

# DRDO

NEWSLETTER

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Amrit Mahotsav



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## FLIGHT-TEST OF SURFACE-TO-SURFACE MISSILE 'PRALAY' SUCCESSFULLY CONDUCTED





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Cover Photo: Flight test of 'Pralay' Missile on 22 December 2021



# Contents

COVER STORY ..... 4



INNOVATION ..... 5

EVENTS ..... 7

HRD ACTIVITIES ..... 16

VISITS ..... 27

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# DRDO SUCCESSFULLY CONDUCTS FLIGHT-TEST OF SURFACE-TO-SURFACE MISSILE 'PRALAY'

**D**efence Research and Development Organisation successfully conducted flight-tests of indigenously developed conventional surface-to-surface missile 'Pralay' from Dr APJ Abdul Kalam Island off the coast of Odisha on 22 December 2021 and 23 December 2021. For the first time, two consecutive flight tests of a ballistic missile have been conducted successfully on two consecutive days. On 22 December 2021, the maiden launch of the 'Pralay' missile was carried out. The mission has met all its objectives. The new missile followed the desired quasi-ballistic trajectory and reached the designated target with high degree accuracy, validating the control, guidance and mission algorithms. All the sub-systems performed satisfactorily. The sensors deployed near the impact point across the eastern coast, including the downrange ships, tracked the missile trajectory and captured all the events.

The missile is powered by a solid-propellant rocket motor and many new technologies. The missile has a range of 150-500 km and can be launched from a mobile launcher. The missile guidance system includes a state-of-the-art navigation system and integrated avionics.

In its second launch on 23 December 2021, the missile was tested for heavier payload and different ranges to prove the precision and lethality of

the weapon. This launch was monitored by the range sensors and instruments, including telemetry, radar and electro-optic tracking system deployed across the eastern coast and the downrange ships positioned near the impact point.

Raksha Mantri Shri Rajnath Singh has congratulated DRDO

and associated teams for these consecutive successful development flight trials. Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy appreciated the associated team and said, with this successful flight test, the country has proved strong design and development capabilities in defence R&D.



## INDIGENOUSLY DEVELOPED AERV INDUCTED INTO INDIAN ARMY

The first set of indigenously developed next-generation Armoured Engineer Reconnaissance Vehicle (AERV) was inducted into the Corps of Engineers of Indian Army in a solemn function attended by Gen MM Naravane, the Chief of Army Staff at Pune on 21 December 2021.

The system has been designed by DRDO and manufactured by Ordnance Factory Medak & Bharat Electronics Limited, Pune. Despite the various restrictions imposed by the COVID pandemic since last year, the supply of the vehicle to the Indian Army has been on schedule. The vehicle is capable of carrying out reconnaissance of water obstacles and boggy patches for the execution of engineer tasks with capabilities to carry out



reconnaissance and provide real-time updates to force commanders. The system will enhance the existing engineer reconnaissance

capabilities of the Indian Army and would be a major game-changer in support of mechanised operations in future conflicts.

## FLIGHT DEMONSTRATION OF CONTROLLED AERIAL DELIVERY SYSTEM

Aerial Delivery Research and Development Establishment (ADRDE), Agra conducted a flight demonstration of a Controlled Aerial Delivery System of 500 kg capacity (CADS-500) on 18 December 2021. The ADRDE is an R&D laboratory of DRDO and the flight demonstration is part of a series of activities organised towards celebrating 'Azadi Ka Amrit Mahotsav, commemorating

75 years of Independence. The CADS-500 is used for precise delivery of payloads up to 500 kg at a predetermined location by making use of maneuverable capabilities of the Ram Air Parachute (RAP). It uses a global positioning system for the coordinates, altitude and heading sensors for the heading information during its flight. The CADS, with its onboard electronics unit, autonomously steers its flight path using waypoint

navigation towards the target location by operating controls. System performance was demonstrated at Drop Zone, Malpura from an altitude of 5000 m. The system was paraded from AN32 aircraft and then steered to the pre-designated landing point in autonomous mode. Eleven paratroopers of the Indian Army and Indian Air Force chased the CADS-500 in the air and landed simultaneously.

# NEW GENERATION BALLISTIC MISSILE 'AGNI P' SUCCESSFULLY TEST-FIRED

**D**efence Research & Development Organisation successfully tested the new generation nuclear-capable ballistic missile 'Agni P' from Dr APJ Abdul Kalam island off the coast of Odisha on 18 December 2021. Various telemetry, radar, electro-optical stations and downrange ships positioned along the eastern coast tracked and monitored the missile trajectory and parameters. The missile followed a textbook trajectory meeting all mission objectives with a high level of accuracy. The Agni P is a two-stage canisters solid-propellant ballistic missile with dual redundant navigation and guidance system. This second flight test has proven the reliable performance of all the advanced technologies integrated into the system.

Raksha Mantri Shri Rajnath Singh congratulated DRDO for the successful flight test and expressed his happiness for the excellent performance of the system. Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy appreciated the efforts of the team to have done the second development flight trial with many additional features and congratulated for the consecutive success within the same calendar year.





# ICONIC WEEK CELEBRATION BY MED & COS CLUSTER

Secretary DD R&D and Chairman DRDO Dr G Satheesh Reddy handed over three products developed by Micro Electronics Devices and Computational Systems (MED & CoS) cluster to the user laboratories at an event held at New Delhi on 15 December 2021 as part of Azadi Ka Amrit Mahotsav celebrations and iconic week of the Ministry of Defence. He also handed over four Transfer of Technology (ToT) agreements to public and private sector companies. The GaN process development kit for MMIC designers, to enable them to design indigenous GaN MMICs for various frequencies up to X-band was released. The devices can be manufactured at GAETEC. Secretary DD R&D handed over High-g MEMS Switch, UHF 1kW high power amplifier and X band power amplifier to user laboratories. He also handed over the technology of

0.5W Stirling Cryocooler for Integrated Detector Dewar Cooler Assembly (IDDCA) to Bharat Electronics Limited. Technology document of 10W laser diode chip fabrication technology and X-band GaN HEMT MMIC was handed over to GAETEC.

