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New Thippasandra Post
Bangalore 560 075
Karnataka, INDIA
Phone No : +91 80 25273851
Email: editoraesi@yahoo.com
Website: www.aerjournalindia.com

Publication Team

Dr R Balasubramaniam
Dr S Kishore Kumar
Dr P Raghothama Rao
Mrs Chandrika R Krishnan
Mr Hemanth Kumar R
Mr Kumaran A K M

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Head Quarters

The Aeronautical Society of India
13-B, Indraprastha Estate
New Delhi 110 002, India
Tel: +91 11 23370516
Fax: +91 11 23370768

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Qualification testing of VIKAS Engine for Gaganyaan Programme



High Thrust VIKAS Engine for Gaganyaan programme has successfully undergone qualification test for a duration of 25 seconds at ISRO Propulsion Complex (IPRC), Mahendragiri, Tamil Nadu. With regard to the Vikas engine qualification for the Gaganyaan Programme, two engines have already undergone tests under nominal operating conditions for a total duration of 480 seconds. The test carried out today is to verify the robustness of the engine by operating beyond its nominal operating conditions (fuel-oxidiser ratio and chamber pressure). The performance of the engine met the test objectives and the engine parameters were closely matching with the predictions during the entire duration of the test. Further, three more tests are planned for a cumulative duration of 75 seconds under varying operating conditions. Subsequently, another high thrust Vikas engine will undergo a long-duration test for 240 seconds to complete the Vikas engine qualification for Gaganyaan Programme.

Source: <https://www.isro.gov.in/>

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CURRENT AFFAIRS

Qualification testing of Cryogenic Engine for Gaganyaan Programme

ISRO successfully conducted the qualification test of Cryogenic Engine for Gaganyaan programme for a duration of 720 seconds at ISRO Propulsion Complex (IPRC), Mahendragiri, Tamil Nadu. The performance of the engine met the test objectives and the engine parameters were closely matching with the predictions during the entire duration of the test. This successful long-duration test is a major milestone for the Human Space Programme – Gaganyaan. It ensures the reliability and robustness of the cryogenic engine for induction into the human-rated launch vehicle for Gaganyaan. Further, this engine will undergo four more tests for a cumulative duration of 1810 seconds. Subsequently, one more engine will undergo two short-duration tests & one long-duration test to complete the cryogenic engine qualification for Gaganyaan Programme.



Source: <https://www.isro.gov.in/>

Shri. S Somanath assumes charge as Secretary, Department of Space

Shri. S. Somanath assumed charge as Secretary, Department of Space and Chairman, Space Commission. Shri. Somanath assumed charge after a stint of four years as the Director, Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram. He also served as the Director of Liquid Propulsion Systems Centre (LPSC), Valiamala, for two and half years. Shri. Somanath obtained B. Tech in Mechanical Engineering from TKM College of Engineering, Kollam, and Masters in Aerospace Engineering from Indian Institute of Science, Bangalore, specializing in Structures, Dynamics, and Control with a Gold Medal. He joined VSSC in 1985 and was a team leader for the Integration of PSLV during the early phases. Shri. Somanath is an expert in the area of system engineering of Launch vehicles. His contributions in PSLV and GSLV MkIII were in their overall architecture, propulsion stages design, structural and structural dynamics designs, separation systems, vehicle integration, and integration procedures development. He is the recipient of the 'Space Gold Medal' from the Astronautical Society of India. He received the 'Merit Award' and 'Performance Excellence award' from ISRO and a 'Team excellence award' for GSLV Mk-III development. He is a Fellow of the Indian National Academy of Engineering (INAE), a Fellow of the Aeronautical Society of India (AeSI), Astronautical Society of India (ASI), and a Corresponding Member of the International Academy of Astronautics (IAA). He is in the bureau of the International Astronautical Federation (IAF) and a recipient of the National Aeronautics Prize from the Aeronautical Society of India (ASI). He has published papers in journals & seminars in structural dynamics and control, dynamic analysis of separation mechanisms, vibration & acoustic testing, launch vehicle design, and launch services management.



Source: <https://www.isro.gov.in/>

Third Arihant class submarine quietly launched in November

The third of the Arihant-class SSBN (Sub Surface Ballistic Nuclear) submarine code-named S4, was quietly launched some time in the last week of November in Visakhapatnam. Though this was not officially confirmed by the Ministry of Defence or the Indian Navy so far, sources in the navy and Ship Building Centre (SBC) in Visakhapatnam, where India's nuclear submarines are being built, have confirmed it. The soft launch of S4 was first reported by UK-based Janes Defence Weekly, citing satellite imagery sources. The construction, commissioning, testing and status of the SSBNs are directly under the Strategic Forces Command (SFC) or the Strategic Nuclear Command (SNC), which is under the control of the PMO (Prime Minister's Office). Confirming the launch, a senior naval officer said that the launch of a submarine is nothing more than getting the outer hull floated in water. It was in the dry dock area till now and it is now in the water. It is still a long way for sea trials, weapon trials and commissioning, he said. The first of the SSBN pack, INS Arihant (code name S2) was launched amidst much fanfare, when it was launched on July 26, 2009, with Gursharan Kaur, wife of then Prime Minister Manmohan Singh, breaking a coconut on the hull, to mark its launch in Visakhapatnam. S3 is undergoing sea trials. But it took almost five years, since its launch to undergo its first sea trials some time in December 2014. INS Arihant was finally commissioned by Prime Minister Narendra Modi in August 2016. As per sources, the second in the pack, S3 or INS Arighat is ready and is undergoing advanced sea trials. To complete the nuclear triad (nuclear weapon operability from air, land and sea) India's The Heron TP (Image courtesy: Israel Aerospace Industries website) |Representational Image| 10 aims to have at least four SSBNs. It is learnt that S4 is bigger in size, tonnage and capability compared to S2 and S3. Sources say unlike S2 and S3, which can carry four K-4 or 12 K-15 SLBMs (submarine launched ballistic missiles), S4 is being built to accommodate eight K-4 or 24 K-15 SLBMs. The missiles can be launched through vertical tubes, when the submarines are in submerged state. The K-4, developed by DRDO, is tested and cleared for production, is a variant of land-based ballistic missile Agni – III, and has a range of about 3,500 km. On the other hand, K-15 is the variant of Shaurya and has a range of 750 to 1,500 km, depending on the size of the warhead.

