Mahendragiri, the last Project 17A Frigate, will be launched by Dr (Smt.) Sudesh Dhankhar, wife of Hon'ble Vice President of India, Shri Jagdeep Dhankhar, at M/s Mazagon Dock Shipbuilders Limited, Mumbai on 01 Sep 23.

Mahendragiri, named after a mountain peak in Eastern Ghats located in the state of Orissa, is the seventh ship of the Project 17A Frigates. These warships are follow-ons of the Project 17 Class Frigates (Shivalik Class), with improved stealth features, advanced weapons and sensors and platform management systems. The newly christened Mahendragiri is a technologically advanced warship and stands as a symbol of India's determination to embrace its rich naval heritage, while propelling itself towards a future of indigenous defence capabilities.

Under the Project 17A program, a total of four ships by M/s MDL and three ships by M/s GRSE are under construction. The first six ships of the project have been launched so far by MDL & GRSE, between 2019-2023.

Project 17A ships have been designed in-house by Indian Navy's Warship Design Bureau, the pioneer organisation for all warship design activities. Aligning with the country's resolute commitment to 'Aatma Nirbharata', a substantial 75% of the orders for equipment and systems of Project 17A ships have been ordered on indigenous firms, including Micro, Small, and Medium Enterprises (MSMEs). The launch of Mahendragiri is an apt testament to the incredible progress our Nation has made in building a self-reliant naval force.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1953504>

**THEWEEK**

*Wed, 30 Aug 2023*

## **BEL Makes Vehicle for NDRF to Respond to Radiological Biological Chemical Disasters**

State-owned Bharat Electronics Limited (BEL) has designed and manufactured a vehicle for the National Disaster Response Force to respond to incidents involving hazardous chemicals, biological or radiological substances, a release said.

The first CBRN (Chemical Biological Radiological Nuclear) HAZMAT (Hazardous Material) vehicle for NDRF was flagged off at BEL's Pune unit on Wednesday, it said.

This vehicle is yet another achievement in BEL's Make in India and Atmanirbhar Bharat initiatives, said the release.

The vehicle is used to detect, monitor and respond to hazardous chemical, biological or radiological incidents, where "it is vital to plug or seal the source of contamination to contain any further release of hazardous substances", the release said.

The vehicle has a spacious operator compartment integrated with a wide range of user-friendly "Chemical-Biological-Radiation-Nuclear detection and identification sensors", it said.

hand-held thermal imager, providing night vision. The vehicle has an alternate breathing support facility in the form of demand valve face masks during contingencies, read the release.

The vehicle provides a platform to take the responders up to the source of the leak and facilitates the responders in case of a CBRN disaster, where moving on foot would not be feasible, as per the release.

It is integrated with "NBC (nuclear, biological and chemical) Filtration System" for keeping the vehicle safe in an NBC contaminated area and provides fresh air for 6 personnel, the release said.

The vehicle is also integrated with "Hazard Prediction Software" that takes inputs from the observer about CBRN threat, environmental data from the weather sensor and positioning data from the on-board GPS system and provides a realistic picture of the whole scenario to the command and control centre, the release said.

The systems on board capture the responder's health data live to plan rescue and replacement. The vehicle also contains decontamination chambers for decontaminating responders re-entering the vehicle after operations.

<https://www.theweek.in/wire-updates/national/2023/08/30/bom50-mh-cbrn-vehicle-ndrf.html>



*Thu, 31 Aug 2023*

## **Navy to Get Counter-drone Systems for Warships Like INS Vikramaditya to Clip Wings of Pak, China**

The Indian Navy has decided to spend Rs 490 crore to procure counter-drone systems for its warships like the INS Vikramaditya and Vikrant and the force's bases ashore to combat threats from enemy drones of Pakistan, China, and terrorist outfits. News18 has accessed a tender document in this regard issued on August 29.

"The Ministry of Defence, Government of India, intends to procure Counter Drone System (Soft Kill) for use onboard Indian Naval warships and establishments ashore," says the Request for Information (RFI) document.

This is significant as enemy drones have been a major concern for Army and Air Force establishments in the country and led to the procurement of anti-drone systems by these forces. The Navy has now also decided to buy such systems given that the threat from enemy drones exists on the sea as well as its various bases in the country.

The Indian Navy has two aircraft carriers, INS Vikrant and INS Vikramaditya, eight warships, and various destroyers and frigates. The counter-drone systems will be procured from Indian vendors. "The system should be capable of installation on and operation from a ship, operation from establishment ashore, including mobile variant and should have 360° coverage through integral radar for aerial and surface target. The radar should have capability for detection and tracking of Mini/Micro drone at 5 km or more, and intercept them while identifying the direction of the drone's signals," says the document.

A Naval Anti-Drone System has been developed by the DRDO with the support of the Indian Navy and is being manufactured by Bharat Electronics Limited.

### **HOW THE SYSTEM WILL WORK**

The system would have directional ability to jam frequencies used for drone communication and would be capable of carrying out threat evaluation, target classification (nano/mini/micro drone, etc), target prioritisation, engagement planning, generating fire control solutions, and assignment of targets to weapons with operator control, the document says.