The technology document for HgCdTe-based DDCA was handed over to STAR-C. The technology of Acoustic Emission (AE) sensors, AE data acquisition and analysis system was handed over to the industry. The sensors and the system will be used for site-specific snow avalanche monitoring/prediction. Secretary, DD R&D handed over INDIGIS, a Geographical Information System (GIS) developed by Centre for Artificial Intelligence and Robotics (CAIR) to industry. A secure mobile handset to facilitate the secure transmission of voice and instant messaging over 4G cellular

networks for usage in a sensitive environment was launched. Reliable and secure key transfer Quantum Key Distribution (QKD) at a distance over 100 km using commercial telecom optical fiber link was announced. On this occasion, SAG, Delhi issued certificates of assurance for IT products, namely Data Diode to BEL and software product of CAIR.

Data diode is a device for enforcing one-way traffic to the Internet from an internal network. The improved bandwidth internal network and various IT portals were launched during the event. A compendium 'Yatra' depicting glorious 60 years of SSPL was also released during the occasion. The event was attended by various clusters and corporate DGs, Directors, senior scientists from various DRDO laboratories, former DRDO Directors and industry representatives.



# RAKSHA MANTRI HANDS OVER DRDO DEVELOPED PRODUCTS TO ARMED FORCES

As part of the Azadi Ka Amrit Mahotsav celebrations and iconic week of the Ministry of Defence, Raksha Mantri Shri Rajnath Singh handed over five DRDO developed products to the Armed Forces and other security agencies at an event held at DRDO Bhawan, New Delhi on 14 December 2021. He also handed over six Transfer of Technology (ToT) agreements to public and private sector companies. A seminar “Preparing For The Future” was also organised where Vice Chiefs of the Armed Forces and DRDO scientists shared their views.

Speaking on the occasion, the Raksha Mantri said, such seminars help in meeting of the minds and evolving a common strategy to face enemy threats. “When we talk about integration and jointness, it is not limited to initiatives taken by government alone. Its success has to be achieved by the meeting of minds of our defence forces. It is an effort to jointly enhance our capabilities to face the challenges posed by our adversaries. The integration we talk about, is not limited to our forces but also it means synergy among every concerned organisation in the

country,” he added.

He also said that there has been a big change over the last few years in the approach of DRDO whereby it not only working on technologies to mitigate current threats but also on first-of-its-kind technologies to face future challenges. On the objective of making India a strong platform of defence manufacturing base and net defence exporter, Raksha Mantri said DRDO has played a significant role in this endeavor. “Its path passes through collaboration among DRDO, the Armed Forces, private industry, start-ups and academia. The ToT





with private players which took place today indicates that we are ready to make a strong defence industrial base in the country that will cater not only the domestic defence requirements but also will fulfill needs of friendly countries by defence item exports.”

Paying tribute to the late Chief of Defence Staff (CDS), General Bipin Rawat and others who lost their lives in an air crash recently, the Raksha Mantri said that the process of integration and modernisation of Tri-Services that was initiated with the creation of a post of CDS and Department of Military Affairs will move on seamlessly and will be a priority of the government to achieve the target as soon as possible.

Emphasizing the role of technology in warfare, Shri Singh said our aim should be to make India a leader in the defence technology and identified the development of Hypersonic cruise missiles as one such advanced technology for which all should work together.

Citing the scientific prowess of DRDO in developing Mission Shakthi, Raksha Mantri said DRDO is working on smart materials, artificial intelligence, machine learning-based systems, swarm drones, asymmetric warfare, etc.

Shri Rajnath Singh added Government is working in a concerted manner to realize the objective of *Make in India* and *Make for the World* by bringing in several policy reforms such as increasing FDI in Defence sector through automatic route to 74 per cent Corporatisation of OFB, creation of defence corridors in Uttar Pradesh and Tamil



Nadu, formulation of Defence Production and Export Promotion Policy-2020, bringing out positive lists of defence items for domestic manufacturing, etc.

Products handed over to the Armed Forces and Ministry of Home Affairs are the Anti-Drone system, Modular Bridge, Smart Anti-Airfield Weapon, Chaff Variants and the Light Weight Fire Fighting Suit. The counter-drone systems, developed by DRDO for detection, deterrence and destruction of incoming drones was handed over to the CISC by the Raksha Mantri. He also handed over the Modular Bridge to the Chief of Army Staff General M M Naravane. Modular bridge developed by R&DE (Engineers) is a single span, mechanically launched assault bridge of military load class MLC-70, and can be launched in different spans.

The Raksha Mantri handed over Smart Anti Airfield Weapon (SAAW), an air-launched, long-range, stand-off, air-to-surface Smart Bomb, to the Chief of

the Air Staff Air Chief Marshal V R Chaudhari. The variants of Advanced Chaff were handed over to the Chief of the Naval Staff Admiral R Hari Kumar. Structural fire-fighting suit developed by DRDO's Centre for Fire, Explosive and Environment Safety (CFEES), Delhi was handed over to Shri V S K Kaumudi, Special Secretary, MHA.

The LAToT documents of seven DRDO developed systems were handed over during the event for the systems/technologies namely Coastal Surveillance Radar, Automatic Chemical Agent Detection and Alarm (ACADA) and Chemical Agent Monitor (CAM), Unit Maintenance Vehicle, Unit Repair Vehicle, Fused Silica-based Ceramic Core technology and the Fire Suppressing Gel.