Source: <https://www.thehindu.com>

Packed '22 for ISRO with Disha, Trishna, Venus missions; work on Gaganyaan will continue

ISRO, which has had two lean years, has ahead of it what appears to be a packed 2022 with work on multiple high-profile missions, including the Gaganyaan and Chandrayaan-3 programmes, expected to progress. Aside from the human space (Gaganyaan) and lunar (Chandrayaan-3) missions, the space agency also has its eyes set on three key missions: Disha, a twin-satellite system that will study Earth's aeronomy, the uppermost layer of Earth's atmosphere. Trishna, a joint mission with CNES, the French space agency, meant for accurate mapping of land surface temperatures. And a mission to Venus. While Trishna is scheduled for a 2024 launch, no immediate timeline is available for Disha and the Venus mission. Besides, some work is expected to happen on the NISAR and Xposat missions too. However, in terms of launch missions, Isro may only manage an uncrewed Gaganyaan mission and Chandrayaan-3 other than the regular earth observations, SSLV and commercial satellite missions. According to scientists from Isro, Disha will be implemented by the Physical Research Laboratory. Short for "Disturbed and quiet-type System at High Altitude", it'll involve twin satellites orbiting Earth at an altitude of 450km. "...Three new space science missions are in the pipeline: Disha, the Venus mission and the Isro-CNES joint mission Trishna. Trishna is meant for accurate mapping of land surface temperatures and will be the benchmark for temperature data at best resolution and repeatability globally," Sivan said in his New Year address. Farming, Water Mgt & Land Planning According to CNES, Trishna — Thermal infraRed Imaging Satellite for High-resolution Natural resource Assessment — will acquire imagery of Earth's surface in the thermal infrared with a resolution and revisit frequency never seen before. "Trishna is designed to observe Earth's surface in the thermal infrared domain. Temperature is an indicator of the energy budget of land surfaces — croplands, pastures, forests, urban areas, snow and ice — and yields a wealth of information such as plant water stress and evapotranspiration," CNES' description of Trishna, reads. Today, temperature measurements from space can only be obtained monthly at a resolution of about 100 metres, and daily global measurements are only available at a resolution

of one kilometre, CNES said. Gaganyaan, Chandrayaan-3 & Aditya As reported earlier by TOI, Sivan reiterated that Gaganyaan has completed the design phase and entered the testing phase. “Tests are in progress for human-rated L-ILO Vikas engine, Cryogenic stage, Crew escape system motors and service module propulsion system. The S200 motor has been realised for ground testing too. Main parachute drop test has also commenced. Astronauts have completed the generic spaceflight training abroad,” he said.

Source: <https://timesofindia.indiatimes.com/>

Indigenous Aircraft Carrier Vikrant heads out for next round of sea trials

The Indigenous Aircraft Carrier (IAC) Vikrant has headed out for the next set of sea trials on January 9, shortly after two high-profile visits — that of the President and the VicePresident of India within a span of about two weeks. The maiden sea trials in August 2021 were to establish propulsion, navigational suite and basic operations, while the second sea trial in October-November saw the ship being put through various machinery trials and flight trials. Here, the ship was out for 10 days, proving its sustenance in the very second sortie. Various seamanship evolutions were also successfully cleared during the second sortie. The IAC now sails to undertake complex manoeuvres to establish specific readings of how the ship performs in various conditions. Various sensor suites of the ship too would be tested. Scientists from the Naval Science and Technological Laboratory — a DRDO laboratory based at Visakhapatnam would embark the vessel during the trials, the Navy has said. That the ship was able to carry out basic flying operations from its very first sortie itself is a landmark in Indian warship construction history. Despite surging COVID cases in the country and the resultant challenges, the combined teams from multiple organisations associated with the project, are upbeat and committed to meet the timelines. On successful completion of a series of progressive sea trials, the ship is scheduled to be commissioned as INS Vikrant later this year, as the nation commemorates ‘Azadi ka Amrit Mahotsav’. The ship would operate a mix of MiG-29K fighter aircraft and various helicopters, ranging from the Kamov-31 Air Early Warning helicopters, the soon-to-be inducted MH-60R multi-role helicopters and the indigenously developed Advanced Light Helicopter Mk III, the Navy said.

Source: <https://www.thehindu.com>

Rafale fighter to join carrier Vikrant for compatibility trials

As the 40,000-tonne, indigenous aircraft carrier Vikrant sailed out from Kochi harbour on Sunday for the third phase of sea trials, beginning Monday, French aircraft maker Dassault Aviation will fly its Rafale-M fighter jet from the Indian Navy’s Shore Based Test Indigenous Aircraft Carrier Vikrant heads out for sea trials from Kochi on January 9, 2022. Photo: Special Arrangement 3 Facility (SBTF) in Goa to demonstrate compatibility and suitability to operate from the carrier’s deck. The Rafale-M arrived in Goa last Thursday and the demonstration is expected to go upto February 1, two Defence officials independently said. Boeing will also demonstrate the compatibility of its F/A-18 Super Hornet on the SBTF likely in March, it has been learnt. These trials are part of demonstrations by aircraft manufacturers to showcase the compatibility of their aircraft to fly from Indian Navy’s aircraft carriers which use a ski-jump to launch aircraft, one official explained. Both the Rafale-M and F/A-18 are originally designed to operate from carriers with a catapult launch mechanism. The carrier would thus require minor modifications to operate the aircraft, officials said. A government-to-government agreement could be signed based on the aircraft selected to speed up the process, one of the official observed. Boeing has taken a lead in the race having already demonstrated the ability of F/A-18 to take off from a similar shore based facility at Naval Air Station Patuxent river in Maryland, U.S. in December 2020. However, each fighter brings certain advantages while having some limitations. For instance, while the Rafale-M is not a twin-seater, its acquisition would mean commonality with the Indian Air Force which will soon complete inducting the 36 Rafale jets contracted in 2016. On the other hand, the F/A-18 is a more widely employed platform with a twin-seater trainer and also has an electronic warfare version which might be of interest to the Navy. There is also the issue of the size of the aircraft and their fit on the carrier and its lifts, which would also be factored in the final evaluation. Urgent

