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India successfully test fires nuclear capable Prithvi-II missile

Coming after the successful trial of Agni-I, the Strategic Forces Command (SFC) conducted the fresh user trial of Prithvi-II missile yesterday, which was a perfectly successful. Describing the trial as a complete success, the defence sources said all mission objectives were met during the test launch, as reported by *PTI*.

India successfully test-fires Prithvi-II, indigenously developed short-range ballistic missile, capable of carrying nuclear warheads. It is a great impetus to the nation's defence capabilities.

About the Trial

- The indigenously developed nuclear-capable surface-to-surface Prithvi-II ballistic missile was successfully test fired from a mobile launcher from launch complex-3 of the Integrated Test Range (ITR) at Chandipur-on-sea near Balasore, Odisha
- The downrange teams onboard the ship deployed near the designated impact point in the Bay of Bengal monitored the terminal events and splashdown.

About the Missile

- Prithvi-II missile is a short range surface-to-surface ballistic missile which can dive at an angle of 80 degrees
- It is 9 metres tall
- The state-of-the-art missile is a single-stage liquid-fuelled missile capable of carrying 500-1,000 kilogram of warheads which it can deliver deep into enemy territory and inflict heavy damage to forward airfields
- It is thrust by a liquid propulsion twin engine-system and as strike range of 350 km
- It uses advanced inertial guidance system with manoeuvring trajectory to hit its target
- It is designed in such a way that it can be taken close to the forward line over any kind of terrain
- It is first missile developed by DRDO under its most ambitious Integrated Guided Missile Development Programme (IGMDP). It was inducted into Indian armed forces in 2003
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Background

- The missile was randomly chosen from the production stock and the entire launch activities were carried out by the specially formed Strategic Force Command (SFC) of the Army and monitored by the scientists of DRDO as part of training exercise, revealed sources
- In salvo mode, on November 21, 2016, two missiles were successfully test fired in quick succession from the same base and the last trial was successful on June 2, 2017 from the same base.

<https://www.indiatoday.in/education-today/gk-current-affairs/story/india-successfully-test-fires-nuclear-capable-prithvi-ii-missile-1165766-2018-02-09>

DRDO's assault rifles to throw shield around Assam rhinos

By Rahul Karmakar

The indigenously developed Ghatak will be given to forest guards to combat armed poachers who killed 30 of the animals last year

An indigenous hybrid rifle, named Ghatak for 'deadly,' will protect the rhino in Assam from heavily armed poachers.

The Assam Forest Department is poised to be the first non-police or non-paramilitary force to acquire the Ghatak, a multi-calibre rifle from the Defence Research Development Organisation (DRDO). It placed orders for the weapon more than a year ago.

The rifle is described as a cross between an automatic close-combat weapon such as AK-47 and a more lethal long-range firearm.

Some consignments of the rifle have been delivered to Central Paramilitary Force as well as the Assam Police. The Ghatak is yet to clear the more stringent tests of the Army, such as 18 rounds of non-stop firing, but forest officials are not worried.

"Our combat situation is different from that of the Army," they say.

Dharanidhar Boro, a highly decorated green soldier who retired in 2016 after years of fighting poachers in Kaziranga National Park, is upbeat about Ghatak's induction.

"I am not sure how good it is, but it will certainly be much better than the unwieldy 0.315 rifles with which we guarded the rhino's best-known home," he said from western Assam's Manas National Park, where he is now an officer on special duty.

Poachers a step ahead

On Kaziranga, a World Heritage site established in 1905, some 230 km east of Guwahati, the veteran officer says, "We did our best to save the rhinos during our time, but the poachers are always a step ahead. It is high time our guards are equipped with weapons that deter poachers."

The national park houses more than 55% of the world's one-horned rhinos and boasts the highest density of Royal Bengal tigers.

Forest department records say 30 rhinos have been killed in the 430 sq. km. Kaziranga and other wildlife reserves such as Orang National Park and Pobitora Wildlife Sanctuary since January 2016. Six poachers were killed during this period. Cartridges recovered from rhino kill sites revealed the poachers were using AK-56 rifles, M16 and M4 carbines.