Secretary, DDR&D and Chairman, DRDO Dr G Satheesh Reddy; Vice Chiefs of Army, Navy and Air Staff, other senior civil and military officials of Ministry of Defence and Home Affairs were also present on the occasion.

# SUPERSONIC MISSILE ASSISTED TORPEDO SYSTEM GETS SUCCESSFULLY LAUNCHED

**S**upersonic missile assisted torpedo system developed by Defence Research and Development Organisation was successfully launched from Wheeler Island in Odisha on 13 December 2021. The system is a next generation missile-based standoff torpedo delivery system. During the mission, full range capability of the missile was successfully demonstrated. The system has been designed to enhance anti-submarine warfare capability far beyond the conventional range of the torpedo.

The entire trajectory was monitored by the electro-optic telemetry system, various range radars, including the down range instrumentation and down range ships. The missile carried a torpedo, parachute delivery system and release mechanisms. This canister-based missile system consists of advanced technologies, viz. two stage solid propulsion, electro-mechanical actuators and precision inertial navigation. The missile is launched from ground mobile launcher and can cover a range of distances. A number of DRDO laboratories developed various technologies for this advanced missile system. Industry participated in the development and production of various sub-systems.

Raksha Mantri Shri Rajnath Singh congratulated the teams involved in the successful test of the supersonic missile assisted torpedo system and said, the

development of the system is a perfect example of building futuristic defence systems in the country.

Secretary, Department of Defence R&D & Chairman DRDO, Dr G Satheesh Reddy has

congratulated all those involved in the successful test. He said, the system will further enhance the strength of Indian Navy and promote self-reliance in defence, harnessing of expertise and capabilities.



# DRDO & IAF SUCCESSFULLY FLIGHT-TEST INDIGENOUS STAND-OFF ANTI-TANK MISSILE

Defence Research and Development Organisation and Indian Air Force (IAF) flight-tested the indigenously designed and developed helicopter launched Stand-off Anti-Tank (SANT) missile from Pokhran ranges on 11 December 2021. The flight-test was successful in meeting all its mission objectives. The release mechanism, advanced guidance and tracking algorithms, all avionics with integrated software, performed satisfactorily and tracking systems monitored all mission events. The missile is

equipped with a state-of-the-art MMW seeker which provides high precision strike capability from a safe distance. The weapon can neutralise targets in a range up to 10 km.

The SANT missile has been designed and developed by Research Centre Imarat (RCI), Hyderabad in coordination with other DRDO labs and participation from industries. This is the third in the series of indigenous stand-off weapons to be tested in recent times after long range bomb and smart anti-airfield weapon for

strengthening the arsenal of IAF. The indigenous development of various configurations for different applications with advanced technologies is a firm march towards Aatmanirbhar Bharta.

Raksha Mantri Shri Rajnath Singh has congratulated the team associated with the mission. Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy said the successful flight test of SANT missile would further bolster the indigenous defence capabilities.





# AIR VERSION OF BRAHMOS SUPERSONIC CRUISE MISSILE TEST-FIRED FROM SU30 MK-I

**A**ir version of BrahMos supersonic cruise missile was successfully test fired from the supersonic fighter aircraft Sukhoi 30 MK-I from Integrated Test Range, Chandipur off the coast of Odisha on 8 December 2021. The missile launched from the aircraft followed the pre-planned trajectory meeting all mission objectives.

The launch is a major milestone in the BrahMos development. It clears the system for the serial production of air-version BrahMos missiles within the country. Major airframe assemblies which form the integral part of the ramjet engine are indigenously developed by Indian Industry. These include metallic and non-metallic air frame sections comprising ramjet fuel tank and pneumatic fuel supply system. During the test, the structural integrity and functional performance have been proven. The air version of BrahMos was last flight tested in July 2021.



Raksha Mantri Shri Rajnath Singh has praised DRDO, BrahMos, Indian Air Force and the industry on the successful test firing. Congratulating the teams involved in the flight test, Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy said various laboratories of DRDO, academic institutions, quality assurance and certification agencies, public sector

undertakings and Indian Air Force participated in the development, testing, production and induction of this complex missile system.

BrahMos is a Joint Venture between India (DRDO) and Russia (NPOM) for the development, production and marketing of the supersonic cruise missile. BrahMos is the potent offensive missile weapon system already inducted into the Armed Forces.

## FLIGHT TEST OF VERTICAL LAUNCH SHORT RANGE SURFACE-TO-AIR MISSILE

**V**ertical launch short range surface-to-air missile was successfully flight tested on 7 December 2021 from Integrated Test Range, Chandipur, off the coast of Odisha. The launch was conducted from a vertical launcher against an electronic target at a very low altitude. The flight path

of the vehicle along with health parameters were monitored using a number of tracking instruments deployed by ITR, Chandipur. All sub-systems performed as per expectation. The launch of the system was conducted to validate integrated operation of all weapon system components including

the vertical launcher unit with controller, canisterised flight vehicle, weapon control system, etc. required for future launches of the missile from Indian Naval Ships. The test launch was monitored by senior officials from DRDO and Indian Navy. The first trial was conducted on 22 February 2021

and this is confirmatory trial to prove the consistent performance of the configuration and integrated operation.

Raksha Mantri, Shri Rajnath Singh has congratulated DRDO, Indian Navy and industry for the successful flight test and stated that this system will further enhance defence capability of Indian Naval Ships against aerial threats.

Secretary Department of Defence Research & Development & Chairman DRDO, Dr G Satheesh Reddy has complemented the teams involved in the successful flight test and said that this has paved the way for integration of weapon system onboard Indian Naval Ships.