requirement In 2017, the Navy had floated Request For Information (RFI) to procure 57 twin-engine carrier fighters which is now set to downsized to around 26, including few twin-seater trainer variants. The revision is in the backdrop of a new indigenous Twin Engine Carrier Based Deck Fighter (TEBDF) being designed and developed by the Defence Research and Development Organisation (DRDO) and Aeronautical Development Agency (ADA). However, the procurement has now gained urgency as the Navy is short of aircraft to operate from both the carriers. The Vikrant is scheduled to be commissioned this August coinciding with 75 years of Independence, while the aviation trials and operationalisation will go into 2023. INS Vikramaditya, the only carrier in service presently, operates the Mi9-29K aircraft. While 45 aircraft were originally contracted from Russia, their availability has been a major problem and won't fill the requirements of both the carriers, Navy officials stated. According to ADA, the first flight of the under-development, TEBDF is planned in 2026. It is envisaged as a twin-engine medium weight fighter, with an all up weight of 26 tonnes and wing folding and is meant to replace the Mig-29Ks in service, as reported by The Hindu earlier. Phase-3 sea trials The Vikrant had sailed out for maiden trails in August 2021 and Phase-2 trials in October of that year. According to the Navy, in the current phase of sea trials, the carrier will "undertake complex manoeuvres to establish specific readings of how the ship performs in various conditions." Scientists from the Naval Science and Technological Laboratory, a DRDO laboratory based at Visakhapatnam would also be on board during the trials, the Navy said. "In addition, various sensor suites of the ship would also be tested."

Source: <https://www.thehindu.com>

'Light Combat Aircraft MK-1A to take flight in June'

Hindustan Aeronautics Limited (HAL) expects to deliver all Light Combat Aircraft (LCA) Tejas in the Final Operational Clearance (FOC) variant to the Indian Air Force (IAF) in 2022 while the LCA MK-1A, with specific enhancements, will take flight by middle of this year, said R. Madhavan, Chief Managing Director, HAL. "We will be attempting at least 6-8 aircraft (LCA) this year. All 10 aircraft are already ready, there are some systems to be delivered from Israel. If that happens in time, we can deliver all 10," Mr. Madhavan told The Hindu talking of the hectic calendar HAL has for this year. "By June this year we should start flying the LCA MK-1A configuration. Once flying starts, we have about 20 to 24 months of testing. Once that is done, we will be ready for deliveries as expected." Last February the Defence Ministry had signed a Rs.48,000 crore deal with HAL to supply 83 LCA MK-1A to the IAF. HAL will be delivering the first three aircraft in 2024 and 16 aircraft per year for subsequent five years, the Defence Ministry had stated earlier. We will start manufacturing activities parallel with the testing, Mr. Madhavan said on LCA MK-1A schedule. With COVID-19 cases surging again, there could be some delay if the work schedule is disrupted. To ramp up production, HAL has already set up two additional assembly lines. Stating that all three LCA assembly lines are operational now, Mr. Madhavan said the back end of the lines is what they are finishing now including supply of sub-assemblies by vendors. LCA-MK2 roll out by year end or early 2023 The design for LCA MK-2, a much bigger aircraft, has been frozen and some of the manufacturing activities have started. Hopefully by this year end or early 2023 we should have the first roll out of the aircraft, and one year after that it will be taking to the skies, Mr. Madhavan said. "We are targeting early 2023 but we should be able to do it slightly early." The LCA MK-2 features enhanced range and endurance including Onboard Oxygen Generation System (OBOGS), which is being integrated for the first time. Heavy stand off weapons of the class of Scalp, Crystal Maze and Spice-2000 will also be integrated on the MK-2. The MK-2 will be a heavier and much more capable aircraft than the current LCA variants with the aircraft 1350mm longer, featuring canards and can carry a payload of 6,500 kg compared to 3,500 kg by the LCA. IAF had earlier placed orders for 20 IOC (Initial Operational Configuration) standard aircraft and 20 FOC standard aircraft including eight twin seater trainers. The First LCA squadron with IOC aircraft is complete and the second squadron with FOC has also been operationalised. Once the FOC aircraft are delivered, the twin seater aircraft would be the balance from this order. The HAL is also expecting the formal contract from the Services for the Light Combat Helicopter (LCH) which was formally handed over to the IAF by Prime Minister Narendra Modi at an event in Jhansi in November. The manufacture of the Light Utility Helicopter (LUH), which has received the Initial Operational Clearance, is also in advanced stages with HAL's new facility in Tumkur set to be Taking flight: HAL will try to deliver all 10 Light Combat Aircraft (LCA) Tejas aircraft by this year. File | Photo Credit: The

Hindu 5 ready by March. The government recently informed in Parliament that four Limited Series Production (LSP) LUH would be manufactured by 2022-23 and eight LSP LUHs by 2023-24.