"The killing of a couple of rhinos last year made us realise that the archaic, single-shot bolt action rifles of our guards are no match for the sophisticated automatic weapons of the poachers.

A decision was taken to overhaul the arsenal of our department," Environment and Forest Minister Pramila Rani Brahma said.

"In March last year, we purchased an assortment of rifles from Ishapore Ordnance Factory in Kolkata. We received a few, but we are really looking forward to the Ghatak rifles," the State's Principal Chief Conservator of Forests, Bikash Brahma, said.

The weapons the department bought were 272 Indian Small Arms System or INSAS assault rifle, 954 self-loading rifles or SLRs, 91 Ghatak rifles, 20 pistols (9mm), and 133 pump action guns of 12-bore.

"Our men in the field are excited about Ghatak. But it will take a great deal of adjustment from the old rifles to a hybrid one," Kaziranga's Divisional Forest Officer Rohini Ballave Saikia said.

Assam's choice

Army and paramilitary forces in the militancy-hit Northeast comprising eight States do not use the Ghatak, but the Assam Police does.

On the choice of the weapon, Assam Police chief Mukesh Sahay said, "I cannot be specific about the number, but we received a small consignment a year ago. More are in the pipeline. We procure weapons based on our requirement, which primarily is counter-insurgency. We need long-range and area weapons too."

Senior police officials, however, said Ghatak tested in a field situation because militancy has ebbed over the last 15 months.

Army officials said the initiative to make the 5.56mm-7.62mm hybrid came from the Ordnance Factory Board. Of the three prototypes made by three ordnance factories, the one developed by Rifle Factory Ishapore cleared all preliminary tests. "It fell short of the Army's requirement, though," an officer said, declining to be named.

The Defence Ministry has tendered for multi-calibre rifles, officials said. Among those in contention are Beretta and Colt, the latter making M4 carbines. But the Ishapore factory is keen on upgrading Ghatak.

<http://www.thehindu.com/sci-tech/energy-and-environment/drds-assault-rifles-to-throw-shield-around-assam-rhinos/article22716184.ece>



Mon, 12 Feb, 2018

Inter-govt. defence deals gain traction

By Dinakar Peri

Preferred due to delayed contracts

While allegations continue to be made on the Rafale fighter deal with France, government-to-government deals have become the preferred route to conclude major defence contracts and will remain so in the face of unending delays in defence modernisation, officials said.

Several deals are being lined up for likely conclusion through inter-governmental agreements (IGA), some of which can happen this year.

It's transparent

"An inter-governmental agreement (IGA) between two sovereign governments ensures transparency and avoids troubles later. It has become the only way now to conclude pending critical deals. Especially with elections close by, this is a safe bet," an official source said.

The official stated that despite several efforts, the Defence Procurement Procedure (DPP) remains cumbersome and deals invariably get delayed. For instance, the Navy's multi-role helicopter (MRH) tender for 16 helicopters, which began in 2009, was stuck over cost negotiations with Sikorsky for over two years due to price escalation.

The Navy cancelled the tender last year and a fresh tender for 24 MRHs will be issued shortly.

"The possibility of an IGA is being looked into as the platform has already been tested. It will ensure delivery at the earliest," one official said.

Similarly, the Army's Spike Anti-Tank Guided Missile (ATGM) tender was cancelled last year after protracted negotiations.

Last month, the Defence Acquisition Council (DAC) cleared the procurement of 72,400 assault rifles and 93,895 close quarter battle (CQB) carbines for Rs. 3,547 crore on a fast-track basis. Both the deals have been repeatedly cancelled.

Defence budget low? Make best of it

By Bhartendu Kumar Singh

India is not unique to have declining defence budgets as proportion of GDP. This is perhaps because of the early political consensus for according priority to economic security and well-being.

World over, liberal-democratic governments are redefining and expanding the national security concept. India is no exception. Therefore, the recent budgetary allocation for defence, pegged at Rs 2.95 lakh crore (excluding defence pensions), should be seen in the light of India's endeavours towards comprehensive national security. However, some strategic experts miss the big picture in being critical about the low budgetary allotments. Equally unfortunate is the fact that there is no debate about making the best of defence budget.