Vertical launch short range surface-to-air missile

## PM HANDOVER ADVANCED EW SUITE 'SHAKTI' FOR INS TO CHIEF OF NAVAL STAFF

**A**dvanced Electronic Warfare (EW) System 'Shakti' has been designed and developed by Defence Electronics Research Laboratory (DLRL) Hyderabad for capital warships of the Indian Navy for the interception, detection, classification, identification and jamming of conventional and modern radars. The Shakti EW system will provide an electronic layer of defence against modern radars and anti-ship missiles to ensure electronic dominance and survivability in the maritime battlefield. This system will replace the earlier generation EW Systems of the Indian Navy. The system has been integrated with the wideband

Electronic Support Measures (ESM) and Electronic Counter Measure (ECM) for the defence of Indian Navy ships against missile attacks. The ESM of the system helps in finding accurate direction and interception of modern radars. The system has a built-in radar fingerprinting and data recording replay feature for post-mission analysis. First Shakti system has been installed onboard INS Visakhapatnam and is being installed onboard indigenous aircraft carrier, INS Vikrant. Twelve Shakti systems are under production at Bharat Electronics Ltd (BEL) supported by more than fifty MSMEs. These systems are scheduled to be installed onboard

capital warships under production, including P-15B, P-17A and Talwar class follow-on ships.

Raksha Mantri Shri Rajnath Singh congratulated DRDO, Indian Navy and Industry Partners for the development of the Shakti EW System. He said that this will enhance the capabilities of the Indian Navy and termed it as a major milestone towards Atmanirbhar Bharat in areas of advanced defence technologies.

Secretary DDR&D and Chairman DRDO, Dr G Satheesh Reddy has congratulated the teams associated with the development of the Shakti EW System and said that the system will further augment the Navy's electronic intelligence capability.

## INAUGURATION OF VC AND TEST FACILITY

**D**r K. Maheswara Reddy, DS & Director, Defence Electronics Research Laboratory (DLRL), Hyderabad inaugurated Video Conference and Test Setup facility of the Directorate of Naval Projects on 24 November 2021 in the presence of senior officers and staff of DLRL. The facility consists of a 5-screen display system, non-intrusive (ceiling microphone-based) sound system and video teleconference facility over DRONA network with multiple remote agencies connected via DRONA network. The display system has one 98" screen and four 68" screen with 3840 x 2160 UHD resolution. The video teleconference facility has a multi-party license to connect up to seven sites over the Intranet network. The facility has



a speaker tracking camera which helps automatic zoom on the speaker and a sitting capacity of around 35 people. It can be used

for system evaluation and testing with agencies joining in remotely to observe the process.

## INAUGURATION AND CLEARANCE OF FULL MISSION SIMULATOR FOR LCA-MK1

**T**he Full Mission Simulator (FMS) for LCA-Mk 1 (Phase-I), designed and developed by Aeronautical Development Establishment (ADE), Bangalore was inaugurated by Air Chief Marshal V R Chaudhari PVSM, AVSM, VM, ADC on 23 October 2021 at Airforce Station, Sulur in the presence of Dr G Satheesh Reddy, Secretary DD R&D and Chairman DRDO, Dr (Smt) Tessy Thomas, Director General (Aeronautical Systems), Dr Girish S Deodhare, Director General (ADA) and PGD-

CA, Dr S Venugopal, OS & Director ADE, Shri Shashi Bhushan Taneja, Director, ISSA, Shri APVS Prasad CE, CEMILAC, and Shri Shridhar M Devagiri, CCE R&D(E). Air Officer Commanding AFS Sulur, other senior scientists and IAF officers were also present to mark the occasion.

A brief of the project was presented by Shri R Chandrasekaran, Sc 'G', Technology Director (FSIM) and Project Director (FMS). Group Captain D K Dhankhar, Oi/C-FMS, explained the salient

features of the operational utilities to the dignitaries. Dr S. Venugopal, Director, ADE, Smt. Asha Garg, PGD (Manned Aircraft Systems) and Shri R. Chandrasekaran, PD (LCA-FMS) took the chief guest on a guided tour of the facility. The chief guest inaugurated the function which was followed by a short sortie flight by CAS in the FMS.

During the occasion, Chairman, DRDO released and handed over the LCA-FMS (Phase-1) documents to the Chief of Air Staff. The





Certificate indicating Clearance of Full Mission Simulator (Flight Dynamics Simulator) for Tejas-LCA was handed over to the Chief of Air Staff by the Chief Executive, Centre for Military Airworthiness & Certification (CEMILAC).

Air Chief Marshal V R Chaudhari addressed the august gathering highlighting the scientific milestones achieved by DRDO. He complimented the Chairman, DRDO, Director ADE and LCA-FMS team for the design and development of Full Mission Simulator, which is critically required by the Indian Air Force to train its pilots and timely handing

over of the system to the Indian Air Force well within the scheduled PDC of the project. Chairman, DRDO highlighted the role of the Indian Air Force in their constant support, regular feedback and confidence bestowed in DRDO which enabled the production of state-of-the-art indigenous equipment. The function concluded with exchanges of mementos and high tea.

The LCA-FMS facility comprises of a state-of-the-art high field of view Dome-based Flight Simulator. Phase-1 caters to the pilot training requirements of pilot strap-up, aircraft start-

up, takeoff, regular flying, approach, landing and aircraft shutdown procedures with an in-depth functional simulation of various aircraft systems such as the electrical, hydraulic, engine, fuel system, landing gear system. Phase-2 of the FMS will cater for meeting the training requirements on simulated weapon systems and advanced sensors such as electronic warfare suite, multi-mode radar and laser designator pod among others. Phase-1 of the FMS was handed over to the squadron pilots for training after the inauguration and is being extensively used.