Source: <https://www.thehindu.com/>

The Light Combat Aircraft programme

The story so far: According to the Chief Managing Director of Hindustan Aeronautics Limited (HAL), R Madhavan, HAL expects to deliver all Final Operational Clearance (FOC) variant aircraft to the Indian Air Force (IAF) in 2022 pending some systems from Israel, while the LCAMK1A is expected to take flight in June this year. There is another 20 to 24 months of testing after which deliveries would begin with manufacturing activities going parallel to the testing. The Light Combat Aircraft (LCA)-Tejas was conceptualised in the year 1984. Since the first flight of the LCA technology demonstrator in January 2001, the indigenous single engine 4.5 generation multi-role fighter jet christened as 'Tejas' by then Prime Minister Atal Bihari Vajpayee in May 2003, has come a long way both in terms of the maturity of the platform as well as the overall aircraft development programme despite repeated delays and cost overruns. In all, 123 LCA aircraft of various configurations are on order so far. What is the status of the LCA programme? Two decades since the first flight, in February 2021, the Defence Ministry signed a Rs.48,000 crore deal with HAL to supply 83 LCA-Mk1A to the IAF. This includes 73 LCA Tejas Mk-1A fighter aircraft and 10 LCA Mk-1 trainer aircraft at the cost of Rs.45,696 crore along with design and development of infrastructure sanctions worth Rs.1,202 crore. The MK-1A will have over 40 modifications over the MK1 variant including some major ones like a new Electronic Warfare system, Advanced Electronically Scanning Array (AESA) radar, Beyond Visual Range (BVR) missiles and network warfare system including Software Defined Radio (SDR). LCA achieved Initial Operation Clearance (IOC) in December 2013 and FOC in February 2019. The IAF had earlier signed two contracts with HAL, for 20 IOC configuration aircraft including four IOC trainers on March 31, 2006 and for 20 FOC configuration aircraft including four FOC trainers on December 23, 2010. Both the deliveries have been delayed due to delays in the certification process. The first IOC fighter aircraft was delivered in 2016 and the first LCA squadron No. 45 "Flying Daggers" in the IAF was formed in July 2016 with two aircraft. The first squadron is now complete and the second LCA squadron No. 18 'Flying Bullets' was operationalised in May 2020. What is the cost of the LCA development programme? The Government had originally sanctioned Rs.2,188 crore for Full Scale Engineering Development (FSED) —Phase-I programme to design and develop two Technology Demonstrators (TDs), and Rs.5,777.56 crore for FSED —Phase-II Programme. The objectives of Phase-II are fabrication of three Prototype Vehicles (PVs), establishment of production facility at HAL for production of eight aircraft per year and manufacturing and delivery of eight Limited Series Production (LSP) aircraft. To the skies: Final Operational Clearance version of LCA Tejas Mk-1 which the Indian Air Force added to its armoury in 2020. 4 On the overall project cost, the Government informed Parliament in March 2020 that a total of Rs.11,096 crore has been spent till date on the indigenous LCA and the Kaveri jet engine (now shelved) development programmes. Of the total amount, Rs.9,063.96 crore was spent on LCA and Rs.2,032 crore on the Kaveri Engine. What is the way forward? As per the contract, HAL has to deliver the first three MK1A aircraft to IAF in 2024 followed by 16 aircraft per year for the next five years, according to the Defence Ministry. To ramp up production, HAL has already set up two additional assembly lines which are operational. Some back end activities are also being finished at the moment, according to HAL. The indigenous content in LCA is currently about 52% and HAL said it is looking at ways to increase it to 65%. In addition, the LCA-MK2, a larger aircraft with a more capable engine is expected to roll out by year end or early 2023 following which it would take a year for its first flight. The LCA-MK2 brings significant capability enhancement to the LCA programme featuring new technologies, ability to carry heavy stand off weapons like Scalp, Crystal Maze and Spice-2000. It can also carry significantly higher payload, 6,500kg compared to 3,500kg by the LCA. An ambitious fifth generation fighter aircraft Advanced Medium Combat Aircraft (AMCA), and a new Twin Engine Deck Based Fighter (TEDBF) to operate from the Navy's aircraft carriers are being developed by the Defence Research and Development Organisation (DRDO) and Aeronautical Development Agency (ADA). The AMCA is envisaged as a 25 tonne aircraft with internal carriage of 1,500kg of payload and 5,500kg external payload with 6,500kg of internal fuel with the roll out planned in 2024 and first flight planned in 2025, according to ADA officials. The TEDBF is being designed based on lessons learnt from the Naval LCA programme and the first

flight is planned in 2026. In addition to supplying to the IAF, HAL is aggressively pitching its helicopters and Tejas to countries in South East Asia and West Asia and LCA is in the contest in Malaysia. Stating that the price is competitive, Mr. Madhavan had earlier stated that each LCA MK1A jet would cost Rs.309 crore.

Source: <https://www.thehindu.com>

Indian Army celebrates 74th Army Day

The Indian Army celebrated its 74th Army Day. Every year, 15 January is commemorated as “Army Day” to remember the occasion when General (later Field Marshal) KM Cariappa took over the command of the Indian Army from General Sir FRR Bucher, the last British Commander-in-Chief in 1949 and became the first Indian Commander-in-Chief of Independent India. The Indian Army’s theme for the year 2022, “In Stride with the Future”, is an acknowledgement of the increasingly critical role played by niche and disruptive technologies in modern warfare. The Indian Army confronts a plethora of security challenges, conventional and non-traditional, and is looking at Artificial Intelligence (AI), 5G, Robotics and Quantum Technology to find innovative solutions to these emerging challenges. The Army Day celebrations commenced with the Wreath Laying ceremony at the National War Memorial where the three Service Chiefs paid homage to the bravehearts. In his message to all ranks of the Indian Army, the Chief of the Army Staff, General MM Naravane saluted the supreme sacrifice of all personnel who laid down their lives in the line of duty, reiterating his unstinted support to the Veer Naris and Next of Kin of the fallen soldiers. He assured the Nation that the Indian Army was operationally ready to deal with any adverse situation. The Chief of the Army Staff reviewed the Army Day Parade at the Cariappa Parade Ground, Delhi Cantonment and awarded 15 Sena Medals (including five posthumously) for individual acts of gallantry and 23 COAS Unit Citations to units for their commendable performance. The Army Day Parade this year showcased the evolution of various weapon systems held in the Indian Army’s inventory. New and modern weapon systems and platforms were displayed alongside their old counterparts. Centurion tanks were followed by Arjun Main Battle Tanks and TOPAS was succeeded by the BMP-II. Similarly pairs of the 75/24 Indian Field Gun and Dhanush, PMP/PMS and Sarvatra bridges and Tiger Cat & Akash Surface to Air Missiles were also on display. The parade also included International Sports awardees and seven marching contingents, including mounted horse cavalry. A song titled ‘Maati’, sung by famed singer Hariharan, dedicated to the Army and the Nation, was exclusively released during the event. The Indian Army also unveiled the latest pattern of its combat dress during the parade.