True, the defence budget has been coming down as a proportion of GDP or Central Government expenditure. There is also no probability of the proportion going up. But this is perhaps because of the early political consensus for according priority to economic aspects of national security. The downfall of the then Soviet Union was primarily because of overt emphasis on military security. This fact was not lost on India's policy makers and partly contributed to the economic reforms of 1991. Since then, India has been giving primacy to economic security and well-being.

Declining defence budgets are not unique to India; rather the trend is ubiquitous. For instance, according to a BBC report, between 2010 and 2015, the UK defence budget came down by 18 percent after inflation adjustment compared to 2009-10 budget. Similarly, defence budgets have been declining in the US and other NATO countries in percentage terms and are nowhere comparable to Cold War proportions. While the decline in great power conflicts and Cold War mentality are certainly the causal factors, it is also true that there has been a renewed emphasis on comprehensive national security.

It is this global picture that is being missed out in India. India has a national security debate that is largely perceived in militaristic terms and has no correlation with other aspects of national security. The series of hunger deaths, farmer deaths, illiteracy, backwardness etc do not figure in this national security discourse. The counter-narrative to this one-sided monologue is often suppressed under the rubric of 'emotional nationalism'. One dare not argue that India needs to expand its economic base for futuristic and meaningful investments in defence. Even in the US that has a highly militarised agenda and accounts for almost half of the global defence expenditure, there is reasonable emphasis on economic aspects of security in the National Security Strategy (NSS) of December 2017.

Perhaps the first issue that needs debate is expenditure management in armed forces. As evident from budgetary propositions, revenue expenditure is exploding, threatening to touch Rs 2 lakh crore. The Army, accounting for more than 50 per cent of the defence budget, has an unhealthy revenue capital ratio of 80:20. The proportion is slightly better in other two arms since they are capital intensive. The ideational revenue capital ratio of 40:60 (prevalent in many armed forces) is perhaps an unachievable goal. Worse, the revenue expenditure is increasingly eating into capital resources, leaving little money to buy sophisticated arms. An inhouse introspection is long overdue, since the three services have conveniently skipped the issues.

Resource management in armed forces also needs debate. In an environment where every penny counts, there is no awareness or sensitivity for resource and asset management in armed forces. Potential resources in armed forces are yet to be tapped in many greenfield areas and rent and revenue generation are far below expected benchmarks. True, commercial involvement and combat effectiveness are not evenly correlated and the opinions are quite divided in the academic literature. The Chinese PLA experience of commercial activities in late eighties and early nineties was bad, denting their combat capabilities. Hence, the Indian debate should consider global experience before experimenting it inhouse for generating revenues.

Prudent contract management also needs consideration and debate. Significant money is spent in paying for escalated cost of weaponry since they jump the timeline stipulated in the Defence Procurement Procedure (2016). Part of the reason is the isolated environment in which all stakeholders work and files move in creepy manner. If all stakeholders commit to collegiate knowledge sharing, the decision making would be faster and original cost would metamorphose into final cost. Similarly, developmental projects and works contracts for the armed forces also consume considerable time. Hardly any developmental contract or works contract are executed without time or cost escalation. These issues can be taken care of through stringent project monitoring and learning from global practices.

Finally, the big ticket armaments through costly imports also need debate. Recent initiatives have boosted the domestic military industrial complex (MIC) but the impact would be visible only after four-five years leading to potential cost savings. The domestic MIC is competent to supply comparable artillery guns, missiles and fighter jets at competitive prices but needs preferential treatment. For example, the 155 mm artillery gun being produced at the Gun Carriage Factory (GCF) Jabalpur is much cheaper than comparable guns in international market. These domestic products would also save money and create jobs.