## WORLD QUALITY DAY CELEBRATION

**D**irectorate of Reliability & Quality Assurance (R&QA) of Advanced Systems Laboratory (ASL), Hyderabad celebrated World Quality Day on 11 November 2021.

Shri Nakka Sudarshan, Technology Director, R&QA gave the welcome address. Shri AS Srinivas Gopal, Group Director QA talked briefly about the challenges for QA fraternity with new technologies. Dr M Rama Manohara Babu, Director, ASL gave the inaugural talk and highlighted the importance of QA in the current scenario. Shri S. Giridhar Rao, Sc 'G' (Retd.), ASL delivered a talk on "QA Challenges with New Technologies in Electronic Systems Manufacturing".



A good number of participants from ASL, DRDL, RCI, CAS and SSQAG attended the programme and made it a grand success. Shri Sameer kant Behera, Sc 'D' proposed the vote of thanks.

## CELEBRATION OF WORLD QUALITY MONTH

**W**orld Quality Month was celebrated in a ceremonial way at Directorate of Special Projects (DSP), Hyderabad on 18 November 2021. Dr A. Swarna Bai, Group Head, QRG welcomed the gathering, followed by her inaugural address.

Dr PSR Srinivasa Sastry, OS & Director, DSP emphasized the significance of quality for space projects and also inaugurated the Quality Policy of DSP.

On the occasion Rear Admiral Ranjith Singh, Director, DQR&S, DRDO HQ, graced the event as chief guest and gave the inaugural address on "Quality DRDO Vision, Mission, Growth Profile and what is Quality About".





Guest of honour, Cmdre Rupak Barua, ADG, SSQAG gave a talk on “Strategic Systems Quality Assurance Group” and Shri A. Madhusudhana Rao, Sc’G’, Group Director QA ANSP, DRDL gave a talk on “Evolution of a QMS-Sixteen Years young”

Dr Anupam Sharma, OS & Associate Director, and Ms Rani

Surender, Sc’G’, PD, Anvesha addressed the gathering on the importance of quality aspects. Group Heads and scientists, technical officers and staff attended the programme.

On the occasion of World Quality Month, Quality Reliability Group, DSP conducted various competitions, i.e., essay writing,

debate, poster presentation, quiz competition, quotes/slogans. In the valedictory ceremony, dignitaries distributed mementos to the winners of the various competitions.

The programme concluded with National Anthem.

## RAISING DAY CELEBRATIONS

### ASL, HYDERABAD

Advanced Systems Laboratory (ASL), Hyderabad celebrated its 20th Annual Day on 30 November 2021. Vice Adm RB Pandit, AVSM, C-in-C, SFC honoured the event as Chief Guest and Dr BHVS Narayana Murthy, DG (MSS), DRDO as guest of honour.

Dr N Kishore Nath, Sc ‘G’, Chairman, Organising Committee welcomed the august gathering. Shri Neil Dubey, Sc ‘F’, Director, Management Services presented the annual report of ASL.

Dr M Rama Manohara Babu, DS & Director, ASL in his address highlighted various achievements, progress of several ongoing project activities as well as briefed about upcoming projects of ASL. He emphasized the need of taking new research and developmental activities to meet futuristic technological requirements of DRDO and the nation.

Dr Narayana Murthy, the guest of honour appreciated the dedicated work done by all employees of ASL and mentioned about challenging technological requirements of future projects of ASL.



Vice Adm RB Pandit, congratulated ASL fraternity and appreciated the excellent work done by ASL to meet country defence requirements.

Laboratory-level DRDO Awards and Mementos to employees, who have completed 20, 25, 30 and 35 years of service, were presented. Dr APJ Abdul Kalam Merit Awards and Dr APJ Abdul Kalam Welfare Awards were also given to children of ASL employees. A cultural programme

was organised portraying in-house talents. Shri Hemant Kumar, Sc ‘E’ proposed the vote of thanks.

### DRL, TEZPUR

Defence Research Laboratory (DRL) celebrated its 60th Raising Day on 21 November 2021. Dr DV Kamboj, Director, DRL hoisted DRL Flag and highlighted the achievements of the laboratory in his welcome address. Dr Sudhir Kamath, OS & DG (Med & Cos), graced the cultural function as chief



guest. Various sports activities were also organized. All members of the DRL family participated with full zeal and enthusiasm. Retired employees shared their views and DRDO laboratory-level awards and 'SN Dube Publication Award' for the best paper were distributed. Prizes were also distributed to the winners of the various events. The programme ended with a community dinner.

## PXE, CHANDIPUR

Proof & Experimental Establishment (PXE) celebrated its 127th Raising Day on 7 November 2021. On account of the prevailing COVID-19 pandemic, the celebration was restricted to PXE employees only and COVID guidelines were strictly followed. Shri DK Joshi, Director, PXE inaugurated the event by hoisting the DRDO flag and congratulated all past and present employees for their valuable contributions. He emphasised the need of adopting new technologies for meeting futuristic challenges and making PXE a world-class armament test range.



Different activities were conducted during the day- Under the "Clean and Green Drive" initiative, more than 127 saplings of fruit-bearing and medicinal plants were planted and a cleanliness drive for the entire technical area including adjoining sea beach was undertaken. A blood donation camp was organized and 127 units of blood were collected. Limited sports activities, quiz and essay competitions were also conducted for the employees.

Various laboratory-level and DRDO cash awards were conferred to the meritorious employees. Shri Ratnakar S. Mohapatra, Sc 'F' was awarded 'Lab Scientist of the Year'; Shri PK Mohanty, ADFO with 'Proof Man of the Year' and Hav (Gnr); Sashi Kumar with 'PXE Sainik Puraskar'. Employees who have rendered their service in DRDO for 25 years were also felicitated. Dr S Padhy, Sc 'F', Chairman, Organising Committee, conducted all the events.