Source: <https://pib.gov.in/>

Year of hectic activity for Hyderabad-based DRDO labs

It has been a year of an unusual spree of missile launches, testing of new weapon and defence systems by the Defence Research and Development Organisation (DRDO) labs, most of which are established here. Testing centres at Balasore, offshore site at the Kalam island, Jaisalmer and Pokhran in Rajasthan and others became a beehive of activity when at least a dozen new age advanced weapon systems for the armed forces underwent trials before the induction. Senior officials, requesting anonymity, explained that the missile launches and testing of other weapon systems were meticulously planned despite the cascading effect of COVID-induced lockdown in 2020. Though defence lab works were in full swing with protocols in place, field trials which involved coordination among different agencies, movement of equipment and the likes, made it an assembly line of trial launches. A.P.J. Abdul Kalam Missile Complex, housing Research Centre Imarat (RCI), Defence Research and Development Laboratory (DRDL) and the Advanced Systems Laboratory (ASL) has had a key role in almost all trials as scientists tested for advanced radars, avionics, algorithms, integrated software, rocket motors, propulsion systems and so on. Top of the pops is new generation nuclear-capable ballistic surface to surface ‘Agni P’ missile which was successfully flight tested twice. Another significant one is the quasi-ballistic surface to surface tactical new generation ‘Pralay’ - which too achieved twin success, they said. Defence Minister Rajnath Singh handed over MRSAM - Medium Range Surface to Air Missile System to Indian Air Force (IAF). It is an advanced network centric combat air defence system developed jointly with

Israel Aerospace Industries (IAI); Long Range Surface to Air Missiles (LRSAM) - final production batch was flagged off for Indian Navy, also developed with IAI to tackle targets like fighter aircraft and cruise missiles. HELINA - Helicopter launched Nag missile (for army) and Dhruvastra (for IAF) missile are third generation, Lock On Before Launch (LOBL) fire and forget Anti-Tank Guided Missiles to engage targets both in direct hit mode and top attack mode underwent trials. Indigenously developed low weight, fire and forget Man Portable Antitank Guided Missile (MPATGM) with miniaturized infrared imaging seeker and advanced avionics was test fired so was vertical launch Defence Research and Development Organisation (DRDO) successfully flight test a New Generation Nuclear Capable Ballistic Missile 'Agni P' from Dr APJ Abdul Kalam island. File | Photo Credit: PTI 2 of Short-Range Surface to Air Missile (VL-SRSAM) for Indian Navy to neutralize threats at close ranges like sea-skimming targets. Indigenously developed low weight, fire and forget Man Portable Antitank Guided Missile (MPATGM) with miniaturized infrared imaging seeker and advanced avionics was test fired so was the vertical launch of Short-Range Surface to Air Missile (VL-SRSAM) for the Indian Navy to neutralize threats at close ranges including sea-skimming targets. Air version of BrahMos supersonic missile was successfully test fired from fighter aircraft Sukhoi 30 MK-I as also the supersonic cruise missile assisted torpedo system. Flight trial of new generation surface to air Akash missile was conducted from a land-based platform for the air defence capability of IAF against fast targets. Another one 'Akash Prime' was successfully flight tested with an indigenous active Radio Frequency (RF) seeker for improved accuracy. Two flight tests of indigenously-developed smart anti-airfield weapon was carried with IAF where satellite navigation and electro optical sensors were successfully tested for the first time. Another important development was flight test of Solid Fuel Ducted Ramjet (SFDR) for development of long-range air-to-air missiles, they said. Finished products like 'Shakti', an advanced electronic warfare system was handed over to Indian Navy by Prime Minister Narendra Modi. Incidentally, DRDO Young Scientist Lab - Assymmetric Technologies (DYSL-AT), the brainchild of the PM and also located here, had successfully demonstrated the drone swarm tech last year, senior officials added.

Source: <https://www.thehindu.com/>

BrahMos supersonic cruise missile, with enhanced capability, successfully test-fired off Odisha coast

BrahMos supersonic cruise missile, with increased indigenous content and improved performance, was successfully test-fired from Integrated Test Range, Chandipur off the coast of Odisha at 1030 hrs on January 20, 2022. The launch was conducted by Brahmos Aerospace in close coordination with the teams of Defence Research and Development Organisation (DRDO). In this text-book flight, the missile followed the predicted trajectory meeting all mission objectives. The flight test is a major milestone in the way forward for BrahMos programme. The highly manoeuvrable missile cruised at supersonic speed for its maximum range and all mission objectives were met. The missile was equipped with the advanced indigenous technologies and followed a modified optimal trajectory for enhanced efficiency and improved performance. The missile with the modified control system has been fine tuned to achieve an enhanced capability. This flight test was monitored by all the sensors of the range instrumentation including telemetry, radar and electrooptical tracking systems deployed across the eastern coast and the down range ships. Teams from DRDO and NPOM, Russia participated in the test. BrahMos Aerospace, the joint venture between DRDO and NPOM, Russia, has been continuously upgrading the powerful, highly versatile BrahMos to increase its effectiveness and lethality against sea and land targets. BrahMos is the potent missile weapon system already inducted into the Armed Forces. Raksha Mantri Shri Rajnath Singh has complimented the Brahmos, DRDO teams and industry for the successful flight test. Secretary, Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy appreciated the scientists and engineers for continuously putting efforts to maximise the weapon systems efficiency and more focus on indigenous content. Director General, BrahMos Shri Atul D Rane congratulated the joint teams of NPOM, Russia and DRDO teams involved in the test.

Source: <https://pib.gov.in>

Stalled by Covid curbs, ISRO now goes on fast-track, to launch 5 satellites in 3 months