The counter-drone system can engage multiple targets and perform a "kill assessment". "The response time from assignment of the target to engagement should be such that it is able to achieve threat neutralization prior reaching the desired minimum interception range," the document says.

### **DRONE CAPACITY OF INDIAN NAVY**

The Navy has been using two General Atomics-manufactured SeaGuardian surveillance drones on lease since 2020 after the Galwan Valley clash between Indian and Chinese troops.

The government is also planning to buy 31 armed Predator drones (MQ-9B) from the US to further enhance the capabilities of the Army, IAF, and Navy.

<https://www.news18.com/india/navy-to-get-counter-drone-systems-for-warships-like-ins-vikramaditya-to-clip-wings-of-pak-china-exclusive-8557813.html>

# THE ECONOMIC TIMES

Wed, 30 Aug 2023

## **G-20 Summit: IAF AWACS, Fighter Jets, Air Defence Missiles to be on High Alert to Protect Delhi Air Space**

In view of the G-20 summit to be held in the next couple of weeks, the Indian Air Force would be keeping its airborne warning systems, fighter jets including the Rafale on high alert along with stationing the new air defence missile systems at vital locations to protect the Delhi air space to provide protection to the high-level meeting.

The counter-drone systems along with air defence missiles are also being stationed in the national capital to protect against any possible air threat in coordination with all security agencies by the Indian Air Force, defence sources told ANI. To keep an eye on any movement around the northern parts of the country, the 'eyes in the sky'- the Airborne Warning and Control Systems would remain in the air continuously. The indigenous surveillance plane 'Netra' would also be carrying out regular monitoring in the area. A number of air bases in the vicinity of the national capital territory including the areas of responsibility of the Western Air Command and the South Western Air Command would be ready in operational readiness platform mode.

The deployment would be done in view of doing away with the possibility of any aerial platform trying to create any obstruction in the high-profile meeting where heads of state from countries including the US, Saudi Arabia, Japan, France and Germany would be coming.

Prime ministers of Canada, UK and Italy would also be in attendance.

The air defence systems that the Indian Air Force surface air defence missile systems activated and deployed to protect Delhi air space include the Medium Range Surface to Air Missile (MRSAM) air defence system which can take out targets from 70-80 Km range along with the Akash air defence missile system which has been moved to areas from where it can counter any threat.

The Indian defence forces would also be seeing the deployment of their Special Forces to protect critical locations as a large number of global leaders would be in the national capital at an unprecedented scale in the last many years.

The IAF maintains such preparedness during national day celebrations like Republic Day and Independence Day when the highest air defence protocols are put in place in the national capital.

The air bases to be activated for the summit include the Hindan air base near Delhi and many others including Ambala, Sirsa, Bhatinda, and Adampur.

<https://economictimes.indiatimes.com/news/defence/g-20-summit-iaf-awacs-fighter-jets-air-defence-missiles-to-be-on-high-alert-to-protect-delhi-air-space/articleshow/103219837.cms>

## THE TIMES OF INDIA

*Thu, 31 Aug 2023*

### **Rajnath Singh to Visit Lanka Later this Week to Boost Military Ties**

Defence minister Rajnath Singh will head for Sri Lanka this weekend to further bolster bilateral military ties and cooperation to meet the challenges in the Indian Ocean Region (IOR), in a visit that comes amid China's ever-growing presence in the region, which has also seen some of its naval ships as well as 'spy' vessels docking at Sri Lankan ports.

Singh is slated to meet Sri Lankan President Ranil Wickremesinghe during his visit to the island nation on September 2-3. .

Noting that India is committed to help Sri Lankan armed forces in "capacity and capability-building", an official said New Delhi has extended a \$150 million defence line of credit to Colombo. "Out of this, around \$100 million credit has been utilised so far," he said.

Singh's visit comes soon after Chinese warship Hai Yang 24 Hao docked at Colombo earlier this month. Beijing has also sought Colombo's nod for a visit by its survey vessel Shiyan-6 in October-November.

India in the past has conveyed its strong concerns to Sri Lanka over allowing Chinese naval and spy vessels to dock at its ports.

The docking of Chinese vessel Yuan Wang-5 at Hambantota in August last year had, in fact, led to a major diplomatic wrangle between India and Sri Lanka.

<https://timesofindia.indiatimes.com/india/rajnath-singh-to-visit-lanka-later-this-week-to-boost-military-ties/articleshow/103222274.cms>

Wed, 30 Aug 2023

## **Indian Army Fortifies Border Vigilance with 130 Tethered Drones and 19 Advanced Tank Simulators**

To fortify the nation's intelligence, surveillance, and operational prowess along the formidable Line of Actual Control (LAC) the Indian Army, has firmed up agreements with the domestic companies for a fleet of 130 tethered drone systems.

Bringing innovation to the forefront, the Indian Army has etched its commitment by sealing pacts with NewSpace Research and Technologies, as well as the technological trailblazers at Zen Technologies Limited for drone systems and 19 state of the art tank driving simulators.