## VIGILANCE AWARENESS WEEK – 2021

Vigilance Awareness Week is celebrated every year to create public awareness about the ill effects of corruption. Naval Physical and Oceanographic Laboratory (NPOL), Kochi observed 'Vigilance Awareness Week' from 26 October to 1 November 2021. The theme decided by the Central Vigilance Commission for the year 2021 is "Independent India@ 75; Self-reliance with Integrity". The week activities at NPOL commenced with Shri S. Vijayan Pillai, OS & Director NPOL, administering the integrity pledge to all the employees. Online essay competition on "How will you handle a bomb threat intended on your office, based on an anonymous phone call?" was conducted. The



employees participated in the competition enthusiastically. An eBook on "Cyber Wars" by Institute for System Studies and Analysis (ISSA), New Delhi was also distributed to the employees to educate on the damage potential of cyber threats and the best

practices for protection, extremely relevant in these post-pandemic days when virtual interactions have become the new normal. The activities were coordinated by the Vigilance & Security Group and all the events were conducted adhering to the COVID protocols.

## BIRTH ANNIVERSARY CELEBRATIONS OF MAHATMA GANDHI & LAL BAHADUR SASTRI

Naval Science & Technological Laboratory (NSTL), celebrated the birth anniversary of Mahatma Gandhi and Shri Lal Bahadur Sastri on 2 October 2021. Chief guest, Dr Y Sreenivas Rao, OS & Director NSTL, narrated Gandhiji as an innovator and as a scientist. He explained how Gandhiji innovatively used Satyagraha as a weapon in freedom-fighting and how he scientifically gathered people without using any social media in those days. Also, he applauded the contributions of Shri Lal Bahadur Sastri in building



a strong nation. On the occasion, financial assistance of Rs.15,000/- was given to Manasu Orphanage Home, Prahladapuram.

Senior scientists, officers and staff of NSTL participated and paid floral tributes to Gandhiji and Sastriji.



# HINDI PAKHWARA CELEBRATIONS-2021

## NSTL, VISAKHAPATNAM

Naval Science & Technological Laboratory (NSTL) organised Hindi Fortnight Celebration-2021 from 6-21 September 2021. The programme was inaugurated by Chief guest Dr Y Sreenivas Rao, OS & Director, NSTL along with Shri B Mohan Rao, Sc 'F', Chairman, HFC-2021 and Sri Vivek Sharma, Sc 'F', Rajbhasha Adhikari.

In his address, Dr Rao, said that DRDO is working with many countries so Hindi can be used as the option to maintain secrecy in defence R&D technologies. Various competitions were conducted and cash awards and books were distributed to the winners and participants. A separate poster making competition on



“Azadi ka Amrut Mahotsav” was also organised. In his valedictory speech, he explained the importance of Hindi Diwas

and Hindi Fortnight celebrations and how hindi language develops bonding between people which help in the development of the nation.

## DESIDOC, DELHI

Defence Scientific Information & Documentation Centre (DESIDOC), Delhi celebrated Hindi Diwas and Hindi Pakhwara from 14 September 2021 onwards following the guidelines and instructions issued by the official language department of the Home Ministry including Directorate of Rajbhasha, DRDO. The programme was organized by the Rajbhasha Implementation Committee strictly following the guidelines for the COVID-19. Total 10 nos. competitions were organized for the employees of DESIDOC to motivate them to get their official work done in Rajbhasha Hindi. During this event “VadVivad” and “Poster” competitions were acclaimed and liked by everyone in the lab.



Officers and staff of DESIDOC participated in the competition with full enthusiasm. Maximum participation has been noted by the committee. The programme was inaugurated by Dr K Nageshwara

Rao, Director DESIDOC. He addressed all the employees of DESIDOC and encouraged all to use the official language Hindi. Shri. Ajay Kumar, Rajbhasha Pramukh coordinated the event.



## NATIONAL S&T RAJBHASHA SEMINAR- 2021

Under DRDO Chandigarh Cluster, a three-day "National Scientific and Technical Rajbhasha Seminar-2021" was organized by Defence Institute of High Altitude Research (DIHAR) at Leh-Ladakh during 17-19 November 2021. The seminar was inaugurated on 17 November 2021 by Shri Jamyang Tsering Namgyal, Hon'ble MP Ladakh in the presence of Guest of Honour, Dr Surinder K Mehta, Vice-Chancellor, Ladakh University; Dr O P Chaurasia, Chief Patron of Seminar and Director, DIHAR; Dr Narendra Singh, Additional Director, DIHAR and Seminar Coordinator and other dignitaries. The chief guest gave his best wishes to the organizers for conducting a seminar on complex topics like science and technology in official language Hindi and appreciated

their effort. He said it is a good attempt to propagate the latest researches carried out by scientists in Hindi language. He believed in encouraging the use of Hindi language as it will be beneficial for armed forces, locals and other participants attending the seminar. He also said that Ladakh region has its own language and its own culture. Despite all this, the people of Ladakh region look at Hindi language with respect and like to communicate in Hindi language.

Sixty-four research papers have been compiled in the abstract book of the seminar and about 125 representatives were registered for the seminar. Oral research papers were presented on 6 subjects on different topics in various sessions and simultaneously poster presentation was organized.

The Closing Ceremony of the seminar was on 19 November 2021. The Chief Guest of the function was Dr Surinder K Mehta, Vice-Chancellor, Ladakh University. Dr O P Chaurasia, Director, DIHAR; Dr Dinesh Kumar Pal, Sc 'F', TBRL, Chandigarh; Dr Ganesh Kumar, Sc 'F', DGRE, Chandigarh expressed their views in the context of the official languages and scientific lectures presented during the seminar. The Chief Guest appreciated the importance, quality and level of the seminar. Dr Narendra Singh, Additional Director, DIHAR and Seminar Coordinator thanked Directors of the participating laboratories of the Chandigarh Cluster for the cooperation and expressed gratitude towards all the participants and representatives of the seminar.