While liberal budgetary allocations for defence are always welcome, marginalised issues in the 'guns vs butter' debate cannot be neglected. Therefore, instead of clamouring for 'more and more', the solution lies in debating ways and means to make the best of defence budget, at least until India's economic empowerment is complete. *Views are personal*

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Four-pronged Strategy is Necessary to Checkmate Pak's Deep State

Strategies: Tactical assertiveness on LoC; covert ops to neutralise terror leaders; bolstering counter-infiltration grids; Pak's economic strangulation & diplomatic isolation

By Brig (retd) Gurmeet Kanwal

The attack on the family quarters of the military camp at Sunjwan by ISI-backed and Masood Azhar-led Jaishe-Mohammed (JeM) terrorists, which led to the death of five soldiers and one civilian and injuries to several soldiers and their family members, calls for serious introspection.

After the terrorist attack at the military camp at Uri in September 2016, India had adopted a policy of tactical assertiveness under the umbrella of strategic restraint. Surgical strikes by special forces on terrorist training camps at multiple points across the LoC were followed by artillery fire assaults. Direct firing weapons were also used to dominate the LoC.

The aim was to inflict punishment on the Pakistan army deployed on the LoC with a view to raising its cost for waging a war against India through asymmetric means like jihadi terrorists. Clearly, the quantum of punishment inflicted was inadequate as attempts at infiltration and terrorist strikes in the hinterland have not only continued, but have risen in number in 2017.

There is an inescapable necessity to progressively raise the cost for Pakistan's 'deep state' (the army and the ISI) till it becomes prohibitive and it pleads for peace. This can be done by employing India's firepower superiority to destroy Pakistani posts on the LoC and military infrastructure while taking care to avoid collateral damage.

Simultaneously, concerted efforts need to be made to enhance the security potential of military camps and airbases near the LoC and the international boundary in J&K. Most of these are protected merely by a thin barbed wire fence and have rudimentary access control systems, making them vulnerable to attacks by determined Fedayeen.

What is required is to construct a well-lit, high boundary wall with a barbed wire fence on top and electronic surveillance, including a CCTV network. The quick reaction teams must be equipped with suitable protective gear and night-vision devices. Constant patrolling of vulnerable areas will pay handsome dividends. Civilian areas adjacent to military camps should be patrolled by civilian volunteers.

After the attacks at the Pathankot airbase, the Ministry of Defence had appointed a committee headed by a former Army Vice-Chief to assess the shortcomings and recommend suitable measures to improve the security of military bases. Ironically, the government is reported to have sanctioned a sum of ₹1,487 crore to beef up security just a few days before the attack at Sunjwan.

As for the larger picture, the present Pakistan army leadership does not appear to be inclined to put an end to cross-border terrorism and negotiate a peaceful resolution of disputes. A four-pronged strategy is necessary to checkmate Pakistan's deep state: progressively greater tactical assertiveness on the LoC; covert operations to neutralise the leaders of terrorist organisations; further bolstering of the counter-infiltration and counter-insurgency grids, including enhanced use of electronic surveillance systems; and, economic strangulation and diplomatic isolation of Pakistan.

The writer is Distinguished Fellow, Institute for Defence Studies and Analyses, New Delhi. Views are personal



Mon, 12 Feb, 2018

From the Lab: Using the Raman Effect more effectively to study tiny particles

While Raman Scattering is a very effective way of gaining some information about the object under observation, it is also an extremely weak phenomenon.

By Amitabh Sinha

Sub-micron particles, such as molecules, are too small to be seen. Scientists use different methods to indirectly observe them and study their properties. One of these methods is to study light rays that are scattered by these particles.

Light can interact with an object in different ways — it is reflected, refracted, transmitted or absorbed in different measures, depending on the object it is interacting with. In general, light, when it interacts with an object, is randomly scattered in all directions.

When the object in question is very small, of the scale of a few nanometres (a billionth of a metre) or less, most of the light incident on it goes along undisturbed, taking no note of the particle. This is because these particles are smaller than the wavelength of light and, therefore, do not interact strongly with light waves. Very occasionally though, not more than a few times in a billion, light waves do interact with the particle. Detecting these scattered light waves can provide some very important information about the particle light has interacted with.

One of the things that scientists study is whether the scattered light has the same energy it had before hitting the particle, or whether there was a change in energy levels. In other words, whether the interaction was “elastic” or “inelastic”.