These tethered drones, akin to vigilant sentinels, establish an unbreakable link between the sky and the earth. With the ability to hoist payloads as crucial as cameras and radios, these drones stand as resolute tools, safeguarding the borders through continuous vigilance and oversight.

These strategic assets are poised to become instrumental in amplifying the Army's intelligence and operational capabilities along the LAC, to keep a watch on China.

Envisioning holistic readiness, this groundbreaking procurement initiative has brought aboard Zen Technologies, entrusted with the tethered drone systems, and Newspace Research Technologies Private Limited, bestowed with the responsibility of the tank driving simulators.

Propelled by the urgency of the times, the Indian Army's Armoured Branch expedited the tethered drone procurement proposal under the fast-track procedure. Commencing in January of this year, this initiative underscores the Army's commitment to securing borders and neutralizing threats that loom beyond the visible horizon.

### **About the Tethered Drone Systems**

These tethered marvels, with wings that span both day and night, promise to serve as vigilant guardians, transmitting vital data and video feeds that reinforce border security with unwavering persistence.

With precision as their hallmark, each tethered drone system encompasses twin aerial agents, gracefully laden with EO/IR payloads. A portable ground control station, a resilient tether station, a remote video terminal, a robust generator set, an accompanying battery charger, and a backup battery for each drone constitute the arsenal that these vigilant sentinels carry.

As per the requirements specified, the Indian Army insists upon a minimum of 60 percent indigenous content in this technological assembly. And the manufacturer is tasked to deliver these groundbreaking systems within the span of a mere 12 months.

Beyond the realm of aviation, tethered drones are a paradigm shift in surveillance, virtually anchoring them to the ground while empowering them to bear vital loads like cameras and radios. This very attribute catapults them to the echelons of indispensability in the realm of border surveillance and vigilant oversight.

<https://www.financialexpress.com/business/defence-indian-army-fortifies-border-vigilance-with-130-tethered-drones-and-19-advanced-tank-simulators-3227878/>

## **Brazil Army Chief Shows Keen Interest in 'Made in India' Weapons During Drills in Pokhran**

Brazilian Army commander General Tomas Miguel Mine Ribeiro Paiva witnessed a massive firepower demonstration by the Indian Army as he visited Pokhran in Rajasthan on Wednesday, August 30.

Paiva observed India's integrated drills, showcasing the prowess of the Indian defence industry. Armoured and mechanised troops of the Indian Army's Airavat Division (Black Elephants), under the Western Army Command, carried out integrated training manoeuvres with attack helicopters, as stated by Indian Army officials.

Army officials said the weapon systems executed operational manoeuvres in a combined arms firing exercise involving armour, mechanised infantry, artillery, army air defence, and aviation assets at the Pokhran Field Firing Range.

### **What was included in the Indian Army's display?**

Among the systems demonstrated in the weapons trials were India's indigenous surface-to-air missile Akash, T-90 S Bhishma tanks, India's Electronic Warfare systems as part of its Samyukta programme, and the Advanced Light Vehicle Helicopter Weapons System integrated variant Rudra. The demonstrations also included an older variant of the Arjun Tank, which experts at DRDO refer to as the "Desert Ferrari."

Indeed, it lived up to its name. Amidst the expanse of Rajasthan's desert, the MBT Arjun asserted its dominance. With a combat weight of 58.5 tons, it rampaged through the sands at 70 km/h. A symbol of "cutting-edge engineering," as described by DRDO. Equipped with a 120 mm calibre rifled gun, it possesses "relatively good" armour-defeating capability. However, the incorporation of Kanchan armour is what makes it a formidable beast, especially in the plains of Punjab and the deserts of Rajasthan.

Amid Rajasthan's desert heat, AKASH emerged as India's guardian of the skies during the weapons demo. A Short-Range Surface-to-Air Missile, it defends vulnerable zones with simultaneous multi-target engagement, Electronic Counter-Counter Measures to defend against enemy ECM threats, and, as per DRDO, due to the units being designed for quick deployment and mobility, the system becomes highly adaptable. Therefore, calling Akash as India's "Short King" should not be a drag, as explicitly mentioned by the Ministry of Defence during the cabinet's approval for its export, "Akash is the country's important missile with over 96 percent indigenisation." ALH has been among the crème de la crème of the Indian Armed Forces and is a true representative of Atma Nirbhar Bharat. HAL has delivered a total of 336 helicopters by October 2022, both to India and foreign customers. The indigenously designed and developed Advanced Light Helicopter (ALH-DHRUV) is a twin-engine, multi-role, multi-mission new-generation helicopter in the 5.5-ton weight class. The army showcased the Weapon System Integrated (WSI) variant Rudra, which performed in synergy with the mechanised and armoured troops as part of the integrated firing drills.

Electronic warfare systems of the Indian Army and signal apparatus were also part of the drills in Rajasthan, and the Brazilian Army chief witnessed India's capabilities firsthand.