# NATIONAL CONFERENCE AND EXHIBITION ON AEROSPACE & DEFENCE RELATED MECHANISMS -2021

The 12th National Conference and Exhibition on Aerospace & Defence Related Mechanisms (ARMS-21) was organised by Pune Chapter of Indian National Society for Aerospace and Related Mechanisms (INSARM). The three-day national conference on the theme 'Recent Innovation and Challenges in Aerospace and Defence Related Mechanisms' was held at Armament Research and Development Establishment (ARDE), Pune during 2-4 December 2021. ARMS-21 was organised in association with DRDO and Indian Space Research Organization (ISRO).

The conference was conducted in hybrid mode (In-person and Online). More than 400 delegates attended the conference in-

person and around 150 delegates participated online. The sessions were held at Dr APJ Abdul Kalam Auditorium and ARDE, Pune. The conference was inaugurated by Secretary, Department of Defence R&D and Chairman DRDO Dr G Sateesh Reddy. Dr V Venkateswara Rao, OS & Director, ARDE and National President INSARM gave the Welcome address.

Lt. Gen (Dr.) D B Shekatkar, Dr C P Ramanarayana, VC, DIAT, Shri P K Mehta, DG, ACE Cluster, S Somnath, Director, VSSC, Shri Abdul Majeed, Founder President of INSARM, various Directors of DRDO and ISRO labs were present during inauguration.

On the first day, a tutorial was held for aspiring students, scientist, technologists and

researchers. Informative discussions and talks were given by leading academicians and researchers in the field of artificial intelligence, aerospace and related mechanisms from all over India.

The conference received tremendous response in terms of papers, posters and delegates from R&D, academic institutes and industry partners. Key note addresses, various plenary talks and invited talks by the experienced mechanisms designers from ISRO and DRDO were delivered in the event. A total of 87 papers were presented in oral and 34 papers in an online poster session. Various industries displayed their products and services in an online exhibition during the event.

Shri R P Pandey, Sc 'G', gave vote of thanks.





# CONSTITUTION DAY CELEBRATIONS

## DLRL, HYDERABAD

Every year 26 November is celebrated as Constitution Day to commemorate the adoption of the Constitution of India and to honor and acknowledge the contribution of the founding fathers of the constitution. As part of the celebration, Dr K Maheswara Reddy, DS & Director DLRL, garlanded the photograph of Dr B.R. Ambedkar, Father of the Indian constitution. Director and employees read the preamble of the constitution both in English & Hindi and took the pledge on the preamble.



## HQ, DELHI

This year Constitution Day of India is celebrated at DRDO HQ on 26 November 2021 by reading the Preamble of the Constitution of India by Dr G Satheesh Reddy, Secretary DDR&D and Chairman DRDO, along with all officers and staff of DRDO HQ.

## ITR, CHANDIPUR

Constitution Day was celebrated at Integrated Test Range (ITR) on 26 November 2021. The programme was inaugurated by Shri H K Ratha, Director ITR. In his inaugural address, Director ITR highlighted the values of

the Indian Constitution and administered the preamble of the Indian Constitution to the ITR fraternity. More than 100 officers and staff attended the programme.

Shri P N Panda, Sc 'F' and his team organised the programme.





## COMMUNAL HARMONY CAMPAIGN WEEK

Communal Harmony Campaign Week-2021 was observed at Integrated Test Range (ITR), Chandipur during 19-25 November 2021. Banners promoting Communal Harmony were displayed inside and outside the office premises. On the inaugural day Shri H K Ratha, OS and Director, ITR administered the pledge on national integration to all the employees of ITR. On this occasion Director, ITR encouraged all to upkeep honesty, integrity and harmony among all as well as in every sphere of life and made a call to donate voluntarily for fundraising of the National Foundation for Communal Harmony (NFCH) which carries



out activities on various schemes and provides financial assistance to children rendered orphan or destitute in communal, caste, ethnic or terrorist violence for their care, education and training,

and rehabilitation. Many officers and staff donated voluntarily for the noble cause on this occasion.

The programme was organised by P N Panda, Sc 'F', AGD (HR) and his Team.

## WORKSHOP AT BORDER OF UTTARAKHAND

The development of strong civil-military linkages is an important component of border security. Defence Institute of Bio-Energy Research (DIBER) has been operating at the border districts of Uttarakhand, viz., Uttarkashi, Chamoli and Pithoragarh using a two-pronged approach. The first aspect includes a direct approach to the Army Units located in the border regions. Recently, teams of scientists and technical staff from DIBER have ventured to the Army posts located beyond 3200 m asl altitude at international borders. Road connectivity to these locations is poor, prone to blockages due to landslides.

The routes are open only



for a short duration in a year. Therefore, the soldiers deployed at these locations have to rely

on tinned food for most part of the year. With an objective to make fresh and green produce

available at these units, DIBER is providing technical inputs, technology, seeds, seedlings and polythene to construct polyhouse structures, while other raw materials and manpower are arranged by the beneficiary unit. Recently, Director DIBER, Dr Madhu Bala reviewed the

tasks at Army posts in Goting (3900 m asl) beyond Niti Village. Technology to grow fresh and green vegetables by constructing low-cost poly-houses was disseminated to 23 Bn ITBP, Mana Village (3200 m asl), 22 Grenadiers (3200 m asl), Garhwal scouts (3250 m asl) and Ghastoli

(3800 m asl) in Mana sector, 9 Mahar in Malari (3350 m asl), and various sites of 9 Bihar in Uttarkashi District. Every site in the higher Himalayas in Uttarakhand has a unique micro-climate and geography, therefore necessitating the personal attention of a technical team.