One particular type of inelastic scattering, in which a change in the energy of the light is effected due to the vibrations of the molecule or material under observation, leading to a consequent change in wavelength, is Raman Scattering (or Raman Effect) — named after the physicist Sir C V Raman who discovered it in the 1920s, and for which he won the Nobel Prize in 1930.

While Raman Scattering is a very effective way of gaining some information about the object under observation, it is also an extremely weak phenomenon. For several years now, Dr G V Pavan Kumar and his

team at the Indian Institute of Science Education and Research (IISER), Pune, have been trying to look for ways to enhance the effects of both Raman and elastic scattering, so that the phenomena can be studied more easily. They have been looking at increasing the number of light waves undergoing Raman Scattering, and also aligning the scattered waves in a particular direction so that all of them can be picked up by a sensor or detector.

In a recent paper in Nano Letters, Dr Pavan Kumar and his team reported how they achieved this through innovative use of special properties of metals at nano scales. The metal they used extensively was silver. A nano silver wire coupled with the layer of molecules under observation showed very interesting results. Apart from enhancing the strength of Raman Scattering, the silver wire acted like a “wave guide antenna”, directing the scattered waves at a particular angle. The effect was seen to be strengthening further when the set-up was placed on a gold nano film.

To ensure that they were studying the scattered light only from the desired molecule and not from the silver wire or the gold foil, the experimenters took readings of scattered light from each of the individual materials before combining them. The team designed and built a special microscope, called Fourier Plane Raman Scattering microscope, to measure the enhancement of Raman Scattering, as well as to detect the exact direction from which the scattered light waves emerged.

The signals received by the microscope can give very good information about the vibrational motion of molecules in nano-cavity, their orientations with respect to each other, and the angular distribution of the scattered light with high accuracy and precision. Dr Pavan Kumar and his team are continuing with their studies to see how these experiments can be tweaked to get even better results down to single-molecule sensitivity.

Also, they are extrapolating the Fourier microscopy methods to elastic and nonlinear light scattering to study the structure and dynamics of soft matter such as colloids, liquid crystals and active matter, which has conceptual connections to biological cells, membranes, and tissues.



Mon, 12 Feb, 2018

Scientists to hold Darwin Week, dispel doubts around evolution

New Delhi: To remove the “doubts being planted in the minds of the common people” about the theory of evolution, and demonstrate with evidence how humans evolved from apes, scientists from across the country are celebrating ‘Darwin Week’ from Sunday.

Recent statements by MoS for human resource development Satyapal Singh have compelled the scientific community to raise their voices against political interference in the field of science. Singh had stated last month that the Darwin’s theory of evolution was “scientifically wrong” and proposed to drop it from the school and college curriculum.

The February 12 to 18 ‘Darwin Week’ is being organised by The India March for Science Organising Committee and the Breakthrough Science Society.

The committee had organised a protest march in August last year demanding greater financial support for scientific research and education.

“The objective of the Darwin Week will be to remove any doubt that has been planted in the minds of the common people about Darwin’s theory of evolution,” Soumitro Banerjee, Associate Professor at IISER Kolkata, told news agency PTI.

During the proposed Darwin Week, scientists will mount a special drive to reach out to the people to disseminate the Darwin’s theory of organic evolution, which states that life evolved from single celled organisms over a course of millions of years.

Through a series of workshops and seminars, scientists will assert that Darwin's theory of evolution offers the correct explanation of the observed evolution in nature and is no longer a subject of debate within the scientific community.

"A seed of doubt has been planted among the common people and students that the theory may be wrong - that it's just a theory," said Banerjee, who is the General Secretary of the Breakthrough Science Society All India Committee.

"We will go to schools and colleges and remove doubts about Darwin's theory. We will show that it is not 'just a theory', and that there are a hundred ways to prove it right," he said.

Born on February 12 in 1809, Charles Darwin is best known for his contributions to the science of evolution. He established that all species of life have descended over time from common ancestors, which means that humans and monkeys had a common ancestor at some point in history.

In a series of programmes organised in schools and colleges in different states, scientists will demonstrate with evidence how humans evolved from apes.

Apart from West Bengal, universities in Kerala, Tamil Nadu and Karnataka are also participating in the drive.