## **The Brazilian Army Chief's reaction**

As reported by PTI, Paiva showed keen interest in 'Made In India' platforms as part of 'Aatmanirbharta'. "General Paiva expressed his admiration for the cohesion, coordination, interoperability, and complimented the robustness of the Indian Army to operate in varied terrains and difficult conditions, across various spectrums of engagement," the statement said.

The Commander of the Brazilian Army is on a six-day visit to India (August 28 - September 2, 2023) with the aim of bolstering India-Brazil armed forces ties. A day before the demonstration, he held talks with General Manoj Pande on cooperation and exchanged insights at the Army Headquarters, highlighting joint growth and the sharing of military practices. Meetings with the Defense Chief and Secretary were also geared towards achieving common security goals.

The "keen interest," as reported by PTI, in Indian defence technology presents an opportunity for exports of indigenous systems, as Brazil has emerged as India's biggest ally in recent years.

<https://www.republicworld.com/india-news/general-news/brazil-army-chief-shows-keen-interest-in-made-in-india-weapons-during-drills-in-pokhran-articleshow.html>



*Thu, 31 Aug 2023*

## **US Congress Clears Landmark India-US Fighter Engine Deal**

The United States (US) Congress has no objection to the Joe Biden administration's decision to pursue the GE jet engine deal with India, paving the way for the implementation of the company's agreement with the Hindustan Aeronautics Limited (HAL) that includes unprecedented technology transfer, manufacturing of jet engines in India and licensing arrangements.

A person familiar with developments on Capitol Hill, the home of the US Congress, said, "It is all clear from the legislative end. The sale was approved before Prime Minister Narendra Modi's visit itself. But, as per the process, the state department notified the House and Senate foreign relations committee on July 28." If, for 30 days after the notification, no Congressional representative or Senator objects, it is treated as assent. "There has been no objection. The administration can go ahead with the next steps," the person added, asking not to be named.

During President Biden's visit to India for the G20 summit in September, both countries are expected to discuss the next steps in taking forward the deal. Without confirming the status of the Congressional process, a senior administration said: "I don't want to steal any of the thunder of our meetings. We are working towards and expecting the necessary steps on both sides to be able to move forward on this historic agreement."

The state department refused to comment on the matter. A spokesperson said, "We are restricted from publicly commenting on the details of commercial defence trade licensing activities."

HT was the first to report before Modi's visit that the US administration had sealed the jet engine deal and the notification to the US Congress was imminent.

On June 22, the day of Prime Minister Narendra's Modi's historic state visit to Washington DC where he was accorded a ceremonial welcome in the White House before extensive bilateral talks and a state dinner, GE Aerospace and HAL signed a memorandum of understanding to produce F-414 jet engines in India for the under-development light combat aircraft (LCA) Mk2.

The deal is significant because the US treats jet engine technology as a “crown jewel” and hasn’t shared similar tech with even its closest allies. For its part, India has lagged in jet engine technology, a gap that the agreement can bridge, helping bolster both India’s aerial power, especially in the context of the fragile situation with China at the Line of Actual Control, and its ambition of building a domestic defence industrial base. US administration officials have acknowledged that the GE deal could be a model going forward, as it helps address India’s concerns over tech transfer and co-production and fits in with American hopes of integrating the defence ecosystems and platforms of both countries more closely.

The deal will involve 80% transfer of technology (ToT) and is estimated to be worth around \$1 billion. The production of the engines will result in the new fighter jet having an indigenous content of around 75% compared to 55%-60% in LCA Mk-1A and 50% in the existing variants, Indian officials familiar with the matter said. The deal with GE Aerospace to produce 99 F-414 engines under licence is likely to be signed during the current financial year, and the first lot of engines will be made in India three years thereafter, the officials added, asking not to be named.

The ToT will cover 11 critical areas many of which were entirely off-limits more than a decade ago when GE and India’s Aeronautical Development Agency (ADA) began talks on the possible production of the engines in the country. Back then, the US agreed to only 58% technology transfer, keeping a string of key engine technologies out of India’s reach, as previously reported by HT. The F-414 has evolved from the F-404 engine that powers the existing LCA variants, Mk1 and Mk1A. In February 2021, IAF signed a contract for 83 Mk-1A jets, taking the total number of LCA variants ordered to 123.

IAF’s 40 earlier LCA Mk-1s ordered are in the initial operational clearance (IOC) and the more advanced final operational clearance (FOC) configurations. The LCA Mk-2 will form an important element of IAF’s future combat capabilities as India is planning to build around 130 such fighter jets.

Last year, the government gave its nod for developing the LCA Mk-2, and sanctioned ₹10,000 crore for the project. The Mk-2 fighter will be the most advanced LCA variant to be designed and developed indigenously. Apart from the more powerful GE-414 engine, it will be equipped with superior radar, better avionics and electronics, and will be capable of carrying a higher weapons payload.

Under the deal, the complex engine technologies that will be transferred to India include machining and coating for single crystal turbine blades, fabrication of powder metallurgy discs, inertia friction welding for fan and afterburner, laser drilling technology for combustor, special coatings for corrosion and erosion, machining and coating of ceramic matrix composites for nozzle guide vanes, flaps and other parts, machining of thin-walled titanium casing, polymer matrix composites for bypass duct and bottle boring of shafts, the officials said.