Indian Space Research Organisation (Isro), under its new chairman S Somanath, is gearing up to accelerate space activities, which were till now paralysed for several months due to Covid-triggered restrictions. In the next three months, Isro is targeting to launch five satellite missions involving three rocket launches, which also include the maiden launch of India's first newly-developed small satellite launch vehicle (SSLV or mini-PSLV) targeted at scaling up launches of small-sized commercial satellites. While giving the timelines of the new launches to space minister Jitendra Singh in Delhi on Tuesday, the Isro chairman mentioned a RISAT-1A satellite launch with PSLV C5-2 rocket scheduled for February, OCEANSAT-3, INS2B and ANAND satellite launches by PSLV C-53 in March and SSLV-D1 launching a microSAT in April. This year, Isro also has the distinction of launching Gsat21, the first fully-funded satellite of New Space India Ltd (NSIL) that will be owned and operated by the public sector undertaking. This communication satellite will meet direct to home (DTH) application needs of the country. While Risat-1A is a remote sensing satellite that will boost the country's border security, Oceansat-3 is a ocean-observation satellite and INS2B is a satellite belonging to Bhutan developed by a group of Bhutanese engineers trained by Isro. ANAND satellite is the first satellite of Indian startup Pixxel and will become part of Pixxel's Firefly fleet of earth observation satellites, which will help detect, monitor and predict global phenomena in real-time. MicroSAT to be launched by India's first SSLV will be an experimental imaging satellite. Somanath also updated Jitendra Singh about the status of the Gaganyaan programme and said there had been a delay in timeline because of Covid and other constraints "but now things have again fallen back on track and all the systems needed for the first unmanned mission are getting realised", a statement from the Department of Space said. Before the final manned mission in 2023, Isro is planning to launch two unmanned missions, the second one will carry a 'vyommitra (humanoid)', before the final mission involving two or three gagannauts to space for seven days. The minister was also informed that gagannauts have successfully undergone generic space flight training in Russia and now a dedicated ad-hoc centre has also been established at Bengaluru. New ISRO chairman S Somanath updates space minister Jitendra Singh on missions to be launched this year, in New Delhi on Tuesday 22 for a specific training for the mission. The preparations for the human mission, said the Isro chairman, involve in-flight demonstration of the crew escape system functioning in lower atmosphere (less than 10km). The exercise recovery of the crew module after impacting in the sea is also being worked out.

Source: <https://timesofindia.indiatimes.com>

ISRO announces opportunities for proposals for 12th cycle of Astrosat observations

The Indian Space Research Organisation (Isro) is soliciting proposals for the twelfth cycle of observations to be made by Astrosat, India's first space-based telescope, through its latest Announcement of Opportunities (AO). This announcement is open to Indian scientists and researchers residing and working at institutes, universities, colleges in India for 55% of time and to Non-Indian scientists and researchers, NRIs, working at space agencies, institutes, universities, colleges around the globe for 20% time, who are involved in research in the area of astronomy and are equipped to submit proposals as Principal Investigators (PIs). The applicants must be equipped to submit proposals as PIs for specific target observations with necessary scientific and technical justification and can analyse the data, if the target is observed based on approvals, Isro said, adding that in the twelfth cycle, "55% of observing time is available for Indian proposals and 20% of observing time is for International proposals" and that the rest of the time in this cycle is allotted for calibration, targets of opportunity and the "AstroSat long term key proposals (ALTKP). AstroSat is the first dedicated Indian astronomy mission aimed at studying celestial sources in X-ray and UV spectral bands simultaneously. The satellite is at 650km near-equatorial orbit with six-degree orbital inclination. AstroSat completed six years in orbit at the end of September 2021 and currently the eleventh cycle proposals are being executed. And, observations for the twelfth cycle will be carried out between October, 2022 to September 2023. "A significant amount of AstroSat's observing time is made available to PIs of proposals, both Indian and International. The observations will be planned as per mission scheduling. The PI will be informed, after the completion of successful observation for the

downloading of processed Level-1 data,” Isro said. The space agency added that after the 12-month proprietary period, the archived data will be open to registered users and will be publicly available.

Source: <https://timesofindia.indiatimes.com/>

TECHNOLOGY

Indigenous Intermediate Jet Trainer completes six-turn spins

Defence PSU Hindustan Aeronautics Limited (HAL) on Thursday said that the Intermediate Jet Trainer (IJT), designed and developed by it for stage-II training of Indian Air Force (IAF) pilots has successfully demonstrated the capability to carry out six-turn spins. The aircraft was piloted by Gp Capt (retd) HV Thakur and Gp Capt (retd) A Menon. HAL CMD R Madhavan said: “Given the right resources and backing, HAL is capable of designing products that can meet any requirement of Indian armed forces.” Mr Arup Chatterjee, director (engineering and R&D) added that by demonstrating its capability to have six turn spins on both sides the IJT has achieved a major milestone. “The success can be attributed to the synergy between designers, flight operations and certifying agencies,” he said, adding that with the completion of spin certification of HTT-40 and the progress achieved in IJT, HAL will soon have the state-of-the-art trainers for stage I and II training of IAF pilots. The IJT, which was conceived by HAL as a replacement to the ageing Kirans of IAF fleet, had completed demonstration of its capabilities in terms of altitude and speed envelope, load factor, satisfactory stall characteristics and limited armament capability as required by IAF, earlier. “...The only pending task was spin testing. During the course of spin testing, in 2016, the aircraft departed from a controlled flight which brought the programme to a temporary halt. However, The meeting was held under the chairmanship of Army Chief General MM Naravane who has currently been appointed as the acting chairman of COSC by defence minister Rajnath Singh. (PTI/File Photo) 5 HAL decided to proceed further using its internal resources to complete the critical Spin testing,” HAL said in a statement. The PSU added that the capability to enter and recover from spin is a necessity for a trainer aircraft in order to familiarise the trainee pilot to recognise departure from controlled flight and the actions required to recover from such situations. “Achieving satisfactory characteristics during spin and an assured recovery from spin form a part of very crucial flight tests due to its unpredictability. The spin flight testing is inherently a high-risk maneuver and therefore progresses incrementally turn by turn. Due to the complex interplay of aerodynamic and inertia forces, the motion of the aircraft in spin is unpredictable and flight testing is the only way to assess the acceptability or otherwise of its characteristics,” HAL added. Pointing out that spin flights are carried out in good weather conditions with a team of designers, flight test engineers and safety pilots monitoring various parameters during the flight, HAL said, it was, therefore, time-consuming. “Several flight tests are required to be carried out before six-turn spin flights are undertaken as well as a number of flights are further required before full spin certification is achieved,” it added. Subsequent to the temporary halting of flight tests in 2016, HAL undertook major modifications like shifting the vertical tail aft on the airframe and increasing the rudder area and flight testing resumed in April 2019. These modifications entailed the use of a new Anti-Spin Parachute system (ASPS) which is mandated for the safety of the aircraft and test crew during spin flight testing. The new ASPS was integrated into the aircraft in July 2020 and the successful streaming of the parachutes were demonstrated in September 2020. HAL commenced the stall and spin testing of the IJT in its new modified configuration in November 2020.