## COURSE ON RELIABILITY ENGINEERING

**A**s part of the Azadi Ka Amrit Mahotsav Celebration, NSTL, Vishakapatnam in association with the Institution of Quality and Reliability (IQR), Pune organised a short-term course on Reliability Engineering during 22-23 October 2021.

Shri R. Srihari, Sc 'G' & Technology Director (QRS), gave the welcome address and explained in detail how NSTL is giving the highest priority to quality and reliability for delivering world-class underwater weapons.

In his inaugural speech, Dr Samir V Kamat, DG (NS&M) said that DRDO becomes 'QRS Champion Organisation' in near future. Till now, NSTL developed systems, focusing on quality and now NSTL is in a mature phase to focus on developing reliable systems.

Rear admiral Ranjit Singh, Director, Directorate of Quality reliability and Safety DRDO HQrs participated in the event through video conference. He complimented NSTL for

organising the course like said quality and reliability as two eyes of an organisation and with them, safety is automatically ensured. He said the NSTL quality policy is well aligned with DRDO quality policy.

Dr Y Sreenivas Rao, Director NSTL, highlighted the NSTL quality structure and explained how it is unique and opts for the design and development of world-class underwater weapons. He expressed his happiness over incorporating quality culture in all phases of realising a system.





# DRDO Newsletter

## Readers' Views

(Your feedback is important to us as it gives scope for improvement and serve the organisation in a better way)

1. Name of the Establishment: \_\_\_\_\_

2. How would you rate the *DRDO Newsletter* as a medium to adequately present DRDO developments?

Excellent  Very Good  Good  Fair  Satisfactory

3. How would you rate the technical contents of the *Newsletter*?

Excellent  Very Good  Good  Fair  Satisfactory

4. How would you rate the quality of photographs in the *Newsletter*?

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5. Ideal number of pages you would like for the *Newsletter*?

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8. Suggestions, if any, to further improve the technical content of the *Newsletter*?

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Please mail your suggestions to:  
The Editor, DRDO Newsletter, DESIDOC, DRDO, Metcalfe House, Delhi - 110 054



## VISITORS TO DRDO LABS NPOL, KOCHI

✿ V. Adm. Sandeep Naithani, AVSM, VSM, Chief of Materiel, Indian Navy visited Naval Physical & Oceanographic Laboratory (NPOL), Kochi on 2 November 2021. Shri S Vijayan Pillai, OS & Director, NPOL welcomed the guest and briefed him on the ongoing research activities being carried out at NPOL. During the full-day meeting, COM reviewed all the ongoing projects of NPOL including the strategic programme and newly sanctioned Integrated Combat Suite Programme. The chief guest interacted with the senior scientists and also visited the exhibition on new NPOL products and technologies. He also released Interactive Electronic Technical Manual (IETM) for Project USHUS 2. COM expressed his great appreciation of the NPOL's ongoing technical initiatives. The visit further strengthened the deep bond shared between NPOL and Indian Navy.

✿ Dr Samir V Kamat, DS & DG (NS&M), visited Naval Physical & Oceanographic Laboratory (NPOL), Kochi on 30 November 2021. Shri S Vijayan Pillai, OS & Director, NPOL welcomed DG (NS & M) and briefed him on the ongoing project activities being carried out at NPOL. Dr Samir V Kamat also reviewed the status of proposed projects being taken up by NPOL as part of its 2,5,10 year roadmap.

✿ Shri Rajeev Chandrasekhar, Hon'ble Union Minister of State for Electronics & Information



**Release of Interactive Electronic Technical Manual (IETM) for Project USHUS 2 by V. Adm. Sandeep Naithani, AVSM, VSM, Chief of Materiel**



**Dr Samir V kamat, DS & DG (NS&M) taking keen interest in NPOL activities**



**Shri Rajeev Chandrasekhar, Hon'ble Union Minister of State during his visit to NPOL**

Technology and Skill Development and Entrepreneurship visited the sole DRDO laboratory in Kerala-Naval Physical and Oceanographic Laboratory (NPOL), Kochi on 11 November 2021. During the minister's visit, Shri S Vijayan Pillai, OS & Director, NPOL briefed the minister about the various research and development activities undertaken by the laboratory in the field of underwater surveillance systems and technologies. The Director apprised the minister about NPOL's futuristic roadmap for

the next twenty years and threw light into several new challenging technology projects being taken up by NPOL to meet specific requirements of the Indian Navy. The minister was also informed about the substantial number of collaborations NPOL had forged over the years with industry and academia to develop highly successful systems and products. The various public outreach activities being organized by the lab in connection with Azadi Ka Amrit Mahotsav were also presented.

\* Dr Chandrika Kaushik, OS & Director (DISB), and V Adm (Retd) Dinesh Prabhakar visited Naval Physical & Oceanographic Laboratory (NPOL), Kochi on 8 November 2021. Shri S Vijayan Pillai, OS & Director, NPOL welcomed the guests and briefed them on the technical activities being carried out at NPOL. Detailed presentations were made on the ongoing and proposed projects of NPOL. The guests also visited major test facilities like DARPAN-2, Main Tank, MATS and Fiber optic-based sensor systems.



Dr Chandrika Kaushik, OS & Sc 'H', Director (DISB) and V Adm (Retd) Dinesh Prabhakar being briefed by Shri S Vijayan Pillai, OS & Director, NPOL

DRDO NEWSLETTER  
WISHES READERS A VERY  
HAPPY NEW YEAR 2022