The LCA Mk2 will have improved range, enhanced survivability, better situational awareness for pilots, network centric capabilities, and the ability to quickly switch from one role to another, the officials added.

The 17.5-tonne fighter will have a maximum speed of 1.8 Mach, compared to the 13.5-tonne LCA Mk-1A that has a top speed of 1.6 Mach. The new aircraft will come with a payload capacity of 6.5 tonne (compared to 3.5 tonne for the Mk1A) and it will carry a mix of weapons including beyond visual range air-to-air missiles, air-to-ground missiles, heavy precision guided weapons and conventional bombs.

<https://www.hindustantimes.com/india-news/us-congress-clears-landmark-india-us-fighter-engine-deal-101693418713191-amp.html>

## **U.S. Approves Military Aid to Taiwan under Program it Usually Reserves for Sovereign Nations**

The Biden administration has approved the first-ever U.S. military transfer to Taiwan under a program generally reserved for assistance to sovereign, independent states.

The State Department notified Congress of the sale on Wednesday. It said the material would “be used to strengthen Taiwan’s self-defense capabilities through joint and combined defense capability and enhanced maritime domain awareness and maritime security capability.”

The package is modest — only \$80 million of what Congress had set aside as a potential \$2 billion — but the implications of using the so-called Foreign Military Financing program to provide it will likely infuriate China.

Beijing, which regards Taiwan as a renegade province, has repeatedly not ruled out the use of force to reunite it with the mainland and vociferously protests all U.S. arms sales to the self-governing island.

However, previous arms sales to Taiwan have been approved under other authorities that do not necessarily imply statehood. U.S. officials were quick to say that the provision of FMF funding to Taiwan did not represent a change in policy. It's a position the Chinese are sure to disagree with.

The only other time the U.S. has provided a non-nation-state with military assistance under FMF was to the African Union, an organization of sovereign states based in Ethiopia, according to American officials. The notification, a copy of which was obtained by The Associated Press, did not specify what military equipment or systems would be paid for under FMF, which commits U.S. taxpayer dollars to pay for the supply of materiel to foreign countries.

But, it said items that could be covered would include: air and coastal defense systems, armored vehicles, infantry fighting vehicles, drones, ballistic missile and cyber defenses, and advanced communications equipment. It added that protective gear, an array of small, medium and heavy weapons systems, ammunition, armored and infantry fighting vehicles could also be included.

In addition to equipment, FMF may also be used to support training for Taiwanese military forces.

<https://www.thehindu.com/news/international/us-approves-military-aid-to-taiwan-under-program-it-usually-reserves-for-sovereign-nations/article67253357.ece>



## **US Deploys B-1B Bombers for Separate Drills with South Korea, Japan**

The United States separately deployed B-1B bombers for joint drills with South Korea and Japan on Wednesday, as the three allies have stepped up responses to threats from North Korea.

A U.S. B-1B flew alongside South Korean FA-50 jets and U.S. Air Force F-16 fighters as part of ongoing Ulchi Freedom Shield exercises, South Korea's defence ministry said. It marked the 10th such flight by an American bomber this year.

North Korea routinely denounces the annual military drills as a rehearsal for war. The allies have stressed that the exercises are defensive.

Separately, two U.S. Air Force B-1Bs joined joint drills with 12 Japanese fighters, including four F-15 jets, according to Japan's defence ministry.

The U.S.-led bomber drills came days after North Korea attempted a satellite launch that ended in failure.

The U.S. and South Korea began Ulchi Freedom Shield last week - a joint large-scale military exercise designed to enhance their response to Pyongyang's nuclear and missile threats, with the second part kicking off on Monday.

Wednesday's exercise was a demonstration of what the allies have called "extended deterrence" in the face of North Korea's recent space launch vehicle flights and a show of "strong united defence posture", South Korea's defence ministry said in a statement.

Tokyo's defence ministry said the U.S.-Japan joint air drills over the Sea of Japan on Wednesday confirmed the two militaries' "readiness to respond to any situation" amid North Korea's ballistic missile launches.

Japan also participated in a trilateral naval missile defence exercise with the U.S. and South Korea on Tuesday.

On Tuesday in a speech marking Navy Day, North Korean leader Kim Jong Un accused the United States and its allies of increasing the risk of nuclear war, referring to an Aug. 18 summit at Camp David between the United States, South Korea and Japan.

"Owing to the reckless confrontational moves of the U.S. and other hostile forces, the waters off the Korean Peninsula have been reduced to the world's biggest war hardware concentration spot, the most unstable waters with the danger of a nuclear war," Kim was quoted as saying by state media KCNA.

<https://www.reuters.com/world/us-b-1b-bomber-deployed-joint-military-drills-with-south-korea-2023-08-30/>

## THE TIMES OF INDIA

*Thu, 31 Aug 2023*

### **North Korea Launches Ballistic Missiles Toward the Sea after US Flies Bombers During Drills**

North Korea launched two short-range ballistic missiles toward the sea on Wednesday night, its neighbours said, hours after the US flew long-range bombers for drills with its allies in a show of force against the North.