Source: <https://timesofindia.indiatimes.com>

Gaganyaan crew will have 2 landing choices: ISRO expert

The country’s maiden manned mission to space, Gaganyaan, which is targeted to send two-three gagannauts to space for seven days, is set to have two landing site choices, a senior Isro official handling the mission said. The crew

module will be splashing down near the Indian coast in 2023 after it returns from the week-long mission, and the Arabian Sea, which is comparatively calmer, is the primary choice though the Bay of Bengal is also being considered as a backup option, wrote Dr Unnikrishnan Nair S, director, Human Space Flight Centre (HSFC), ISRO, Bengaluru, in an article 'Indian Human Space Mission' in a publication. While in orbit, the orbital module (OM) will be orbiting the Earth with a velocity of about 7,800 metre/second. The crew module, a habitat of astronauts, has an ablative thermal protection system (TPS) to protect it during the intense aerodynamic heating during the flight, Nair wrote. The orbital module will be launched by a human-rated GSLV MK-III vehicle. For Gaganyaan, the four selected gagannauts have undergone generic space flight training in Russia for nearly 15 months and will now undergo training at the Astronaut Training Facility, being set up at Bengaluru. The crew will undergo training in weightlessness condition by flying in special aircraft through a parabolic path that will give 25 to 30 seconds duration of weightlessness. To familiarise the crew with rescue under abort conditions, they will undergo special survival training in sea, snow, mountain and desert conditions. Before the final manned mission, Isro has scheduled to send a 'vyommitra' (a human-like robot) to space in two unmanned missions, one of the missions is likely to be launched around this year.

Source: <https://timesofindia.indiatimes.com>

DRDO flight tests final deliverable configuration of MPATGM

Defence Research and Development Organisation (DRDO) successfully flight tested the final deliverable configuration of Man Portable Anti-Tank Guided Missile (MPATGM) on January 11, 2022. The indigenously developed anti-tank missile is a low weight, fire & forget missile and is launched from a man portable launcher, integrated with thermal sight. The missile impacted the designated target and destroyed it. The final impact event was captured on camera and the test has validated the minimum range successfully. The present test was to prove the consistent performance for the minimum range. All the mission objectives were met. The missile has miniaturised infrared imaging seeker and advanced avionics for on-board control and guidance. The missile performance has been proven for the maximum range in earlier test trials. Raksha Mantri Shri Rajnath Singh has congratulated DRDO for the consistent performance of the anti-tank missile and said that this is an important step towards Atmanirbhar Bharat in advanced technology-based defence system development. Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy congratulated the team for the excellent performance of the missile during the test.

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=1789153>

BUSINESS

Announcement of Opportunity (AO) soliciting proposals for 12th AO cycle observations

The Intermediate Jet Trainer (IJT), designed and developed by HAL for stage –II training of IAF pilots has successfully demonstrated the capability to carry out six turn spins to the LH and RH sides. The aircraft was piloted by Gp. Capt HV Thakur (Retd) and Gp. Capt A Menon (Retd). Given the right resources and backing, HAL is capable of designing products that can meet any requirement of Indian Armed Forces, says Mr. R Madhavan, CMD. Mr Arup Chatterjee, Director (Engineering and R&D) added that by demonstrating its capability to have six turn spins on both sides the IJT has achieved a major milestone. He attributed the success to the synergy between designers, flight operations and certifying agencies (RCMA and DGAQA). He further hoped that with the completion of spin certification of HTT-40 and the progress achieved in IJT, HAL will soon have the state-of-the-art trainers for stage I and II training of IAF pilots. The IJT which was conceived by HAL as a replacement to the ageing Kirans of IAF fleet, had completed demonstration of its capabilities in terms of altitude and speed envelope, load factor, satisfactory stall characteristics and limited armament capability as required by IAF, much earlier. The only pending task was spin testing. During the course of

spin testing, in 2016, the aircraft departed from controlled flight which brought the programme to a temporary halt. However, HAL decided to proceed further using its internal resources to complete the critical Spin testing. The capability to enter and recover from spin is a necessity for a trainer aircraft in order to familiarise the trainee pilot to recognise departure from controlled flight and the actions required to recover from such situations. Achieving satisfactory characteristics during spin and an assured recovery from spin form a part of very crucial flight tests due to its unpredictability. The spin flight testing is inherently a high risk maneuver and therefore progresses incrementally turn by turn. Due to the complex interplay of aerodynamic and inertia forces, the motion of the aircraft in spin is unpredictable and flight testing is the only way to assess the acceptability or otherwise of its characteristics. The spin flights are carried out in good weather conditions with a team of designers, flight test engineers and safety pilot monitoring the various parameters during the flight and therefore time consuming. Several flight tests are required to be carried out before 6-turn spin flights are undertaken as well as a number of flights are further required before full spin certification is achieved. Subsequent to the temporary halting of flight tests in 2016, HAL undertook major modifications like shifting the vertical tail aft on the airframe and increasing the rudder area and flight testing resumed in April 2019. These modifications entailed the use of a new Anti-Spin Parachute system (ASPS) which is mandated for the safety of the aircraft and test crew during spin flight testing. The new ASPS was integrated into the aircraft in July 2020 and the successful streaming of the parachutes were demonstrated in September 2020. Despite the delays due to COVID-19 pandemic, HAL could commence the stall and spin testing of the IJT in its new modified configuration in November 2020. Wg. Cdr M Patel (Retd) was the test director and Gp. Capt. K K Venugopal (Retd) was the safety pilot in command at telemetry.



Source: <https://hal-india.co.in/>

HAL Signs Contract for Export of ALH to Mauritius

In-line with Government's vision to boost defence exports to friendly foreign countries, HAL signed a contract with Govt. of Mauritius (GoM) for export of one Advanced Light Helicopter (ALH Mk III) for Mauritius Police Force. The Govt. of Mauritius already operates HAL built ALH and Do-228 aircraft. With this contract, HAL and GoM have further strengthened the long standing business relations spanning over three decades. The contract was signed by Mr. BK Tripathy, General Manager, Helicopter Division-HAL and Mr. OK Dabidin, Secretary of Home Affairs, Prime Minister's Office, Govt. of the Republic of Mauritius recently at HAL's Transport Aircraft Division, Kanpur in the presence of Mr. Apurba Roy, General Manager, TAD-Kanpur, Mr. K Jhugroo, Deputy Commissioner of Mauritius Police, Mrs. P Sohun, Dy Permanent Secretary, Govt. of Mauritius, Mr. T Abdoolahkhan, Chief Inspector of Mauritius Police and Mr. Arup Kumar Mallick, Addl. General Manager (Mktg)-HAL. The ALH Mk III is a multi-role, multi-mission versatile helicopter in 5.5 tonne category. It has proven its mettle in various utility role including numerous lifesaving missions during natural calamities in India and abroad. More than 335 ALHs have been produced till date logging around 3,40,000 cumulative flying hours. HAL also ensures technical assistance and product support to the customer to ensure healthy serviceability of the helicopter.