The launches, the latest in the North's barrage of weapons tests since last year, came amid ongoing annual US-South Korean military exercises that North Korea regards as a rehearsal for invasion.

There were no reports of damages caused by Wednesday's launches. But observers say North Korea likely aimed to demonstrate again it has missiles capable of striking key targets in South Korea in protest at its rivals' military exercises.

South Korea's Joint Chiefs of Staff said in a statement that the North Korean missiles both travelled about 360 kilometres before landing in the waters of the Korean Peninsula's east coast. It said the missiles were launched from the North's capital region.

The Joint Chiefs of Staff called the launches “a grave provocation” that threatens international peace and violates UN Security Council resolutions that ban any ballistic launches by North Korea. It said the South Korean and US intelligence authorities were analyzing more details.

Japan's Defence Ministry said it also detected the launches. It said the missiles travelled a distance of 400 kilometres at the maximum altitude of 50 kilometres before falling outside Japan's exclusive economic zone.

Earlier Wednesday, the United States flew at least one B-1B bomber for a joint aerial training exercise with other South Korean and US warplanes, according to South Korea's Defence Ministry. It said the drills off the Korean Peninsula's west coast demonstrated the two countries' combined defence posture and the US commitment to the defence of South Korea.

Japan's Defence Ministry said that Japan and the US also conducted a joint aerial exercise involving two US B-1Bs on Wednesday over the waters between Japan and the Korean Peninsula. It said the exercise was meant to show the two countries' resolves to respond to any emergencies promptly and confirm their response capabilities.

North Korea is extremely sensitive to the deployment of US B-1B bombers, which are capable of carrying a large payload of conventional weapons. Wednesday's B-1B deployment is the 10th flyover by US bombers on the Korean Peninsula this year, according to South Korea's Defence Ministry.

On August 21, the US and South Korean militaries kicked off their summer Ulchi Freedom Shield computer-simulated command post exercise. During this year's training, set to last until this Thursday, the allies have included field exercises. South Korean defence officials said Wednesday's joint aerial exercise involving the B-1B aircraft was part of that field training.

North Korea's state media said Tuesday that leader Kim Jong Un called for the military to be constantly ready for combat to thwart plans by its rivals to invade. A state media dispatch cited Kim as saying in a speech marking the country's Navy Day on Monday that the waters off the Korean Peninsula have been made unstable “with the danger of a nuclear war” because of US-led hostilities.

Also Tuesday, South Korea, the US and Japan mobilised naval destroyers for a trilateral missile defence exercise near the peninsula in response to North Korea's evolving nuclear and missile threats.

“The Kim regime may intend to show that it has the ability to attack at any time and from many directions. It might wish to complicate the allies' missile tracking and analysis,” said Leif-Eric Easley, a professor at Ewha University in Seoul.

Kim has been pushing to enlarge and modernize his weapons arsenals. Since the opening of 2022, Kim's military has conducted more than 100 weapons tests, some of them involving nuclear-capable missiles designed to strike the US, South Korea and Japan and other developmental high-tech weapons systems.

Last week, North Korea's second attempt to launch a spy satellite into space ended in failure again. It said it would make a third attempt in October.

Foreign experts say Kim eventually wants to use his expanded weapons arsenals to force the US to make concessions when diplomacy resumes.

North Korea's testing spree has caused the US and South Korea to expand their drills, resume trilateral training involving Japan, and enhance “regular visibility” of US strategic assets at the Korean Peninsula. In July, the United States deployed a nuclear-armed submarine to South Korea for the first time in four decades.

<https://timesofindia.indiatimes.com/world/rest-of-world/north-korea-launches-ballistic-missiles-toward-the-sea-after-us-flies-bombers-during-drills/articleshow/103222415.cms>



*Thu, 31 Aug 2023*

## **US Claims Russia, North Korea ‘Actively Advancing’ in Negotiations Over Arms Deal**

As per a newly released United States intelligence, Russia and North Korea are “actively advancing” potential arms deal negotiations that would provide significant ammunition for various types of weapons systems, including artillery.

On Wednesday (August 30), the government of Joe Biden said that they have been concerned about the two pariah states which are in the middle of arms negotiations and that after the trip of Russian Defence Minister Sergei Shoigu to North Korea last month, Russia's second delegation of officials visited Pyongyang to further discuss a potential deal.

Along with the second delegation, letters were exchanged between Russian President Vladimir Putin and North Korean leader Kim Jong, in which the two leaders are “pledging to increase their bilateral cooperation,” as reported by National Security Council strategic communications coordinator John Kirby.

“We remain concerned that the DPRK continues to consider providing military support to Russia’s military forces in Ukraine and we have new information which we are able to share today that arms negotiations between Russia and the DPRK are actively advancing,” Kirby stated. “Following these negotiations, high-level discussion may continue in coming months,” he added.

“Under these potential deals, Russia would receive significant quantities and multiple types of munitions from the DPRK, which the Russian military plans to use in Ukraine. These potential deals could also include the provision of raw materials that would assist Russia’s defence industrial base,” Kirby stated, further promising that the US will take direct action for sanctioning any entities that are involved in a potential deal and appealed Pyongyang to cease the negotiations.

Letters exchanged were more at the surface level

He stated that the letters were “more at the surface level” but that North Korean and Russian weapons sales were advancing. The letters were exchanged by the leaders following the visit of Shoigu, he stated.

“Following Shoigu’s visit another group of Russian officials travelled to Pyongyang for follow-on discussions about potential arms deals between the DPRK and Russia,” said Kirby.

Earlier this month, a sanctions evasion network was sanctioned by the US Treasury which is aimed at supporting arms deals between Russia and North Korea. Kirby added that attempts were being

made by Russia to source weapons from countries like North Korea and Iran which clearly showed the distress of Moscow.

“There is no other way to look at that than desperation and weakness, quite frankly,” Kirby stated.

<https://www.wionews.com/world/us-claims-russia-north-korea-actively-advancing-in-negotiations-over-arms-deal-630701>

## Science & Technology News



*Thu, 31 Aug 2023*

### **Chandrayaan 3: Pragyan Rover Travels 15 Metres, Snaps Vikram Lander; ISRO Shares Fresh Visuals**

Hours after the Indian Space Research Organisation (ISRO) released the first image of the Vikram lander resting on the moon, the Pragyan rover's navigation cameras have captured another series of photographs featuring its companion. Shared by the Indian space agency, these pictures were taken today at 11am, when the rover had covered a distance of approximately 15 metres.

In a social media post on platform X, ISRO accompanied the visuals writing, “Beyond Borders, Across Moonscapes: India's Majesty knows no bounds! Once more, co-traveller Pragyan captures Vikram in a Snap! This iconic snap was taken today around 11 am IST from about 15 m.”

The data collected from the NavCams undergoes processing at ISRO's Space Applications Centre located in Ahmedabad, Gujarat.

Pragyan rover has two navigation cameras fitted in the front parts. Developed by Laboratory for Electro-Optics Systems (LEOS), it is said to be one of the best cameras put on the lunar surface.

LEOS, one of the vital units of ISRO, deals with the design, development and production of Attitude Sensors for all LEO (Low Earth Orbit) GEO (Geostationary Equatorial Orbit) and interplanetary missions; develops and delivers Optical Systems for remote sensing and meteorological payloads.

Where is the Chandrayaan 3's Pragyan rover presently?

Along with the image, ISRO has also shared coordinates of the Chandrayaan 3. It is 69.373 S, 32.319 E, well near the intended landing point of 4 km x 2.4 km at 69.367621 S, 32.348126 E, planned by the Indian space agency.

Vikram lander's probes seen in the image

The image reveals two of Vikram lander's vital instruments, Chandra's Surface Thermo-physical Experiment (ChaSTE) probe and the Instrument for Lunar Seismic Activity (ILSA) probe, both deployed on the lunar surface.

The ILSA sensor is designed to gauge seismic activities around the landing site, thus outlining the lunar crust and mantle's structural composition.

On the other hand, ChaSTE is tasked with conducting measurements of the lunar surface's thermal properties in the vicinity of the polar region. Through the employment of the thermal probe, ISRO has already divulged the moon's temperature profile, illustrating a marked temperature contrast between the surface (approximately 55 degrees Celsius) and a depth of 8 cm (-10 degrees Celsius).

Vikram lander also has LASER Retroreflector Array (LRA) and Radio Anatomy of Moon Bound Hypersensitive ionosphere and Atmosphere (RAMBHA) to understand the dynamics of the moon system and to measure the near-surface plasma (ions and electrons) density and its changes with time, respectively.

<https://www.hindustantimes.com/india-news/chandrayaan-3-pragyan-rover-travels-15m-snaps-vikram-lander-isro-shares-fresh-visuals-101693410871115.html>



*Wed, 30 Aug 2023*

## **Aditya L1 Launch: ISRO Completes Rehearsal, Internal Checks on PSLV**

The Indian Space Research Organisation (Isro) has successfully completed the launch rehearsal and internal checks for its upcoming Aditya-L1 mission.

This marks a significant milestone in India's first solar mission as Isro gears up for launch.

The Aditya-L1 mission is set to study the Sun from an orbit around L1, a point between the Earth and the Sun. The spacecraft carries seven payloads designed to observe various aspects of the Sun, including the photosphere, the chromosphere, and the outermost layer known as the corona. Four of these payloads will directly view the Sun, while the remaining three will carry out in-situ studies of particles and fields at the Lagrange point L1.

The launch of the Aditya-L1 mission is scheduled for September 2, 2023, at 11:50 am from the Sriharikota spaceport.

This mission is expected to provide crucial information to understand coronal heating, coronal mass ejection, pre-flare and flare activities, and their characteristics, dynamics of space weather, and propagation of particle and fields.