Source: <https://hal-india.co.in/>

India could evade US curbs on S-400 deal, signals Biden aide

More signs that the Biden administration will waive sanctions against India for buying Russian S-400 air defense system emerged on Wednesday with a key official saying Washington will have to weigh geo-strategic considerations involving China against a domestic law that calls for punitive action. “The administration has made clear that it is discouraging India from proceeding with the acquisitions of Russian equipment, and there are important geostrategic considerations, particularly with (unintelligible) relationship to China. So, I think we have to look at what the balance is,” James O’Brien, President Biden’s nominee for the US State Department’s coordinator for sanctions policy said at his confirmation hearing, hewing to the broad sentiment in the administration and in Congress to give New Delhi a pass. Indications that India could get past sanctions for the systems which Moscow has already begun supplying came also from remarks from lawmakers even as they noted that New Delhi is in process of acquiring new frigate ships from Russia. “India is a vital ally in our competition against China, and thus, I believe we should resist taking any actions that might drive them away from us and the Quad. I am therefore strongly supportive of waiving CAATSA sanctions against India, given our shared foreign policy interests,” Indiana senator Todd Young said. Despite the growing sentiment against Russia on account of its alleged interference in US elections and its aggressive posture in its sphere of influence, the Biden administration and lawmakers appear intent on giving New Delhi enough wiggle room for now in return for an assurance that India will wean itself off Russian military supplies. “As most here know, the Indians have a lot of legacy systems from previous decades, and they are interoperable with the Russians’ systems. And the Indians seek to defend their land border from Chinese incursions and defend the Indian Ocean from an increasingly adventurous and lawless blue ocean navy in the People’s Liberation Army,” Young noted in his support for a waiver under US domestic law known as Countering America’s Adversaries Through Sanctions Act (CAATSA). India signed a \$5-billion deal with Russia to buy five units of the S-400 air defence missile systems, despite a warning from the then Trump administration that going ahead with the contract may invite US sanctions. Delivery of the systems to India began late last year 10 India signed a USD 5 billion deal with Russia to buy five units of the S-400 air defence missile systems, despite a warning from the then Trump administration that going ahead with the contract may invite US sanctions. Delivery of the systems began late last year. The US administration has also struggled with giving India a pass while CAATSA is being invoked against Turkey, a NATO ally whose ties with Washington has gone south lately. Asked about this by Young, O’Brien said it is difficult to compare the two situations, describing India as “a partner of growing importance.” “India’s got some decisions in front of it, so it would be premature to say more. But this is something I look forward to working with you and other interested members,” he added.

Source: <https://timesofindia.indiatimes.com/>

In first BrahMos missile export order, Philippines approves \$374-million contract

In the first export order for the BrahMos supersonic cruise missile system, Philippines has approved a \$374.96 million contract for the purchase of shore based anti-ship variant of the missile from India, while discussions are ongoing with few other South East Asian countries. Secretary of National Defence of Philippines, Delfin Lorenzana has signed the ‘Notice of award’ for the purchase, the contract for which is expected to be signed very soon. “As head of procuring entity (HOPE), I recently signed the Notice of Award for the Philippine Navy shore-based anti-ship missile acquisition project. Negotiated with the Government of India, it includes the delivery of three batteries, training for operators and maintainers as well as the necessary Integrated Logistics Support (ILS) package,” Mr. Lorenzana said on social media. Conceptualised as early as 2017, the Office of the President approved its inclusion in the Horizon 2 Priority Projects in 2020, he stated. The coastal defence regiment of the Philippine Marines will be the primary employer of this modern strategic defense capability of the Armed Forces of the Philippines, Mr. Lorenzana added. While Philippines had raised a unit sometime to operate the missile system, the contract was delayed by couple of years due to the COVID pandemic and budgetary constraints. The BrahMos anti-ship missile manufactured by India. | Photo Credit: PTI A file picture of BrahMos, supersonic cruise missile successfully test-fired as part of service life extension program,

from the Integrated Test Range (ITR), in Balasore. | Photo Credit: PTI 4 The Department of National Defence of Philippines, their equivalent of Ministry of Defence, too confirmed the notification and a copy of the notice of award signed by Mr. Lorenzana on December 31, 2021 was posted on the official website. "This is to inform you that the proposal of BrahMos Aerospace Private Ltd. For the shore based anti-ship missile system acquisition project for the Philippine Navy, with a corresponding price proposal in the amount of \$374,962,800 is hereby accepted," the letter stated. "You are hereby directed to provide, within 10 calendar days from receipt of this notice, the performance security in the form and amount stipulated in the terms of reference," it added. Discussions underway As reported by The Hindu earlier, there is interest for acquiring BrahMos missiles from several countries and negotiations are in advanced stages with Indonesia and Thailand. Discussions with Indonesia are in fairly advanced stage, a defence official said. The sale of BrahMos was also on top of the agenda during the visit of the Indonesian Defence Minister Prabowo Subianto to New Delhi in July 2020, another official stated. BrahMos is a joint collaboration between India and Russia and is capable of being launched from land, sea, sub-sea and air against surface and sea-based targets and has been long inducted by the Indian armed forces. The range of the missile was originally capped at 290 kms as per obligations of the Missile Technology Control Regime (MTCR). Following India's entry into the club in June 2016, officials said the range would be extended to 450 kms and to 600 kms at a later stage. An extended range missile has already been tested, the latest on January 11 from indigenous guided stealth missile destroyer INS Visakhapatnam.

Source: <https://www.thehindu.com/>

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