In addition to the Aditya-L1 mission, Isro also provided an update on the Chandrayaan-3 mission's Pragyan rover. The rover has confirmed the presence of Sulphur on the lunar surface, marking another significant achievement for Isro.

As India continues to make strides in space exploration, the successful completion of the launch rehearsal and internal checks for the Aditya-L1 mission brings the country one step closer to understanding the mysteries of our Sun.

<https://www.indiatoday.in/science/story/aditya-l1-launch-isro-completes-rehearsal-internal-checks-on-pslv-c57-2428760-2023-08-30>

## Smooth Operation of Liquid Apogee Motor Engine Critical to Aditya-L1 Success

A small but powerful engine going by the acronym ‘LAM’ will have a critical role to play in the Indian Space Research Organisation’s (ISRO) upcoming Aditya-L1 mission meant to study the sun.

The successful operation of LAM, short for Liquid Apogee Motor, is vital to ISRO’s plans to place the Aditya spacecraft in a halo orbit at Lagrangian point L1.

Developed by the Liquid Propulsion Systems Centre (LPSC), the ISRO centre for liquid and cryogenic propulsion in Thiruvananthapuram, LAM has played an important role in missions, including the 2014 Mars Orbiter Mission (MOM) Mangalyaan and the more recent Chandrayaan-3.

In simple terms, LAM engines are used for orbital adjustment manoeuvres of satellites/spacecraft in orbit. For the Aditya-L1 mission, the ISRO will be using a LAM identical to the one used in the Mars and moon missions, says LPSC Director V. Narayanan.

Aditya-L1 is the first ‘space-based observatory class Indian solar mission to study the Sun,’ according to the ISRO.

The ISRO is planning to launch the mission using a Polar Satellite Launch Vehicle (PSLV-XL) on September 2. Once the Aditya spacecraft exits the earth’s sphere of influence and heads toward its destination — the Lagrangian point L1 which is 1.5 million km away — the LAM engine will shut down for the best part of the four-month journey.

The propulsion system of the spacecraft comprises the 440 Newton LAM engine plus eight 22 Newton thrusters and four 10 Newton thrusters which will be intermittently fired. The thrusters will be used to correct the orientation of the spacecraft as it traverses the vast emptiness of space.

The big challenge before the ISRO is restarting LAM at the precise moment for ‘braking’ the spacecraft as it closes in on its destination and nudging it into the desired halo orbit at L1. During the Mangalyaan mission, this critical manoeuvre, ‘waking’ the LAM engine after an extended ‘hibernation’, had given ISRO scientists nail-biting moments.

“The propulsion module system on Aditya-L1 is identical to the one used on Chandrayaan-3. The LAM engine is similar. Its propellant combination (mono-methyl hydrazine (MMH) and MON3 (MON, short for mixed oxides of nitrogen) too is the same. Its volume is different, hence propellant tank sizes are also different,” says Dr. Narayanan.

About 1.5 million kilometres from the earth between it and the sun is L1, one of the five Lagrangian points or ‘equilibrium points’ in the sun-earth system. Aditya is to be placed in a halo orbit at this vantage point in space to carry out studies with its seven scientific payloads.

<https://www.thehindu.com/sci-tech/science/smooth-operation-of-lam-engine-critical-to-aditya-l1-success/article67252358.ece>

Wed, 30 Aug 2023

## **GalaxEye Revolutionizes Space Imaging with High-Resolution Aerial Drone-based SAR System**

GalaxEye, a pioneering SpaceTech start-up, has achieved a groundbreaking feat by introducing an innovative high-resolution Aerial Drone-based Synthetic Aperture Radar (SAR) System. This cutting-edge technology allows for detailed all-weather imaging, even in adverse conditions. GalaxEye has set itself apart as a leading player in this field, alongside established organizations like ISRO & DRDO.

Their proprietary data fusion technology enables satellite constellations to perform all-weather imaging without being hindered by atmospheric challenges. This advancement facilitates the creation of detailed images through a compact satellite constellation. Once fully operational, this constellation aims to achieve global coverage within a 12-hour window, proving invaluable across sectors such as insurance, agriculture, property assessment, and utility monitoring.

Dr Sudheer Kumar of ISRO acknowledges GalaxEye's capabilities, emphasizing the growth of young space startups in India. Dr V Kamakoti of IIT Madras praises GalaxEye's achievements and the promising landscape of India's space-tech ecosystem.

Suyash Singh, GalaxEye's CEO, has highlighted the company's tech prowess and commitment to its mission in an official company statement. The accomplishment underscores India's space successes and its growing space-tech ecosystem.

Founded in 2021, GalaxEye is the brainchild of entrepreneurs from Avishkar Hyperloop. The start-up is developing a multi-sensor imaging satellite with high resolution and a unique Data-as-a-Service model. Collaborations with organizations like Antaris Inc and Dassault Systemes further propel their endeavors. The company has also sought support from ISRO to advance its initiatives.

<https://www.financialexpress.com/business/defence-galaxeye-revolutionizes-space-imaging-with-high-resolution-aerial-drone-based-sar-system-3227224/>

